Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
CGM Ignition Switch Run/ Start Position Circuit Low	B2B0D	This DTC monitors for a CGM Ignition Switch Run/Start Position Circuit Low error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the CGM Ignition Switch Run/Start Position Circuit Low DTC has set in the CGM.		General Enable Criteria: Message $3CF Central Gateway Module	 is being received is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
CGM Ignition Switch Run/ Start Position Circuit High	B2B0E	This DTC monitors for a CGM Ignition Switch Run/Start Position Circuit High error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the CGM Ignition Switch Run/Start Position Circuit High DTC has set in the CGM.		General Enable Criteria: Message $3CF Central Gateway Module	 is being received is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
CGM Control Module Memory Failure	B2B12	This DTC monitors for a CGM Control Module Memory Failure error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the CGM Control Module Memory Failure DTC has set in the CGM.		General Enable Criteria: Message $3CF Central Gateway Module	 is being received is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
CGM Control Module Internal Performance Failure	B2B13	This DTC monitors for a CGM Control Module Internal Performance Failure error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the CGM Control Module Internal Performance Failure DTC has set in the CGM.		General Enable Criteria: Message $3CF Central Gateway Module	 is being received is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft Actuator Solenoid Circuit Open – Bank 1	P0010	Controller specific output driver circuit diagnoses the CAM phaser oil control valve solenoid high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	≥ 200 K Ω impedance between signal and controller ground.	System supply voltage Output driver is commanded on Ignition switch is in crank or run position	> 11.00 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft System Performance – Bank 1	P0011	Detects a VVT system error by comparing the desired and actual cam positions when VVT is activated.	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive.	(Intake cam Bank 1) Cam Position Error > (**P0011_CamPosErrorLimIc1**) deg	**Intake Cam Phsr Enable**	= TRUE	300.00 failures out of 400.00 samples 100 ms /sample	Type B, 2 Trips
					System Voltage	> 11.00 Volts		
					Engine Running	= TRUE		
					Power Take Off (PTO) active	= FALSE		
					Desired cam position	> 0 deg		
					Desired AND Measured cam position	> (**P0011_CamPosErrorLimIc1**) deg AND < (**CalculatedPerfMaxIc1**) deg		
					Desired cam position variation	< 5.00 deg for (**P0011_P05CC_StablePositionTimeIc1**) seconds		
					No Active DTCs	P0010 P2088 P2089		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Camshaft Actuator Solenoid Circuit Open – Bank 1	P0013	Controller specific output driver circuit diagnoses the CAM phaser oil control valve solenoid high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	≥ 200 K Ω impedance between signal and controller ground.	System supply voltage Output driver is commanded on Ignition switch is in crank or run position	> 11.00 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Camshaft System Performance – Bank 1	P0014	Detects a VVT system error by comparing the desired and actual cam positions when VVT is activated.	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive.	(Exhaust cam Bank 1) Cam Position Error > (**P0014_CamPosErrorLimEc1**) deg	**Exhaust Cam Phsr Enable**	= TRUE	300.00 failures out of 400.00 samples 100 ms /sample	Type B, 2 Trips
					System Voltage	> 11.00 Volts		
					Engine Running	= TRUE		
					Power Take Off (PTO) active	= FALSE		
					Desired cam position	> 0 deg		
					Desired AND Measured cam position	> (**P0014_CamPosErrorLimEc1**) deg AND < (**CalculatedPerfMaxEc1**) deg		
					Desired cam position variation	< 5.00 deg for (**P0014_P05CE_StablePositionTimeEc1**) seconds		
					No Active DTCs	P0013 P2090 P2091		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP)-Camshaft Position (CMP) Correlation Bank 1 Sensor A (end-park phaser)	P0016	Detects cam to crank misalignment by monitoring if the cam sensor pulse for bank 1 sensor A occurs during the incorrect crank position, diagnostic passes when the cam sensor pulse is in the expected range	4 cam sensor pulses less than or greater than nominal position in one cam revolution.	-7.1 Crank Degrees 8.3 Crank Degrees	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs: Time since last execution of diagnostic Delay diagnostic if Engine RPM and Cam is Enabled for	CrankSensor_FA P0340, P0341 < 1.0 seconds > 8,200.00 < 3.00	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. There is a delay after the first failed test to allow the camshaft position to return to the park position. This time is defined by the table **P0016, P0017, P0018, P0019: Cam Correlation Oil Temperature Threshold** . One sample per cam rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 1 Sensor B (end-park phaser)	P0017	Detects cam to crank misalignment by monitoring if the cam sensor pulse for bank 1 sensor B occurs during the incorrect crank position, diagnostic passes when the cam sensor pulse is in the expected range	4 cam sensor pulses less than or greater than nominal position in one cam revolution..	-8.4 Crank Degrees 9.2 Crank Degrees	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs: Time since last execution of diagnostic Delay diagnostic if Engine RPM and Cam is Enabled for	 CrankSensor_FA P0365, P0366 < 1.0 seconds > 8,200.00 < 3.00	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. There is a delay after the first failed test to allow the camshaft position to return to the park position. This time is defined by the table **P0016, P0017, P0018, P0019: Cam Correlation Oil Temperature Threshold** . One sample per cam rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank 1 Sensor 1	P0030	Controller specific output driver circuit diagnoses the heater output low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	≥ 200 K Ω impedance between output and controller ground.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0031 may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank1 Sensor1	P0031	Controller specific output driver circuit diagnoses the heater output low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	≤ 0.5 Ω impedance between output and controller ground.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0030 may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank1 Sensor1	P0032	Controller specific output driver circuit diagnoses the heater output low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	 ≤ 0.5 Ω impedance between output and controller power.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank 1 Sensor 2	P0036	Controller specific output driver circuit diagnoses the heater output low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	≥ 200 K Ω impedance between output and controller ground.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0037 may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank1 Sensor2	P0037	Controller specific output driver circuit diagnoses the heater output low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	 ≤ 0.5 Ω impedance between output and controller ground.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0036 may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank1 Sensor2	P0038	Controller specific output driver circuit diagnoses the heater output low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	≤ 0.5 Ω impedance between output and controller power.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
HO2S Heater Resistance Bank 1 Sensor 1	P0053	Detects an oxygen sensor heater having an incorrect or out of range resistance value. This test calculates the heater's resistance (using voltage and current) at engine start after a longer soak condition and compares it to the expected values for the released sensor. This fault is set if the heater resistance is outside the expected range.	Heater Resistance outside of the expected range of	3.8 < ohms < 10.5	No Active DTC's Coolant – IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run time	ECT_Sensor_FA P262B IAT_SensorFA < 8.0 ºC > 28,800 seconds ≥ -30.0 ºC < 32.0 volts < 0.09 seconds	Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
HO2S Heater Resistance Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0054	Detects an oxygen sensor heater having an incorrect or out of range resistance value. This test calculates the heater's resistance (using voltage and current) at engine start after a soak condition and compares it to the expected values for the released sensor. This fault is set if the heater resistance is outside the expected range.	Heater Resistance outside of the expected range of	6.7 < ohms < 14.0	No Active DTC's Coolant – IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run time	ECT_Sensor_FA P262B IAT_SensorFA < 8.0 ºC > 28,800 seconds ≥ -30.0 ºC < 32.0 volts < 0.06 seconds	Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module SIDI High Pressure Pump min/ max authority	P0089	This DTC determines when the high pressure pump control has reached to its max or min authority	High Pressure Fuel Pump Delivery Angle OR High Pressure Fuel Pump Delivery Angle	>= 92 ° <= 0 °	High Pressure Pump Performance Diagnostic Enable Battery Voltage Low Side Fuel Pressure Barometric Pressure Inlet Air Temp Fuel Temp Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) andCam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In	True >= 11 Volts > 0.300 MPa Enabled when a code clear is not active or not exiting device control Engine is not cranking >= 70.0 KPA >= -10.0 degC -10 <= Temp degC <= 132	Windup High/ Low 10.00 seconds failures out of 12.50 Seconds samples	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true andManufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
High Pressure Pump Control Solenoid Enable Low Side Open Circuit	P0090	Controller specific output driver circuit diagnoses High Pressure pump Control Solenoid low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	>= 200 KOhms impedance between signal and controller ground	Engine Speed Battery Voltage	>= 50 RPM >= 11 Volts Not in pump device control Enabled when a code clear is not active or not exiting device control	20 failures out of 40 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
High Pressure Pump Control Solenoid Enable Low Side Short to Ground	P0091	Controller specific output driver circuit diagnoses High Pressure pump Control Solenoid low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 0.1 Amps between signal and controller ground	Engine Speed Battery Voltage	>= 50 RPM >= 11 Volts Not in pump device control Enabled when a code clear is not active or not exiting device control	20 failures out of 40 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
High Pressure Pump Cntrl Solenoid Enable Low Side Short to Power	P0092	Controller specific output driver circuit diagnoses diagnoses High Pressure pump Control Solenoid low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	<= 1.1 or 15 Amps selectable thershold based on High pressure Pump .	Engine Speed Battery Voltage	>= 50 RPM >= 11 Volts Not in pump device control Enabled when a code clear is not active or not exiting device control	20 failures out of 40 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor 2 Circuit Performance (applications with humidity sensor, but no manifold temperature sensor)	P0096	Detects an Intake Air Temperature 2 (IAT2) sensor value that is stuck in range by comparing the IAT2 sensor value against the IAT and coolant temperature sensor values and failing the diagnostic if the IAT2 value is more different than the IAT and coolant temperature values than is expected. If the engine has been off for a long enough period of time, the air temperature values in the engine compartment of the vehicle are considered to have equalized, and the diagnostic can be enabled. The diagnostic will fail if the IAT and coolant temperature values are similar, and the IAT2 value is not similar to the IAT and coolant temperature values. This diagnostic is executed once per ignition cycle if the enable conditions are met.	ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up ECT – Power Up IAT2) >= ABS(Power Up ECT – Power Up IAT)	> 25 deg C	Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit 2 Low (applications with humidity)	P0097	Detects a continuous short to ground in the Intake Air Temperature 2 (IAT2) signal circuit or an IAT2 sensor that is outputting a frequency signal that is too low. The diagnostic monitors the IAT2 sensor output frequency and fails the diagnostic when the IAT2 frequency is too low. The IAT2 sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. The temperature value is converted by the sensor to a frequency value in Hertz. A digital square wave signal is transmitted by the sensor to the ECM. The ECM calculates the frequency of the square wave signal and converts that frequency to a temperature value. A lower frequency is equivalent to a lower temperature. This diagnostic is enabled if the Powertrain Relay voltage is high enough.	Raw IAT 2 Input	< 13 Hertz (~-60 deg C)	Powertrain Relay Voltage for a time No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit 2 High (applications with humidity)	P0098	Detects an Intake Air Temperature 2 (IAT2) sensor that is outputting a frequency signal that is too high. The diagnostic monitors the IAT2 sensor output frequency and fails the diagnostic when the IAT2 frequency is too high. The IAT2 sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. The temperature value is converted by the sensor to a frequency value in Hertz. A digital square wave signal is transmitted by the sensor to the ECM. The ECM calculates the frequency of the square wave signal and converts that frequency to a temperature value. A higher frequency is equivalent to a higher temperature. This diagnostic is enabled if the Powertrain Relay voltage is high enough.	Raw IAT 2 Input	> 390 Hertz (~150 deg C)	Powertrain Relay Voltage for a time No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor 2 Intermittent In-Range (applications with humidity)	P0099	Detects a noisy or erratic signal in the Intake Air Temperature 2 (IAT2) circuit by monitoring the IAT2 sensor and failing the diagnostic when the IAT2 signal has a noisier output than is expected. When the value of the IAT2 signal in °C is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of IAT2 readings. The result of this summation is called a “string length”. Since the IAT2 signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic IAT2 signal. The diagnostic will fail if the string length is too high. This diagnostic is enabled if the Powertrain Relay voltage is high enough.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current IAT 2 reading - IAT 2 reading from 100 milliseconds previous)	> 100.00 deg C 10 consecutive IAT 2 readings	Powertrain Relay Voltage for a time No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	4 failures out of 5 samples Each sample takes 1.0 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
High Pressure Start Diagnostic	P00C6	The DTC Diagnoses the high side fuel pressure during engine cranking.	The ECM detects that the fuel pressure is not rising or has fallen beyond acceptable limits during engine cranking Pressure Rise Test: Sensed High Pressure Fuel Rail Pressure value Pressure Fall Test: Sensed High Pressure Fuel Rail Pressure value	< **P00C6 - Minimum pressure in MPa that will exit High Pressure Start mode and allow fuel delivery** (see Supporting Table) <= **P00C6 - Minimum acceptable value of fuel rail pressure after High Pressure Start** (see Supporting Table)	High Pressure Rise Diagnostic During Start High Pressure Fail Diagnostic During Start Low side feed fuel pressure Engine Run Time Run/Crank Voltage Engine Coolant For each engine start, only 1 diagnostic is performed. The pressure rise test will run if HIgh side fuel pressure is less than KtFHPC_p_HighPressStart, otherwise, the pressure fall diagnostic will run The pressure fall runs when the engine is cranking.	True False >= 0 KPA < = 0 sec > 8 Volts -42 <= °C <= 130 All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IAT, IAT2 and ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control	Pressure Rise Test: Crank Time >= **P00C6 - High Pressure Pump Control Mode timeout** (see Supporting Table) 6.25 ms per sample Pressure Fall Test: Injected cylinder events >= **P00C6 - maximum acceptable counts of fuel rail pressure below KtFHPD_p_HPS_PressFallLoThrsh after High Pressure Start** (see Supporting Table) 4 samples per engine rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true and Manufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active		
					Barometric Pressure	>= 70.0 KPA		
					Inlet Air Temp	>= -10.0 DegC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Pressure Measurement System - Multiple Sensor Correlation (naturally aspirated with TIAP/ Baro sensor)	P00C7	Detects an inconsistency between pressure sensors in the induction system in which a particular sensor cannot be identified as the failed sensor. If the engine has been off for a sufficient amount of time, the pressure values in the induction system will have equalized. The Manifold Pressure (MAP) and Barometric Pressure (BARO) sensors values are checked to see if they are within the normal expected atmospheric pressure range. If they are, then MAP and BARO are compared to see if their values are similar. If the MAP and BARO values are not similar, there are no other pressure sensors to compare against to identify which sensor is not rational. The Multiple Pressure Sensor Correlation Diagnostic will fail in this case.	ABS(Manifold Pressure - Baro Pressure)	> 10.0 kPa	Time between current ignition cycle and the last time the engine was running Engine is not rotating Manifold Pressure Manifold Pressure Baro Pressure Baro Pressure No Active DTCs: No Pending DTCs:	> 10.0 seconds >= 50.0 kPa <= 115.0 kPa >= 50.0 kPa <= 115.0 kPa EngineModeNotRunTimer Error MAP_SensorFA AAP_SnsrFA MAP_SensorCircuitFP AAP_SnsrCktFP	4 failures out of 5 samples 1 sample every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Press Regulator Solenoid Supply Voltage Control High Side Circuit Short to ground	P00C9	Controller specific output driver circuit diagnoses High Pressure pump Control Solenoid high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	 <= 1.1 or 15 Amps selectable thershold based on High pressure Pump.	Engine Speed Battery Voltage	>= 50 RPM >= 11 Volts Not in pump device control Enabled when a code clear is not active or not exiting device control	20 failures out of 40 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Press Regulator Solenoid Supply Voltage Control High Side Circuit Short to power	P00CA	Controller specific output driver circuit diagnoses High Pressure pump Control Solenoid high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	 <= 0.1 Amps between signal and controller power	Engine Speed Battery Voltage	>= 50 RPM >= 11 Volts Not in pump device control Enabled when a code clear is not active or not exiting device control	20 failures out of 40 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Humidity Sensor Circuit Low	P00F4	Detects a continuous short to ground in the humidity signal circuit or a humidity sensor that is outputting a duty cycle that is too low. The diagnostic monitors the humidity sensor duty cycle output and fails the diagnostic when the humidity duty cycle is too low. The humidity sensor converts the capacitance across the sensor to a relative humidity. The relative humidity value is converted by the sensor to a duty cycle value in %. A digital square wave signal is transmitted by the sensor to the ECM. The ECM calculates the duty cycle of the square wave signal and converts that duty cycle to a relative humidity value in % through a transfer function. This diagnostic is enabled if the Powertrain Relay voltage is high enough.	Humidity Duty Cycle	<= 5.0 %	Powertrain Relay Voltage for a time No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Humidity Sensor Circuit High	P00F5	Detects a humidity sensor that is outputting a duty cycle signal that is too high. The diagnostic monitors the humidity sensor duty cycle output and fails the diagnostic when the humidity duty cycle is too high. The humidity sensor converts the capacitance across the sensor to a relative humidity. The relative humidity value is converted by the sensor to a duty cycle value in %. A digital square wave signal is transmitted by the sensor to the ECM. The ECM calculates the duty cycle of the square wave signal and converts that duty cycle to a relative humidity value in % through a transfer function. This diagnostic is enabled if the Powertrain Relay voltage is high enough.	Humidity Duty Cycle	>= 95.0 %	Powertrain Relay Voltage for a time No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Humidity Sensor Circuit Intermittent	P00F6	Detects a noisy or erratic signal in the humidity circuit by monitoring the humidity sensor and failing the diagnostic when the humidity signal has a noisier output than is expected. When the value of relative humidity in % is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of humidity readings. The result of this summation is called a “string length”. Since the humidity signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic humidity signal. The diagnostic will fail if the string length is too high. This diagnostic is enabled if the Powertrain Relay voltage is high enough.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current Humidity reading - Humidity reading from 100 milliseconds previous)	> 80 % 10 consecutive Humidity readings	Powertrain Relay Voltage for a time No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	4 failures out of 5 samples Each sample takes 1.0 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow System Performance (naturally aspirated)	P0101	Detects a performance failure in the Mass Air Flow (MAF) sensor, such as when a MAF value is stuck in range. This diagnostic is performed using the Intake Flow Rationality Diagnostic (IFRD). IFRD calculates modeled values of sensors from other sensors. The other sensors are the Manifold Pressure (MAP) sensor and Throttle Position sensor (TPS). These modeled values are compared against the actual sensor values to see if they are similar. If they are similar, then the model passes. If they are not similar, then that model is considered to be failed. Certain combinations of model passes and model failures can be interpreted to be caused by a performance issue with the MAF sensor. In this case, the MAF Performance diagnostic will fail.	Filtered Throttle Model Error AND ABS(Measured Flow – Modeled Air Flow) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	<= 125 kPa*(g/s) > 15.0 grams/sec > 22.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria (Coolant Temp OR OBD Max Coolant Achieved Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables.	>= 0 RPM <= 5,400 RPM >= -9 Deg C = TRUE) <= 125 Deg C = FALSE) >= -20 Deg C <= 125 Deg C >= 0.50 Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** Modeled Air Flow Error multiplied by **P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on RPM** and **P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on MAF Est**	Continuous Calculation are performed every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					       No Active DTCs: No Pending DTCs:	MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow Sensor Circuit Low Frequency	P0102	Detects a continuous short to ground in the MAF sensor circuit or a MAF sensor that is outputting a frequency that is too low. The diagnostic monitors the MAF sensor frequency output and fails the diagnostic when the MAF frequency is too low. The MAF sensor monitors the temperature of a circuit in the air flow of the engine. The temperature of this circuit is related to the air velocity across the sensor. The MAF sensor converts this air velocity to a mass air flow value. The mass air flow value is converted by the sensor to a frequency value in Hertz. A digital square wave signal is transmitted by the sensor to the ECM. The ECM calculates the frequency of the square wave signal and converts that frequency to a mass air flow value in grams/second through a transfer function.	MAF Output	<= 840 Hertz (~ 0.00 gm/sec)	Engine Run Time Engine Speed Ignition Voltage Above criteria present for a period of time	> 1.0 seconds >= 300 RPM >= 10.0 Volts >= 1.0 seconds	200 failures out of 250 samples 1 sample every cylinder firing event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow Sensor Circuit High Frequency	P0103	Detects a MAF sensor that is outputting a frequency signal that is too high. The diagnostic monitors the MAF sensor frequency output and fails the diagnostic when the MAF frequency is too high. The MAF sensor monitors the temperature of a circuit in the air flow of the engine. The temperature of this circuit is related to the air velocity across the sensor. The MAF sensor converts this air velocity to a mass air flow value. The mass air flow value is converted by the sensor to a frequency value in Hertz. A digital square wave signal is transmitted by the sensor to the ECM. The ECM calculates the frequency of the square wave signal and converts that frequency to a mass air flow value in grams/second through a transfer function.	MAF Output	>= 14,500 Hertz (~ 333.5 gm/sec)	Engine Run Time Engine Speed Ignition Voltage Above criteria present for a period of time	> 1.0 seconds >= 300 RPM >= 10.0 Volts >= 1.0 seconds	200 failures out of 250 samples 1 sample every cylinder firing event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Manifold Absolute Pressure Sensor Performance (naturally aspirated)	P0106	Detects a performance failure in the Manifold Pressure (MAP) sensor, such as when a MAP value is stuck in range. If the engine has been off for a sufficient amount of time, the pressure values in the induction system will have equalized. The MAP sensor value is checked to see if it is within the normal expected atmospheric pressure range. If it is not, then the MAP performance diagnostic will fail. The engine running portion of this diagnostic is performed using the Intake Flow Rationality Diagnostic (IFRD). IFRD calculates modeled values of sensors from other sensors. The other sensors are the Mass Air Flow (MAF) sensor and Throttle Position sensor (TPS). These modeled values are compared against the actual sensor values to see if they are similar. If they are similar, then the model	**<u>Engine Running:</u>** Filtered Throttle Model Error AND ABS(Measured MAP – MAP Model 1) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	 <= 125 kPa*(g/s) > 22.0 kPa > 22.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria (Coolant Temp OR OBD Max Coolant Achieved Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables. No Active DTCs:	>= 0 RPM <= 5,400 RPM >= -9 Deg C = TRUE) <= 125 Deg C = FALSE) >= -20 Deg C <= 125 Deg C >= 0.50 Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM** MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** MAP_SensorCircuitFA	Continuous Calculations are performed every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		passes. If they are not similar, then that model is considered to be failed. Certain combinations of model passes and model failures can be interpreted to be caused by a performance issue with the MAP sensor. In this case, the MAP Performance diagnostic will fail.			 No Pending DTCs:	EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP		
			<u>Engine Not Rotating:</u> Manifold Pressure OR Manifold Pressure	 < 50.0 kPa > 115.0 kPa	Time between current ignition cycle and the last time the engine was running Engine is not rotating No Active DTCs: No Pending DTCs:	 > 10.0 seconds EngineModeNotRunTimerError MAP_SensorCircuitFA AAP_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP	4 failures out of 5 samples 1 sample every 12.5 msec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Manifold Absolute Pressure Sensor Circuit Low (Gen III)	P0107	Detects a continuous short to ground in the Manifold Absolute Pressure (MAP) signal circuit by monitoring the MAP sensor output voltage and failing the diagnostic when the MAP voltage is too low. The MAP sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	MAP Voltage	< 3.0 % of 5 Volt Range (This is equal to 6.1 kPa)	Continuous		320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Manifold Absolute Pressure Sensor Circuit High (Gen III)	P0108	Detects a continuous short to power or open circuit in the Manifold Absolute Pressure (MAP) signal circuit by monitoring the MAP sensor output voltage and failing the diagnostic when the MAP voltage is too high. The MAP sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	MAP Voltage	> 90.0 % of 5 Volt Range (This is equal to 115.0 kPa)	Continuous		320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit Performance (applications with humidity sensor, but no manifold temperature sensor)	P0111	Detects an Intake Air Temperature (IAT) sensor value that is stuck in range by comparing the IAT sensor value against the IAT2 and coolant temperature sensor values and failing the diagnostic if the IAT value is more different than the IAT2 and coolant temperature values than is expected. If the engine has been off for a long enough period of time, the air temperature values in the engine compartment of the vehicle are considered to have equalized, and the diagnostic can be enabled. The diagnostic will fail if the IAT2 and coolant temperature values are similar, and the IAT value is not similar to the IAT2 and coolant temperature values. This diagnostic is executed once per ignition cycle if the enable conditions are met.	ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up ECT – Power Up IAT) > ABS(Power Up ECT – Power Up IAT2)	> 25 deg C	Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit Low	P0112	Detects a continuous short to ground in the Intake Air Temperature (IAT) signal circuit by monitoring the IAT sensor output resistance and failing the diagnostic when the IAT resistance is too low. The IAT sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. A lower resistance is equivalent to a higher temperature.	Raw IAT Input	< 58.00 Ohms (~150 deg C)	Engine Run Time	> 0.00 seconds	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit High	P0113	Detects a continuous open circuit in the Intake Air Temperature (IAT) signal circuit by monitoring the IAT sensor output resistance and failing the diagnostic when the IAT resistance is too high. The IAT sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. A higher resistance is equivalent to a lower temperature.	Raw IAT Input	> 142,438 Ohms (~-60 deg C)	Engine Run Time	> 0.00 seconds	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Intermittent In-Range	P0114	Detects a noisy or erratic signal in the Intake Air Temperature (IAT) circuit by monitoring the IAT sensor and failing the diagnostic when the IAT signal has a noisier output than is expected. When the value of the IAT signal in °C is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of IAT readings. The result of this summation is called a “string length”. Since the IAT signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic IAT signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current IAT reading - IAT reading from 100 milliseconds previous)	> 80.00 deg C 10 consecutive IAT readings	Continuous		4 failures out of 5 samples Each sample takes 1.0 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temp Sensor Circuit Low	P0117	Circuit Continuity This DTC detects a short to ground in the ECT (Engine Coolant temperature) signal circuit or the ECT sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ 150ºC)	< 55 Ohms			5 failures out of 6 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temp Sensor Circuit High	P0118	Circuit Continuity This DTC detects a short to high or open in the ECT (Engine Coolant temperature) signal circuit or the ECT sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60ºC)	> 134,000 Ohms	Engine run time OR IAT min	> 10.0 seconds ≥ -9.0 °C	5 failures out of 6 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature (ECT) Sensor Circuit Intermittent	P0119	Circuit Erratic This DTC detects large step changes in the ECT (Engine Coolant temperature) signal circuit or the ECT sensor. Allowable high and low limits are calculated for the next sample based on the previous sample and sensor time constant. If the sensor responds faster than should be possible the DTC is set.	ECT temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. The calculated high and low limits for the next reading use the following calibrations: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last ECT reading was 90 Deg C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 Deg C and the high limit was calibrated to 200 Deg C the caluculated limits are 101 Deg C and 73 Deg C. The next reading (after the 90 Deg C reading) must be between 73 Deg C and 101 Deg C to be valid. ****************************	7.4 seconds -60.0 Deg C 200.0 Deg C	No Active DTC's	ECT_Sensor_Ckt_FP	3 failures out of 4 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Throttle Position Sensor Performance (naturally aspirated)	P0121	Detects a performance failure in the Throttle Position sensor (TPS) sensor, such as when a TPS value is stuck in range. This diagnostic is performed using the Intake Flow Rationality Diagnostic (IFRD). IFRD calculates modeled values of sensors from other sensors. The other sensors are the Manifold Pressure (MAP) sensor and Mass Air Flow (MAF) sensor. These modeled values are compared against the actual sensor values to see if they are similar. If they are similar, then the model passes. If they are not similar, then that model is considered to be failed. Certain combinations of model passes and model failures can be interpreted to be caused by a performance issue with the TPS sensor. In this case, the TPS Performance diagnostic will fail.	Filtered Throttle Model Error AND ABS(Measured MAP – MAP Model 2) Filtered	> 125 kPa*(g/s) <= 22.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria (Coolant Temp OR OBD Max Coolant Achieved Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables. No Active DTCs:	>= 0 RPM <= 5,400 RPM >= -9 Deg C = TRUE) <= 125 Deg C = FALSE) >= -20 Deg C <= 125 Deg C >= 0.50 Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM** MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA	Continuous Calculation are performed every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No Pending DTCs:	EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS1 Circuit Low	P0122	Detects a continuous or intermittent short low or open in TPS1 circuit by monitoring the TPS 1 sensor percent Vref and failing the diagnostic when the TPS percent Vref is too low. This diagnostic only runs when battery voltage is high enough.	TPS1 % Vref <	0.3250 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P06A3	79 / 159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS1 Circuit High	P0123	Detects a continuous or intermittent short high in TPS1 circuit by monitoring the TPS 1 sensor percent Vref and failing the diagnostic when the TPS percent Vref is too high. This diagnostic only runs when battery voltage is high enough.	TPS1 % Vref >	4.750 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P06A3	79 / 159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Below Stat Regulating Temperature	P0128	This DTC detects if the ECT (EngineCoolant temperature) does not achieve the required target temperature after an allowed energy accumulation by the engine. This can be caused by an ECT sensor biased low or a cooling system that is not warming up correctly because of a stuck open thermostat or other fault.	Energy is accumulated after the first conbustion event using Range #1 or #2 below: Thermostat type is divided into normal (non-heated) and electrically heated. For this application the "type" cal (KeTHMG_b_TMS_ElecThstEquipped) = 0 If the type cal is equal to one, the application has an electrically heated t-stat, if equal to zero the the application has an non heated t-stat. See appropiate section below. **************************** Type cal above = 1 (Electrically heated t-stat) == == == == Range #1 (Primary) ECT reaches Commanded temperature minus 11 °C when Ambient min is ≤ 52 °C and > 10 °C. Note: Warm up target for range #1 will be at least 74 °C == == == == Range #2 (Alternate) ECT reaches Commanded temperature minus 37 °C when Ambient min is ≤ 10 °C and > -9 °C. Note: Warm up target for range #2 will be at least	See the two tables named: **P0128_Maximum Accumulated Energy for Start-up ECT conditions - Primary** and **P0128_Maximum Accumulated Energy for Start-up ECT conditions - Alternate** in the Supporting tables section. This diagnostic models the net energy into and out of the cooling	No Active DTC's Engine not run time (soaking time before current trip) Engine run time Fuel Condition Distance traveled *************************** If Engine RPM is continuously greater than for this time period The diagnostic test for this key cycle will abort *************************** *************************** If T-Stat Heater commanded duty cycle for this time period	ECT_Sensor_Ckt_FA ECT_Sensor_Perf_FA VehicleSpeedSensor_FA OAT_PtEstFiltFA IAT_SensorCircuitFA MAF_SensorFA THMR_AWP_AuxPumpFA THMR_AHV_FA THMR_SWP_Control_FA THMR_SWP_NoFlow_FA THMR_SWP_FlowStuckOn_FA EngineTorqueEstInaccurate ≥ 1,800 seconds 30 ≤ Eng Run Tme ≤ 1,400 seconds Ethanol ≤ 87 % ≥ 0.93 miles *************************** 9,999 rpm 5.0 seconds *************************** *************************** > 50.0 % duty cycle > 5.0 seconds	1 failure to set DTC 1 sec/ sample Once per ignition key cycle	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			55 °C **************************** Type cal above = 0 (non - heated t-stat) == == == == Range #1 (Primary) ECT reaches 81 °C when Ambient min is ≤ 52 °C and > 10 °C. == == == == Range #2 (Alternate) ECT reaches 55 °C when Ambient min is ≤ 10 °C and > -9 °C. ****************************	system during the warm-up process. The five energy terms are: heat from combustion (with AFM correction), heat from after-run, heat loss to enviroment, heat loss to cabin and heat loss to DFCO.	The diagnostic test for this key cycle will abort *************************** ECT at start run	*************************** -60 ≤ ECT ≤ 69 °C		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Low Voltage Bank 1 Sensor 1	P0131	This DTC determines if the O2 sensor signal circuit is shorted low. When enabled, the diagnostic monitors the O2S signal and compares it to the threshold. The diagnostic failure counter is incremented if the O2S signal is below the threshold value. This DTC is set based on the fail and sample counters.	Oxygen Sensor Signal	< 40.0 mVolts	No Active DTC's AIR intrusive test Fuel intrusive test Idle intrusive test EGR intrusive test System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Only when FuelLevelDataFault Commanded Equivalence Ratio Air Per Cylinder Fuel Control State Closed Loop Active	TPS_ThrottleAuthorityDefaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA = Not active = Not active = Not active = Not active 10.0 < Volts = Not active = Not active = Not active = Not active = False = False 0.9912 < ratio < 1.0137 60 < mgram < 500 = Closed Loop = TRUE (Please see "**Closed Loop Enable Clarification**" in Supporting Tables).	320 failures out of 400 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					All Fuel Injectors for active Cylinders Fuel Condition Ethanol Estimation in Progress Fuel State All of the above met for	Enabled (On) Ethanol ≤ 87 % = Not Active (Please see "**Ethanol Estimation in Progress**" in Supporting Tables). DFCO not active > 5.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit High Voltage Bank 1 Sensor 1	P0132	This DTC determines if the O2 sensor signal circuit is shorted high or open. When enabled, the diagnostic monitors the O2S signal and compares it to the threshold. The diagnostic failure counter is incremented if the O2S signal is above the threshold value. This DTC is set based on the fail and sample counters.	Oxygen Sensor Signal	> 1,050 mvolts	No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Low Fuel Condition Diag Only when FuelLevelDataFault *********************** Secondary delay after above conditions are complete (cold start condition) Secondary delay after above conditions are complete (not cold start condition) Commanded Equivalence Ratio *********************** All of the above met for	TPS_ThrottleAuthorityDefaulted MAF_SensorFA MAP_SensorFA EvapExcessPurgePsbl_FA FuelInjectorCircuit_FA Ethanol Composition Sensor FA AIR System FA 10.0 < Volts = All Cylinders active = Complete > 5.0 seconds > 30.0 seconds = False = False *********************** > 150.0 seconds when engine soak time > 28,800 seconds > 150.0 seconds when engine soak time ≤ 28,800 seconds ≤ 1.014 EQR *********************** > 3.0 seconds	40 failures out of 50 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Slow Response Bank 1 Sensor 1) (For use with ESPD and w/o WRAF	P0133	This DTC determines if the Bank 1 primary O2 sensor has a slow response (in the Rich to Lean (R2L) or Lean to Rich (L2R) direction) and thereby can no longer be used for closed loop fuel control based on emission correlation testing. This diagnostic runs passively (see enable conditions) and monitors the time the O2 sensor signal is between an upper and lower voltage thresholds over the sample period. The diagnostic also monitors the O2 sensor signal for the number of Slope Time (ST) switches in each direction between the same upper and lower voltage thresholds over the sample period. When the required data is collected, an average R2L and L2R response time and individual R2L and L2R Slope Time (ST) switch count is calculated. This fault is set when the L2R and R2L response test results are compared to the	Fault condition present when the average response time is caluclated over the test time, and compared to the threshold. OR Slope Time L/R Switches OR Slope Time R/L Switches	Refer to **P0133_O2S Slow Response Bank 1 Sensor 1 Pass/Fail Threshold table** in the Supporting Tables tab < 5 < 5 The test averages the signal response time over 60.0 seconds when the signal is transitioning between 400 mvolts and 600 mvolts. An average rich to lean time and lean to rich time are each calculated separately. Note: the table listed above uses the following calibratable X axis: **P0133_KnEOSD_t_ST_LRC_LimRS1** and calibratable Y axis: **P0133_KnEOSD_t_ST_RLC_LimRS1**	No Active DTC's Bank 1 Sensor 1 DTC's not active System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Only when FuelLevelDataFault Green O2S Condition	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA Ethanol Composition Sensor FA EngineMisfireDetected_FA P0131, P0132, P0134 > 10.0 Volts = Not active = Not active = Not active = Not active = False = False = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than	Sample time is 60 seconds Frequency: Once per trip	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		"P0133_O2S Slow Response Bank 1 Sensor 1 "Pass/Fail Threshold Table" and the outcome determines a response faulted condition. Additionally, this fault is set when the L2R or R2L slope time switch count test results are less than the ST individual thresholds.				**Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 18.0 grams/sec.		
					O2 Heater on for	≥ 30 seconds		
					Learned Htr resistance	= Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's")		
					Engine Coolant	> 60 ºC		
					(Or OBD Coolant Enable Criteria	= TRUE)		
					IAT	> -40 ºC		
					Engine run Accum	> 30 seconds		
					Time since any AFM status change	> 1.5 seconds		
					Time since Purge On to Off change	> 0.0 seconds		
					Time since Purge Off to On change	> 1.5 seconds		
					Engine airflow	12 ≤ grams/sec ≤ 60		
					Engine speed	1,000 ≤ RPM ≤ 3,500		
					Fuel Condition	< 87 % Ethanol		
					Baro	> 70 kpa		
					Air Per Cylinder	≥ 100 mGrams		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE (Please see “**Closed Loop Enable**		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					LTM (Block Learn) fuel cell Transient Fuel Mass Baro Fuel Control State Fuel State Commanded Proportional Gain ================= All of the above met for	**Clarification**" in Supporting Tables). = Enabled, refer to **Multiple DTC Use - Response Cell Enable Table** for additional info. ≤ 100.0 mgrams = Not Defaulted not = Power Enrichment DFCO not active ≥ 0.0 % ================= > 4.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Performance Bank 1 Sensor 1	P0135	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit. This test compares the measured heater current (monitored thru the low side driver) and compares it to the expected values (over the voltage range provided) for the released sensor. The diagnostic failure counter is incremented if the heater current is outside the expected range. This DTC is set based on the fail and sample counters.	Heater Current outside of the expected range of	0.3 < Amps < 2.5	No Active DTC's System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty Cycle All of the above met for	ECT_Sensor_FA > 10.0 Volts = Complete = Not active > zero > 120 seconds	8 failures out of 10 samples Frequency: 3 tests per trip 10 seconds delay between tests and 1 second execution rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Low Voltage Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0137	This DTC determines if the O2 sensor signal circuit is shorted low. When enabled, the diagnostic monitors the O2S signal and compares it to the threshold. The diagnostic failure counter is incremented if the O2S signal is below the threshold value. This DTC is set based on the fail and sample counters.	Oxygen Sensor Signal	< 40 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA	320 failures out of 400 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips
					AIR intrusive test Fuel intrusive test Idle intrusive test EGR intrusive test System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control	= Not active = Not active = Not active = Not active 10.0 < Volts = Not active = Not active = Not active = Not active		
					Low Fuel Condition Only when FuelLevelDataFault	= False = False		
					Commanded Equivalence Ratio Air Per Cylinder Fuel Control State Closed Loop Active	0.991 ≤ ratio ≤ 1.014 60 ≤ mgrams ≤ 500 = Closed Loop = TRUE (Please see "**Closed Loop Enable Clarification**" in Supporting Tables).		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					All Fuel Injectors for active Cylinders Fuel Condition Ethanol Estimation in Progress Fuel State All of the above met for	Enabled (On) Ethanol ≤ 87 % = Not Active (Please see "**Ethanol Estimation in Progress**" in Supporting Tables). DFCO not active > 5.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit High Voltage Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0138	This DTC determines if the O2 sensor signal circuit is shorted high or open. When enabled, the diagnostic monitors the O2S signal and compares it to the threshold. The diagnostic failure counter is incremented if the O2S signal is above the threshold value. This DTC is set based on the fail and sample counters.	Oxygen Sensor Signal	> 1,050 mvolts	No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Low Fuel Condition Only when FuelLevelDataFault ********************** Secondary delay after above conditions are complete (cold start condition) Secondary delay after above conditions are complete (not cold start condition) Commanded Equivalence Ratio ********************** All of the above met for	TPS_ThrottleAuthorityDefaulted MAF_SensorFA MAP_SensorFA EvapExcessPurgePsbl_FA FuelInjectorCircuit_FA Ethanol Composition Sensor FA AIR System FA 10.0 < Volts = All Cylinders active = Complete > 5.0 seconds > 30.0 seconds = False = False ********************** > 175.0 seconds when engine soak time > 28,800 seconds > 175.0 seconds when engine soak time ≤ 28,800 seconds ≤ 1.014 EQR ********************** > 3.0 seconds	40 failures out of 50 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Slow Response Rich to Lean Bank 1 Sensor 2	P013A	The P013A diagnostic is the third in a sequence of six intrusive secondary O2 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary O2 sensor has an slow response to an A/F change from Rich to Lean and thereby can no longer be used for secondary O2 sensor fuel control or for catalyst monitoring. This diagnostic commands fuel cut off while monitoring the sensor signal and the accumulated mass air flow. Note: The Primary method is used when the secondary O2 sensor signal transitions from above the upper threshold to below the lower threshold, otherwise the Secondary method is used. <u>Primary method</u>: The P013A diagnostic measures the secondary O2 sensor voltage response rate	Primary Method: The EWMA of the Post O2 sensor normalized integral value. The EWMA repass limit is The EWMA calculation uses a 0.28 coefficient. OR Secondary Method: The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)	> 8.0 units ≤ 7.5 units > 60.0 grams (upper voltage threshold is 450 mvolts and lower voltage threshold is 150 mvolts)	No Active DTC's B1S2 DTC's Not Active this key cycle System Voltage Learned heater resistance Green O2S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA O2S_Bank_ 1_TFTKO O2S_Bank_ 2_TFTKO P013B, P013E, P013F, P2270 or P2271 > 10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 18.0 grams/sec.	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		between an upper and lower voltage threshold. The response rate is then normalized to mass air flow rate and scaled resulting in a normalized intregral value. The normalized integral is fed into a 1st order lag filter to update the final EWMA result. DTC P013A is set when the EWMA value exceeds the EWMA threshold. Note: This EWMA diagnostic employs two features, Fast Initial Response (FIR) and Rapid Step Response (RSR). The FIR feature is used following a code clear event or any event that results in erasure of the engine controller's non-volatile memory. The RSR feature is used when a step change in the test result is identified. Both these temporary features improve the EWMA result following a non-typical event by allowing multiple intrusive tests on a given trip until the total number of tests reach a calibration value. Secondary method:			Low Fuel Condition Only when FuelLevelDataFault Post fuel cell Crankshaft Torque DTC's Passed ================== After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).	= False = False = Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info. < 125.0 Nm P2270 (and P2272 if applicable) P013E (and P014A if applicable) ==================		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		This fault is set if the secondary O2 sensor does not achieve the required lower voltage threshold before the accumulated mass air flow threshold is reached.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Slow Response Lean to Rich Bank 1 Sensor 2	P013B	The P013B diagnostic is the sixth in a sequence of six intrusive secondary O2 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary O2 sensor has an slow response to an A/F change from Lean to Rich and thereby can no longer be used for secondary O2 sensor fuel control or for catalyst monitoring. This diagnostic increases the delivered fuel while monitoring the sensor signal and the accumulated mass air flow. Note: The Primary method is used when the secondary O2 sensor signal transitions from below the lower threshold to above the upper threshold, otherwise the Secondary method is used. <u>Primary method</u>: The P013B diagnostic measures the secondary O2 sensor voltage response rate	Primary Method: The EWMA of the Post O2 sensor normalized integral value. The EWMA repass limit is The EWMA calculation uses a 0.28 coefficient. OR Secondary Method: The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)	> 8.0 units ≤ 7.5 units > 805 grams (lower voltage threshold is 350 mvolts and upper voltage threshold is 650 mvolts)	No Active DTC's B1S2 DTC's Not Active this key cycle System Voltage Learned heater resistance Green O2S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA O2S_Bank_ 1_TFTKO O2S_Bank_ 2_TFTKO P013A, P013E, P013F, P2270 or P2271 > 10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		between an lower and upper voltage threshold. The response rate is then normalized to mass air flow rate and scaled resulting in a normalized intregral value. The normalized integral is fed into a 1st order lag filter to update the final EWMA result. DTC P013B is set when the EWMA value exceeds the EWMA threshold. Note: This EWMA diagnostic employs two features, Fast Initial Response (FIR) and Rapid Step Response (RSR). The FIR feature is used following a code clear event or any event that results in erasure of the engine controller's non-volatile memory. The RSR feature is used when a step change in the test result is identified. Both these temporary features improve the EWMA result following a non-typical event by allowing multiple intrusive tests on a given trip until the total number of tests reach a calibration value. Secondary method:			 Green Cat System Condition Low Fuel Condition Only when FuelLevelDataFault Post fuel cell DTC's Passed =================== After above conditions are met: Fuel Enrich mode continued. =================	is above 18.0 grams/sec. = Not Valid, Green Cat System condition is considered valid until accumulated airflow is greater than 360,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C and airflow is greater than 18.0 grams/ sec. (Note: This feature is only enabled when the vehicle is new and cannot be enabled in service). = False = False = Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info. P2270 P013E P013A P2271 P013F ==================		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		This fault is set if the secondary O2 sensor does not achieve the required upper voltage threshold before the accumulated mass air flow threshold is reached.			During this test the following must stay TRUE or the test will abort: 0.960 ≤ Base Commanded EQR ≤ 1.080			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Rich to Lean Bank 1 Sensor 2	P013E	The P013E diagnostic is the second in a sequence of six intrusive secondary O2 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary O2 sensor has an initial delayed response to an A/F change from Rich to Lean and thereby can no longer be used for secondary O2 sensor fuel control or for catalyst monitoring. This diagnostic commands fuel cut off while monitoring the sensor signal and the accumulated mass air flow. This fault is set if the secondary O2 sensor does not achieve the required voltage before the accumulated mass air flow threshold is reached.	Post O2 sensor voltage AND The Accumulated mass air flow monitored during the Delayed Response Test under DFCO DFCO begins after: 1) Catalyst has been rich for a minimum of AND 2) Catalyst Rich Accumulation Air Flow is	> 450 mvolts > 45 grams > 1 secs ≥ 3.0 grams	No Active DTC's B1S2 DTC's Not Active this key cycle System Voltage Learned heater resistance Green O2S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA O2S_Bank_ 1_TFTKO O2S_Bank_ 2_TFTKO P013A, P013B, P013F, P2270 or P2271 > 10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						is above 18.0 grams/sec.		
					Low Fuel Condition	= False		
					Only when FuelLevelDataFault	= False		
					Post fuel cell	= Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info.		
					Crankshaft Torque	< 125.0 Nm		
					DTC's Passed	P2270		
					Number of fueled cylinders	≤ 3 cylinders		
					==================	==================		
					After above conditions are met: DFCO mode entered (wo driver initiated pedal input).			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Lean to Rich Bank 1 Sensor 2	P013F	The P013F diagnostic is the fifth in a sequence of six intrusive secondary O2 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary O2 sensor has an initial delayed response to an A/F change from Lean to Rich and thereby can no longer be used for secondary O2 sensor fuel control or for catalyst monitoring. This diagnostic increases the delivered fuel while monitoring the sensor signal and the accumulated mass air flow. This fault is set if the secondary O2 sensor does not achieve the required voltage before the accumulated mass air flow threshold is reached.	Post O2 sensor voltage AND The Accumulated mass air flow monitored during the Delayed Response Test	< 350 mvolts > 65 grams	No Active DTC's B1S2 DTC's Not Active this key cycle System Voltage Learned heater resistance Green O2S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA O2S_Bank_ 1_TFTKO O2S_Bank_ 2_TFTKO P013A, P013B, P013E, P2270 or P2271 > 10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						is above 18.0 grams/sec.		
					Green Cat System Condition	= Not Valid, Green Cat System condition is considered valid until accumulated airflow is greater than 360,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C and airflow is greater than 18.0 grams/ sec. (Note: This feature is only enabled when the vehicle is new and cannot be enabled in service).		
					Low Fuel Condition	= False		
					Only when FuelLevelDataFault	= False		
					Post fuel cell	= Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info.		
					DTC's Passed	P2270 P013E P013A P2271		
					Number of fueled cylinders	≥ 1 cylinders		
					=================== After above conditions are met: Fuel Enrich mode entered. ================= During this test the	==================		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					following must stay TRUE or the test will abort: 0.960 ≤ Base Commanded EQR ≤ 1.080			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Performance Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0141	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit. This test compares the measured heater current (monitored thru the low side driver) and compares it to the expected values (over the voltage range provided) for the released sensor. The diagnostic failure counter is incremented if the heater current is outside the expected range. This DTC is set based on the fail and sample counters.	Heater Current outside of the expected range of	0.3 > amps > 2.5	No Active DTC's System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty Cycle All of the above met for	ECT_Sensor_FA > 10.0 Volts = Complete = Not active > zero > 120 seconds	8 failures out of 10 samples Frequency: 3 tests per trip 10 seconds delay between tests and 1 second execution rate.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Rich to Lean Bank 1 Sensor 1) (For use w/o WRAF	P015A	DTC P015A detects that the primary oxygen sensor for Bank 1 has delayed response when the air fuel ratio transitions from rich to lean condition. This diagnostic runs simultaneously with the intrusive secondary O2 monitor rich to lean tests (P013E / P013A / P2271), which commands fuel cut off. Note: The Primary method is used when the primary O2 sensor signal transitions from above to below the O2 voltage threshold, otherwise the Secondary method is used. Primary method: The P015A diagnostic measures the primary O2 sensor response time between a rich condition above a starting voltage threshold and a lower voltage threshold. The response time is then scaled and normalized to mass air flow rate, engine speed, Baro, and intake air temperature resulting in a normalized delay	Primary Method: The EWMA of the Pre O2 sensor normalized R2L time delay value. The EWMA repass limit is The EWMA calculation uses a 0.25 coefficient. This method calculates the result when the Pre O2 sensor voltage is OR Secondary Method: The Accumulated time monitored during the R2L Delayed Response Test. AND Pre O2 sensor voltage is	> 0.69 EWMA (sec) ≤ 0.60 EWMA (sec) < 550 mvolts ≥ 2.5 Seconds > 100.0 mvolts	No Active DTC's System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Only when FuelLevelDataFault Green O2S Condition	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA P0131, P0132, P013A, P013B, P013E, P013F, P2270, P2271 > 10.0 Volts = Not active = Not active = Not active = Not active = False = False = Not Valid, Green O2S condition is	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		value. The normalized delay is fed into a 1st order lag filter to update the final EWMA result. DTC P015A is set when the EWMA value exceeds the EWMA threshold. Note: This EWMA diagnostic employs two features, Fast Initial Response (FIR) and Rapid Step Response (RSR). The FIR feature is used following a code clear event or any event that results in erasure of the engine controller's non-volatile memory. The RSR feature is used when a step change in the test result is identified. Both these temporary features improve the EWMA result following a non-typical event by allowing multiple intrusive tests on a given trip until the total number of tests reach a calibration value. Secondary method: This fault is set if the primary O2 sensor does not achieve the required lower voltage threshold before a delay time threshold is reached.			O2 Heater (pre sensor) on for Learned Htr resistance Engine Coolant (Or OBD Coolant Enable Criteria IAT Engine run Accum Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled) Engine Airflow Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after initially enabled) Closed loop integral	considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 18.0 grams/sec. ≥ 30 seconds = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") > 60 ºC = TRUE) > -40 ºC > 30 seconds 1,050 ≤ RPM ≤ 3,500 1,000 ≤ RPM ≤ 3,650 2.0 ≤ gps ≤ 20.0 40.4 ≤ MPH ≤ 77.7 36.0 ≤ MPH ≤ 80.8 0.92 ≤ C/L Int ≤ 1.08		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Closed Loop Active	= TRUE (Please see "**Closed Loop Enable Clarification**" in Supporting Tables).		
					Evap	not in control of purge		
					Ethanol Estimation in Progress	= Not Active (Please see **"Ethanol Estimation in Progress**" in Supporting Tables).		
					Baro	> 70 kpa		
					Post fuel cell	= enabled		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater (post sensor) on Time	≥ 30.0 sec		
					Predicted Catalyst temp	550 ≤ ºC ≤ 910		
					Fuel State	= DFCO possible		
					===================	==================		
					All of the above met for at least 2.0 seconds, and then the Force Cat Rich intrusive stage is requested.			
					===================	==================		
					Pre O2S voltage B1S1 at end of Cat Rich stage	≥ 680 mvolts		
					Fuel State	= DFCO active		
					Number of fueled cylinders	≤ 3 cylinders		
					===================	==================		
					After above conditions are met: DFCO Mode is entered (wo driver			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					initiated pedal input).			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Lean to Rich Bank 1 Sensor 1) (For use w/o WRAF	P015B	DTC P015B detects that the primary oxygen sensor for Bank 1 has delayed response when the air fuel ratio transitions from lean to rich condition. This diagnostic runs simultaneously with the intrusive secondary O2 monitor lean to rich tests (P013F / P013B), which commands fuel enrichment. Note: The Primary method is used when the primary O2 sensor signal transitions from lean condition to above the O2 voltage threshold, otherwise the Secondary method is used. <u>Primary method</u>: The P015B diagnostic measures the primary O2 sensor response time between a lean condition and a higher voltage threshold. The response time is then scaled and normalized to mass air flow rate, engine speed, Baro, and intake air temperature resulting in a normalized delay value. The normalized delay is fed into a 1st	Primary method: The EWMA of the Pre O2 sensor normalized L2R time delay value. The EWMA repass limit is The EWMA calculation uses a 0.25 coefficient. OR Secondary method: The Accumulated time monitored during the L2R Delayed Response Test. AND Pre O2 sensor voltage is OR At end of Cat Rich stage the Pre O2 sensor output is	> 0.70 EWMA (sec) ≤ 0.60 EWMA (sec) ≥ 2.0 Seconds < 300 mvolts < 680 mvolts	No Active DTC's P015A test is complete and System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Only when FuelLevelDataFault	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA P0131, P0132, P013A, P013B, P013E, P013F, P015A, P2270, P2271 = Passed > 10.0 Volts = Not active = Not active = Not active = Not active = False = False	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		order lag filter to update the final EWMA result. DTC P015B is set when the EWMA value exceeds the EWMA threshold. Note: This EWMA diagnostic employs two features, Fast Initial Response (FIR) and Rapid Step Response (RSR). The FIR feature is used following a code clear event or any event that results in erasure of the engine controller's non-volatile memory. The RSR feature is used when a step change in the test result is identified. Both these temporary features improve the EWMA result following a non-typical event by allowing multiple intrusive tests on a given trip until the total number of tests reach a calibration value. <u>Secondary method</u>: This fault is set if the primary O2 sensor does not achieve the required higher voltage threshold before a delay time threshold is reached.			Green O2S Condition O2 Heater (pre sensor) on for Learned Htr resistance Engine Coolant (Or OBD Coolant Enable Criteria IAT Engine run Accum Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled) Engine Airflow Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after	= Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 18.0 grams/sec. ≥ 30 seconds = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") > 60 ºC = TRUE) > -40 ºC > 30 seconds 1,050 ≤ RPM ≤ 3,500 1,000 ≤ RPM ≤ 3,650 2.0 ≤ gps ≤ 20.0 40.4 ≤ MPH ≤ 77.7		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					initially enabled)	36.0 ≤ MPH ≤ 80.8		
					Closed loop integral	0.92 ≤ C/L Int ≤ 1.08		
					Closed Loop Active	= TRUE (Please see "**Closed Loop Enable Clarification**" in Supporting Tables).		
					Evap	not in control of purge		
					Ethanol Estimation in Progress	= Not Active (Please see "**Ethanol Estimation in Progress**" in Supporting Tables).		
					Baro	> 70 kpa		
					Post fuel cell	= enabled		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater (post sensor) on Time	≥ 30.0 sec		
					Predicted Catalyst temp	550 ≤ ºC ≤ 910		
					Fuel State	= DFCO inhibit		
					Number of fueled cylinders	≥ 1 cylinders		
					================	==================		
					When above conditions are met: Fuel Enrich mode is entered.			
					================	==================		
					During this test: Engine Airflow must stay between:	0 ≤ gps ≤ 20		
					and the delta Engine Airflow over 12.5msec			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					must be :	≤ 20.0 gps		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel System Too Lean Bank 1	P0171	Determines if the primary fuel control system for Bank 1 is in a lean condition, based on the filtered long-term and short-term fuel trim. A normally operating system operates centered around long-term fuel trim metric of 1.0. For lean conditions extra fuel trim is required therefor values > 1.0 indicate a Lean condition. A fault is determined, when the long term fuel metric exceeds the threshold value. In addition to the long-term fuel trim limit, the short-term fuel trim metric can be monitored and the fault sets once both threshold values are exceeded. The short-term fuel trim metric is only monitored on programs that have acceptable emissions when the long-term fuel metric reaches its full authority.	The filtered long-term fuel trim metric AND The filtered short-term fuel trim metric (Note: any value below 0.95 effectively nullifies the short-term fuel trim criteria)	>= 1.360 >= 0.102 If a fault has been detected the long-term fuel trim metric must be < 2.000 and the short-term fuel trim metric must be < 2.000 to repass the diagnostic.	Engine speed BARO Coolant Temp Coolant Temp MAP Inlet Air Temp MAF Fuel Level Long Term Fuel Trim data accumulation: Sometimes, certain Long-Term Fuel Trim Cells are not utilized for control and/or diagnosis Closed Loop Long Term FT	400 <rpm< 6,100 > 70 kPa > -20 °C (or OBD Coolant Enable Criteria = TRUE) < 150 °C 5 <kPa< 255 -20 <°C< 150 1 <g/s< 510 > 10 % or if fuel sender is faulty the diagnostic will bypass the fuel level criteria. > 47.0 seconds of data must accumulate on each trip, with at least 35.0 seconds of data in the current fuel trim cell before a pass or fail decision can be made. (Please see **P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage** in Supporting Tables for a list of cells utilized for diagnosis) Enabled Enabled (Please see "**Closed Loop Enable Clarification**" and "**Long Term FT Enable Criteria**" in Supporting Tables.)	Frequency: 100 ms Continuous Loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					EGR Diag. Catalyst Diag. Post O2 Diag. Device Control EVAP Diag. No active DTC:	Intrusive Test Not Active Intrusive Test Not Active Intrusive Test Not Active Not Active Large Leak Diagnostic (P0455) Not Active IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapExcessPurgePsbl_FA Ethanol Composition Sensor FA FuelInjectorCircuit_FA EngineMisfireDetected_FA EGRValvePerformance_FA EGRValveCircuit_FA MAP_EngineVacuumStatus AmbPresDfltdStatus TC_BoostPresSnsrFA O2S_Bank_1_Sensor_1_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel System Too Rich Bank 1	P0172	Determines if the fuel control system is in a rich condition, based on the filtered long-term fuel trim metric.A normally operating system operates centered around long-term fuel trim metric of 1.0. For rich conditions less fuel trim is required therefor values < 1.0 indicate a rich condition. There are two methods to determine a Rich fault. They are Passive and Intrusive. A Passive Test decision can be made up until the time that purge is first enabled. From that point forward, rich faults can only be detected by turning purge off intrusively. If during this period of time the filtered long-term fuel trim metric exceeds the threshold a fault will be set. In addition to the long-term fuel trim limit, the short-term fuel trim metric can be monitored and the fault sets once both threshold values are exceeded. The short-	**Passive Test:** The filtered Non-Purge Long Term Fuel Trim metric AND The filtered Short Term Fuel Trim metric (Note: any value above 1.05 effectively nullifies the short-term fuel trim criteria) ***************************** **Intrusive Test:** For 3 out of 5 intrusive segments The filtered Purge Long Term Fuel Trim metric AND The filtered Non-Purge Long Term Fuel Trim metric AND The filtered Short Term Fuel Trim metric (Note: any value above 1.05 effectively nullifies the short-term fuel trim criteria)	<= 0.700 <= 1.996 ************************* <= 0.705 <= 0.700 <= 1.996 If a fault has been detected (by the passive or intrusive test) the long-term fuel trim metric must be > 0.700 and the short-	***************************** Purge Vapor Fuel	Secondary Parameters and Enable Conditions are identical to those for P0171, with the exception that fuel level is not considered. ***************************** <= 100.00 % Intrusive Test is inhibited when Purge Vapor percentage is greater than this threshold. (Note: values greater than 50% indicate the Purge Vapor Fuel requirement is not being used) A minimum number of accumlated Fuel Trim Data samples are required to adequately learn a correct Purge Vapor Fuel value. See the table **Minimum Non-Purge Samples for Purge** (**Vapor Fuel**) for the Purge Off cells used to validate the Purge Vapor Fuel parameter.	Frequency: 100 ms Continuous Loop ****************** **Segment Definition:** Segments can last up to 45 seconds and are separated by the lesser of 12.0 seconds of purge-on time or enough time to purge 11 grams of vapor. A maximum of 5 completed segments or 20 attempts are allowed for each intrusive test. After an intrusive test report is completed, another intrusive test cannot occur for 300 seconds to allow sufficient	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		term fuel trim metric is only monitored on programs that have acceptable emissions when the long-term fuel metric reaches its full authority. Once purge is enabled if the filtered Purge Long Term Fuel Trim metric > 0.705 , the test passes without intrusively checking the filtered Non-Purge Long Term Fuel Trim metric. However if the filtered Purge Long Term Fuel Trim metric is <= 0.705 , the Intrusive test is invoked. The purge is ramped off to determine if excess purge vapor is the cause of the rich condition. If during 3 out of 5 intrusive segments, the filtered Purge Long Term Fuel Trim metric <= 0.700 the fault will set. Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, and the execution frequency of other diagnostics. This is why the intrusive test is operated over several		term fuel trim metric must be > 0.000 to repass the diagnostic. The intrusive test will be enabled at long-term fuel metric values < 0.70 until the diagnostic repasses after a failure.		If the accumulated purge volume is > 0.0 grams, the intrusive test will not be inhibited even if Purge Vapor Fuel is > 100.0 %.	time to purge excess vapors from the canister. During this period, fuel trim will pass if the filtered Purge Long Term Fuel Trim metric > 0.705 for at least 200.0 seconds, indicating that the canister has been purged.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		segments allowing Purge to renable between segments. Likewise, for these reasons, if after the 5 intrusive segments the diagnostic continues to pass, there is a delay period of 300 seconds to allow sufficient time to purge excess vapors from the canister, before re-evaluating a Rich condition if it still exists.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Temperature Sensor 1 Circuit Low Fault	P0182	This DTC diagnose SENT fuel rail temperature sensor 1 that is too low out of range. If the sensor digital value (represnting the refernce voltage) is below the lower digital threshold, the low fail counter then increments. If the low fail counter reaches its threshold then a fail is reported. A pass is reported for this DTC if the low sample counter reaches its threshold.	Fuel Temperature Sensor 1 SENT digital read value	< 145	Fuel Temperature Out of Range Diagnoistic Enabled No Fault Active on No Fault Pending on	True Enabled when a code clear is not active or not exiting device control SENT Communication Fault Active (P16E4, P16E5) SENT Intenal Error Fault Active (P126E) Fuel Temperature Sensor SENT Message Error Fault Active (P128C) SENT Intenal Error Fault Pending (P126E) Fuel Temperature Sensor SENT Message Error Fault Pending (P128C)	50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Temperature Sensor 1 Circuit High Fault	P0183	This DTC diagnose SENT fuel rail temperature sensor 1 that is too high out of range. If the sensor digital value (represnting the refernce voltage) is above the upper digital threshold, the high fail counter then increments. If the high fail counter reaches its threshold then a fail is reported. A pass is reported for this DTC if the high sample counter reaches its threshold.	Fuel Temperature Sensor 1 SENT digital read value	> 1,865	Fuel Temperature Out of Range Diagnoistic Enabled	True	50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
						Enabled when a code clear is not active or not exiting device control		
					No Fault Active on	SENT Communication Fault Active (P16E4, P16E5) SENT Intenal Error Fault Active (P126E) Fuel Temperature Sensor SENT Message Error Fault Active (P128C)		
					No Fault Pending	SENT Intenal Error Fault Pending (P126E) Fuel Temperature Sensor SENT Message Error Fault Pending (P128C)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Temperature Sensor 2 Circuit Low Fault	P0187	This DTC diagnose SENT fuel rail temperature sensor 2 that is too low out of range. If the sensor digital value (represnting the refernce voltage) is below the lower digital read threshold, the low fail counter then increments. If the low fail counter reaches its threshold then a fail is reported. A pass is reported for this DTC if the low sample counter reaches its threshold.	Fuel Temperature Sensor 1 SENT digital read value	< 145.00	Fuel Temperature Out of Range Diagnoistic Enabled	True	50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
						Enabled when a code clear is not active or not exiting device control		
					No Fault Active on	SENT Communication Fault Active (P16E4, P16E5) SENT Intenal Error Fault Active (P126F) Fuel Temperature Sensor SENT Message Error Fault Active (P128D)		
					No Fault Pending	SENT Intenal Error Fault Pending (P126F) Fuel Temperature Sensor SENT Message Error Fault Pending (P128D)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Temperature Sensor 2 Circuit High Fault	P0188	This DTC diagnose SENT fuel rail temperature sensor 2 that is too high out of range. If the sensor digital value (represnting the refernce voltage) is above the upper digital read threshold, the high fail counter then increments. If the high fail counter reaches its threshold then a fail is reported. A pass is reported for this DTC if the high sample counter reaches its threshold.	Fuel Temperature Sensor 1 SENT digital read value	> 1,865.00	Fuel Temperature Out of Range Diagnoistic Enabled	True	50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
						Enabled when a code clear is not active or not exiting device control		
					No Fault Active on	SENT Communication Fault Active (P16E4, P16E5) SENT Intenal Error Fault Active (P126F) Fuel Temperature Sensor SENT Message Error Fault Active (P128D)		
					No Fault Pending	SENT Intenal Error Fault Pending (P126F) Fuel Temperature Sensor SENT Message Error Fault Pending (P128D)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Sensor "B" Circuit Range/ Performance	P018B	This DTC detects a fuel pressure sensor response stuck within the normal operating range using an intrusive test (as follows) a] Intrusive Test Trigger: 1] Fuel Pump Duty Cycle Clamped Time (min or max duty cycle) >= 5 sec Or 2] Fuel Pres Err Variance <= calibration value KeFRPD_cmp_FPSS_ MinPres Variance (typically 0.3 to 0.6); Otherwise, Report status as Pass b] Intrusive test freq limit: 60 sec between intrusive tests that pass, c] Intrusive test Fuel Flow limit: Fuel Flow Actual < Max allowed Fuel Flow rate	Absolute value of fuel pressure change (as sensed during intrusive test)	<= 30 kPa	a] Diagnostic Enabled b] Engine Run Time c] Engine Fuel Flow d] Fuel Pump Control Enabled e] Fuel Pump Control State f] Emissions Fuel Level Low g] Validity status VeFRPD_b_FPSS_ DataIntegrityOK IF [1] FRP Circuit Low Fault Active (DTC P018C) [2] FRP Circuit High Fault Active (DTC P018D) [3] Fuel Pump Circuit Low Fault Active (DTC P0231) [4] Fuel Pump Circuit High Fault Active (DTC P0232) [5] Fuel Pump Circuit Open Fault Active (DTC P023F) [6] Reference Voltage Fault Status (DTC P0641) [7] Fuel Pump Control Module Driver Over-temperature Fault Active (DTC P1255) [8] Fuel Pump Driver Mod	a] == TRUE b] >= 5.00 sec c] > 0.05 g / sec d] == TRUE e] Normal OR Fuel Pres Sensor Stuck Ctrl (rationality) f] <> True g] == TRUE IF [1] <> True [2] <> True [3] <> True [4] <> True [5] <> True [6] <> Active This Key [7] <> True [8] <> True	1 sample / 12.5 millisec Intrusive Test Duration: Fuel Flow - related (5 to 12 sec)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Ign Sw RunStart Pstn Ckt Low Fault Active (DTC P129D) [9] Fuel Pump Driver Control Mod Enable Ckt Perf Fault Active(DTC P12A6)	 [9] <> True		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Sensor "B" Circuit Low	P018C	This DTC detects if the fuel pressure sensor circuit is shorted low	Fuel Pressure Sensor Voltage Percent, 5.0V Nominal ((Abs(5.0V - SensorV_actual) /5.0V) *100)	< 4.00 % or [0 kPa ga]	Ignition circuit input state	High (Run or Crank)	64 failures / 80 samples 1 sample/12.5 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Sensor "B" Circuit High	P018D	This DTC detects if the fuel pressure sensor circuit is shorted high	Fuel Pressure Sensor Voltage Percent, 5.0V Nominal ((Abs(5.0V - SensorV_actual) /5.0V) *100)	> 96.00 % or [743 kPa ga]	Ignition circuit input state	High (Run or Crank)	64 failures / 80 samples 1 sample/12.5 millisec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT SIDI High Pressure Sensor Performance	P0191	The DTC determines if there is a skewed control fuel rail sensor (Sensor1) via a comparison to diagnostic sensor (sensor2) continuously when the engine is running and the commanded pressure is steady.	Primary sensor (P1) vs. Secondary sensor (P2) performance rationality **(**(Low Limit fail Filtered Fuel Control Error) OR (High Limit Fail: Filtered Fuel Control Error)**)** AND (FIltered Absolute delta between sensor1 and sensor2	<= **P0191 - Low fail limit of fuel control due to pressure sensor skewed low** (See supporting table) >= **P0191 - High fail limit of fuel control due to high pressure sensor skewed High** (see Supporting table) >= 1.00 mpa Note: fuel control error is calcuated based on the squreroot of senor1 divided by sensor2, this value is filter to ensure proper failure detection. Absolute delta between sensor1 and sensor2 value is filter to ensure proper failure detection.	Commanded Pressure rate of change (increasing or dercresing) for a period of time	< 0.70 mpa >= 1.25 seconds Enabled when a code clear is not active or not exiting device control	Filter Fuel Control Error term and Absolute delta between sensor1 and sensor2 exceed Low or High Fail limit for a duration >= 1.50 seconds This is diagnostic runs Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Pressure Sensor 1 Out of Range	P0192	This DTC diagnose SENT high pressure sensor 1 that is too low out of range. If the sensor digital value (represnting the refernce voltage) is below the lower digital threshold, the low fail counter then increments. If the low fail counter reaches its threshold then a fail is reported. A pass is reported for this DTC if the low sample counter reaches its threshold.	High Pressure Rail Sensor 1 SENT digital read value	=< 94			Time Based: 400 Failuer out of 500 Samples 6.25 ms per Sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Coolant Temperature Dropped Below Diagnostic Monitoring Temperature	P01F0	This DTC detects an unexplained cooling system cool down below the OBD monitoring threshold during normal operating conditions. This check is run throughout the key cycle.	For this application the "type" cal (KeTHMG_b_TMS_ElecThstEquipped) = 0 If the type cal is equal to one, the application has an electrically heated t-stat, if equal to zero the the application has an non heated t-stat. See appropiate section below. ***************************** Type cal above = 0 (non - heated t-stat) == == == ==		No Active DTC's	ECT_Sensor_Ckt_FA VehicleSpeedSensor_FA OAT_PtEstFiltFA THMR_AWP_AuxPumpFA THMR_AHV_FA THMR_SWP_Control_FA EngineTorqueEstInaccurate ECT_Sensor_Perf_FA THMR_SWP_NoFlow_FA THMR_SWP_FlowStuckOn_FA	30 failures out of 60 samples 1 sample / second Continuous	Type B, 2 Trips
					Engine Runtime	≥ 30.0 seconds		
			Engine coolant temperature	≤ 80.0 Deg C	Distance traveled this key cycle	≥ 1.2 km		
			***************************** Type cal above = 1 (Electrically heated t-stat) == == == ==		Ambient air pressure	≥ 55.0 kPa		
					Ambient air temperature	≥ -9.0 Deg C		
					**************************			
			Engine coolant temperature	≤ 73.0 Deg C	Engine coolant temperature			
					At least once during the key cycle			
					Type 0 (non-heated t-stat)	≥ 81 Deg C		
					Type 1 (Electrically heated T-stat)	≥ 74.0 to 74.0 Deg C		
					**************************			
					Heat to coolant	≥ 20.0 kW		
					DFCO time	≤ 0.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Thermostat duty cycle	≤ 50.0 %		
					RPM	≤ 8,192		
					Active Fuel Management is not in	Half Cylinder Mode		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 Open Circuit - (SIDI)	P0201	Controller specific output driver circuit diagnoses Injector 1 low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. Or Controller specific output driver circuit diagnoses Injector 1 high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit. Or Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	>= 200 KOhms impedance between signal and controller ground >= 200 KOhms impedance between signal and controller ground	Battery Voltage Engine Running	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 Open Circuit - (SIDI)	P0202	Controller specific output driver circuit diagnoses Injector 2 low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. Or Controller specific output driver circuit diagnoses Injector 2 high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit. Or Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	>= 200 KOhms impedance between signal and controller ground >= 200 KOhms impedance between signal and controller ground	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 Open Circuit - (SIDI)	P0203	Controller specific output driver circuit diagnoses Injector 3 low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. Or Controller specific output driver circuit diagnoses Injector 3 high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit. Or Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	>= 200 KOhms impedance between signal and controller ground >= 200 KOhms impedance between signal and controller ground	Battery Voltage Engine Running	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 Open Circuit - (SIDI)	P0204	Controller specific output driver circuit diagnoses Injector 4 low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. Or Controller specific output driver circuit diagnoses Injector 4 high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit. Or Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	>= 200 KOhms impedance between signal and controller ground >= 200 KOhms impedance between signal and controller ground	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS2 Circuit Low	P0222	Detects a continuous or intermittent short low or open in TPS2 circuit by monitoring the TPS 2 sensor percent Vref and failing the diagnostic when the TPS percent Vref is too low. This diagnostic only runs when battery voltage is high enough.	TPS2 % Vref <	0.250 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P06A3	79 / 159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS2 Circuit High	P0223	Detects a continuous or intermittent short high in TPS2 circuit by monitoring the TPS 2 sensor percent Vref and failing the diagnostic when the TPS percent Vref is too high. This diagnostic only runs when battery voltage is high enough.	TPS2 % Vref >	4.590 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P06A3	79 / 159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Secondary Circuit Low [FPPM applications only]	P0231	This DTC detects if the fuel pump control circuit is shorted to low. Per "smart device" design guidelines, Fuel Pump Power Driver device reports a Faulted state enumeration if current >= 18A [25A for high performance variants. FPDCM reports Not Faulted enumeration if current < 18A FPDCM reports Indeterminate state enumeration if the circuit is not being evaluated during current decision loop due to other conditions.	Power driver output current (Fuel Pump Power Module Driver Circuit Ground Short enumeration)	Current >= 18.0 A	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) Fuel Pump Control Enable command d) Fuel Pump Control Enable time [FAFR FPPM GshtDlyThr] e) System Voltage f] FPDCM Driver Status Alive Rolling Count Sample Faulted g] Diagnostic feedback received	a) == FCBR Gas ECM FPPM Sys b) == TRUE c) == TRUE d) >= 40.00 seconds e) > 7.00 Volts f] <> TRUE g] == TRUE	64.00 failures / 80.00 samples 1 sample/12.5 millisec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Secondary Circuit High [FPPM applications only]	P0232	This DTC detects if the fuel pump control circuit is shorted to high voltage by measuring voltage offset relative to low state level of duty cycle pulse. Per "smart device" design guidelines, Fuel Pump Power device reports a Faulted state enumeration if circuit voltage >= 4V. FPPM reports Not Faulted enumeration if circuit voltage < 4V. FPPM reports Indeterminate state enumeration if the circuit is not being evaluated during current decision loop due to other conditions.	Voltage offset relative to low state level of duty cycle pulse measured at fuel pump circuit	> 4.0 V	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) Diagnostic System Disabled d) Fuel Pump Control Enabled e] Arbitrated Fuel Pump Duty Cycle Rate of Change [FCBR] f] System voltage g] FPPM Driver Status Alive Rolling Count Sample Faulted h] Diagnostic serial data received	a) == FCBR Gas ECM FPPM Sys b) == TRUE c) <> True d) == TRUE e] >= -100.0 % / sec f] > 7.0 volts g] <> True h] == TRUE	64 failures / 80 samples 1 sample / 12.5 millisec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Secondary Circuit Open [FPPM applications only]	P023F	This DTC detects if the fuel pump control circuit is open Per "smart device" design guidelines, Fuel Pump Power device reports a Faulted state enumeration if current <= 1A . FPPM reports Not Faulted enumeration if current > 1A. FPPM reports Indeterminate state enumeration if the circuit is not being evaluated during current decision loop due to other conditions.	Output driver current (Fuel Pump Power Module Driver Circuit Open enumeration)	Current <= 1.0 A	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) Arbitrated Fuel Pump Duty Cycle (%) d] Fuel Pump Control Enable Faulted e] FPPM Fuel Pmp Driver Over-temperature Faulted f] FPPM Driver Status Alive Rolling Count Sample Faulted g] Diagnostic feedback received h] System Voltage	a) == FCBR Gas ECM FPPM Sys b) == TRUE c) > 49.00 % d] <> TRUE e] <> TRUE f] <> TRUE g] == TRUE h] > 11.00 Volts	40 failures / 80 samples 1 sample/12.5ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 Low side circuit shorted to ground (SIDI)	P0261	Controller specific output driver circuit diagnoses Injector 1 low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 1 volt between signal and controller ground	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 Low side circuit shorted to power (SIDI)	P0262	Controller specific output driver circuit diagnoses Injector 1 low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 Low side circuit shorted to ground (SIDI)	P0264	Controller specific output driver circuit diagnoses Injector 2 low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 1 volt between signal and controller ground	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 Low side circuit shorted to power (SIDI)	P0265	Controller specific output driver circuit diagnoses Injector 2 low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 Low side circuit shorted to ground (SIDI)	P0267	Controller specific output driver circuit diagnoses Injector 3 low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 1 volt between signal and controller ground	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 Low side circuit shorted to power (SIDI)	P0268	Controller specific output driver circuit diagnoses Injector 3 low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 Low side circuit shorted to ground (SIDI)	P0270	Controller specific output driver circuit diagnoses Injector 4 low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 1 volt between signal and controller ground	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 Low side circuit shorted to power (SIDI)	P0271	Controller specific output driver circuit diagnoses Injector 4 low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Random Misfire Detected Cylinder 1 Misfire Detected Cylinder 2 Misfire Detected Cylinder 3 Misfire Detected Cylinder 4 Misfire Detected	P0300 P0301 P0302 P0303 P0304	These DTC's will determine if a random or a cylinder specific misfire is occurring by monitoring various terms derived from crankshaft velocity. The rate of misfire over an interval is compared to both emissions and catalyst damaging thresholds. The pattern of crankshaft acceleration after the misfire is checked to differentiate between real misfire and other sources of crank shaft noise. Emissions Neutral Default Action: If consumed Emissions Neutral Default DTCs from other subsystems are set: Ignore Rough Road, Traction, Stability, and Antilock brake signals. If default action not activated, Misfire Monitor could complete less frequently or inaccurately. Default Action Latched for duration of Trip Default Action: If Misfire P030x sets on some hybrid applications, the isolation damper	Crankshaft Deceleration Value(s) vs. Engine Speed and Engine load The equation used to calculate deceleration value is tailored to specific vehicle operating conditions. The selection of the equation used is based on the 1st single cylinder continuous misfire threshold tables encountered that are not max of range. If all tables are max of range at a given speed/load, that speed load region is an ***Undetectable region*** see Algorithm Description Document for additional details. SINGLE CYLINDER CONTINUOUS MISFIRE((Medres_Decel Medres_Jerk OR (Medres_Decel Medres_Jerk OR (Lores_Decel Lores_Jerk OR (Lores_Decel Lores_Jerk OR RevBalanceTime)	- see details of thresholds on Supporting Tables Tab > **RufSCD_Decel** AND > **RufSCD_Jerk)** > **SCD_Decel** AND > **SCD_Jerk)** > **RufCyl_Decel** AND > **RufCyl_Jerk)** > **CylModeDecel** AND > **CylModeJerk)** >**RevMode_Decel**	Engine Run Time Engine Coolant Temp Or If ECT at startup Then System Voltage + Throttle delta - Throttle delta Early Termination option: (used on plug ins that may not have enough engine run time at end of trip for normal interval to complete.)	> 2 crankshaft revolution "ECT" If OBD Max Coolant Achieved = FALSE -12 ºC < ECT Or if OBD Max Coolant Achieved = TRUE -12 ºC < ECT < 127 ºC < -12 ºC If OBD Max Coolant Achieved = FALSE 21 ºC < ECT If OBD Max Coolant Achieved = TRUE 21 ºC < ECT < 127 ºC 9.00 < volts < 32.00 < 100.00 % per 25 ms < 100.00 % per 25 ms Not Enabled	Emission Exceedence = any (5) failed 200 rev blocks out of (16) 200 rev block tests Failure reported for (1) Exceedence in 1st (16) 200 rev block tests, or (4) Exceedences thereafter. OR when Early Termination Reporting = Enabled and engine rev > 1,000 revs and < 3,200 revs at end of trip	Type B, 2 Trips (Mil Flashes with Catalyst damage level of Misfire)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		between engine and transmission can go into extreme resonance. Default action is to move rpm out of the resonance zone. If default action not activated, significant hardware damage could occur rendering vehicle inoperable.	****************************** **This Feature not used on Gasoline engines** Combustion Modes that force selection of Idle Tables ****************************** Other patterns of misfire use adjustments to the single cylinder continuous misfire threshold tables: RANDOM MISFIRE Use random misfire thresholds If no misfire for (Medres_Decel AND Medres_Jerk) OR (Medres_Decel AND Medres_Jerk) OR (Lores_Decel AND Lores_Jerk)	************************** **This Feature not used on Gasoline engines** **CombustModeIdleTbl** in Supporting Tables ************************** > 3 Engine Cycles > **RufSCD_Decel** * **Random_SCD_Decel** >**RufSCD_Jerk** * **Random_SCD_Jerk** > **SCD_Decel** * **Random_SCD_Decel** > **SCD_Jerk** * **Random_SCD_Jerk** > **RufCyl_Decel** * **RandomCylModDecel** > **RufCyl_Jerk** * **RandomCylModJerk**			any Catalyst Exceedence = (1) 200 rev block as data supports for catalyst damage. Catalyst Failure reported with (1 or 3) Exceedences in FTP, or (1) Exceedence outside FTP. Continuous	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			OR (Lores_Decel AND Lores_Jerk) OR RevBalanceTime PAIRED CYLINDER MISFIRE If a cylinder & it's pair are above PAIR thresholds (Medres_Decel AND Medres_Jerk) OR (Medres_Decel AND Medres_Jerk) OR (Lores_Decel AND Lores_Jerk) OR (Lores_Decel AND Lores_Jerk)	> **CylModeDecel * RandomCylModDecel** > **CylModeJerk** * **RandomCylModJerk** > **RevMode_Decel** * **RandomRevModDecl** > **RufSCD_Decel * Pair_SCD_Decel** > **RufSCD_Jerk** * **Pair_SCD_Jerk** > **SCD_Decel** * **Pair_SCD_Decel** > **SCD_Jerk** * **Pair_SCD_Jerk** > **RufCyl_Decel** * **PairCylModeDecel** > **RufCyl_Jerk** * **PairCylModeJerk** > **CylModeDecel** * **PairCylModeDecel** > **CylModeJerk** * **PairCylModeJerk**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			OR (Revmode Active AND (within one engine cycle: 2nd largest Lores_Decel) AND Above TRUE for))	> **CylModeDecel * PairCylModeDecel** > 80 engine cycles out of 100 engine cycles				
			BANK MISFIRE Cylinders above Bank Thresholds	>= 3 cylinders				
			(Medres_Decel AND Medres_Jerk)	> **RufSCD_Decel** * **Bank_SCD_Decel** > **RufSCD_Jerk** * **Bank_SCD_Jerk**				
			OR (Medres_Decel AND Medres_Jerk)	> **SCD_Decel** * **Bank_SCD_Decel** > **SCD_Jerk** * **Bank_SCD_Jerk**				
			OR (Lores_Decel AND Lores_Jerk)	> **RufCyl_Decel** * **BankCylModeDecel** > **RufCyl_Jerk** * **BankCylModeJerk**				
			OR (Lores_Decel AND Lores_Jerk)	> **CylModeDecel** * **BankCylModeDecel** > **CylModeJerk** * **BankCylModeJerk**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CONSECUTIVE CYLINDER MISFIRE 1st cylinder uses single cyl continuous misfire thresholds; 2nd Cylinder uses: (Medres_Decel AND Medres_Jerk) OR (Medres_Decel AND Medres_Jerk) OR (Lores_Decel AND Lores_Jerk) OR (Lores_Decel AND Lores_Jerk) CYLINDER DEACTIVATION MODE (Active Fuel Managment)	> **RufSCD_Decel * ConsecSCD_Decel** > **RufSCD_Jerk * ConsecSCD_Jerk** > **SCD_Decel * ConsecSCD_Decel** > **SCD_Jerk * ConsecSCD_Jerk** > **RufCyl_Decel * ConsecCylModDecel** > **RufCyl_Jerk * ConsecCylModeJerk** > **CylModeDecel * ConsecCylModDecel** > **CylModeJerk * ConsecCylModeJerk**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AFM: SINGLE CYLINDER CONTINUOUS MISFIRE (CylAfterDeacCyl_Decel AND CylAfterDeacCyl_Jerk) OR (CylBeforeDeacCylDecel AND CylBeforeDeacCyl_Jerk) AFM: RANDOM MISFIRE Use random misfire thresholds If no misfire for (CylAfterDeacCyl_Decel AND CylAfterDeacCyl_Jerk) (CylBeforeDeacCylDecel AND CylBeforeDeacCyl_Jerk)	> **CylModeDecel** * **ClyAfterAFM_Decel** > **CylModeJerk** * **CylAfterAFM_Jerk** > **CylModeDecel** * **CylBeforeAFM_Decel** > **CylModeJerk** * **ClyBeforeAFM_Jerk** > 3 Engine Cycles > **CylModeDecel** * **ClyAfterAFM_Decel** * **RandomAFM_Decl** > **CylModeJerk** * **CylAfterAFM_Jerk** * **RandomAFM_Jerk** > **CylModeDecel** * **CylBeforeAFM_Decel** * **RandomAFM_Decl** > **CylModeJerk** * **ClyBeforeAFM_Jerk** * **RandomAFM_Jerk** - see details on Supporting Tables Tab				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Misfire Percent Emission Failure Threshold	≥ 2.75 % P0300				
			Misfire Percent Catalyst Damage	> **Catalyst_Damage_Misfire_Percentage** in Supporting Tables whenever secondary conditions are met.				
			When engine speed and load are less than the FTP cals (3) catalyst damage exceedences are allowed.	≤ 1,600 FTP rpm AND ≤ 35 FTP % load	(at low speed/loads, one cylinder may not cause cat damage) Engine Speed Engine Load Misfire counts	 > 1,600 rpm AND > 25 % load AND < 180 counts on one cylinder		
					Engine Speed	1,050 < rpm < ((Engine Over Speed Limit) - 50) OR 8,191) Engine speed limit is a function of inputs like Gear and temperature	4 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						see **EngineOverSpeedLimit** in supporting tables		
					No active DTCs:	TPS_FA EnginePowerLimited MAF_SensorTFTKO MAP_SensorTFTKO IAT_SensorTFTKO ECT_Sensor_Ckt_TFTKO 5VoltReferenceB_FA CrankSensor_TFTKO CrankSensor_FA CamLctnIntFA CamLctnExhFA CamSensorAnyLctnTFTK O AnyCamPhaser_FA AnyCamPhaser_TFTKO AmbPresDfltdStatus	4 cycle delay	
					P0315 & engine speed	> 1,000 rpm	4 cycle delay	
					Fuel Level Low	LowFuelConditionDiagnos tic	500 cycle delay	
					Cam and Crank Sensors	in sync with each other	4 cycle delay	
					Misfire requests TCC unlock	Not honored because Transmission in hot mode or POPD intrusive diagnostic running	4 cycle delay	
					Fuel System Status	≠ Fuel Cut	4 cycle delay	
					Active FuelManagement	Transition in progress	0 cycle delay	
					Undetectable engine	***Undetectable region***	4 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					speed and engine load region	from Malfunction Criteria		
					Abusive Engine Over Speed	> 8,192 rpm	0 cycle delay	
					Below zero torque (except CARB approved 3000 rpm to redline triangle.)	< **ZeroTorqueEngLoad** or <**ZeroTorqueAFM** if AFM is active in Supporting Tables	4 cycle delay	
					Below zero torque: TPS Vehicle Speed	≤ 2.0 % (≤ 2.0 % in AFM) > 318 mph (> 19 mph AFM)	4 cycle delay	
					NEGATIVE TORQ AFM If deactivated cylinders appear to make power, torque is negative: DeactivatedCyl_Decel AND DeactivatedCyl_Jerk AND # of Deact Cyls Inverted	<**DeacCylInversionDecel** <**DeacCylInversionJerk** > 4 cylinders	0 cycle delay	
					EGR Intrusive test	if Active	12 cycle delay	
					Manual Trans	Clutch shift	0 cycle delay	
					Accel Pedal Position AND Automatic transmission shift	> 100.00 %	0 cycle delay	
					After Fuel resumes on Automatic shift containing Fuel Cut		2 Cylinder delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Delay if PTO engaged	Enabled	4 cycle delay	
					******************************	******************************	******************	
					This Feature not used on Gasoline engines			
					Combustion Mode	= **InfrequentRegen** value in Supporting Tables	0 cycle delay	
					Driver cranks before Wait to Start lamp extinguishes	IF TRUE	**WaitToStart** cycle delay	
					Brake Torque	> 199.99 % Max Torque	0 cycle delay	
					******************************	******************************	******************	
					DRIVELINE RING FILTER After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early.			
					Filter Driveline ring:	> "**Ring Filter**" # of engine cycles after misfire in Supporting Tables		
					Stop filter early:	> "**Number of Normals**" # of engine cycles after misfire in Supporting Tables tab		
					ABNORMAL ENGINE SPEED OSCILLATION: (checks each "misfire" candidate in 100 engine			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Cycle test to see if it looks like some disturbance like rough road (abnormal).)			
					Used Off Idle, and while not shifting, TPS Engine Speed Veh Speed Auto Transmission	> 1 % > 1,000 rpm > 0 mph not shifting		
					indivdual candidate deemed abnormal if number of consecutive decelerating cylinders after "misfire": (Number of decels can vary with misfire detection equation) Consecutive decels while in SCD Mode Cyl Mode Rev Mode	> **Abnormal SCD Mode** > **Abnormal Cyl Mode** > **Abnormal Rev Mode** in Supporting Tables		
					At the end of 100 engine cycle test, the ratio of abnormal/candidate is checked to confirm if real misfire is present within the 100 engine cycles.			
					abnormal candidates/ total candidates	>0.50 ratio	discard 100 engine cycle test	
					MISFIRE CRANKSHAFT			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					PATTERN RECOGNITION checks each "misfire" candidate in 100 engine Cycle test to see if overall crankshaft pattern looks like real misfire (recognized), or some disturbance like rough road (unrecognized). At the end of 100 engine cycle test, the ratio of unrecog/recognized is checked to confirm if real misfire is present within the 100 engine cycles. Typically used for checking a single misfire per engine cycle but can support some other patterns on some packages			
					Pattern Recog Enabled:	Disabled		
					Pattern Recog Enabled during Cylinder Deac	Not Enabled		
					Pattern Recog Enabled consecutive cyl pattrn	Disabled		
					Engine Speed	700 < rpm < 3,000		
					Veh Speed	> 0.6 mph		
					The 1st check for "recognized" is the 1st fired cylinder after the misfire candidate should both accelerate and jerk an amount based acceleration and jerk of Single Cylinder Misfire			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					thresholds in effect at that speed and load. (CylAfter_Accel AND CylAfter_Jerk) Addtionally, the crankhaft is checked again a small calibratible number of cylinders later to see if the distrubance is still large like rough road, or has calmed down like real misfire. The size of disturbance is compared to a multiplier times the ddt_jerk value used to detect misfire at that speed and load. If there is repetitive misfire on consecutive engine cycles, the expected snap is adjusted due to the higher expected disturbance. Num of Cylinders after misfire to start check of crankshaft snap "misfire" recognized if: Crankshaft snap after: isolated "misfire"	> Misfire_ decel ***** **1st_FireAftrMisfr_Acel** > Misfire_Jerk ***** **1st_FireAftrMisfr_Jerk** Or if AFM mode is active: > Misfire_ decel * **1stFireAftrMisAcelAFM** > Misfire_Jerk * **1stFireAfterMisJerkAFM** 2 Cylinders < Misfire_Jerk ***** **SnapDecayAfterMisfire**		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					repetative "misfire"	< Misfire_Jerk * **SnapDecayAfterMisfire * RepetSnapDecayAdjst** in Supporting Tables		
					At the end of 100 engine cycle test, the ratio of unrecog/recognized is checked to confirm if real misfire is present.			
					Ratio of Unrecog/Recog	> 1.00	discard 100 engine cycle test	
					*****************************	*****************************	******************	
					NON-CRANKSHAFT BASED ROUGH ROAD:	Enabled		
					Rough Road Source	Wheel Speed in ECM		
					*****************************	*****************************	******************	
					IF Rough Road Source = WheelSpeedInECM			
					ABS/TCS	active	discard 100 engine cycle test	
					Wheel speed noise	> **WSSRoughRoadThres**		
					VSES	active		
					AND No Emission Neutral Default Action DTCs	ABS Failed Vehicle Dynamics Control System Status Driven Wheel Rotation Status Non Driven Wheel Rotation Status		
					*****************************	*****************************	******************	
					IF Rough Road Source = "FromABS"			
					ABS/TCS		discard 100	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					RoughRoad VSES AND No Emission Neutral Default Action DTCs ***************************** IF Rough Road Source = "TOSS" TOSS dispersion AND No Active DTCs ***************************** Default Action Isolator Resonance Default Action Option ***************************** If Isolator Resonance Option Enabled AND Misfire P030x TFTKO	active detected active ABS Failed Vehicle Dynamics Control System Status ***************************** >**TOSSRoughRoadThres** in supporting tables Transmission Output Shaft Angular Velocity Validity TransmissionEngagedState_FA (Auto Trans only) ClutchPstnSnsr FA (Manual Trans only) ***************************** Enabled ***************************** Set engine speed limits: 2,500 < Eng RPM < 9,000	engine cycle test ******************* discard 100 engine cycle test 4 cycle delay ******************* *******************	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position System Variation Not Learned	P0315	This DTC determines if the crankshaft sensor learn values that are stored in memory are valid. The angle between each tooth of the reluctor wheel is learned, and the sum of all angles together should sum to 360° (one revolution of the reluctor wheel). Default values, or corrupted values will not sum to 360°.	The Crankshaft target wheel should be 360 degrees around in circumferance. Loss or controller non-volitile memory or an error in memory will cause the values of individual teeth learn to be defaulted or incorrect. Set the DTC if the Differance between the sum of the reluctor wheel's teeth and 360 degrees is greater than:	> 0.001 degrees	OBD Manufacturer Enable Counter	MEC = 0	0.50 seconds Frequency Continuous100 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Performance Per Cylinder	P0324	This diagnostic checks for knock sensor performance out of the normal expected range on a per cylinder basis due to Excessive Knock (either real or false knock). In the knock detection algorithm, the term “Knock Intensity” (KI) is used to define the relative size of a knock event, and is calculated as (KI = current knock event - knock threshold). This results in a KI amplitude that is proportional to the size of the knock event (as seen by the knock sensor). In addition, Knock Intensity cannot be less than zero as it is forced/limited to be = 0 with no knock detected (i.e. whenever the current knock event < knock threshold, KI = 0). This diagnostic calculates a first-order lag filter version of the Knock Intensity and sets a fault when: (Filtered KI) > (Excessive Knock Diagnostic Threshold)	Filtered Knock Intensity (where 'Knock Intensity' = 0 with no knock; and > 0 & proportional to knock magnitude with knock)	**> P0324_PerCyl_ExcessiveKnock_Threshold** (no units)	Diagnostic Enabled? Engine Run Time Engine Speed Engine Air Flow Engine Coolant Temperature or OBD Coolant Enable Criteria Inlet Air Temperature Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle)	Yes ≥ 2.0 seconds ≥ 700 RPM AND ≤ 8,500 RPM ≥ 50 mg/cylinder AND ≤ 2,000 mg/cylinder ≥ -40 deg's C = TRUE ≥ -40 deg's C ≥ 170 revs	First Order Lag Filters with Weight Coefficient = 0.0201 Updated each engine event	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Circuit Bank 1	P0325	This diagnostic checks for an open in the knock sensor circuit Sensor 1/Bank 1. There are two possible methods used: 1. **20 kHz Method**: This method injects a 20 kHz signal (internal to the ECU) onto one of the Knock Sensor inputs. For a normal/ good circuit the 20 kHz signal will propogate through the Knock sensor and back to the ECU through the sensor return circuit. The 20 kHz signal is processed through the Fast Fourier Transform (FFT) and then filtered with a first-order lag filter. Since the Knock Detection algorithm uses a Differential Op-Amp to compare the input from the two knock sensor wires, the FFT 20 kHz diagnostic signal will have either: A. Low output with a good circuit (because the 20 kHz injected signal is detected on both of the sensor inputs) or B, High output for an Open Circuit (because	Open Circuit Method chosen (2 possible methods: 20 kHz or Normal Noise): Filtered FFT Output Filtered FFT Output	= **P0325_P0330_OpenMethod_2** **<u>Case 1 (20 kHz Method):</u>** **> P0325_P0330_OpenCktThrshMin (20 kHz) AND < P0325_P0330_OpenCktThrshMax (20 kHz)** **<u>Case 2 (Normal Noise Method):</u>** **> P0325_P0330_OpenCktThrshMin (Normal Noise) AND < P0325_P0330_OpenCktThrshMax (Normal Noise)**	Diagnostic Enabled? Engine Run Time Engine Speed Cumulative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) Engine Air Flow Engine Coolant Temperature or OBD Coolant Enable Criteria Inlet Air Temperature	Yes ≥ 2.0 seconds ≥ 1,000 RPM and ≤ 4,650 RPM ≥ 100 revs ≥ 40 mg/cylinder and ≤ 2,000 mg/cylinder ≥ -40 deg's C = TRUE ≥ -40 deg's C	First Order Lag Filter with Weight Coefficient Weight Coefficient = 0.0100 Updated each engine event	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		the 20 kHz injected signal is detected only on one of the sensor inputs). The 20 kHz method is typically used for the entire operating region of the engine. However, some engines may not have adequate separation between good and bad circuits at high engine speed. In these cases the 20 kHz method is used at low and medium engine speeds, and the "Normal Noise" method is used at high engine speed only. 2. **Normal Noise**: The Normal Noise method monitors the background engine noise level for a selected frequency range output of the knock detection FFT. The background noise (i.e. Normal Noise) is filtered with a first-order lag filter. A good circuit is determined when the filtered Normal Noise signal is greater than the threshold. See Supporting Tables for method definition: **P0325_P0330_OpenM**						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		ethod defines which of the two diagnostic methods is used as a fucntion of engine speed (RPM). Typical implementations: A. Use 20 kHz method at allengine RPM (used when acceptable separation achieved at all RPM) or B. Use 20 kHz method at low/medium RPM and Normal Noise at high RPM						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Performance Bank 1	P0326	This diagnostic checks for knock sensor performance out of the normal expected range, on a per sensor basis. This diagnostic is specifically designed to identify the fault condition where the knock sensor is properly attached electrically, but produces an abnormally low output due to being unattached (or loosely attached) with the mounting bolt (and thus unable to properly transfer the engine vibration energy from the engine block to the knock sensor). The term "Abnormal (engine) Noise" is used to define this diagnostic method. A fault condition is identified when a first-order lag filtered version of the Abnormal Noise signal falls below the diagnostic threshold.	Filtered FFT Intensity (where 'FFT Intensity' = Non-knocking, background engine noise for a selected frequency) Filtered FFT Intensity	**<u>Case 1</u>: Engine <u>not</u> in AFM mode** < **P0326_P0331_AbnormalNoise_Threshold** (Supporting Table) OR **<u>Case 2</u>: Engine <u>is</u> in AFM mode** < **P0326_P0331_AbnormalNoise_Thresh_AFM** (Supporting Table; Engine <u>is</u> in AFM mode)	Diagnostic Enabled? Engine Run Time Engine Speed Engine Air Flow Engine Coolant Temperature or OBD Coolant Enable Criteria Inlet Air Temperature Individual Cylinders enabled for Abnormal Noise Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle)	Yes ≥ 2.0 seconds ≥ 2,000 RPM (not in AFM mode) OR ≥ 8,500 (in AFM mode) AND ≤ 8,500 RPM ≥ 50 mg/cylinder AND ≤ 2,000 mg/cylinder ≥ -40 deg's C = TRUE ≥ -40 deg's C **P0326_P0331_AbnormalNoise_CylsEnabled** (Supporting Table) ≥ 333 Revs	First Order Lag Filters with Weight Coefficient = 0.0021 Updated each engine event	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Circuit Low Bank 1	P0327	This diagnostic checks for an out of range low knock sensor signal. A 3-resistor bias network at each sensor input to the ECM provides a DC diagnostic voltage that will remain within a normal range when the external knock sensor circuit is free of short circuit faults. The diagnostic output is reported as a percentage (0 to 100%) when compared to the 5.0 volt reference voltage.	Sensor Input or Return Signal Line	< 8.0 Percent (of 5.0 Volt reference)	Diagnostic Enabled? Engine Speed	Yes > 0 RPM and < 8,500 RPM	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Circuit High Bank 1	P0328	This diagnostic checks for an out of range high knock sensor signal. A 3-resistor bias network at each sensor input to the ECM provides a DC diagnostic voltage that will remain within a normal range when the external knock sensor circuit is free of short circuit faults. The diagnostic output is reported as a percentage (0 to 100%) when compared to the 5.0 volt reference voltage.	Sensor Input or Return Signal Line	> 39.0 Percent (of 5 Volt Reference)	Diagnostic Enabled? Engine Speed	Yes > 0 RPM and < 8,500 RPM	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP) Sensor A Circuit	P0335	Diagnostic will fail if a crank sensor pulse was not received during a period of time; if crank sensor pulses are received the diagnostic will pass.	Time since last crankshaft position sensor pulse received	>= 4.0 seconds	Starter engaged AND (cam pulses being received OR (MAF_SensorFA AND Engine Air Flow	= FALSE > 2.0 grams/second))	Continuous every 100 msec	Type B, 2 Trips
			No crankshaft pulses received	>= 0.3 seconds	Engine is Running Starter is not engaged		Continuous every 12.5 msec	
			No crankshaft pulses received		Engine is Running OR Starter is engaged No DTC Active:	P0365 P0366	2 failures out of 10 samples One sample per engine revolution	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP) Sensor A Performance	P0336	1. Fail counts will occur if the engine goes out of synchronization repeatedly over a period of time and will pass if the engine stays in synchronization. 2. Diagnostic will fail if synchronization gap is not found in a specified period of time and will pass if the synchronization gap is found. 3. Diagnostic will fail if the incorrect number of crank sensor teeth are detected in-between detecting the synchronization gap and will pass if the correct number of teeth are seen.	Time in which 10 or more crank re-synchronizations occur	< 10.0 seconds	Engine Air Flow Cam-based engine speed No DTC Active:	>= 2.0 grams/second > 450 RPM P0335	Continuous every 250 msec	Type B, 2 Trips
			No crankshaft synchronization gap found	>= 0.4 seconds	Engine is Running Starter is not engaged		Continuous every 12.5 msec	
			Time since starter engaged without detecting crankshaft synchronization gap	>= 1.5 seconds	Starter engaged AND (cam pulses being received OR (MAF_SensorFA AND Engine Air Flow	= FALSE > 2.0 grams/second))	Continuous every 100 msec	
			Crank pulses received in one engine revolution OR Crank pulses received in one engine revolution	< 1 > 65	Engine is Running OR Starter is engaged No DTC Active:	P0365 P0366	8 failures out of 10 samples One sample per engine revolution	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor A	P0340	Diagnostic will fail if a cam sensor pulse was not received during a period of time; if cam sensor pulses are received the diagnostic will pass.	Time since last camshaft position sensor pulse received OR Time that starter has been engaged without a camshaft sensor pulse	>= 5.5 seconds >= 4.0 seconds	Starter engaged AND (crank pulses being received OR (MAF_SensorFA AND Engine Air Flow	= FALSE > 2.0 grams/second))	Continuous every 100 msec	Type B, 2 Trips
			Fewer than 4 camshaft pulses received in a time	> 3.0 seconds	Engine is running Starter is not engaged		Continuous every 100 msec	
			No camshaft pulses received during first 12 MEDRES events (There are 12 MEDRES events per engine cycle		Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	CrankSensor_FA	Continuous every MEDRES event	
			The number of camshaft pulses received during 100 engine cycles	= 0	Crankshaft is synchronized No DTC Active:	CrankSensor_FA	8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor A	P0341	Diagnostic will fail if an incorrect number of cam sensor pulses are detected over a number of engine cycles and will pass if the number of cam pulses is correct.	The number of camshaft pulses received during first 12 MEDRES events is OR (There are 12 MEDRES events per engine cycle)	< 4 > 6	Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	CrankSensor_FA	Continuous every MEDRES event	Type B, 2 Trips
			The number of camshaft pulses received during 100 engine cycles OR	< 398 > 402	Crankshaft is synchronized No DTC Active:	CrankSensor_FA	8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #1 CIRCUIT	P0351	Diagnoses Cylinder #1 Ignition Control (EST) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	$\geq$ 30 kΩ impedance between signal and controller ground	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #2 CIRCUIT	P0352	Diagnoses Cylinder #2 Ignition Control (EST) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	$\geq$ 30 kΩ impedance between signal and controller ground	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #3 CIRCUIT	P0353	Diagnoses Cylinder #3 Ignition Control (EST) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	 ≥ 30 kΩ impedance between signal and controller ground	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #4 CIRCUIT	P0354	Diagnoses Cylinder #4 Ignition Control (EST) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	 ≥ 30 kΩ impedance between signal and controller ground	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor B	P0365	Diagnostic will fail if a cam sensor pulse was not received during a period of time; if cam sensor pulses are received the diagnostic will pass.	Time since last camshaft position sensor pulse received OR Time that starter has been engaged without a camshaft sensor pulse	>= 5.5 seconds >= 4.0 seconds	Starter engaged AND (crank pulses being received OR (MAF_SensorFA AND Engine Air Flow	= FALSE > 2.0 grams/second))	Continuous every 100 msec	Type B, 2 Trips
			Fewer than 4 camshaft pulses received in a time	> 3.0 seconds	Engine is running Starter is not engaged		Continuous every 100 msec	
			No camshaft pulses received during first 12 MEDRES events (There are 12 MEDRES events per engine cycle		Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	CrankSensor_FA	Continuous every MEDRES event	
			The number of camshaft pulses received during 100 engine cycles	= 0	Crankshaft is synchronized No DTC Active:	CrankSensor_FA	8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor B	P0366	Diagnostic will fail if an incorrect number of cam sensor pulses are detected over a number of engine cycles and will pass if the number of cam pulses is correct.	The number of camshaft pulses received during first 12 MEDRES events is OR (There are 12 MEDRES events per engine cycle)	< 4 > 6	Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	CrankSensor_FA	Continuous every MEDRES event	Type B, 2 Trips
			The number of camshaft pulses received during 100 engine cycles OR	< 398 > 402	Crankshaft is synchronized No DTC Active:	CrankSensor_FA	8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation (EGR) Flow Insufficient	P0401	During a closed throttle decel condition, the EGR valve is normally closed. This diagnostic opens the valve to a pre-determined position, and the change in MAP is computed. This change in MAP correlates to the flow rate of the EGR system.	With EGR valve open, the peak positive MAP change is monitored over a period of time. This value is compared with a threshold from an Engine Speed vs Baro table and the difference computed. The result is statistically filtered (EWMA) and compared to a decision limit.	DTC is set when the filtered pressure change (NeEGRD_p_EWMA) exceeds 2.40 kPa.	EGR is available.	True	Time to test (once enabled) = 0.40 sec. Completes once per trip (typically) 6.25 ms operating loop	Type A, 1 Trips
					DTC's NOT active	FuelInjectorCircuit_FA CrankSensor_FA TPS_Performance_FA TPS_FAMAP_SensorFA VehicleSpeedSensor_FA 5VoltReferenceA_FA 5VoltReferenceB_FA IAT_SensorFA ECT_Sensor_Ckt_FA IAC_SystemRPM_FA EGRValveCircuit_FA EngineMisfireDetected_FA MAF_SensorFA, , Ethanol Composition Sensor FA P0604		
					No engine over heat	EngineMetalOvertempActive		
					Power Take off mode	Not active		
					Traction control	Not active		
					Device Control	Not active		
					Catalyst Protection mode	Not active		
					Difference between desired & actual Air Charge	< 40.00 kPa		
					Barometric Pressure	> 70.00 kPa & NOT defaulted		
					Intake Air Temperature	-23.00 ~ 100.00 degC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Trans gear stable timer	> 2.00 sec		
					Decel fuel cut off state is unchanged for time	> 0.25 sec		
					Vehicle Speed	0.00 ~ 166.00 mph		
					Arbitrated Torque	< 50.0		
					EGR Position	< 4.80		
					Engine Speed	1,100.00 ~ 1,300.00 rpm		
					MAP change	< 1.00 Kpa		
					Altitude-compensated MAP	20.00 ~ 50.00 kPa		
					[STEP CHANGE DETECTION]			
					IF {}{ the difference between the current EWMA and the current map diff >	> **P0401_StepDelta** kPa		
					AND			
					Current map diff }	> **P0401_StepMAP_DIFF** kPa		
					Run multiple tests until	**P0401_StepSamplesPerTrip**		
					number of tests have been completed.	**P0401_SamplesAfterStep**		
					[Intrusive Mode			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Enablements]			
					Pos. Delta RPM	<= 150.00 rpm		
					Neg. Delta RPM	<= 150.00 rpm		
					Number of EGR On-time execution loops	< 25.00 times		
					Throttle Area fluctuations	< = 1.20 %		
					[CODE CLEAR / NONVOLITLE MEMORY RESET DETECTION:]			
					Upon code clear or a nonvolatile memory failure, Initiate multiple tests. Run multiple tests per trip until .	**P0401_SamplesAfterReset** # of tests have been completed.		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation (EGR) Flow Excessive	P0402	During a closed throttle decel condition, the EGR valve is normally closed. This diagnostic opens the valve to a pre-determined position, and the change in MAP is computed. This change in MAP correlates to the flow rate of the EGR system.	With EGR valve open, the peak positive MAP change is monitored over a period of time. This value is compared with a threshold from an Engine Speed vs Baro table and the difference computed. The result is statistically filtered (EWMA) and compared to a decision limit.	DTC is set when the filtered pressure change (NeEGRD_p_EWMA_Hi) exceeds 100.00 kPa.	EGR is available.	True	Time to test (once enabled) = 0.40 sec. Completes once per trip (typically) 6.25 ms operating loop	Type A, 1 Trips
					DTC's NOT active	FuelInjectorCircuit_FA CrankSensor_FA TPS_Performance_FA TPS_FAMAP_SensorFA VehicleSpeedSensor_FA 5VoltReferenceA_FA 5VoltReferenceB_FA IAT_SensorFA ECT_Sensor_Ckt_FA IAC_SystemRPM_FA EGRValveCircuit_FA EngineMisfireDetected_FA MAF_SensorFA, , Ethanol Composition Sensor FA P0604		
					No engine over heat	EngineMetalOvertempActive		
					Power Take off mode	Not active		
					Traction control	Not active		
					Device Control	Not active		
					Catalyst Protection mode	Not active		
					Difference between desired & actual Air Charge	< 40.00 kPa		
					Barometric Pressure	> 70.00 kPa & NOT defaulted		
					Intake Air Temperature	-23.00 ~ 100.00 degC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Trans gear stable timer	> 2.00 sec		
					Decel fuel cut off state is unchanged for time	> 0.25 sec		
					Vehicle Speed	0.00 ~ 166.00 mph		
					Arbitrated Torque	< 50.0		
					EGR Position	< 4.80		
					Engine Speed	1,100.00 ~ 1,300.00 rpm		
					MAP change	< 1.00 Kpa		
					Altitude-compensated MAP	20.00 ~ 50.00 kPa		
					[STEP CHANGE DETECTION]			
					IF {}{ the difference between the current EWMA and the current map diff >	> **P0401_StepDelta** kPa		
					AND			
					Current map diff }	> **P0401_StepMAP_DIFF** kPa		
					Run multiple tests until	**P0401_StepSamplesPerTrip**		
					number of tests have been completed.	**P0401_SamplesAfterStep**		
					[Intrusive Mode			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Enablements]			
					Pos. Delta RPM	<= 150.00 rpm		
					Neg. Delta RPM	<= 150.00 rpm		
					Number of EGR On-time execution loops	< 25.00 times		
					Throttle Area fluctuations	< = 1.20 %		
					[CODE CLEAR / NONVOLITLE MEMORY RESET DETECTION:]			
					Upon code clear or a nonvolatile memory failure, Initiate multiple tests. Run multiple tests per trip until	**P0401_SamplesAfterReset** # of tests have been completed.		
					.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Solenoid Circuit Open	P0403	Controller specific output driver circuit diagnoses the EGR Solenoid high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	≥ 4 K Ω impedance between signal and controller ground.	System supply voltage Output driver is commanded on Ignition switch is in crank or run position	> 11.00 Volts	100.00 failures out of 120.00 samples 250 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Valve - Open Position Performance	P0404	Diagnostic enables while EGR valve is commanded open and opening position remains stable within time limit. This diagnostic detects if the error between actual and desired is too large.	When EGR is commanded to open, check difference between actual and commanded position of the valve. If this error is more than error threshold than open position performance failure is set.	> 4.90 %	The following DTC's NOT active: Engine is running Off-board device PTO P0401 Intrusive Ignition voltage EGR control Desired EGR position variation Enable conditions met Desired EGR position	P0405 P0406 Active Not Active Not Active Not Active >= 11.00 Volt Enabled < 4.00 for 2.00 sec. 3.00 sec > 0%	80.00 failures out of 100.00 samples 100ms loop Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Valve - Position Sensor - Circuit Low	P0405	This diagnostic detects if the valve position feedback circuit is open or shorted to ground by comparing the sensor feedback to normal operating ranges	Raw EGR feedback sensor signal is less than the expected low limit If below allowed operating range, test fails.	Raw EGR feedback sensor signal < 8.00 %	The following DTC's NOT active:		53.00 failures out of 60.00 samples 100 ms Continuous	Type B, 2 Trips
					Engine Run State	Active		
					Off-board device	Not active		
					PTO	Not active		
					EGR Flow Insufficient (P0401)	Not intrusive		
					Ignition voltage	>= 11.00		
					EGR diagnostic	Enabled		
					Enable conditions met for	3.00 sec.		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Valve - Position Sensor - Circuit High	P0406	This diagnostic detects if the valve position feedback circuit is shorted to high voltage or the 5V return is open.	Raw EGR feedback sensor signal is greater than the expected high limit. By comparing the feedback value to the max allowed operating range.	Raw EGR feedback sensor signal > 89.00 %	The following DTC's NOT active: Engine Run State Off-board device PTO EGR Flow Insufficient (P0401) Ignition voltage EGR diagnostic Enable conditions met for	 Active Not active Not active Not intrusive >= 11.00 Enabled 3.00 sec.	53.00 failures out of 60.00 samples 100 ms Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor2 Ckt Range/ Performance	P040B	Determines the EGR temperature Sensor 2 has not moved enough since start after an allowed amount of EGR flow consumed by engine following a long enough soak.	After an allowed amount of EGR flow consumed by engine following a long enough soak, the Down Stream Temperature sensor has not change enough.	Absolute error between current temperature and Initial temperature <= **Down Stream Stk Temp Vrtn**	System supply voltage	> 11.00 Volts	Cumulative EGR Flow > 4,000.00 100 ms /sample, continuous	Type B, 2 Trips
					Engine soak (not run) time	>= 28,800.00 Sec		
					No Active DTCs	P262B		
					Engine is running	Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor2 Ckt Low	P040C	Diagnose the EGR Down Stream Temperature sensor circuit low if the feedback of the Down Stream temp sensor is below allowed operating range the sensor is faulted.	The ECM detects that the measured resistance of the temperature sensor is out of range low.	Measured Resistance of the Temperature sensor < 100.00 Ω impedance	System supply voltage Output driver is commanded on Ignition switch is in crank or run position	> 11.00 Volts	50 failures out of 63 samples 100 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor2 Ckt High	P040D	Diagnose the EGR Down Stream Temperature sensor circuit high if the feedback of the Down Stream temp sensor is above allowed operating range the sensor is faulted	The ECM detects that the measured resistance of the temperature sensor is out of range high.	Measured Resistance of the Temperature sensor > 1,400.00 Ω impedance	System supply voltage Output driver Ignition switch	> 11.00 Volts On Crank or Run	50 failures out of 63 samples 100 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor2 Ckt Intermittent/ Erratic	P040E	Detects a temperature sensor that is showing erratic or intermittent temperature readings. The temperature feedback is monitored in a 100 ms time loop. If the temperature is changing more than an allowed amount per loop the sensor is determined to be erratic.	The absolute value of the loop to loop (100 ms / sample) resistance change of the temperature sensor is greater than the allowed rate of change.	Delta change > 10.00 Ω impedance	System supply voltage Output driver Ignition switch	> 11.00 Volts On Crank or Run	15 failures out of 30 samples 100 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor1 Ckt Range/ Performance	P041B	Determines the EGR temperature Sensor 1 has not moved enough since start after an allowed amount of EGR flow consumed by engine following a long enough soak.	After an allowed amount of EGR flow consumed by engine following a long enough soak, the Up Stream Temperature sensor has not change enough.	Absolute error between current temperature and Initial temperature <= **UP Stream Stk Temp Vrtn**	System supply voltage Engine soak (not run) time No Active DTCs Engine is running	> 11.00 Volts >= 28,800.00 Sec P262B Active	cumulative EGR Flow > 4,000.00 100 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor1 Ckt Low	P041C	Diagnose the EGR Up Stream Temperature sensor circuit low by measuring the resistance of the sensor circuit. If the measured resistance of the circuit is below the allowed operating range, the sensor is out of range low.	The ECM detects that the measured resistance of the temperature sensor is out of range low.	Measured Resistance of the Temperature sensor < 100.00 Ω impedance	System supply voltage Output driver is commanded on Ignition switch is in crank or run position	> 11.00 Volts	53 failures out of 60 samples 100 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor1 Ckt High	P041D	Diagnose the EGR Up Stream Temperature sensor circuit high by measuring the resistance of the sensor circuit. If the measured resistance of the circuit is above the allowed operating range, the sensor is out of range high.	The ECM detects that the measured resistance of the temperature sensor is out of range high.	Measured Resistance of the Temperature sensor > 1,400.00 Ω impedance	System supply voltage Output driver is commanded on Ignition switch is in crank or run position	> 11.00 Volts	50 failures out of 63 samples 100 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor1 Ckt Intermittent/ Erratic	P041E	Detects a temperature sensor that is showing erratic or intermittent temperature readings. The temperature feedback is monitored in a 100 ms time loop. If the temperature is changing more than an allowed amount per loop the sensor is determined to be erratic.	The absolute value of the loop to loop (100 ms / sample) resistance change of the temperature sensor is greater than the allowed rate of change.	Delta chage impedance > 10.00 Ω	System supply voltage Output driver Ignition switch	> 11.00 Volts On Crank or Run	15 failures out of 30 samples 100 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Catalyst System Low Efficiency Bank 1	P0420	NOTE: The information below applies to applications that use the Decel Catalyst Monitor Algorithm Oxygen Storage. The catalyst washcoat contains Cerium Oxide. Cerium Oxide reacts with NO and O2 during lean A/F excursions to store the excess oxygen (I.e. Cerium Oxidation). During rich A/F excursions, Cerium Oxide reacts with CO and H2 to release this stored oxygen (I.e. Cerium Reduction). This is referred to as the Oxygen Storage Capacity, or OSC. CatMon's strategy is to "measure" the OSC of the catalyst through forced Rich (intrusive rich) and Lean (decel fuel cutoff) A/F excursions Normalized Ratio OSC Value Calculation Information and Definitions = 1. Raw OSC Calculation = (post cat O2 Resp time - pre cat O2 Resp time) 2. BestFailing OSC value from a calibration	Normalized Ratio OSC Value (EWMA filtered)	< 0.35	All enable criteria associated with P0420 can be found under P2270 - (O2 Sensor Signal Stuck Lean Bank 1 Sensor 2) Rapid Step Response (RSR) feature will initiate multiple tests: If the difference between current EWMA value and the current OSC Normalized Ratio value is and the current OSC Normalized Ratio value is Maximum number of RSR tests to detect failure when RSR is enabled. MAF Predicted catalyst temperature Front O2 Sensor or Front WRAF Rear O2 Sensor General Enable Criteria In addition to the p-codes listed under P2270, the following DTC's shall also	> 0.66 < 0.10 8 > 2.00 g/s < 30.00 g/s < 910 ° C > 680.00 mV or > 1.25 EQR > 700.00 mV	1 test attempted per valid decel period Minimum of 1 test per trip Maximum of 3 tests per trip Frequency: Fueling Related : 12.5 ms OSC Measurements: 100 ms Temp Prediction: 12.5ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		table (based on temp and exhaust gas flow) 3. WorstPassing OSC value (based on temp and exhaust gas flow) Normalized Ratio Calculation = (1-2) / (3-2) A Normalized Ratio of 1 essentially represents a good part and a ratio of 0 essentially represents a very bad part. Refer to the **P0420_WorstPassingOSCTableB1** and **P0420_BestFailingOSCTableB1** in Supporting Tables tab for details The Catalyst Monitoring Test is completed during a decel fuel cutoff event. This fuel cutoff event occurs following a rich instrusive fueling event initiated by the O2 Sensor Signal Stuck Lean Bank 1 Sensor 2 test (P2270). Several conditions must be met in order to execute this test. Additional conditions and their related values			not be set: For switching O2 sensors: For WRAF O2 sensors:	 O2S_Bank_1_Sensor_1_FA O2S_Bank_1_Sensor_2_FA O2S_Bank_2_Sensor_1_FA O2S_Bank_2_Sensor_2_FA WRAF_Bank_1_FA WRAF_Bank_2_FA **P0420_WorstPassingOSCTableB1** **P0420_BestFailingOSCTableB1**		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		are listed in the "Secondary Parameters" and "Enable Conditions" section of this document for P2270 (O2 Sensor Signal Stuck Lean Bank 1 Sensor 2)						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Reference Orifice Low Flow (ELCP Sealed Fuel System)	P043E	A plugged ELCP reference orifice is detected. When the ELCP vacuum pump is on, the ELCP pressure sensor (gauge) measures the vacuum across the reference orifice. The reference vacuum is established when the test time expires. If the reference vacuum is above a maximum reference vacuum threshold then this would indicate a plugged reference orifice. 1st Reference Vacuum Measurement If the 1st reference vacuum measurement is above a maximum threshold then a failure is reported for P043E. This condition could indicate a plugged reference orifice or high flow ELCP vacuum pump. If a failure is detected then the ELCP EVAP diagnostic test sequence is complete. In a passing condition,	If 1st 0.020” reference orifice vacuum averaged measurement is after then a plugged ELCP reference orifice is detected and the DTC fails. Or If 2nd 0.020” reference orifice vacuum averaged measurement is after then a plugged ELCP reference orifice is detected and the DTC fails.	3 second ≥ refer to **P043E First Reference Orifice Measurement** in Supporting Tables 360 seconds 3 second ≥ refer to **P043E Second Reference Orifice Measurement** in Supporting Tables 30 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 ****************************** ELCP hardware can be powered by battery or powertrain relay. For this application the ELCP hardware is powered by battery Voltage ****************************** Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test Refueling request button	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ****************************** ≥ 10 volts ****************************** ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 %	Up to twice per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		the P043E will not report a pass at this time since this diagnostic is run again during the 2nd reference orifice check section. 2nd Reference Vacuum Measurement If the 2nd reference vacuum measurement is above a maximum threshold then a failure is reported for P043E. This condition could indicate a plugged reference orifice or high flow ELCP vacuum pump. If a failure is detected then the ELCP EVAP diagnostic test sequence is complete. In a passing condition, the P043E will report a pass at this time.			pressed Service bay test active Device control exceeds No Active DTC's No Active DTC's TFTKO	 0.5 seconds FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P043F P0451 P145C P145D P145E P1462 P2421 P2422 P2450 P24B9		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Reference Orifice High Flow (ELCP Sealed Fuel System)	P043F	A missing ELCP reference orifice is detected. When the ELCP vacuum pump is on, the ELCP pressure sensor (gauge) measures the vacuum across the reference orifice. The reference vacuum is established when the test time expires. If the reference vacuum is below a minimum reference vacuum threshold then this would indicate a missing reference orifice. 1st Reference Vacuum Measurement If the 1st reference vacuum measurement is below a minimum threshold then a failure is reported for P043F. This condition could indicate a missing reference orifice or low flow ELCP vacuum pump. If a failure is detected then the ELCP EVAP diagnostic test sequence is complete. In a passing condition, P043F will not report a pass at this	If 1st 0.020” reference orifice vacuum averaged measurement is after then a missing ELCP reference orifice is detected and the DTC fails. Or If 2nd 0.020” reference orifice vacuum averaged measurement is after then a missing ELCP reference orifice is detected and the DTC fails.	3 second ≤ refer to **P043F First Reference Orifice Measurements** in Supporting Tables 360 seconds 3 second ≤ refer to **P043F Second Reference Orifice Measurements** in Supporting Tables 30 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 ****************************** ELCP hardware can be powered by battery or powertrain relay. For this application the ELCP hardware is powered by battery Voltage ****************************** Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test Refueling request button	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ****************************** ≥10 volts ****************************** ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥190 % ≤ 200 %	Up to twice per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		time since this diagnostic is run again during the 2nd reference orifice check section. 2nd Reference Vacuum Measurement If the 2nd reference vacuum measurement is below a minimum threshold then a failure is reported for P043F. This condition could indicate a missing reference orifice or low flow ELCP vacuum pump. If a failure is detected then the ELCP EVAP diagnostic test sequence is complete. In a passing condition, P043F will report a pass at this time.			pressed Service bay test active Device control exceeds No Active DTC's No Active DTC's TFTKO	 0.5 seconds FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P043E P0451 P145C P145D P145E P1462 P2421 P2422 P2450 P24B9		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EVAP System Small Leak Detected (ELCP Sealed Fuel System)	P0442	A small leak (≥ 0.020") is detected in the EVAP system between the fuel cap, purge solenoid, and diurnal control valve (DCV).The ELCP vacuum pump creates a vacuum across a 0.020" reference orifice. This reference vacuum is then compared to the vacuum level created in the fuel tank to determine if a leak exists. The diagnostic has fast pass capability. If the Fuel Tank Pressure (FTP) sensor measures a fuel tank system pressure greater than 1,276 Pa or a fuel tank system vacuum greater than -1,278 Pa then both the small leak and large leak diagnostics pass without using the ELCP vacuum pump.	If the ELCP pressure sensor (gauge) vacuum reading is less than the 2nd 0.020" reference orifice vacuum measurement for then the fuel tank system has a small leak and the DTC fails.	400 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 ****************************** ELCP hardware can be powered by battery or powertrain relay. For this application the ELCP hardware is powered by battery Voltage ****************************** Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test Refueling request button	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ****************************** ≥10 volts ****************************** ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 %	Once per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					pressed Service bay test active Device control exceeds No Active DTC's No Active DTC's TFTKO	 0.5 seconds FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P043E P043F P0451 P145C P145D P145E P145F P1462 P2421 P2422 P2450 P24B9		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Purge Control Valve Open Circuit (ELCP Sealed/ Vented Fuel System)	P0443	Controller specific output driver circuit diagnoses the canister purge solenoid low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	≥ 200 K Ω impedance between output and controller ground.	Powertrain relay voltage	Voltage ≥ 11.0 volts	20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0458 may also set (Canister Purge Solenoid Short to Ground)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission (EVAP) Vent System Performance Diagnostic (ELCP Sealed Fuel System)	P0446	EVAP vent system restriction is detected. The vent restriction diagnostic (P0446) is intrusive and runs as part of the purge valve low flow (P0497) diagnostic. It is a X out of Y diagnostic that runs once per trip. The same hysteresis calibrations that define the operating range for the P0497 diagnostic are also used for the vent restriction diagnostic. When the P0497 diagnostic is running purge priority is requested along with an engine vacuum request. The purge priority and vacuum request are maintained until both the P0497 and P0446 diagnostics are complete, or until a maximum engine vacuum request time is reached. The P0446 diagnostic will not begin until the P0497 diagnostic is in a passing condition. If the P0497 diagnostic detects a failure, then the P0446 diagnostic will not execute.	After an initial time delay of if the Fuel Tank Pressure (FTP) sensor indicates a vacuum level is then the fail counter is incremented.	10 seconds, < -3,238 Pa	Min baro Max baro Min OAT Max OAT ****************************** Conditions for corrected / estimated ambient temperature using OAT sensor to be valid = TRUE ****************************** Engine RPM to enable Engine RPM to re-enable Engine vac to enable Engine vac to re-enable Engine airflow to enable Engine airflow to re-enable Fuel level Purge flow to enable Purge flow to re-enable Purge DC to enable Purge DC to re-enable Requested purge flow to enable Delivered purge flow to re-enable Delivered purge flow to enable Vehicle not in assembly plant (value must = 0) Engine Running Run/Crank Voltage Purge is enabled Abort Conditions: Refueling request button pressed Device control exceeds	≥ 70 Pa ≤ 110 kPa ≥ 4 °C ≤ 35 °C ****************************** ****************************** 1,400 ≤ RPM ≤ 3,400 1,500 ≤ RPM ≤ 3,300 15 kPa ≤ vac ≤ 56 kPa 16 kPa ≤ vac ≤ 54 kPa 5 gps ≤ airflow ≤ 29 gps 6 gps ≤ airflow ≤ 27 gps ≤ 90 % ≥ 0.17 gps ≥ 0.18 gps ≥ 14.5 % ≥ 15.5 % ≥ 2.94 % ≥ 2.89 % ≥ 2.06 % 0 ≥ 11.0 volts 0.5 seconds	50 failures out of 63 samples Once per trip when Propulsion System Active and Engine On 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		If a passing condition is reached for the P0497 diagnostic there is then a short time delay before starting the P0446 diagnostic. This allows the ELCP switching valve to transition back to the vent position and the vacuum in the fuel tank to return to normal operating levels. After this time delay the FTP sensor is monitored and compared to an upper vacuum threshold and the sample counter begins to increment. If the vacuum in the fuel tank exceeds the threshold then the fail counter increments. If the fail counter reaches its threshold then a fail is reported for P0446. A pass is reported for P0446 if the sample counter reaches its threshold. The diagnostic concludes when either the fail or sample counters reach their threshold calibrations.			Passing DTC's No Active DTC's No Active DTC's TFTKO	P0497 MAP_SensorFA EnginePowerLimited AmbientAirDefault OAT_EstAmbTemp_FA FuelLevelDataFault P0442 P0443 P0449 P0451 P0452 P0453 P0455 P0458 P0459 P0497 P0498 P0499 P145D P145E P2400 P2401 P2402 P2418 P2419 P2420 P2422 P2450 P24B9 P24BA P24BB		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Vent Solenoid Control Open Circuit (ELCP Sealed Fuel System)	P0449	Controller specific output driver circuit diagnoses the vent solenoid low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	≥ 200 K Ω impedence between output and controller ground			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0498 may also set (Vent Solenoid Short to Ground)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Tank Pressure (FTP) Sensor Circuit Performance Diagnostic (ELCP Sealed Fuel System)	P0451	Fuel Tank Pressure (FTP) sensor correlation diagnostic. Propulsion System Off The FTP sensor correlation follows the ELCP pressure sensor correlation diagnostic. For the FTP sensor to ELCP pressure sensor correlation, the ELCP vacuum pump is off, the ELCP switching valve is in the pump position, and the DCV is open. The ELCP switching valve transitions to the pump position with a short delay time before opening the DCV to prevent excessive venting of the fuel tank. There is another short delay time to allow the ELCP pressure sensor to stabilize with the pressure or vacuum in the fuel tank before the FTP sensor correlation is started. In the case where the pressure or vacuum in the fuel tank is beyond the FTP sensor range the correlation check is based on the ELCP	Purge off time After a delay time of and a stabilization time of This section of the diagnostic can both pass and fail IF 1) the FTP sensor reading is and the FTP sensor is in a readable range. OR 2) the ELCP pressure sensor (gauge) reading is and the ELCP pressure sensor indicates that the FTP sensor is in a readable range. THEN If the average difference between the FTP sensor reading and ELCP pressure sensor (gauge) reading is after then a FTP sensor correlation failure has been detected and the DTC fails. This section of the diagnostic can only pass IF 1) the FTP sensor reading	> 5 seconds 2 seconds 3 seconds > -4,010 Pa < 3,587 Pa, > -3,736 Pa < 3,313 Pa, > 1,021 Pa 5 seconds	Propulsion System Not Active Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 ***************************** ELCP hardware can be powered by battery or powertrain relay. For this application the ELCP hardware is powered by battery Voltage ***************************** Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh	 4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ***************************** ≥ 10 volts ***************************** ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 %	Once per trip with Propulsion System Not Active, for each required wake-up event Once per trip with Propulsion System Active and Engine On 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		pressure sensor also indicating high pressure or high vacuum in the fuel tank. If both sensors are above their thresholds for a period of time, then a pass is reported for P0451. In this condition, a failure cannot be detected, only a passing decision can be made. In the case where the FTP sensor is in a readable range the correlation check uses an average difference comparison between the FTP sensor and ELCP pressure sensor readings. This logic is also used when the FTP sensor is beyond its range but the ELCP pressure sensor indicates it should be in a readable range. The difference between the two sensor readings is averaged over a time period and then compared to a fail threshold. If the average difference is above the threshold, a fail is reported for P0451. The ELCP EVAP diagnostic test sequence is complete if a failure is detected.	is and the FTP sensor is outside its readable range. AND 2) the ELCP pressure sensor (gauge) reading is and the ELCP pressure sensor indicates that the FTP sensor is outside its readable range. THEN after the correlation is confirmed and the DTC passes.	< -4,010 Pa > 3,587 Pa, < -3,736 Pa > 3,313 Pa, 5 seconds	Max fuel level slosh Key up during test Refueling request button pressed Service bay test active Device control exceeds No Active DTC's No Active DTC's TFTKO Propulsion System Active and Engine On Min baro Max baro Min OAT Max OAT	≤ 200 % 0.5 seconds FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P145D P24B9 ≥ 70 kPa ≤ 110 kPa ≥ 4 °C ≤ 35 °C		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Propulsion System On This section describes the correlation diagnostic between the FTP and ELCP pressure sensors when the propulsion system is on. This diagnostic executes once per trip when the engine is running and purge is not enabled. If the engine does not come on during a trip then the FTP sensor correlation diagnostic does not run. This diagnostic follows the similar steps and shares the same calibration values that are used in the FTP sensor correlation diagnostic with propulsion system off. After the enable conditions are met, there is a short delay period before beginning the correlation check. This allows the two pressure sensors to stabilize in the case where purge was active prior. It also allows the DCV and ELCP switch valve to be in there proper states before			***************************** Conditions for corrected / estimated ambient temperature using OAT sensor to be valid = TRUE ***************************** Vehicle not in assembly plant (value must = 0) Engine Running Run/Crank Voltage Purge is not enabled ***************************** When FTP sensor is located in the fuel tank then additional conditions Fuel Level No Active DTC's ***************************** Abort Conditions: Refueling request button pressed Device control exceeds No Active DTC's No Active DTC's TFTKO	***************************** ***************************** 0 ≥ 11.0 volts ***************************** Section does not apply ≤ 90.0 % FuelLevelDataFault ***************************** 0.5 seconds MAP_SensorFA EnginePowerLimited AmbientAirDefault OAT_EstAmbTemp_FA P0442 P0443 P0449 P0452 P0453 P0455		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		beginning. Following this delay period, the ELCP switching valve is moved to the pump position. There is a short delay time before opening the DCV to prevent excessive venting of the fuel tank. There is another short delay time to allow the ELCP pressure sensor to stabilize with the fuel tank before the correlation diagnostic is started. In the case where the pressure or vacuum in the fuel tank is beyond the FTP sensor range, the correlation diagnostic is based on the ELCP pressure sensor also indicating high pressure or vacuum in the fuel tank. If both sensors are above their corresponding thresholds for a period of time then a pass is reported for P0451. In this condition a failure cannot be detected, only a passing decision can be made. In the case where the FTP sensor is in a				P0458 P0459 P0498 P0499 P145D P145E P2400 P2401 P2402 P2418 P2419 P2420 P2422 P2450 P24B9 P24BA P24BB		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		readable range, the correlation diagnostic uses an average difference comparison between the reading of the FTP and ELCP pressure sensors. This logic is also used when the FTP sensor is beyond its range but the ELCP pressure sensor indicates that it should be in a readable range. The difference between the two sensor readings is averaged over a time period and then compared to a fail threshold. If the average difference is above the fail threshold then a failure is reported for P0451.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage (ELCP Sealed/ Vented Fuel System)	P0452	This DTC will detect a Fuel Tank Pressure (FTP) sensor signal that is too low out of range. The FTP sensor circuit out of range diagnostic compares the raw sensor voltage to a lower voltage threshold. It is an X out of Y diagnostic that runs continuously anytime the controller is awake. If the sensor voltage is below the lower voltage threshold, the low fail counter then increments. If the low fail counter reaches its threshold then a fail is reported for P0452 DTC. A pass is reported for P0452 DTC if the low sample counter reaches its threshold.	FTP sensor signal The normal operating range of the FTP sensor is 0.5 volts (~ -3757 Pa) to 4.5 volts (~ 3329 Pa).	< 0.15 volts (3.0 % of Vref or ~ -4,111 Pa)			640 failures out of 800 samples 12.5 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Tank Pressure (FTP) Sensor Circuit High Voltage (ELCP Sealed/ Vented Fuel System)	P0453	This DTC will detect a Fuel Tank Pressure (FTP) sensor signal that is too high out of range. The FTP sensor circuit out of range diagnostic compares the raw sensor voltage to an upper voltage threshold. It is an X out of Y diagnostic that runs continuously anytime the controller is awake. If the sensor voltage is above the upper voltage threshold, the high fail counter then increments. If the high fail counter reaches its threshold then a fail is reported for P0453 DTC. A pass is reported for P0453 DTC if the high sample counter reaches its threshold.	FTP sensor signal The normal operating range of the FTP sensor is 0.5 volts (~ -3757 Pa) to 4.5 volts (~ 3329 Pa).	> 4.85 volts (97.0 % of Vref or ~ 3,684 Pa)			640 failures out of 800 samples 12.5 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EVAP System Large Leak Detected (ELCP Sealed Fuel System)	P0455	A large leak (>> 0.020") is detected in the EVAP system between the fuel cap, purge solenoid, and diurnal control valve (DCV) after a refueling event has been detected.The ELCP vacuum pump creates a vacuum across a 0.020" reference orifice. This reference vacuum is then compared to the vacuum level created in the fuel tank to determine if a leak exists.The diagnostic has fast pass capability. If the Fuel Tank Pressure (FTP) sensor measures a fuel tank system pressure greater than 1,276 Pa or a fuel tank system vacuum greater than -1,278 Pa then both the small leak and large leak diagnostics pass without using the ELCP vacuum pump.The Fast Pass Full Test Sequence is conducted on the 0 th consecutive fast pass. All other times, the Fast Pass Reduced Test Sequence is conducted to conserve battery state of charge. The Fast Pass Reduced	After a refueling event has been detected and the small/large leak diagnostics have not passed. A refueling event is detected when there is a fuel level increase ≥ 10 % for ≥ 5 seconds. If the ELCP pressure sensor (gauge) vacuum reading is less than the 2nd 0.020" reference orifice vacuum measurement times a for then the fuel tank system has a large leak and the DTC fails.	0.20 multiplier 400 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 ****************************** ELCP hardware can be powered by battery or powertrain relay. For this application the ELCP hardware is powered by battery Voltage ****************************** Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Refueling request active true Abort Conditions: Min fuel level slosh	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ****************************** ≥ 10 volts ****************************** ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 %	Once per trip after a refueling event has been detected, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Test Sequence includes the following diagnostics: ELCP Pump Stuck On (P145D), ELCP Sensor Performance (P1458), FTP Sensor Performance (P0451), DCV Stuck Closed (P2422), DCV Stuck Open (P2421), Small Leak (P0442) and Large Leak (P0455) diagnostics. Additional Information The large leak diagnostic (P0455) can only be used on fuel systems with fuel caps. The large leak diagnostic (P0455) occurs at the same time the small leak diagnostic evaluation is being done and uses the same EVAP leak check vacuum result. If the small leak diagnostic result is in a passing condition then the large leak diagnostic is also considered passing. The large leak diagnostic can only fail if a prior refueling event was detected. If a prior refueling event was detected and the			Max fuel level slosh Key up during test Refueling request button pressed Service bay test active Device control exceeds No Active DTC's No Active DTC's TFTKO	≤ 200 % 0.5 seconds FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P043E P043F P0451 P145C P145D P145E P145F P1462 P2421 P2422 P2450 P24B9		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		EVAP leak check vacuum result did not reach the 2nd reference vacuum measurement then the large leak diagnostic failure condition is evaluated. The large leak diagnostic pass/ fail decision is then based on comparing the EVAP leak check vacuum result to the large leak threshold. The large leak threshold is calculated by applying a factor to the 2nd reference vacuum measurement. If the EVAP leak check vacuum result is less than the large leak threshold then P0455 is considered failing. The large leak diagnostic will be considered passing if the EVAP leak check vacuum result is greater than or equal to the large leak threshold. As with the small leak diagnostic, the DTC reporting for the large leak diagnostic does not occur until the rest of the sections (2nd reference orifice check and final check sections) successfully						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		complete. Until this occurs, results are temporary stored in VeELCR_e_LargeLeak Fault. With the ELCP leak check hardware it is difficult to distinguish between leak sizes greater than 0.040". A 0.040" leak will generate a vacuum result around 7-12% of the 1st reference vacuum measurement. A 0.090" leak will generate a vacuum result around 0-4% of the 1st reference vacuum measurement. Based on an agreement with CARB, the large leak diagnostic will only be used when a prior refueling event has occurred. The most likely time the fuel cap will be loose or left off is after a refueling event. The large leak diagnostic also has the CARB approved capability of extinguishing the MIL after 1 pass since the "tighten fuel cap" message is supported.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Purge Control Valve Circuit Low (ELCP Sealed/ Vented Fuel System)	P0458	Controller specific output driver circuit diagnoses the canister purge solenoid low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	≤ 0.5 Ω impedence between output and controller ground	Powertrain relay voltage	Voltage ≥ 11.0 volts	20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0443 may also set (Canister Purge Solenoid Open Circuit)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Purge Control Valve Circuit High (ELCP Sealed/ Vented Fuel System)	P0459	Controller specific output driver circuit diagnoses the canister purge solenoid low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	≤ 0.5 Ω impedence between output and controller power	Powertrain relay voltage	Voltage ≥ 11.0 volts	20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Level Sensor 1 Performance (For use on vehicles with a single fuel tank)	P0461	This DTC will detect a primary fuel tank level sensor stuck in-range.	a) Sensed fuel volume change is b) while engine fuel consumption is	a) < 3 liters b) >= 15.70 liters	1. Diagnostic Enabled 2. Engine Operational State	1. == True 2. == Running	250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Level Sensor 1 Circuit Low Voltage	P0462	This DTC will detect a primary fuel tank sensor stuck out-of-range low.	Fuel level Sender % of 5V range	< 10 % or 33.11 liters	a) Diagnostic enabled status b) Fuel Level Sensor Initialized status c) Fuel Level Sensor Data Available Status d) Communication faults status	a) == True b) == True c) == True d) <> True	100 failures out of 125 samples 100 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Level Sensor 1 Circuit High Voltage	P0463	This DTC will detect a primary fuel tank level sensor stuck out-of-range high.	Fuel level Sender % of 5V range	> 60 % or 1.88 liters	a) Diagnostic enabled status b) Fuel Level Sensor Initialized status c) Fuel Level Sensor Data Available Status d) Communication faults status	a) == True b) == True c) == True d) <> True	100 failures out of 125 samples 100 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Solenoid Circuit Low	P0489	This DTC checks the EGR circuit for electrical shorts to ground.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match by monitoring the PWM voltage sent to the EGR Valve. If the PWM voltage is pulled down below an allowed operating threshold the circuit is determined to be shorted to ground : LSO	< 0.15 volts (3.0 % of Vref (5V)	System supply voltage Output driver is commanded on Ignition switch is in crank or run position	> 11.00 Volts	100.00 failures out of 120.00 samples250 ms / sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Solenoid Circuit High	P0490	This DTC checks the EGR circuit for electrical shorts to high voltage.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match by monitoring the PWM voltage sent to the EGR Valve. If the PWM voltage is pulled up above an allowed operating threshold the circuit is determined to be shorted to power : LSO	> 4.85 volts (97.0% of Vref (5 V)	System supply voltage Output driver is commanded on Ignition switch is in crank or run position	> 11.00 Volts	100.00 failures out of 120.00 samples 250 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Low Purge Flow Diagnostic (ELCP Sealed Fuel System)	P0497	Low purge flow is detected. This diagnostic is executed once per trip when the engine is running and purge enabled. Various parameters are monitored and compared to hysteresis thresholds so that the diagnostic can be run in a reliable purge flow region. In certain conditions, the purge low flow diagnostic has the ability to extinguish the MIL after only 1 pass. This is allowed under the following conditions, the first failure occurs after a refueling event and the MIL was not already on for P0497. This is the likely scenario where the customer left the fuel cap off after the refuel event, failed the purge low flow diagnostic, and later put the fuel cap back on. Note: The MIL not on condition is based on agreements with CARB. If the MIL was	After an initial time delay of when the Fuel Tank Pressure (FTP) sensor reading is or after an initial time delay of when the FTP sensor reading is plus an ELCP switching valve delay time of if the ELCP pressure sensor (gauge) indicates a vacuum change for then a low purge flow failure has been detected and the DTC fails.	3 seconds ≥ 299 Pa 3 seconds < 299 Pa 0.2 seconds, < 2,000 Pa 20 seconds	Min baro Max baro Min OAT Max OAT ****************************** Conditions for corrected / estimated ambient temperature using OAT sensor to be valid = TRUE ****************************** Engine RPM to enable Engine RPM to re-enable Engine vac to enable Engine vac to re-enable Engine airflow to enable Engine airflow to re-enable Fuel level Purge flow to enable Purge flow to re-enable Purge DC to enable Purge DC to re-enable Requested purge flow to enable Delivered purge flow to re-enable Delivered purge flow to enable Vehicle not in assembly plant (value must = 0) Engine Running Run/Crank Voltage Purge is enabled Abort Conditions: Refueling request button pressed	≥ 70 kPa ≤ 110 kPa ≥ 4 °C ≤ 35 °C ****************************** ****************************** 1,400 ≤ RPM ≤ 3,400 1,500 ≤ RPM ≤ 3,300 15 kPa ≤ vac ≤ 56 kPa 16 kPa ≤ vac ≤ 54 kPa 5 gps ≤ airflow ≤ 29 gps 6 gps ≤ airflow ≤ 27 gps ≤ 90 % ≥ 0.17 gps ≥ 0.18 gps ≥ 14.5 % ≥ 15.5 % ≥ 2.94 % ≥ 2.89 % ≥ 2.06 % 0 ≥ 11.0 volts	Once per trip with Propulsion System Active and Engine On 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		turned on not due to a refueling event, then the 3 pass MIL off rule needs to be maintained until the MIL is extinguished. If the first failure did not occur after a refueling event or the MIL was already on for P0497, then 3 passes are needed to extinguish the MIL. Using the 1 or 3 pass MIL off is a calibration option. On capless fuel systems, 3 passes are always needed to extinguish the MIL The diagnostic is enabled when the thresholds for requested purge flow, engine RPM, engine airflow, and engine vacuum are met. When these conditions are satisfied then purge priority along with a maximum purge duty cycle value is requested. Once purge priority is granted, an engine vacuum request is made. The ECM communicates with the hybrid controller which allows the engine to operate in a condition that produces the			Device control exceeds No Active DTC's No Active DTC's TFTKO	0.5 seconds MAP_SensorFA EnginePowerLimited AmbientAirDefault OAT_EstAmbTemp_FA FuelLevelDataFault P0442 P0443 P0449 P0451 P0452 P0453 P0455 P0458 P0459 P0498 P0499 P145D P145E P2400 P2401 P2402 P2418 P2419 P2420 P2422 P2450 P24B9 P24BA P24BB		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		minimum desired vacuum level. Once the vacuum request is made, various parameters (which include delivered purge flow, engine RPM, engine airflow, engine vacuum, unfiltered purge flow, and purge duty cycle) are monitored for proper purge flow and operating conditions. If those conditions are lost for a period of time greater than a threshold then purge priority is released. Purge priority will not be requested again until a period of time greater than threshold has elapsed. This allows other diagnostics the opportunity to run. The engine vacuum request is also limited to a maximum time per trip. It is a cumulative timer and once the threshold is reached the request will be cancelled and not requested again for the remainder of the trip. If the operating conditions are met						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		there is then a period of time to allow pressure or vacuum in the fuel tank to reach normal operating levels with purge enabled. This time period is based on whether there is pressure or vacuum in the fuel tank initially as indicated by the FTP sensor. If there is vacuum in the fuel tank then the DCV will already be open and this stabilization period will allow for high levels of vacuum to bleed down before starting the purge flow check. If there is pressure in the fuel tank then the DCV will be closed and this stabilization period will allow time to purge the fuel tank of pressure before opening the DCV. After the pressure stabilization period ends, the DCV will be commanded open to run the purge flow check even if there is still pressure in the fuel tank. There is a calibratable option that prevents autostop and DFCO from occurring above a						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		vehicle speed once the stabilization period is complete. If the vehicle speed drops below this calibration then autostop and DFCO are allowed. Using this option may provide more opportunity to complete the diagnostic quicker. When the stabilization period is complete, the ELCP switching valve is moved to the pump position allowing the ELCP pressure sensor to have communication with the fuel tank. A short time later a reading from the ELCP pressure sensor is taken which represents the initial pressure value. The ELCP pressure sensor is then continuously monitored and compared to the initial pressure value. If the difference is greater than a threshold calibration then purge flow is considered to be present and the ELCP switching valve is moved to the vent position. A pass for P0497 is not						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		reported at this time; the engine vacuum request remains active and the operating conditions are monitored until the test timer reaches the fail time threshold calibration. Once the fail time threshold is reached a pass is reported for P0497 and the purge priority and engine vacuum request are released. If the vacuum difference was not achieved within the fail time then a fail is reported for P0497 indicating no purge flow present. The purge priority and engine vacuum request are released once the purge low flow diagnostic and vent restriction diagnostic are complete.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Vent Solenoid Control Circuit Low (ELCP Sealed Fuel System)	P0498	Controller specific output driver circuit diagnoses the vent solenoid low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	≤ 0.5 Ω impedence between output and controller ground			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0449 may also set (Vent Solenoid Open Circuit)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Vent Solenoid Control Circuit High (ELCP Sealed Fuel System)	P0499	Controller specific output driver circuit diagnoses the vent solenoid low sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds. If the P0499 is active, an intrusive test is performed with the vent solenoid commanded closed for 15 seconds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	 ≤ 0.5 Ω impedence between output and controller power			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cold Start Rough Idle	P050D	Monitors the combustion performance when the cold start emission reduction strategy is active by accumulating and determining the percentage of engine cycles that have less than complete combustion relative to the total number of engine cycles in which Dual Pulse is active.	Deceleration index vs. Engine Speed Vs Engine load Deceleration index calculation is tailored to specific vehicle. Tables used are 1st tables encountered that are not max of range. Undetectable region at a given speed/load point is where all tables are max of range point. Incomplete combustion identified by P0300 threshold tables:	(>Idle SCD AND >Idle SCD ddt Tables) OR (>Idle Cyl Mode AND > Idle Cyl Mode ddt Tables)	Misfire Algorithm Enabled (Refer to P0300 for Enablement Requirements)		Runs once per trip when the cold start emission reduction strategy is active and Dual Pulse is enabled and active. Frequency: 100ms Test completes after Dual Pulse is no longer active OR The first 500 engine cycles have been reached	Type B, 2 Trips
					OBD Manufacturer Enable Counter	= 0		
					To enable the diagnostic, the Cold Start Emission Reduction Strategy Must Be Active per the following:			
					Catalyst Temperature AND	< 350.00 degC		
					Engine Coolant AND	> -12.00 degC		
					Engine Coolant AND	<= 66.00 degC		
					Barometric Pressure	>= 76.00 KPa		
					In addition, Dual Pulse Strategy Is Enabled and Active Per the following:			
					Engine Speed	>= 450.00 RPM <= 2,200.00 RPM		
					Accel Position	<= 110.00 Pct		
					Engine Run Time	< 30 seconds		
					For the engine speeds and loads in which Dual Pulse is active:			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Dual Pulse Error induced misfires percentage	>= catalyst damaging misfire		
					Dual Pulse Error induced misfires percentage	< 90% of the maximum achieveable catalyst damaging misfire.		
					Engine Cycles	>= 50 < 501		
					The Cold Start Emission Reduction strategy must not be exiting. The strategy will exit per the following:			
					Catalyst Temperature AND Engine Run Time	>= 900.00 degC >= 30.00 seconds		
					OR			
					Engine Run Time	> **P050D_P1400_CatalystLightOffExtendedEngineRunTimeExit** This Extended Engine run time exit table is a function of percent ethanol and Catmons NormRatioEWMA. Refer to "Supporting Tables" for details.		
					OR			
					Barometric Pressure	< 76.00 KPa		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Dual Pulse Strategy will exit per the following:			
					Engine Speed OR	> 2,400.00 RPM		
					Accel Position	> 110.00 Pct		
					Engine Run Time	>= 30 seconds		
					Dual Pulse Strategy will also exit if the any of the "Additional Dual Pulse Enabling Criteria" is not satisfied:			
					"Additional Dual Pulse Enabling Criteria":			
					Green Engine Enrichment	Not Enabled		
					Misfire Converter Protection strategy	Not being requested		
					Engine Metal Overtemp strategy	Not being requested		
					Fuel control state	Open Loop		
					Output State Control	Not being requested for fuel		
					DOD Or DFCO	Not Active		
					Power Enrichment	Not Active		
					Dynamic Power Enrichment	Not Active		
					Piston Protection	Not Active		
					Hot Coolant Enrichment	Not Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Injector Flow Test	Not Active		
					General Enable			
					DTC's Not Set:	AcceleratorPedalFailure ECT_Sensor_FA IAT_SensorCircuitFA MnfdTempSensorCktFA CrankSensor_FA FuelInjectorCircuit_FA MAF_SensorFA MAP_SensorFA AnyCamPhaser_TFTKO ClutchPstnSnsr FA IAC_SystemRPM_FA IgnitionOutputDriver_FA TPS_FA VehicleSpeedSensor_FA FuelInjectorCircuit_TFTKO FHPR_b_FRP_SnsrCkt_FA FHPR_b_FRP_SnsrCkt_TFTKO FHPR_b_PumpCkt_FA FHPR_b_PumpCkt_TFTKO TransmissionEngagedState_FA EngineTorqueEstInaccurate FuelPumpRlyCktFA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Pressure (EOP) Sensor Performance - Two Stage Oil Pump	P0521	Determines if the Engine Oil Pressure (EOP) Sensor is stuck or biased in range. The engine oil pressure is compared against thresholds when engine is running and when engine is off.The engine oil pressure rationality diagnostic has two parts: engine runing test and engine off test. The engine running test compares the measured oil pressure to threshold. If the measured oil pressure is out of the thresholds, then the error counter increments. The engine off test compares the measured oil pressure against thresholds after the engine has stopped rotating. If the measured oil pressure is out of the thresholds, then the error counter increments.	**Two Stage Oil Pump EOP Sensor Test with Engine Running, High Pressure State**		Two Stage Oil Pump is Present = TRUE	TRUE		Type B, 2 Trips
					Pump is in high pressure state	Enabled		
			To Fail when previously passing with the engine running: Filtered Engine Oil Pressure below expected threshold	Filtered Oil Pressure < (**P0521_P06DD_P06DE_OP_HiStatePressure** * 0.90 - 75.0 kPa)	Engine Running Diagnostic Status	Test not report a fail state		
					Engine Off Rationality Test Diagnostic Reporting Status	Yes	≥ 40 errors out of 50 samples.	
					Oil Pressure Sensor In Use	≥ 10.0 seconds		
			OR	OR		≥ 70.0 kPa		
					Engine Running		Performed every 100 msec	
			Filtered Engine Oil Pressure above expected threshold	Filtered Oil Pressure > (**P0521_P06DD_P06DE_OP_HiStatePressure** * 1.10 + 75.0 kPa)		FALSE		
					Ambient Air Pressure			
					Oil Aeration (= TRUE if engine speed > 10,000 RPM for longer than 30.0 seconds)	1,000 RPM ≤ Filtered Engine Speed ≤ 4,500 RPM		
					Filtered Engine Speed within range	40.0 deg C ≤ Oil Temp ≤ 120.0 deg C		
					Modelled Oil Temperature within range			
			To pass when previously failing: Filtered Engine Oil Pressure above low threshold plus an offset	Filtered Oil Pressure > **P0521_P06DD_P06DE_OP_HiStatePressu** (**re** * 0.90 - 75.0 kPa + 10.0 kPa) OR	No active DTC's	Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA EngOilPressureSensorCktFA AmbientAirDefault EngOilTempFA CrankSensor_FA	≥ 10 passes out of 50 samples. Performed every 100 msec	
			OR	Filtered Oil Pressure < (				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Filtered Engine Oil Pressure below high threshold minus an offset	**P0521_P06DD_P06DE_OP_HiStatePressure** * 1.10 + 75.0 kPa - 10.0 kPa) (Details on Supporting Tables Tab: **P0521_P06DD_P06DE_OP_HiStatePressure**)				
			Two Stage Oil Pump EOP Sensor Test with Engine Running, Low Pressure State <u>To Fail when previously passing with the engine running:</u> Filtered Engine Oil Pressure below expected threshold OR Filtered Engine Oil Pressure above expected threshold	Filtered Oil Pressure < (**P0521_P06DD_P06DE_OP_LoStatePressure** * 0.90 - 75.0 kPa) OR Filtered Oil Pressure > (**P0521_P06DD_P06DE_OP_LoStatePressure** * 1.10 + 75.0 kPa)	Two Stage Oil Pump is Present = TRUE Pump is in low pressure state Engine Running Diagnostic Status Engine Off Rationality Test Diagnostic Reporting Status Oil Pressure Sensor In Use Engine Running Ambient Air Pressure Oil Aeration (= TRUE if engine speed > 10,000 RPM for longer than 30.0 seconds) Filtered Engine Speed within range Modelled Oil Temperature	TRUE Enabled Test not report a fail state Yes ≥ 10.0 seconds ≥ 70.0 kPa FALSE 1,000 RPM ≤ Filtered Engine Speed ≤ 4,500 RPM 40.0 deg C ≤ Oil Temp ≤ 120.0 deg C	≥ 40 errors out of 50 samples. Performed every 100 msec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			To pass when previously failing: Filtered Engine Oil Pressure above low threshold plus an offset OR Filtered Engine Oil Pressure below high threshold minus an offset	Filtered Oil Pressure > (**P0521_P06DD_P06DE_OP_LoStatePressure** * 0.90 - 75.0 kPa + 10.0 kPa) OR Filtered Oil Pressure < (**P0521_P06DD_P06DE_OP_LoStatePressure** * 1.10 + 75.0 kPa - 10.0 kPa) (Details on Supporting Tables Tab: **P0521_P06DD_P06DE_OP_LoStatePressure**)	within range No active DTC's	Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA EngOilPressureSensorCktFA AmbientAirDefault EngOilTempFA CrankSensor_FA	≥ 10 passes out of 50 samples. Performed every 100 msec	
			Two Stage Oil Pump EOP Sensor Test with Engine Off If enabled: To Fail when previously passing with the engine off: Filtered Engine Oil Pressure greater than threshold	Filtered Oil Pressure ≥ 40.0 kPa	Two Stage Oil Pump is Present = TRUE Engine Off Rationality Test Diagnostic Status Engine Running Rationality Test Diagnostic Status Modelled Oil Temperature No Engine Movement No active DTC's	TRUE Enabled Test not report a fail state ≥ 70.0 deg C > 10.0 seconds EngineModeNotRunTimer_FA EngOilTempFA	≥ 20 errors out of 40 samples. Run once per trip	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						EngOilPressureSensorCkt FA CrankSensor_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Pressure (EOP) Sensor Circuit Low Voltage	P0522	Determines if the Engine Oil Pressure (EOP) Sensor circuit voltage is too low. This diagnostic compares the EOP circuit voltage to the reference voltage.	(Engine Oil Pressure Sensor Circuit Voltage) ÷ 5 Volts) *100	< 5.00 percent Deadband: < 5 percent or > 95 percent	Engine Speed Enable Engine Speed Disable Oil Pressure Sensor In Use Diagnostic Status	> 400 rpm < 350 rpm Yes Enabled	800 failures out of 1,000 samples Performed every 6.25 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Pressure (EOP) Sensor Circuit High Voltage	P0523	Determines if the Engine Oil Pressure (EOP) Sensor circuit voltage is too high. This diagnostic compares the EOP circuit voltage to the reference voltage.	(Engine Oil Pressure Sensor Circuit Voltage) ÷ 5 Volts) *100	> 95.00 percent Deadband: < 5 percent or > 95 percent	Oil Pressure Sensor In Use Diagnostic Status	Yes Enabled	800 failures out of 1,000 samples Performed every 6.25 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Air Conditioning High Side Pressure Sensor (HSPS) Circuit Low Voltage	P0532	Determines if the Air Conditioning High Side Pressure Sensor circuit voltage is too low	(AC High Side Pressure Sensor Circuit Voltage) ÷ 5 Volts) *100	< 3 percent	AC HSP Sensor Present Diagnostic Status	Yes Enabled	80 failures out of 100 samples Performed every 25 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Air Conditioning High Side Pressure Sensor (HSPS) Circuit High Voltage	P0533	Determines if the Air Conditioning High Side Pressure Sensor circuit voltage is too high	(AC High Side Pressure Sensor Circuit Voltage) ÷ 5 Volts) *100	> 94 percent	AC HSP Sensor Present Diagnostic Status	Yes Enabled	80 failures out of 100 samples Performed every 25 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Mutil-Functon Switch Circuit	P0564	Detect when cruise control multi-function switch circuit (analog) voltage is in an invalid range	Cruise Control analog circuit voltage must be "between ranges" for greater than a calibratable period of time.	The cruise control analog voltage A/D count ratio is considerred to be "between ranges" when the ratio is measured in the following ranges: 0.28 -0.31, 0.415-0.445, 0.585 - 0.615 0.78 - 0.81, 1.005 - 1.035	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 0.500 seconds	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control On Switch Circuit	P0565	Detects a failure of the cruise on/off switch in a continously applied state	Cruise Control On switch remains applied for greater than a calibratable period of time.	fail continuously in the applied state for greater than 20.00 seconds	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 20.00 seconds	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Resume Circuit	P0567	Detects a failure of the cruise resume switch in a continously applied state	Cruise Control Resume switch remains applied for greater than a calibratable period of time.	fail continuously in the applied state for greater than 89.000 seconds	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 89.000 seconds	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Set Circuit	P0568	Detects a failure of the cruise set switch in a continously applied state	Cruise Control Set switch remains applied for greater than a calibratable period of time.	fail continuously in the applied state for greater than 89.000 seconds	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 89.000 seconds	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Cancel Switch Circuit	P056C	Detects a failure of the cruise cancel switch in a continously applied state	Cruise Control Cancel switch remains applied for greater than a calibratable period of time.	fail continously in the applied state for greater than 20.00 seconds	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 20.00 seconds	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Input Circuit	P0575	Determines if cruise switch state received from the BCM is valid.	If x of y rolling count / protection value faults occur, disable cruise for duration of fault	Message <> 2's complement of message Message rollling count<>previous message rolling count value plus one	Cruise Control Switch Serial Data Error Diagnostic Enable Serial communication to BCM Power Mode Engine Running	1.00 No loss of communication = RUN = TRUE	9 failures out of / 17 samples Performed on every received message 9 rolling count failures out of / 17 samples Performed on every received messagw	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake Pedal Position Sensor Circuit Range/ Performance	P057B	This diagnostic monitors the Brake Pedal Position Sensor for a stuck in range failure	.Brake pedal position sensor movement diagnostic cal is enabled 1.00	True	Brake Pedal Position Sensor Circuit Range / Performance Diagnostic Enable	1.00 ignition voltage > 10.00		MIL: Type A, 1 Trips
			Calculated EWMA value must be greater than calibratable theshold after calibratable number of tests have completed to report a "test passed" for P057B	EWMA value looked up in supporting table **P057B KtBRKI_K_FastTestPointWeight** P057B as a function of calculated brake pedal position delta EWMA value is > 0.80	calculated brake pedal position delta sample counter > 50.00 for fast test OR calculated brake pedal position delta sample counter > 1,000.00 for slow test	calculated brake pedal position delta > 4.30 OR (for slow test) shift lever has been in park once this key cycle vehicle speed >= 5.00 accelerator pedal position < 5.00	total number of EWMA tests > 20.00	
			Calculated EWMA Value must be less than calibratable threshold after calibratable number of tests have completed to report a "test failed" for P057B. This test runs once per key cycle	EWMA value looked up in supporting table **P057B KtBRKI_K_CmpltTestPointWeight** P057B as a function of calculated brake pedal position delta EWMA value is less thatn 0.40	no DTC's active (P057C, P057D)	shift lever has been in park once this key cycle vehicle speed >= 5.00 accelerator pedal position < 5.00	total number of EWMA tests > 2.00	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake Pedal Position Sensor Circuit Low	P057C	detects short to ground for brake pedal position sensor	If x of y samples are observed below failure threshold, default brake pedal position to zero percent.	5.00	Brake Pedal Position Sensore Low Voltage Diagnostic Enable	1.00	20 / 32.00 counts	MIL: Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake Pedal Position Sensor Circuit High	P057D	detects open circuit for brake pedal position sensor	If x of y samples are observed above failure threshold, default brake pedal position to zero percent and set DTC	95.00	Brake Pedal Position Sensore High Voltage Diagnostic Enable	1.00	20.00 / 32.00 counts	MIL: Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake Pedal Position Sensor Circuit Intermittent/ Erratic	P057E	detects noisy / erratic ouput for brake pedal position sensor	If x of y samples are observed above failure threshold, default brake pedal position to zero percent and set DTC	20.00	Brake Pedal Position Sensor Circuit Intermittent / Erratic Diagnostic Enable	1.00	5.00 / 20.00 counts	MIL: Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Multi-function Circuit Low Voltage	P0580	detects short to ground failure for cruise multi-function switch circuit	Cruise Control analog circuit voltage must be in an "Open Short To Ground" range for greater than a calibratable period of time.	The cruise control analog voltage A/D count ratio is considerred to be "open short to ground when the ratio is measured in the following rangs: 0 - 0.185	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 2.00 seconds	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Multi-function Circuit High Voltage	P0581	detects short to power failure for cruise multi-function switch circuit	Cruise Control analog circuit voltage must be in "Short To Power" range for greater than a calibratable period of time.	The cruise control analog voltage A/D count ratio is considered to be "short to power" when the ratio is measured in the following range: 1.005 - 1.035	CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 2.00 seconds	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Active Grill Air Shutter A Performance /Stuck OFF	P059F	A 2-part diagnostic. Part 1 continuously monitors for failure to achieve a commanded shutter actuator position [Suspect Stuck Condtion] when X failures occur in Y samples after an electronic command latency delay. Part 1 failure enables Part 2 which makes a fixed number of repeat attempts to reach the commanded postion [ReTry to clear obstruction]. The DTC is set when the calibrated fault threshold count of repeat attempts is reached without achieving the original commanded shutter position.	Smart Shutter Actuator 1 Position Response AND Shutter 1 Diagnostic Delay Threshold count	<> Smart Shutter Actuator 1 Commanded Position percent AND Counter > 99.00 counts	a. Ignition Run_Crank Active, b. Ignition Run_Crank AND Ignition Accessory AND ECU Awake, c. Command Shutter1 Enable	a. = TRUE, b. = FALSE AND = FALSE AND = TRUE, c. = 1.00	1.00 failures out of 1.00 samples 1 sample / 100 milliseconds	Type B, 2 Trips
			Shutter 1 Performance Test count	= 5.00 counts	a. Ignition Run_Crank Active, b. Ignition Run_Crank AND Ignition Accessory AND ECU Awake, c. Command Shutter1 Enable	a. = TRUE, b. = FALSE AND = FALSE AND = TRUE, c. = 1.00	1-5 actuator cycles [1 cycle typically requires 10-25 seconds]	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Read Only Memory (ROM)	P0601	This DTC will be stored if the calibration check sum is incorrect or the flash memory detects an uncorrectable error via the Error Correcting Code.	The Primary Processor's calculated checksum does not match the stored checksum value. Covers all software and calibrations.	1 failure if the fault is detected during the first pass. 5.00 failures if the fault occurs after the first pass is complete.			Diagnostic runs continuously in the background.	Type A, 1 Trips
			The Primary Processor's Error Correcting Code hardware in the flash memory detects an error. Covers all software and calibrations.	254 failures detected via Error Correcting Code			Diagnostic runs continuously via the flash hardware.	
			The Primary Processor's calculated checksum does not match the stored checksum value for a selected subset of the calibrations.	2 consecutive failures detected or 5 total failures detected.			Diagnostic runs continuously. Will report a detected fault within 200 ms.	
			The Secondary Processor's calculated checksum does not match the stored checksum value. Covers all software and calibrations.	1 failure if the fault is detected during the first pass. 5 failures if the fault occurs after the first pass is complete.			Diagnostic runs continuously in the background.	
				In all cases, the failure count is cleared when controller shuts down				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Not Programmed	P0602	This DTC will be stored if the ECU is a service part that has not been programmed.	Service (reflash) controller calibration present	= 1		none	Diagnostic runs at powerup and once per second continuously after that	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ECM Long Term Memory Reset	P0603	This DTC detects an invalid NVM which includes a Static NVM, Perserved NVM, ECC ROM in NVM Flash Region, and Perserved NVM during shut down.	Static NVM region error detected during initialization				Diagnostic runs at controller power up.	Type A, 1 Trips
			Perserved NVM region error detected during initialization				Diagnostic runs at controller power up.	
			ECC ROM fault detected in NVM Flash region ECC ROM Error Count >	 5			Diagnostic runs at controller power up.	
			Perserved NVM region error detected during shut down.				Diagnostic runs at controller power down.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ECM RAM Failure	P0604	Indicates that the ECM has detected a RAM fault. This includes Primary Processor System RAM Fault, Primary Processor Cache RAM Fault, Primary Processor TPU RAM Fault, Primary Processor Update Dual Store RAM Fault, Primary Processor Write Protected RAM Fault, and Secondary Processor RAM Fault. This diagnostic runs continuously.	Indicates that the primary processor is unable to correctly read data from or write data to system RAM. Detects data read does not match data written >=	254 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	Type A, 1 Trips
			Indicates that the primary processor is unable to correctly read data from or write data to cached RAM. Detects data read does not match data written >=	254 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	
			Indicates that the primary processor is unable to correctly read data from or write data to TPU RAM. Detects data read does not match data written >=	5 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	
			Indicates that the primary processor detects a mismatch between the data and dual data is found during RAM updates. Detects a mismatch in data and dual data updates >	0.47856 s			When dual store updates occur.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Indicates that the primary processor detects an illegal write attempt to protected RAM. Number of illegal writes are >	0 counts			Diagnostic runs continuously (background loop)	
			Indicates that the secondary processor is unable to correctly read data from or write data to system RAM. Detects data read does not match data written >=	5 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal ECM Processor Integrity Fault	P0606	Indicates that the ECM has detected an internal processor integrity fault. These include diagnostics done on the SPI Communication as well as a host of diagnostics for both the primary and secondary processsors.	Loss or invalid message of SPI communication from the Secondary Processor at initialization detected by the Primary Processor or loss or invalid message of SPI communication from the Secondary Processor after a valid message was received by the Primary Processor	Loss or invalid message at initialization detected or loss or invalid message after a valid message was recieved	Run/Crank voltage Run/Crank voltage	>= 6.41 Volts or >= 11.00 Volts, else the failure will be reported for all conditions	In the primary processor, 159 / 399 counts intermittent or 39 counts continuous; 39 counts continuous @ initialization. 12.5 ms /count in the ECM main processor	Type A, 1 Trips
			Loss or invalid message of SPI communication from the Primary Processor at initialization detected by the Secondary Processor or loss or invalid message of SPI communication from the Primary Processor after a valid message was received by the Secondary Processor	Loss or invalid message at initialization detected or loss or invalid message after a valid message was recieved			In the secondary processor, 20 / 200 counts intermittent or 0.1875 s continuous; 0.4750 s continuous @ initialization. 12.5 ms /count in the ECM secondary processor	
			Checks for stack over or underflow in secondary processor by looking for corruption of known pattern at stack boundaries. Checks number of stack over/ under flow since last powerup reset >=	5		KeMEMD_b_StackLimitTestEnbl == 1 Value of KeMEMD_b_StackLimitTestEnbl is: 1 . (If 0, this test is disabled)	variable, depends on length of time to corrupt stack	
			MAIN processor is verified by responding to a seed sent from the secondary with a key response to secondary. Checks number of incorrect keys	2 incorrect seeds within 8 messages, 0.2000 seconds		ignition in Run or Crank	150 ms for one seed continually failing	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			received > or Secondary processor has not received a new within time limit					
			Time new seed not received exceeded			always running	0.450 seconds	
			MAIN processor receives seed in wrong order			always running	3 / 17 counts intermittent. 50 ms/count in the ECM main processor	
			2 fails in a row in the Secondary processor's ALU check			KePISD_b_ALU_TestEnbld == 1 Value of KePISD_b_ALU_TestEnbld is: 1 . (If 0, this test is disabled)	25 ms	
			2 fails in a row in the Secondary processor's configuration register masks versus known good data			KePISD_b_ConfigRegTestEnbld == 1 Value of KePISD_b_ConfigRegTestEnbld is: 1 . (If 0, this test is disabled)	12.5 to 25 ms	
			Secondary processor detects an error in the toggling of a hardware discrete line controlled by the MAIN processor: number of discrete changes > = or < = over time window(50ms)	7 17		KePISD_b_MainCPU_SOH_FltEnbld == 1 Value of KePISD_b_MainCPU_SOH_FltEnbld is: 0 . (If 0, this test is disabled) time from initialization >= 0.4875 seconds	50 ms	
			Software background task first pass time to complete exceeds			Run/Crank voltage > 6.41	360.000 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			2 fails in a row in the MAIN processor's ALU check			KePISD_b_ALU_TestEnbld == 1 Value of KePISD_b_ALU_TestEnbld is: 1 . (If 0, this test is disabled)	25 ms	
			2 fails in a row in the MAIN processor's configuration register masks versus known good data			KePISD_b_ConfigRegTestEnbld == 1 Value of KePISD_b_ConfigRegTestEnbld is: 1 . (If 0, this test is disabled)	12.5 to 25 ms	
			Checks number of stack over/under flow since last powerup reset >=	3		KeMEMD_b_StackLimitTestEnbl == 1 Value of KeMEMD_b_StackLimitTestEnbl is: 1 . . (If 0, this test is disabled)	variable, depends on length of time to corrupt stack	
			Voltage deviation >	0.4950		KePISD_b_A2D_CnvrtrTestEnbld == 1 Value of KePISD_b_A2D_CnvrtrTestEnbld is: 1 . (If 0, this test is disabled)	5 / 10 counts or 0.150 seconds continuous; 50 ms/count in the ECM main processor	
			Checks for ECC (error correcting code) circuit test errors reported by the hardware for flash memory. Increments counter during controller initialization if ECC error occured since last controller initialization. Counter >=	3 (results in MIL), 5 (results in MIL and remedial action)		KeMEMD_b_FlashECC_CktTestEnbl == 1 Value of KeMEMD_b_FlashECC_CktTestEnbl is: 1 . (If 0, this test is disabled)	variable, depends on length of time to access flash with corrupted memory	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Checks for ECC (error correcting code) circuit test errors reported by the hardware for RAM memory circuit. Increments counter during controller initialization if ECC error occured since last controller initialization. Counter >=	3 (results in MIL), 5 (results in MIL and remedial action)		KeMEMD_b_RAM_ECC_CktTestEnbl == 1 Value of KeMEMD_b_RAM_ECC_CktTestEnbl is: 1 . (If 0, this test is disabled)	variable, depends on length of time to write flash to RAMvariable, depends on length of time to write flash to RAM	
			MAIN processor DMA transfer from Flash to RAM has 1 failure			KePISD_b_DMA_XferTestEnbld == 1 Value of KePISD_b_DMA_XferTestEnbld is: 0 . (If 0, this test is disabled)	variable, depends on length of time to write flash to RAM	
			Safety critical software is not executed in proper order.	>= 1 incorrect sequence.		Table, f(Core, Loop Time). See supporting tables: **P0606_Program Sequence Watch Enable f(Core, Loop Time)** (If 0, this Loop Time test is disabled)	Fail Table, f(Loop Time). See supporting tables: **P0606_PSW Sequence Fail f (Loop Time)** / Sample Table, f (Loop Time)See supporting tables: **P0606_PSW Sequence Sample f(Loop Time)** counts 50 ms/count in the ECM main	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							processor	
			MAIN processor determines a seed has not changed within a specified time period within the 50ms task.	Previous seed value equals current seed value.		KePISD_b_SeedUpdKeyStorFltEnbl == 1 Value of KePISD_b_SeedUpdKeyStorFltEnbl is: 1 . (If 0, this test is disabled)	Table, f(Loop Time). See supporting tables: **P0606_Last Seed Timeout f (Loop Time)**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Relay Control Circuit Open	P0627	Controller specific output driver circuit diagnoses the Feed Fuel Pump Relay high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	>= 200 KOhms impedance between signal and controller ground.	Run/Crank Voltage Engine Speed	Voltage 11.00 volts 0 RPM	8 failures out of 10 samples 250 ms / sample	Type A, 1 Trips Note: In certain controllers P0629 may also set (Fuel Pump Relay Control Short to Power)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Relay Control Circuit Low Voltage	P0628	Controller specific output driver circuit diagnoses the Feed Fuel Pump Relay high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 0.5 Ohms impedance between signal and controller ground	Run/Crank Voltage Engine Speed	Voltage 11.00 volts 0 RPM	8 failures out of 10 samples 250 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Relay Control Circuit High Voltage	P0629	Controller specific output driver circuit diagnoses the Feed Fuel Pump Relay high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	 <= 0.5 Ohms impedance between signal and controller power	Run/Crank Voltage Engine Speed	Voltage 11.00 volts 0 RPM	8 failures out of 10 samples 250 ms / sample	Type A, 1 Trips Note: In certain controllers P0627 may also set (Fuel Pump Relay Control Open Circuit)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Fuel Injector Control Performance	P062B	This DTC determines the internal fuel injctor control module circuit is faulted. The faulted status is set on any failure that could potentially damage the drivers or injectors, or could result in uncontrolled fueling. The following general classes of failures shall be covered: Communication error with control circuit Internal corruption of control circuit values, Invalid interface values (from control circuit)	Internal ECU Boost Voltage OR Internal ECU Boost Voltage OR Driver Status OR Driver Status	>= 90 Volts <= 40 Volts = Not Ready = Uninitialized	Battery Voltage	>= 8 or >= 11 Enabled when a code clear is not active or not exiting device control Engine is not cranking Powertrain Relay Voltage within range	High Voltage - 160 failures out of 200 samples Low Voltage - 160 failures out of 200 samples Driver Status Not Ready- 160 failures out of 200 samples Driver Status Uninitialized - Uninitialized state for >= 100 counts All at 12.5ms per sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Powertrain Internal Control Module EEPROM Error	P062F	This DTC detects a NVM long term performance. There are two types of diagnostics that run during controller power up. One for HWIO reports that writing to NVM (at shutdown) will not succeed, and the other HWIO reports the assembly calibration integrity check has failed.	HWIO reports that writing to NVM (at shutdown) will not succeed				Diagnostic runs at controller power up.	Type B, 2 Trips
			HWIO reports the assembly calibration integrity check has failed				Diagnostic runs at controller power up.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
VIN Not Programmed or Mismatched - Engine Control Module (ECM)	P0630	This DTC checks that the VIN is correctly written	At least one of the programmed VIN digits	= 00 or FF	OBD Manufacturer Enable Counter	= 0	250 ms / test Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #1 Circuit	P0641	Detects a continuous or intermittent short on the 5 volt reference circuit #1 by monitoring the reference percent Vref1 and failing the diagnostic when the percent Vref1 is too low or too high or if the delta between the filtered percent Vref1 and non-filtered percent Vref1 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref1 < or ECM percent Vref1 > or the difference between ECM filtered percent Vref1 and percent Vref1 >	4.875 % Vref1 5.125 % Vref1 0.0495 % Vref1	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= 1 > 6.41 Volts = 0.02 Seconds = FALSE > 8.41 Volts = TRUE	19 / 39 counts; or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Malfunction Indicator Lamp (MIL) Control Circuit (ODM) Open	P0650	Detects an inoperative malfunction indicator lamp control low side driver circuit. This diagnostic reports the DTC when an open circuit is detected.	Voltage low during driver off state (indicates open circuit)	Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Run/Crank Voltage Remote Vehicle Start is not active	Voltage ≥ 11.00 volts	1 failures out of 1 samples 50 ms / sample	Type B, No MIL NO MIL Note: In certain controllers P263A may also set (MIL Control Short to Ground)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #2 Circuit	P0651	Detects a continuous or intermittent short on the 5 volt reference circuit #2 by monitoring the reference percent Vref2 and failing the diagnostic when the percent Vref2 is too low or too high or if the delta between the filtered percent Vref2 and non-filtered percent Vref2 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref2 < or ECM percent Vref2 > or the difference between ECM filtered percent Vref2 and percent Vref2 >	4.875 % Vref2 5.125 % Vref2 0.0495 % Vref2	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= 1 > 6.41 Volts = 0.02 Seconds = FALSE > 8.41 Volts = TRUE	19 / 39 counts; or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Powertrain Relay Control (ODM) Open	P0685	Detects an open circuit in the Powertrain Relay driver. This diagnostic reports the DTC when an open circuit failure is present. Monitoring occurs when the output is powered off. A decision is made by comparing a voltage measurement to a controller specific voltage threshold.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	Open Circuit: ≥ 200 K Ω ohms impedance between output and controller ground	Run/Crank Voltage	Voltage ≥ 11.00 volts	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0686 may also set (Powertrain Relay Control Short to Ground).

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Powertrain Relay Control (ODM) Low	P0686	Detects a short to ground in the Powertrain Relay low side driver. This diagnostic reports the DTC when a short to ground failure is present. Monitoring occurs when the output is powered off. A decision is made by comparing a voltage measurement to a controller specific voltage threshold.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	Short to ground: ≤ 0.5 Ω impedance between output and controller ground	Run/Crank Voltage	Voltage ≥ 11.00 volts	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0685 may also set (Powertrain Relay Control Open Circuit).

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Powertrain Relay Control (ODM) High	P0687	Detects a short to power in the Powertrain Relay low side driver. This diagnostic reports the DTC when a short to power failure is present. Monitoring occurs when the output is powered off. A decision is made by comparing a voltage measurement to a controller specific voltage threshold.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	Short to power: ≤ 0.5 Ω impedance between output and controller power	Run/Crank Voltage	Voltage ≥ 11.00 volts	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Power Relay Feedback Circuit Low Voltage	P0689	Detects low voltage in the control module relay feedback circuit. This diagnostic reports the DTC when low voltage is present. Monitoring occurs when run crank voltage is above a calibrated value.	Control module relay feedback circuit low voltage	Powertrain relay voltage <= 5.00	Powertrain relay short low diagnostic enable Run Crank voltage Powertrain relay state	= 1.00 > 9.00 = ON	5 failures out of 6 samples 1000 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Powertrain Relay Feedback Circuit High	P0690	Detects higher than expected voltage in the powertrain relay feedback circuit. This diagnostic reports the DTC when higher than expected voltage is present. For example, the powertrain relay could be stuck on. Monitoring occurs when the relay is commanded "off" for a calibrated duration.	Powertrain Relay Voltage	>= 4.00 volts will increment the fail counter	Powertrain relay commanded “OFF” No active DTCs:	>= 2.00 seconds PowertrainRelayStateOn_FA	50 failures out of 63 samples 100ms / Sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #3 Circuit	P0697	Detects a continuous or intermittent short on the 5 volt reference circuit #3 by monitoring the reference percent Vref3 and failing the diagnostic when the percent Vref3 is too low or too high or if the delta between the filtered percent Vref3 and non-filtered percent Vref3 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref3 < or ECM percent Vref3 > or the difference between ECM filtered percent Vref3 and percent Vref3 >	4.875 % Vref3 5.125 % Vref3 0.0495 % Vref3	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= 1 > 6.41 Volts = 0.02 Seconds = FALSE > 8.41 Volts = TRUE	19 / 39 counts; or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #4 Circuit	P06A3	Detects a continuous or intermittent short on the 5 volt reference circuit #4 by monitoring the reference percent Vref4 and failing the diagnostic when the percent Vref4 is too low or too high or if the delta between the filtered percent Vref4 and non-filtered percent Vref4 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref4 < or ECM percent Vref4 > or the difference between ECM filtered percent Vref4 and percent Vref4 >	4.875 % Vref4 5.125 % Vref4 0.0495 % Vref4	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= 1 > 6.41 Volts = 0.02 Seconds = FALSE > 8.41 Volts = TRUE	19 / 39 counts; or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Knock Sensor Processor 1 Performance	P06B6	This diagnostic checks for a fault with the internal test circuit (sensor #1) used only for the '20 kHz' method of the Open Circuit Diagnostic. A fault is present when the signal level from the 20 kHz range of the FFT output falls between the Open Test Circuit thresholds.	FFT Diagnostic Output	**> P06B6_P06B7_OpenTestCktThrshMin** **AND** **< P06B6_P06B7_OpenTestCktThrshMax** **See Supporting Tables**	Diagnostic Enabled? Engine Run Time Engine Speed Cumlative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) Engine Air Flow	Yes ≥ 2.0 seconds > 1,000 RPM and < 4,650 RPM ≥ 200 Revs ≥ 40 mg/cylinder and ≤ 2,000 mg/cylinder	First Order Lag Filter with Weight Coefficient Weight Coefficient = 0.0100 Updated each engine event	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #5 Circuit	P06D2	Detects a continuous or intermittent short on the 5 volt reference circuit #5 by monitoring the reference percent Vref5 and failing the diagnostic when the percent Vref5 is too low or too high or if the delta between the filtered percent Vref5 and non-filtered percent Vref5 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref5 < or ECM percent Vref5 > or the difference between ECM filtered percent Vref5 and percent Vref5 >	4.875 % Vref5 5.125 % Vref5 0.0495 % Vref5	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= 1 > 6.41 Volts = 0.02 Seconds = FALSE > 8.41 Volts = TRUE	19 / 39 counts; or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Two Stage Oil Pump Control Circuit Open	P06DA	Controller specific output driver circuit diagnoses the two stage oil pump low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	Open Circuit ≥ 200 k Ω impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Run/Crank Active Cranking State	Enabled ≥ 11.00 = True = False	>= 40 errors out of 50 samples. Performed every 100 msec	Type B, 2 Trips Note: In certain controllers P06DB may also set (Two Stage Oil Pump Control Circuit Short To Ground)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Two Stage Oil Pump Control Circuit Short To Ground	P06DB	Controller specific output driver circuit diagnoses the two stage oil pump low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	Short to Ground Circuit ≤ 0.5 Ω impedance between output and controller ground	Diagnostic Status Powertrain Relay Voltage Run/Crank Active Cranking State	Enabled ≥ 11.00 = True = False	>= 40 errors out of 50 samples. Performed every 100 msec	Type A, 1 Trips Note: In certain controllers P06DA may also set (Two Stage Oil Pump Control Circuit Open)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Two Stage Oil Pump Control Circuit Short To Power	P06DC	Controller specific output driver circuit diagnoses the two stage oil pump low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	Short to Power ≤ 0.5 Ω impedance between output and controller power	Diagnostic Status Powertrain Relay Voltage Run/Crank Active Cranking State	Enabled ≥ 11.00 = True = False	>= 40 errors out of 50 samples. Performed every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Two Stage Oil Pump Control Circuit Performance - Two Sided	P06DD	Diagnoses the two stage oil pump is stuck in the high pressure state. This diagnostic includes an intrusive test and a passive test. Intrusive test: The oil pump control is cycled off (high pressure) and on (low pressure) Y = 15 times at calibratable intervals. If a change in oil pressure above a calibration is not detected then the oil pressure is checked to determine if it is stuck. It takes X-out-of-Y failures to fail and set the appropriate code. Passive test: After the intrusive test passes, then a passive test will begin to run. The passive test will monitor the oil pressure changes associated with oil pump control state changes. If the passive test determines that the oil pressure change was less then desired then the intrusive test is retriggered.	Fail from passing state: Oil Pressure delta is less than a minimum delta pressure on a state change and the measured filtered oil pressure is above a threshold	Oil Pressure delta = ABS [Filtered Oil Pressure at beginning of state change - filtered oil pressure after 1.0 seconds] Oil Pressure delta < **P06DD_P06DE_OP_StateChangeMin** AND Filtered Oil Pressure ≥ (**P0521_P06DD_P06DE_OP_HiStatePressure** + **P0521_P06DD_P06DE_OP_LoStatePressure**) ÷ 2 (see P06DD details on Supporting Tables Tab **P06DD_P06DE_OP_StateChangeMin** **P0521_P06DD_P06DE_OP_HiStatePressure** **P0521_P06DD_P06DE_OP_LoStatePressure**)	Common Criteria: Two Stage Oil Pump is Present Engine Running Ambient Air Pressure Oil Aeration (= TRUE if engine speed > 10,000 RPM for longer than 30.0 seconds) No active DTC's for diagnsotic enable: Check oil pump TFTKO as a diagnostic enable when Enabled. No active DTC's for control enable: Active Criteria: One Sided Performance Test = Disabled	TRUE ≥ 10.0 seconds ≥ 70.0 kPa FALSE Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA CrankSensor_FA EngOilPressureSensorCktFA AmbientAirDefault EngOilTempFA OilPmpTFTKO Enabled : OilPmpTFTKO Enabled Fault bundles for control disable : OilPmpTFTKO EngineTorqueEstInaccurate EngOilPressureSensorFA PowertrainRelayFault CrankSensor_FA EngOilTempFA Disabled	≥ 12 errors out of 15 samples. Run once per trip or activiated by the Passive Test	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Oil Pump in Low State	> 1.0 seconds		
					Modelled Oil Temperature within range	50.0 deg C ≤ Oil Temp ≤ 110.0 deg C		
					Filtered Engine Speed within range	1,150 RPM ≤ Filtered Engine Speed ≤ 3,500 RPM		
					Delta Filtered Engine Speed within a range	ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.0 seconds] ≤ 50 RPM		
					Engine Torque within range	**P06DD_P06DE_MinEnableTorque_OP** ≤ Indicated Requested Engine Torque ≤ **P06DD_P06DE_MaxEnableTorque_OP** (see P06DD details on Supporting Tables Tab **P06DD_P06DE_MinEnableTorque_OP** **P06DD_P06DE_MaxEnableTorque_OP**)		
					Filtered Oil Pressure within range	Filtered Engine Oil Pressure > **P06DD_P06DE_MinOilPressThresh** (see P06DD details on Supporting Tables Tab **P06DD_P06DE_MinOilPressThresh**)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Expected Oil Pressure Delta within range	125.0 kPa < ABS [**P0521_P06DD_P06DE_OP_HiStatePressure** - **P0521_P06DD_P06DE_OP_LoStatePressure**] < 325.0 kPa		
					Passive Criteria:			
					Active Test Passed	TRUE		
					Filtered Engine Speed within range	1,000 RPM ≤ Filtered Engine Speed ≤ 4,500 RPM		
					Modelled Oil Temperature within range	40.0 deg C ≤ Oil Temp ≤ 120.0 deg C		
					Delta Filtered Engine Speed within a range	ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.00 seconds] ≤ 1,000 RPM		
					Oil Pressure Delta within a range	Oil Pressure Delta < **P06DD_P06DE_OP_StateChangeMin** (see P06DD details on Supporting Tables Tab **P06DD_P06DE_OP_StateChangeMin**)		
			Fast Pass Condition Oil Pressure delta is less than a minimum delta pressure on a state change and the measured filtered oil pressure is	Oil Pressure delta = ABS [Filtered Oil Pressure at beginning of state change -	Common Criteria: Two Stage Oil Pump is Present Engine Running	 TRUE ≥ 10.0 seconds	0 errors out of 5 samples. Run once per trip or activiated by the Passive Test	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			above a threshold	filtered oil pressure after 1.0 seconds] Oil Pressure delta < **P06DD_P06DE_OP_StateChangeMin** AND Filtered Oil Pressure ≥ (**P0521_P06DD_P06DE_OP_HiStatePressure** - **P0521_P06DD_P06DE_OP_LoStatePressure**) ÷ 2 (see P06DD details on Supporting Tables Tab **P06DD_P06DE_OP_StateChangeMin** **P0521_P06DD_P06DE_OP_HiStatePressure** **P0521_P06DD_P06DE_OP_LoStatePressure**)	Ambient Air Pressure Oil Aeration (= TRUE if engine speed > 10,000 RPM for longer than 30.0 seconds) No active DTC's for diagnsotic enable: Check oil pump TFTKO as a diagnostic enable when Enabled. No active DTC's for control enable: <u>Active Criteria:</u> One Sided Performance Test = Disabled Oil Pump in Low State Modelled Oil Temperature within range Filtered Engine Speed within range	≥ 70.0 kPa FALSE Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA EngOilPressureSensorCktFA AmbientAirDefault EngOilTempFA OilPmpTFTKO CrankSensor_FA Enabled : OilPmpTFTKO Enabled Fault bundles for control disable : OilPmpTFTKO EngineTorqueEstInaccurate EngOilPressureSensorFA PowertrainRelayFault CrankSensor_FA EngOilTempFA Disabled > 1.0 seconds 50.0 deg C ≤ Oil Temp ≤ 110.0 deg C 1,150 RPM ≤ Filtered Engine Speed ≤ 3,500		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						RPM		
					Engine Torque within range	**P06DD_P06DE_MinEnableTorque_OP** ≤ Indicated Requested Engine Torque ≤ **P06DD_P06DE_MaxEnableTorque_OP** (see P06DD details on Supporting Tables Tab **P06DD_P06DE_MinEnableTorque_OP** **P06DD_P06DE_MaxEnableTorque_OP**)		
					Delta Filtered Engine Speed within a range	ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.0 seconds] ≤ 50 RPM		
					Filtered Oil Pressure within range	Filtered Engine Oil Pressure > **P06DD_P06DE_MinOilPressThresh** (see P06DD details on Supporting Tables Tab **P06DD_P06DE_MinOilPressThresh**)		
					Expected Oil Pressure Delta within range	125.0 kPa < ABS [**P0521_P06DD_P06DE_OP_HiStatePressure** - **P0521_P06DD_P06DE_OP_LoStatePressure**] < 325.0 kPa		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Two Stage Oil Pump Control Circuit StuckOn - Two Sided	P06DE	Diagnoses the two stage oil pump is stuck in the low pressure state. This diagnostic includes an intrusive test and a passive test. Intrusive test: The oil pump control is cycled off (high pressure) and on (low pressure) Y times at calibratable intervals. If a change in oil pressure above a calibration is not detected then the oil pressure is checked to determine if it is stuck. It takes X-out-of-Y failures to fail and set the appropriate code. Passive test: After the intrusive test passes, then a passive test will begin to run. The passive test will monitor the oil pressure changes associated with oil pump control state changes. If the passive test determines that the oil pressure change was less then desired then the intrusive test is retriggered.	Fail from a passing state: Oil Pressure delta is less than a minimum delta pressure on a state change and the measured filtered oil pressure is below a threshold	Oil Pressure delta = ABS [Filtered Oil Pressure at beginning of state change - filtered oil pressure after 1.0 seconds] Oil Pressure delta < **P06DD_P06DE_OP_StateChangeMin** (see P06DE details on Supporting Tables Tab) Filtered Oil Pressure ≤ **P0521_P06DD_P06DE_OP_HiStatePressure** - **P0521_P06DD_P06DE_OP_LoStatePressure** **) ÷ 2** (see P06DE details on Supporting Tables Tab)	Common Criteria: Two Stage Oil Pump is Present Engine Running Ambient Air Pressure Oil Aeration (= TRUE if engine speed > 10,000 RPM for longer than 30.0 seconds) No active DTC's for diagnsotic enable: Check oil pump TFTKO as a diagnostic enable when Enabled. No active DTC's for control enable: Active Criteria: One Sided Performance	TRUE ≥ 10.0 seconds ≥ 70.0 kPa FALSE Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA CrankSensor_FA EngOilPressureSensorCktFA AmbientAirDefault EngOilTempFA Enabled : OilPmpTFTKO Enabled Fault bundles for control disable : OilPmpTFTKO EngineTorqueEstInaccurate EngOilPressureSensorFA PowertrainRelayFault CrankSensor_FA EngOilTempFA Disabled	≥ 12 errors out of 15 samples. Run once per trip or activiated by the Passive Test	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Test = Disabled			
					Oil Pump in Low State	> 1.0 seconds		
					Modelled Oil Temperature within range	50.0 deg C ≤ Oil Temp ≤ 110.0 deg C		
					Filtered Engine Speed within range	1,150 RPM ≤ Filtered Engine Speed ≤ 3,500 RPM		
					Engine Torque within range	**P06DD_P06DE_MinEnableTorque_OP** ≤ Indicated Requested Engine Torque ≤ **P06DD_P06DE_MaxEnableTorque_OP** (see P06DE details on Supporting Tables Tab)		
					Delta Filtered Engine Speed within a range	ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.0 seconds] ≤ 50 RPM		
					Filtered Oil Pressure within range	Filtered Engine Oil Pressure > **P06DD_P06DE_MinOilPressThresh** (see P06DD details on Supporting Tables Tab)		
					Expected Oil Pressure Delta within range	125.0 kPa < ABS [**P0521_P06DD_P06DE_OP_HiStatePressure** - **P0521_P06DD_P06DE_OP_LoStatePressure**] < 325.0 kPa		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Passive Criteria:			
					Active Test Passed	TRUE		
					Filtered Engine Speed within range	1,000 RPM ≤ Filtered Engine Speed ≤ 4,500 RPM		
					Modelled Oil Temperature within range	40.0 deg C ≤ Oil Temp ≤ 120.0 deg C		
					Delta Filtered Engine Speed within a range	ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.00 seconds] ≤ 1,000 RPM		
					Oil Pressure Delta < **P06DD_P06DE_OP_StateChangeMin** (see P06DE details on Supporting Tables Tab)	TRUE		
			Fast Pass Condition Oil Pressure delta is less than a minimum delta pressure on a state change and the measured filtered oil pressure is below a threshold	Oil Pressure delta = ABS [Filtered Oil Pressure at beginning of state change - filtered oil pressure after 1.0 seconds] Oil Pressure delta <	Common Criteria: Two Stage Oil Pump is Present Engine Running Ambient Air Pressure Oil Aeration (= TRUE if engine speed	 TRUE ≥ 10.0 seconds ≥ 70.0 kPa FALSE	0 errors out of 5 samples. Run once per trip or activiated by the Passive Test	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				P06DD_P06DE_OP_StateChangeMin (P06DD Performance Test Details on Supporting Tables Tab) Filtered Oil Pressure ≤ **P0521_P06DD_P06DE_OP_HiStatePressu** (**re** - **P0521_P06DD_P06DE_OP_LoStatePressure**) / 2 (P06DD Performance Test Details on Supporting Tables Tab)	> 10,000 RPM for longer than 30.0 seconds) No active DTC's for diagnsotic enable: Check oil pump TFTKO as a diagnostic enable when Enabled. No active DTC's for control : Active Criteria: One Sided Performance Test = Disabled Oil Pump in Low State Modelled Oil Temperature within range Filtered Engine Speed within range Engine Torque within range	Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA CrankSensor_FA EngOilPressureSensorCktFA AmbientAirDefault EngOilTempFA Enabled : OilPmpTFTKO Enabled Fault bundles for control disable : OilPmpTFTKO EngineTorqueEstInaccurate EngOilPressureSensorFA PowertrainRelayFault CrankSensor_FA EngOilTempFA Disabled > 1.0 seconds 50.0 deg C ≤ Oil Temp ≤ 110.0 deg C 1,150 RPM ≤ Filtered Engine Speed ≤ 3,500 RPM **P06DD_P06DE_MinEnableTorque_OP** ≤		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						Indicated Requested Engine Torque ≤ **P06DD_P06DE_MaxEnableTorque_OP** (P06DD Performance Test Details on Supporting Tables Tab)		
					Delta Filtered Engine Speed within a range	ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.0 seconds] ≤ 50 RPM		
					Filtered Oil Pressure within range	Filtered Engine Oil Pressure > **P06DD_P06DE_MinOilPressThresh** (see P06DD details on Supporting Tables Tab)		
					Expected Oil Pressure Delta within range	125.0 kPa < ABS [**P0521_P06DD_P06DE_OP_HiStatePressure** - **P0521_P06DD_P06DE_OP_LoStatePressure**] < 325.0 kPa		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Wake-up Circuit Performance Diagnostic (ELCP Sealed/ Vented Fuel System)	P06E4	VICM Wake-up events were not received The ELCP EVAP diagnostics with propulsion system off will run many hours after the vehicle has been shut off when the EVAP system is in a stable condition. Since the ECM does not have the capability to wake itself up, a Vehicle Interface Control Module (VICM) is used to wake up the ECM at predetermined intervals to run the EVAP diagnostics. When the propulsion system transitions to off an alarm request is sent to the VICM. After that period of time has elapsed the VICM alarm clock wakes up the ECM. The ECM then requests another wake up and checks the diagnostic enable conditions. If the enable conditions are met and the EVAP diagnostics are able to complete then the future wake up request will be canceled at the next opportunity when there is communication	Whenever the propulsion system goes active, the diagnostic reads its internal timer and evaluates the results from the wake-up events that could have occurred. For each wake-up event the status can be: Pass – the wake-up event occurred within a window Indeterminate – the ECM was already awake at the time the wake-up event could have occurred Fail – the wake-up event occurred outside a window or did not occur at all If the 5.0 hour wake-up event did not occur from to then a failure has occurred. If the 7.0 hour wake-up event did not occur from to then a failure has occurred. If the 9.5 hour wake-up event did not occur from to then a failure has occurred. At Propulsion System Active, if any of the wake-up events indicate a	4.3 hours 5.8 hours 6.0 hours 8.1 hours 8.2 hours 11.0 hours	Distance since assembly plant Drive distance Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 No Active DTC's	≥ 9.9 miles ≥ 0.1 miles ≥ 0 hours ≥ 0 hours VehicleSpeedSensor_FA ModuleOffTime_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA	Once per each wake-up event when Propulsion System is not active Final decision is made when Propulsion System is Active 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		between the VICM and ECM. If the enable conditions are not met then the ECM will go back to sleep and wait for the next wake up to try and run the EVAP diagnostics. There are a total of three wake ups that the ECM can request until there is another transition from propulsion system on to off. This diagnostic indicates if the wake up (s) occurred at the proper requested time (s). A pass will be reported if a wake up occurred at the proper time. A failure will be reported if no wake up occurred, or if a wake up occurred at the incorrect time. The DTC will be indeterminate if the ECM was already awake in a valid window for some reason other than a VICM wake up.	failure then the DTC fails.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Traction Control Torque Request Circuit	P0856	Determines if torque request from the EBCM is valid	Serial Communication 2's complement message - ($1C7/$1C9 for engine torque, $1CA/$1C6 for axle torque)	Message <> 2's complement of message	Active Communication	Serial data has been received	>= 6 failures out of 10 Performed on every received message	Type C, No SVS Safety Special Type C
					Power Mode Engine Running	= Run = True		
					Status of traction in GMLAN message ($4E9)	= Traction Present		
			OR Serial Communication message ($1C7/$1C9 for engine torque, $1CA/ $1C6 for axle torque) rolling count index value	Message rolling count value <> previous message rolling count value plus one	Ignition Voltage	> 6.41 volts	6 rolling count failures out of 10 samples Performed on every received message	
					Run/Crank Active	> 0.50 seconds		
			OR Too many minimum limit torque request transitions occur from TRUE to FALSE to TRUE within a time period	Requested torque intervention type toggles from not increasing request to increasing request			>= 3 multi-transitions out of 5 samples. Performed every 200 ms	
			Torque request greater than torque request diagnostic maximum threshold	> 175 Nm for engine torque based traction torque system, OR > 1,020 Nm for axle torque based traction torque system			>= 4 out of 10 samples Performed on every received message	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Powertrain Control Module (HPC) Requested MIL Illumination	P0AC4	Monitors the HPC MIL request message to determine when the HPC has detected a MIL illuminating fault.	HPC Module Emissions-Related DTC set and module is requesting MIL	HPC Module Emissions-Related DTC set and module is requesting MIL		Time since power-up ≥ 3 seconds	Continuous	Type A, No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Bypass Valve A Command Signals Message Counter Incorrect	P1008	This DTC monitors for an error in communication with the Engine Coolant Bypass Valve A Command Signals	Communication of the Alive Rolling Count or Protection Value of the EBCV Intialization Status from the Engine Coolant Bypass Valve A over LIN bus is incorrect for out of total samples	 >= 10.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Heater Supply Voltage Sense Circuit Range/ Performance	P103B	The P103B diagnostic determines if the heater supply circuit is rational by comparing the heater supply voltage to the run crank voltage and calculating the difference. The heater supply voltage input is connected to the O2 heater supply circuit inside the vehicle relay center. It is representative of the voltage supplied to the O2 heaters. The O2 heater voltage is used by the HWIO to calculate the O2 heater resistance on switching type O2 sensors (non-WRAF). With a fault set, the resistance calculation is performed with run crank voltage. The diagnostic failure counter is incremented if the voltage difference is greater than the threshold. This DTC is set based on the fail and sample counters.	The absolute value of Heater Supply Voltage delta from Run Crank voltage	> 2.00 volts	Powertrain relay in range (Relay in range is defined as relay voltage Run Crank signal active	= True > 11.00 volts) = True (Please see "**Run/Crank Active conditiions**" in Supporting Tables)	8 failures out of 10 samples 250 ms / sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Heater Supply Voltage Sense Circuit Low	P103C	The P103C diagnostic determines if the heater supply circuit is low by comparing the heater supply voltage to the threshold. The heater supply voltage input is connected to the O2 heater supply circuit inside the vehicle relay center. It is representative of the voltage supplied to the O2 heaters. The O2 heater voltage is used by the HWIO to calculate the O2 heater resistance on switching type O2 sensors (non-WRAF). With a fault set, the resistance calculation is performed with run crank voltage. The diagnostic failure counter is incremented if the heater supply voltage is less than the threshold. This DTC is set based on the fail and sample counters.	Heater Supply Voltage	< 6.00 volts	Powertrain relay in range (Relay in range is defined as relay voltage Run Crank signal active	= True > 11.00 volts) = True (Please see "**Run/Crank Active conditiions**" in Supporting Tables)	8 failures out of 10 samples 250 ms / sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Inlet Airflow System Performance (naturally aspirated)	P1101	Detects a performance failure in the Manifold Pressure (MAP) sensor, Throttle Position sensor (TPS) or Mass Air Flow (MAF) sensor that cannot be uniquely identified as a failure in one individual sensor. This diagnostic can set when more than one of these sensors has a performance concern. This diagnostic is performed using the Intake Flow Rationality Diagnostic (IFRD). IFRD calculates modeled values of sensors from these three sensors. These modeled values are compared against the actual sensor values to see if they are similar. If they are similar, then the model passes. If they are not similar, then that model is considered to be failed. Certain combinations of model passes and model failures can be interpreted to be caused by a performance issue with the system, but no	Filtered Throttle Model Error AND ABS(Measured Flow – Modeled Air Flow) Filtered OR ABS(Measured MAP – MAP Model 1) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	 > 125 kPa*(g/s) > 15.0 grams/sec > 22.0 kPa) > 22.0 kPa	Engine Speed Engine Speed (Coolant Temp OR OBD Coolant Enable Criteria (Coolant Temp OR OBD Max Coolant Achieved Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) See Residual Weight Factor tables.	>= 0 RPM <= 5,400 RPM >= -9 Deg C = TRUE) <= 125 Deg C = FALSE) >= -20 Deg C <= 125 Deg C >= 0.50 Filtered Throttle Model Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM** Modeled Air Flow Error multiplied by **P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on RPM** and **P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on MAF Est**	Continuous Calculation are performed every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		single failed sensor can uniquely be identified. In this case, the Inlet Airflow System Performance diagnostic will fail.				MAP Model 1 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM** MAP Model 2 Error multiplied by **P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM**		
					No Active DTCs:	MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA		
					No Pending DTCs:	EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor Not Plausible	P111E	This DTC detects either a biased high or low ECT (Engine Coolant temperature) sensor. This is done by comparing the ECT sensor output to two other temperature sensor outputs after a soak condition.	**Sensor usage definitions:** **Sensor1 =** CeECTR_e_ECT_Snsr (Sensor1 is the temp sensor most impacted by the block heater (if equipped)) **Sensor2 =** CeECTR_e_RCT_Snsr **Sensor3 =** CeECTR_e_OAT_Snsr =================== A failure will be reported if any of the following occur: 1) Sensor1 power up absolute temp difference to Sensor2 and Sensor3 is (Sensor1 fast fail) . 2) Sensor1 power up temp is greater than Sensor2 and Sensor3 in this range: (and a block heater has not been detected) 3) Sensor1 power up temp is lower than Sensor2 and Sensor3 by this amount: 4) Sensor1 power up temp is ≥ Sensor2 and	≥ 25.0 ºC ≥ 15.0 and < 25.0 ºC ≤ 15.0 Deg ºC	No Active DTC's Engine Off Soak Time Propulsion Off Soak Time Non-volatile memory initization Test complete this trip Test aborted this trip Test disabled this trip Ambient LowFuelCondition Diag ================== Block Heater detection is **enabled** when either of the following occurs: 1) Sensor1 power up temp is greater than Sensor2 and Sensor3 in this range: 2) Cranking time ==================	VehicleSpeedSensor_FA IAT_SensorCircuitFA THMR_RCT_Sensor_Ckt_FA ECT_Sensor_Ckt_FA EngineModeNotRunTimerError EngineModeNotRunTimer_FA OAT_PtEstFiltFA OAT_PtEstRawFA PSAR_PropSysInactveCrs_FA DRER_DiagSystemDsbl > 28,800 seconds > 28,800 seconds = Not occurred = False = False = False ≥ -9 ºC = False ================== ≥ 15.0 ºC and < 25.0 ºC < 14.0 Seconds ==================	1 failure to set DTC 1 sec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Sensor3 by 15.0 ºC and the time spent cranking the engine without starting is ≥ 14.0 seconds with the LowFuelConditionDiag	= False	Block Heater is **detected** and diagnostic is aborted when 1) or 2) occurs.			
					1a) IAT monitoring is enabled after the following Vehicle drive constraints			
					1b) Drive time	> 400 Seconds with		
					1c) Vehicle speed	> 12.4 MPH and		
					1d) Additional Vehicle drive time is provided to 1b when Vehicle speed is below 1c as follows:	0.00 times the seconds with vehicle speed below 1b		
					1e) IAT drops from power up IAT	≥ 8.0 ºC		
					2a) ECT monitoring is enabled after engine start in the following engine run time window	10.0 <= seconds <= 15.0		
					2b) Sensor1 temp derivative during the test is:	< -0.50 ºC/sec		
					2c) Consectutive samples of 2b) being true are:	≥ 10 samples		
					==================	===================		
					Diagnostic is **aborted** when 3) or 4) occurs:			
					3) Engine run time with vehicle speed below 1b	≥ 1,370 Seconds		
					4) Engine off time (i.e. auto stop) during Block heater detection	≥ 300.0 Seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT SIDI High Pressure Rail Temperature Sensor Performance	P111F	This DTC Diagnoses Fuel Temperature sensors rationality by comparing Primary sensor (T1) vs. Secondary sensor (T2)	Fuel Temperature Error (Absolute delta between sensor1 and sensor2)	> 20.00 degC	Fuel Temperature Rationality Diagnostic Enabled	True	100.00 failures out of 125.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
						Enabled when a code clear is not active or not exiting device control		
						Temperature sensors 1 out of range Low or High Fault Active (P0182, P0182)		
					No Fault Active on	Temperature sensors 2 out of range Low or High (P0187, P0188)		
						SENT Communication Fault Active (P16E4, P16E5)		
						SENT Intenal Error Fault Active (P126E, P126F)		
						Fuel Temperature Sensor SENT Message Error Fault Active (P128C, P128D)		
						SENT Communication Fault Pending (P16E4, P16E5)		
					No Fault Pending on	Fuel Temperature Sensor SENT Message Error Fault Pending (P128C, P128D)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 low side circuit shorted to high side circuit	P1248	Controller specific output driver circuit diagnoses injector 1 high sided driver for a short to low sided driver failure when the output is powered on by comparing a voltage measurement to controller specific voltage threshold	Voltage measurement outside of controller specific acceptable range during driver on state indicates high sided driver for a short to low sided driver failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for high sided driver for a short to low sided driver failure.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 low side circuit shorted to high side circuit	P1249	Controller specific output driver circuit diagnoses injector 2 high sided driver for a short to low sided driver failure when the output is powered on by comparing a voltage measurement to controller specific voltage threshold	Voltage measurement outside of controller specific acceptable range during driver on state indicates high sided driver for a short to low sided driver failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for high sided driver for a short to low sided driver failure.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 low side circuit shorted to high side circuit	P124A	Controller specific output driver circuit diagnoses injector 3 high sided driver for a short to low sided driver failure when the output is powered on by comparing a voltage measurement to controller specific voltage threshold	Voltage measurement outside of controller specific acceptable range during driver on state indicates high sided driver for a short to low sided driver failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for high sided driver for a short to low sided driver failure.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 low side circuit shorted to high side circuit	P124B	Controller specific output driver circuit diagnoses injector 4 high sided driver for a short to low sided driver failure when the output is powered on by comparing a voltage measurement to controller specific voltage threshold	Voltage measurement outside of controller specific acceptable range during driver on state indicates high sided driver for a short to low sided driver failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for high sided driver for a short to low sided driver failure.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Over Temperature	P1255	To detect if an internal fuel pump driver over-temperature condition exists under normal operating conditions	Fuel Pump Driver Circuit Board temperature (Fuel Pump Driver Overtemperature enumeration)	T>= 160 degC (Fuel Pump Power Module smart device reports Faulted, Not Faulted or Indeterminate)	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c] FPPM Driver Status Alive Rolling Count Sample Faulted d] Diagnostic feedback received e] Run_Crank Ignition Switch Position Circuit VoltageSystem Voltage	a) == FCBR ECM FPPM Sys b) == TRUE c] <> True d] == TRUE e] > 7.00 volts	3 failures / 15 samples 1 sample / 12.5 millisec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Temperature Sensor 1 Internal Fault - Error Code	P126E	This DTC Diagnoses the SENT Fuel Temperature Sensor 1 internal failure	Fuel Temperature Sensor 1 SENT digital read value	>= 4,089.00	No Fault Active on No Fault Pending on	Enabled when a code clear is not active or not exiting device control SENT Communication Fault Active (P16E4, P16E5) Fuel Temperature Sensor SENT Message Error Fault Active (P128C) Fuel Temperature Sensor SENT Message Error Fault Pending (P128C)	50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Temperature Sensor 2 Internal Fault - Error Code	P126F	This DTC Diagnoses the SENT Fuel Temperature Sensor 2 internal failure	Fuel Temperature Sensor 2 SENT digital read value	>= 4,089.00	No Fault Active on	Enabled when a code clear is not active or not exiting device control SENT Communication Fault Active (P16E4, P16E5)	50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips
					No Fault Pending on	Fuel Temperature Sensor SENT Message Error (P128D) Fuel Temperature Sensor SENT Message Error Fault Pending (P128D)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail High Pressure Sensor 2 Out of Range	P127C	This DTC diagnose SENT high pressure sensor 2 that is too low out of range. If the sensor digital value (represnting the refernce voltage) is below the lower digital threshold, the low fail counter then increments. If the low fail counter reaches its threshold then a fail is reported. A pass is reported for this DTC if the low sample counter reaches its threshold.	High Pressure Rail Sensor 2 SENT digital read value	=< 94			Time Based: 400 Failuer out of 500 Samples 6.25 ms per Sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Pressure Sensor 1 Internal Performance	P128A	This DTC determines if there is internal error within the SENT pressure sensor 1 (i.e. Broken wire bond internal to the SENT Sensor). Once the internal error is detected a fixed faulted digital values is communicated to the ECU.	Digital pressure sesnor 1 value	>= 4,089		Enabled when a code clear is not active or not exiting device control	400 failures out of 500 samples	Type A, 1 Trips
					SENT Fuel Rail Pressure Sensor Internal Performance Enable	True	6.25 ms per Sample Continuous	
					Not Fault Pending	P16E4 P16E5 P128F		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Pressure Sensor 2 Internal Performance	P128B	This DTC determines if there is internal error within the SENT pressure sensor 2 (i.e. Broken wire bond internal to the SENT Sensor). Once the internal error is detected a fixed faulted digital values is communicated to the ECU.	Digital pressure sesnor 2 value	>= 4,089		Enabled when a code clear is not active or not exiting device control	400 failures out of 500 samples	Type A, 1 Trips
					SENT Fuel Rail Pressure Sensor Internal Performance Enable	True	6.25 ms per Sample Continuous	
					Not Fault Pending	P16E4 P16E5 P128F		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Pressure &Temperature Sensor Temperature 1 Message Incorrect	P128C	This DTC diagnoses the the communication errors on the temperature 1 serial data channel	Serial Message 1 Age	>= 0.03 ms	SENT signal Serial waveform diagnostics enable SENT power up delay No Fault Active	True >= 0.00 seconds P16E4 P16E5	134 failures out of 167 samples 6.25 ms per sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Pressure & Temperature Sensor Temperature 2 Message Incorrect	P128D	This DTC diagnoses the the communication errors on the temperature 2 serial data channel	Serial Message 2 Age	>= 0.03 ms	SENT signal Serial waveform diagnostics enable SENT power up delay No Fault Active	True >= 0.00 seconds P16E4 P16E5	134 failures out of 167 samples 6.25 ms per sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Pressure & Temperature Sensor Pressure Message Incorrect	P128F	This DTC determines if there is any SENT signal waveform for discrepancies (i.e. too many pulse, too few pulse, clock shift). The SENT HWIO Determines message waveform fault (i.e.too many pulse, too few pulse, clock shift) and if the message age is too long.	SENT HWIO Determines message fault (i.e.too many pulse, too few pulse, clock shift) Message Age	= true > 1.69 ms	SENT signal Serial waveform diagnostics enable SENT power up delay No Fault Active on	True >= 0.00 seconds Enabled when a code clear is not active or not exiting device control P16E4 P16E5	400 failures out of 500 samples 6.25 ms per sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Module- Ignition Switch Run/ Start Position Circuit Low [FPPM applications only]	P129D	To detect if the Run/ Start position circuit voltage is short to low / open	FPPM Run_Crank Active status	<> ECM Run_Crank Active status	a) FPPM configuration KeFRPR_e_ChassisFuelPresSysType b) Diagnostic KeFRPR_b_FPPM_RunCrnkRatlEnbld c) FPPM Control Status Alive Rolling Count result d) Diagnostic feedback received e) System Voltage	a) == CeFRPR_e_ECM_FPPM_Sys b) == TRUE c) == Valid d) == TRUE e) >= 0.0 v	64 failures / 80 samples 1 sample / 12.5 millisec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Control Module Signal Message Counter Incorrect [FPPM applications only]	P129E	To detect if the command message received as serial data from the engine control module is valid The "rolling count check" value is created by adding an appended hexadecimal calculation to the pump duty cycle command value. In order to achieve a desired fuel pressure, a hexadecimal equivalent value representing the necessary fuel pump current pulse "On" time (duty cycle as a percent value) is transmitted to the FPPM. The corresponding "check" value is transmitted as well. At the FPPM, the received duty cycle command value is used to create an expected "rolling count" value using the same calculation method as the ECM. The expected "rolling count" value calculated at the receiving power module (smart device) is compared to the transmitted "rolling count" value. If these do not match, a fault condition is reported	FPPM Received Duty Cycle Rolling Count	<> Transmitted Duty Cycle Rolling Count (ECM) (Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state)	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) FPPM Control Rolling Count Faulted d) FPPM Diagnostic data received [$0CE] e) FPPM Diagnostic Data Validity Enabled f) Diagnostic System Disabled g) Communication Faulted h) Run_Crank Ignition Switch Position Circuit Voltage j) Run_Crank Ignition Status k) Sensor Bus Relay On	a) == FCBR ECM FPPM Sys b) == TRUE c) <> True d) == TRUE e) == TRUE f) <> True g) <> True h) > 7.00 Volts j) == TRUE k) == TRUE	64 failures / 80 samples 1 sample / 12.5 millisec	Type B, 2 Trips
			FPPM Received Duty Cycle Protection Value	<> Transmitted Duty Cycle Protection Value (ECM) (Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state)	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) FPPM Control Rolling Count Faulted d) FPPM Diagnostic data received [$0CE] e) FPPM Diagnostic Data Validity Enabled f) Diagnostic System Disabled g) Communication Faulted h) Run_Crank Ignition Switch Position Circuit	a) == FCBR ECM FPPM Sys b) == TRUE c) <> True d) == TRUE e) == TRUE f) <> True g) <> True h) > 7.00 Volts	64 failures / 80 samples 1 sample / 12.5 millisec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		forward to the ECM where X/Y diagnostic counting is performed.			Voltage j) Run_Crank Ignition Status k) Sensor Bus Relay On	 j) == TRUE k) == TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Control Module Enable Circuit Performance	P12A6	The purpose of the Fuel Pump Driver Control Module Enable Circuit Performance Diagnostic is to detect if the state of the fuel control enable circuit is valid. This is accomplished by comparing the Fuel Control Enable circuit voltage state [high or low] measured by the Fuel Pump Driver Control Module to the state of Fuel Control Enable signal in the ECM. When the measured state does not match the expected state, the fail counter increments.	FPPM Fuel Control Enable Circuit Voltage State	<> Fuel Control Enable State (ECM)	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) Diagnostic System Disabled d) Run_Crank Ignition Sw Position Status Active Timer [expired] e) FPPM Control Data Rolling Count Faulted f) Diagnostic serial data received g) Run_Crank Ignition Switch Position Circuit Voltage	a) == FCBR ECM FPPM Sys b) == TRUE c) <> True d) >= 0.50 seconds e) <> True f) == TRUE g) > 7.00 volts	40 failures / 80 samples 1 sample / 12.5 millisec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Control Status Signal Message Counter Incorrect [FPPM applications only]	P12A8	To detect if the control status message transmitted as serial data from the driver control module is valid. The "rolling count check" value is created by adding an appended hexadecimal calculation to each control command value. The corresponding "check" value is transmitted to the FPPM as well as the actual command. At the FPPM, the received command value is used to create an expected "rolling count" value using the same calculation method as the ECM. The expected "rolling count" value calculated at the receiving power module (smart device) is compared to the transmitted "rolling count" value. If these do not match, a fault condition is reported forward to the ECM where X/Y diagnostic counting is performed.	FPPM Control Status Alive Rolling Count	<> ECM Control Status Alive Rolling Count (Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state)	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) FPPM Diagnostic serial data received d) Run_Crank Ignition Switch Position Circuit Voltage	a) == FCBR ECM FPPM Sys b) == TRUE c) == TRUE d) > 0.00 Volts	64 failures / 80 samples 1 sample / 12.5 millisec	Type B, 2 Trips
			FPPM Power Consumption Alive Rolling Count	<> ECM Power Consumption Alive Rolling Count (Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state)	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) FPPM Diagnostic serial data received d) Run_Crank Ignition Switch Position Circuit Voltage	a) == FCBR ECM FPPM Sys b) == TRUE c) == TRUE d) > 0.00 Volts	64 failures / 80 samples 1 sample / 12.5 millisec	
			FPPM Driver Status Alive Rolling Count	<> ECM Driver Status Alive Rolling Count (Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state)	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) FPPM Diagnostic serial data received d) Run_Crank Ignition Switch Position Circuit Voltage	a) == FCBR ECM FPPM Sys b) == TRUE c) == TRUE d) > 0.00 Volts	64 failures / 80 samples 1 sample / 12.5 millisec	
			FPPM Hardware Status Alive Rolling Count	<> ECM Hardware Status Alive Rolling Count (Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state)	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) FPPM Diagnostic serial data received d) Run_Crank Ignition Switch Position Circuit Voltage	a) == FCBR ECM FPPM Sys b) == TRUE c) == TRUE d) > 0.00 Volts	64 failures / 80 samples 1 sample / 12.5 millisec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Coil Positive Voltage Circuit Group 1 * * SIDI ONLY * *	P135A	This diagnostic checks for minimum voltage at the fuse which supplies power to the Ignition Coils (applicable only for SIDI applications). A diagnostic failure indicates a blown fuse.	Ignition Module Supply Voltage.	< 2.5 Volts	Diagnostic Enabled? Three possible Ignition Coil Power Sources (only 1 used): Ignition Coil Power Source = Case 1: Battery Delay starting at Key-On Case 2: Ignition Run/ Crank Ignition Run/Crank Voltage Case 3: PT Relay PT Relay Voltage	Yes PT Relay (Case 3) 5 Engine Revs > 5.0 volts > 11.0 volts	24 Failures out of 30 Samples 6.25 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cold Start Emissions Reduction System Fault	P1400	Model based test computes power from exhaust flow and thermal energy resulting from elevated idle speed and retarded spark advance. Detects if the cold start emission reduction system has failed resulting in the delivered power being out of range.	Average desired accumulated exhaust power - Average actual accumulated exhaust power (too much energy delivered to catalyst) Average desired accumulated exhaust power - Average actual accumulated exhaust power (too little energy delivered to catalyst) (EWMA filtered) Average Power = output of **P1400_EngineSpeedResidual_Table** * output of **P1400_SparkResidual_Table** NOTE: Desired accumulated power would use the desired catalyst light off spark and desired engine speed and the actual accumuated power would use the final commanded spark and actual engine speed. Refer to the Supporting Tables for details	< -3.85 KJ/s (high RPM failure mode) > 5.30 KJ/s (low RPM failure mode)	To enable the diagnostic, the Cold Start Emission Reduction Strategy must be Active per the following: Catalyst Temperature AND Engine Coolant AND Engine Coolant AND Barometric Pressure The Cold Start Emission Reduction strategy must not be exiting. The strategy will exit per the following: Catalyst Temperature AND Engine Run Time OR Engine Run Time OR Barometric Pressure	< 350.00 degC > -12.00 degC <= 66.00 degC >= 76.00 KPa >= 900.00 degC >= 30.00 seconds > **P050D_P1400_CatalystLightOffExtendedEngineRunTimeExit** This Extended Engine run time exit is a function of percent ethanol and Catmons NormRatioEWMA. Refer to "Supporting Tables" for details. < 76.00 KPa	Runs once per trip when the cold start emission reduction strategy is active Frequency: 100ms Loop Test completes after 15 seconds of accumulated qualified data.	EWMA Based - Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Other Enable Criteria:			
					OBD Manufacturer Enable Counter	0		
					Vehicle Speed	< 81.40 MPH		
					Allow diagnostic to calculate residual in an off-idle state. If the value of the OffIdleEnable is equal to 1 then the "DriverOffAccelPedal" will not be checked. However, if the value of OffIdleEnable is 0 then driver must be off the accel pedal	1 (A value of 1 allows diagnostic to run and calculate the residual while off idle. A value of 0 requires calculation of the residual at idle)		
					A change in throttle position (tip-in/tip-out) will initiate a delay in the calculation of the average qualified residual value. Therefore when the:			
					Pedal Close Delay Timer	> 2.00 seconds		
					the diagnostic will continue the calculation.			
					A change in gear will initiate a delay in the calculation of the average qualified residual value to			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					allow time for the actual engine speed and actual final commanded spark to achieve their desired values. Therefore, when the:			
					Gear Shift Delay Timer	> 2.00 seconds		
					the diagnostic will continue the calculation			
					For Manual Transmission vehicles:			
					Clutch Pedal Position	> 12.00 %		
					Clutch Pedal Position	< 75.00 %		
					The diagnostic will delay calculation of the residual value and potentially weight the residual calculation differently based on engine run time. This is to ensure the diagnostic is operating in idle speed control as well as during the peak catalyst light off period.			
					The time weighting factor must be :	> 0 These are scalar values that are a function of engine run time. Refer to		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P1400_ColdStartDiagnosticDelayBasedOnEngineRunTime and the cal axis, **P1400_ColdStartDiagnosticDelayBasedOnEngineRunTimeCalAxis** in the "Supporting Tables" for details.		
					General Enable:			
					DTC's Not Set:			
						AcceleratorPedalFailure ECT_Sensor_FA IAT_SensorCircuitFA MnfdTempSensorCktFP CrankSensor_FA FuelInjectorCircuit_FA MAF_SensorFA MAP_SensorFA EngineMisfireDetected_FA ClutchPstnSnsr FA IAC_SystemRPM_FA IgnitionOutputDriver_FA TPS_FA VehicleSpeedSensor_FA 5VoltReferenceMAP_OOR_Flt TransmissionEngagedState_FA EngineTorqueEstInaccurate		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation (EGR) Internal Error	P1426	This diagnostic monitors the encoded PWM signal from the Smart EGR Valve. The ECM monitors to determine if the Smart EGR Valve start transmitting the specific PWM Duty Cycle (10%) that indicates it has detected an internal error. The ECM then determines when this conditions has existed long enough to determine the part is faulted.	The smart EGR valve has determined that an internal error exists (internal to the EGR valve). The EGR valve has broadcast the specific duty cycle to indicate internal error conditions exist.	12.00 % > Duty Cycle received from EGR Valve > 8.00 %	Engine RPM Engine RPM Output driver Ignition switch	>= 700 RPM <= 5,900 RPM On Crank or Run	> 20 failures 12.50 ms / sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor1 vs IAT Not Plausible	P1427	The power up temperature varies too much from reference sensor after long soak. At start up, after a long enough soak time to stabilize temperatures, the EGR 1 temp sensor is compared to the IAT temp sensor. If the temperature delta is above an allowed operating threshold the sensor is determined to be faulted.	If the power up, initial value of the temp sensor varies more than allowed from the reference temp sensor.	Temperature Delta from IAT. at power up > 25 degC	Engine soak (not run) time No P codes Ignition switch	>= 28,800.00 Sec P262B P0111 P0114 P010B P00E9 P117D P017C P017D P017B P117B P117F P117E P117C P0116 P0117 P0118 P111E P0128 P0119 Crank or Run	NA	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor2 vs IAT Not Plausible	P1429	The power up temperature varies too much from reference sensor after long soak. At start up, after a long enough soak time to stabilize temperatures, the EGR 2 temp sensor is compared to the IAT temp sensor. If the temperature delta is above an allowed operating threshold the sensor is determined to be faulted.	If the power up initial value of the temp sensor varies more than allowed from the reference temp sensor.	Temperature Delta from IAT at power up > 25.00 C	Engine soak (not run) time	>= 28,800.00 Sec	NA	Type B, 2 Trips
					No P codes	P262B P0111 P0114 P010B P00E9 P117D P017C P017D P017B P117B P117F P117E P117C P0116 P0117 P0118 P111E P0128 P0119		
					Ignition switch	Crank or Run		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor "B" Not Plausible	P1437	The Smart EGR valve is requesting a thermal shutdown when conditions do not exist. DETAILED DESCRIPTION: The EGR Valve on this application is a "Smart EGR Valve". Desired Position, Position Feedback as well as other state communication between the ECM and the Valve are done using an Encoded PWM message. The EGR valve has internal temperature determination that can determine the valve is operating at a temperature that is beyond its range and damage to the valve could occur. GM's standard is that Smart Components cannot make this determination on their own and the request to shut down decision must be made and rationalized by the ECM. When the EGR believes it is in an	The smart EGR valve has determined that a thermal condition exists where the valve should be shut down for protection but ECM has determined that condition is not plausible. ECM Received duty Cycle of 14% (request from valve to be shutdown due to thermal conditions) but none of the other engine "hot conditions" exist.	16.00 % > Duty Cycle Received from EGR Valve > 12.00 % and NONE of the following conditions exist: Engine Metal Overtemp: Engine Metal Temperature > 131 C for > 2 Sec. Ambient Temperature>= 140 C Catalyst temperature > 950 Piston Protection: RPM > 8,192 RPM and Airflow > **Piston Protection Airflow** and engine coolant > 63 C for >= 7 Sec Hot Coolant Enrichment: Engine coolant >= 120.00 C and Percent throttle area >= 5.00 % and	Engine RPM Engine RPM Output driver Ignition switch	>= 700 RPM <= 5,900 RPM On Crank or Run	>= 800 samples 12.50 ms / sample, continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		elevated temperature conditions where it desires to shut down for protection, it must request it from ECM. This is done by sending a 14% DC message as the Feedback position. The range 12% □ 16% of Feedback Position is held for the Valve request for shutdown. The ECM rationalizes this request with several available known temperatures (calibratable). The request can be rationalized versus: Engine Metal Over temp active flag, Ambient Temperature, Catalyst Temperature, Piston Protection Active, High coolant with elevated RPM and Airflow, Hot coolant enrichment active, Turbo Charger Temperature, Engine Metal temperature, Coolant Temperature, Oil temperature. (Calibratable conditions). If the Valve is requesting temperature shutdown and the ECM determines conditions		Intake Manifold Pressure >= 50.00 kPa and vehicle speed >= 15.00 KPH for >= 2.00 sec Turbo Charger Temperature > 930.00 - **GearDownShftOffset** Engine Metal Temperature > 131.00 for > 2.00 Sec. Engine Coolant Temperature >= 124.00 Engine Oil Temperature >= 1,000.00				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		are such that the valve can be hot and should be requesting temperature protection the request is honored and the ECM sends the message to the Valve via the encoded PWM desired position message that Valve shutdown is commanded. If the Valve is requesting temperature shutdown and the ECM determines conditions are NOT such that the valve can be hot and that is should NOT be requesting temperature protection the request is Not honored. The ECM continues to send the desired position command to the Valve via the encoded PWM desired position message. Debouncing of the P1437 EGR Temperature Sensor "B" Not Plausible fault starts. If the request message continues while not rationalized for long enough, the P1437 code is set.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Pump Performance /Stuck Off (ELCP Sealed Fuel System)	P145C	This DTC will detects an ELCP vacuum pump that is stuck off. The 1st reference vacuum measurement is compared to a minimum expected vacuum change for the ELCP vacuum pump stuck off diagnostic. If the minimum vacuum change is not met then a failure is reported for P145C. If a failure is detected then the ELCP EVAP diagnostic test sequence is complete. In a passing condition, P145C will not report a pass at this time since this diagnostic is run again during the 2nd reference orifice check section. The 2nd reference vacuum measurement is compared to a minimum expected vacuum change for the ELCP vacuum pump stuck off diagnostic. If the minimum vacuum change is not met then a failure is reported for P145C. If a failure is detected then the ELCP EVAP diagnostic test sequence is	When the ELCP vacuum pump is commanded on during the 1st 0.020" reference orifice vacuum measurement, if the stabilized ELCP pressure sensor (gauge) vacuum reading is after then the ELCP vacuum pump is stuck off and the DTC fails. When the ELCP vacuum pump is commanded on during the 2nd 0.020" reference orifice vacuum measurement, if the stabilized ELCP pressure sensor (gauge) vacuum reading is after then the ELCP vacuum pump is stuck off and the DTC fails.	< 100 Pa 360 seconds < 100 Pa 30 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 ***************************** ELCP hardware can be powered by battery or powertrain relay. For this application the ELCP hardware is powered by battery Voltage ***************************** Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ***************************** ≥ 10 volts ***************************** ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 %	Up to twice per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		complete. In a passing condition, P145C will report a pass at this time.			Refueling request button pressed Service bay test active Device control exceeds No Active DTC's No Active DTC's TFTKO	 0.5 seconds FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P043E P043F P0451 P145D P145E P1462 P2421 P2422 P2450 P24B9		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Pump Stuck On (ELCP Sealed Fuel System)	P145D	This DTC detects an ELCP vacuum pump that is stuck on. Ambient check section For the ELCP vacuum pump stuck on test, the ELCP vacuum pump is off, the DCV is closed, and the ELCP switching valve is moved from the vent to pump position half way through the test. Utilizing the switching valve allows for proper fault detection whether the ELCP vacuum pump is stuck on before or after the ECM is awake. The ELCP vacuum pump stuck on test is performed by comparing an initial ELCP pressure sensor reading to a second reading after the ELCP switching valve is moved from the vent to pump position. The ELCP switching valve is moved back to the vent position after the second pressure sensor reading is taken. A large difference between the two pressure sensor	The 1st time in the test sequence when the ELCP vacuum pump is commanded off, after the ELCP switching valve transitions from vent to pump position, if the difference between an initial ELCP pressure sensor (absolute) reading and a second ELCP pressure sensor (absolute) reading is after then the ELCP vacuum pump is stuck on and the DTC fails. The 2nd time in the test sequence when the ELCP vacuum pump is commanded off, if the ELCP pressure sensor (gauge) vacuum reading is after then the ELCP vacuum pump is stuck on and the DTC fails.	> 1,000 Pa 8 seconds > 1,180 Pa 14 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 ***************************** ELCP hardware can be powered by battery or powertrain relay. For this application the ELCP hardware is powered by battery Voltage ***************************** Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours **************************** ≥ 10 volts ***************************** ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 %	Once or twice per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		readings indicates the ELCP vacuum pump is stuck on and a failure is reported for P145D. The ELCP EVAP diagnostic test sequence is complete if a failure is detected. In a passing condition, P145D will not report a pass at this time since this diagnostic is run again during the final check section. Final check section The ELCP vacuum pump stuck on test in the final check section is not the same as in the ambient check section. Activating the ELCP switching valve in the final check section is not necessary since it was determined in the ambient check section that the pump was not stuck on when the ELCP EVAP diagnostic test sequence started. In the final check section, the ELCP vacuum pump stuck on test is performed by comparing the initial ELCP pressure sensor reading to the final reading when the test			Refueling request button pressed Service bay test active Device control exceeds No Active DTC's No Active DTC's TFTK	 0.5 seconds FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P043E P043F P0451 P145C P145E P145F P1462 P2421 P2422 P2450 P24B9		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		time is reached. A large difference between the two pressure measurements indicates the ELCP vacuum pump is stuck on and a failure is reported for P145D. The ELCP EVAP diagnostic test sequence is complete if a failure is detected. A pass is reported for P145D if the difference is below the threshold calibration.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EVAP System Leak Between Vent Control Valve and Leak Detection Pump (ELCP Sealed Fuel System)	P145E	A small leak (≥0.020") is detected in the EVAP system between the Diurnal Control Valve (DCV) and the ELCP vacuum pump. This includes a leak through the DCV. In the leak between check section the following diagnostics occur: ELCP switching valve performance - P2450, leak to atmosphere between the ELCP vacuum pump and DCV - P145E, and DCV stuck open. The DCV stuck open diagnostic is calibrated to set the same DTC (P145E) as the leak between diagnostic. The ELCP vacuum pump creates a vacuum across a 0.020" reference orifice. This reference vacuum is then compared to the vacuum level created between the closed Diurnal Control Valve (DCV) and the ELCP leak detection pump to determine if a leak exists. If the measured vacuum is below the	If the ELCP pressure sensor (gauge) vacuum reading is less than the 1st 0.020" reference orifce vacuum measurement times a plus a offset for then a small leak is detected between the DCV and ELCP vacuum pump and the DTC fails.	1.00 multiplier 200 Pa 15 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 ***************************** ELCP hardware can be powered by battery or powertrain relay. For this application the ELCP hardware is powered by battery Voltage ***************************** Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ***************************** ≥ 10 volts ***************************** ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 %	Up to once per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		reference vacuum then a leak has been detected and a failure is reported for P145E.			Refueling request button pressed Service bay test active Device control exceeds No Active DTC's No Active DTC's TFTKO	 0.5 seconds FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P043E P043F P0451 P145C P145D P1462 P2450 P24B9		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Reference Orifice Performance (ELCP Sealed Fuel System)	P145F	1st and 2nd 0.020” reference orifice vacuum measurements do not correlate. The reference vacuum is re-checked after the leak detection test sequence is complete. If the absolute difference between the 1st and 2nd reference vacuum measurements is above a threshold then a failure is reported for P145F. If a failure is detected then the ELCP EVAP diagnostic test sequence is complete. If the absolute pressure difference is less than the threshold then a pass is reported. Additional Information The 2nd reference vacuum measurement is similar to the 1st reference vacuum measurement but has a few differences. The 2nd reference vacuum measurement does not need a warm up period like the 1st reference vacuum measurement since the ELCP vacuum pump is	If the difference between the 1st 0.020” reference orifice vacuum measurement and the 2nd 0.020” reference orifice vacuum measurement is after then the 1st and 2nd reference orifice vacuum measurements do not correlate and the DTC fails.	> 550 Pa 30 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 ***************************** ELCP hardware can be powered by battery or powertrain relay. For this application the ELCP hardware is powered by battery Voltage ***************************** Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ***************************** ≥ 10 volts ***************************** ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 %	Up to once per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		already warmed up since it has been on for the prior test sequences. There are wider calibration limits for the 2nd reference vacuum measurement to account for vacuum increases that can occur the longer the pump runs during the EVAP leak check section. During this portion of the test the ELCP vacuum pump is on, the ELCP switching valve is in the vent position, and the DCV is closed. Just like in the 1st reference orifice check section, the results are based on average vacuum measurements calculated over a period of time. The measurements and calculations described in the 1st reference orifice check section of the guide also apply to the 2nd reference orifice check section. The 2nd reference orifice check section also includes a comparison between the 1st and 2nd reference vacuum			Refueling request button pressed Service bay test active Device control exceeds No Active DTC's No Active DTC's TFTKO	0.5 seconds FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P043E P043F P0451 P145C P145D P145E P1462 P2421 P2422 P2450 P24B9		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		measurements. Large differences between these measurements will fail the reference orifice performance diagnostic (P145F).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative System Leak Detection Reference Orifice Flow Erratic (ELCP Sealed Fuel System)	P1462	0.020" reference orifice vacuum measurement is eratic. When the ELCP vacuum pump is on and the ELCP switching valve is in the vent position, the ELCP pressure sensor measures the absolute pressure between the ELCP vacuum pump and the reference orifice. A short period of time before the tests ends an averaged ELCP pressure sensor (absolute) measurement is captured and compared to a final averaged ELCP pressure sensor (absolute) measurement. Large differences between the two values indicates that a stabilized vacuum measurement did not occur and a failure is detected. The vacuum measurements are considered erratic.	While performing 1st 0.020" reference orifice vacuum measurement for or 2nd 0.020" reference orifice vacuum measurement for If the absolute value of the difference between the averaged ELCP pressure sensor (absolute) reading starting before the end of the reference measurement and the final averaged ELCP pressure sensor (absolute) reading is then a stabilized 0.020" reference orifice vacuum measurement could not be obtained and the DTC fails.	360 seconds 30 seconds 3 second 10 seconds 3 second > 220 Pa	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 ****************************** ELCP hardware can be powered by battery or powertrain relay. For this application the ELCP hardware is powered by battery Voltage ****************************** Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ***************************** ≥10 volts ****************************** ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥190 % ≤ 200 %	Up to twice per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Refueling request button pressed Service bay test active Device control exceeds No Active DTC's No Active DTC's TFTKO	 0.5 seconds IAT_SensorFA FuelLevelDataFault ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P043E P043F P0451 P145C P145D P145E P2421 P2422 P2450 P24B9		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 1 Output Circuit (Output Driver Monitor) (EREV/ PHEV only) Open	P1485	Diagnoses the cooling fan 1 output low side driver circuit for circuit faults	Voltage low during driver off state (indicates open circuit)	Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Battery voltage to enable Battery voltage to remain enabled Accessory line is high for No Active DTC's	≥ 11.00 volts ≥ 10.00 volts 5.00 >seconds P2537	50.00 failures out of 63.00 samples 100 ms / sample	Type B, 2 Trips Note: In certain controllers P1486 may also set (Cooling Fan 1 Output Circuit Short to Ground).

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 1 Output Circuit Low Voltage (ODM) (EREV/ PHEV only)	P1486	Diagnoses the cooling fan 1 output low side driver circuit for circuit faults	Voltage low during driver off state (indicates short-to-ground)	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Battery voltage to enable Battery voltage to remain enabled Accessory line is high for No Active DTC's	≥ 11.00 volts ≥ 10.00 volts 5.00 >seconds P2537	50.00 failures out of 63.00 samples 100 ms / sample	Type B, 2 Trips Note: In certain controllers P1485 may also set (Cooling Fan 1 Output Circuit Open Circuit).

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 1 Output Circuit High Voltage (ODM) (EREV/ PHEV only)	P1487	Diagnoses the cooling fan 1 output low side driver circuit for circuit faults	Voltage high during driver on state (indicates short to power).	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Battery voltage to enable Battery voltage to remain enabled Accessory line is high for No Active DTC's	≥ 11.00 volts ≥ 10.00 volts 5.00 >seconds P2537	50.00 failures out of 63.00 samples 100 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Throttle Position Steady State Actuation Fault	P1516	Detect an inablity to maintain a steady state throttle position.	The absolute difference between desired and indicated throttle position is >	2.00 percent	Run/Crank voltage	> 6.41 Volts	0.49 ms	Type B, 2 Trips
					TPS minimum learn is not active AND Throttle is being Controlled			
					Throttle is considered in a steady state condition when the desired throttle position over a 12.5 ms period is	< 0.25 percent		
					For a settling time period	> 4.00 seconds		
					Ignition voltage failure is false	P1682		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Communication Error with Active Grill Air Shutter Module "A"	P151E	This DTC monitors for an internal error or error in communication with the Active Grill Air Shutter Module A	Communication of the Alive Rolling Count from the Shutter Module A over LIN bus is incorrect or the Shutter Module A signals has an internal error for out of total samples	>= 10.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	LIN bus communication executes in 500ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Adaptive Cruise Control Signal Circuit	P1553	Detects rolling count or protection value errors in Adaptive Cruise Control Axle Torque Command serial data signal	If x of y rolling count / protection value faults occur, disable adaptive cruise control for duration of fault		Adaptive Cruise Control Command Serial Data Error Diagnostic Enable	1.00	9 / 17 counts	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Switch State Undertermined	P155A	Detects when cruise switch state cannot be determined, such as low voltage conditions	cruise switch state is received as "undetermined" for greater than a calibratable time	fail continuously for greater than 0.5 seconds			fail continuously for greater than 0.5 seconds	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Air Conditioning (A/C) Refrigerant Pressure Too High When A/C Off	P156A	Determines if the Air Conditioning High Side Pressure Sensor circuit voltage is stuck or biased in range	**Off Test:** The pressure sensor has to be greater than a threshold value when AC is off (a function of ambient temp)	Off Test Pressure > **P156A_Off_Test_Threshold** (function of ambient temperature) (P156A Off Test Details on Supporting Tables:)	Diagnostic Status Off Test Status AC Off Time No active DTC's	Enabled Enabled Delay Time > **P156A_Off_Test_Delay** Sec. Fault bundles: ACHighSidePressSnsrCktFA ACFailedOnSD ACThrmlRefrigSpdVld ACCMLostComm	80 failures out of 100 samples Performed every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Air Conditioning (A/C) Refrigerant Pressure Too Low When A/C On	P156B	Determines if the Air Conditioning High Side Pressure Sensor circuit voltage is stuck or biased in range	**On Test:** The pressure sensor has to be less than a threshold value when engaged (a function of ambient temp)	On Test Pressure < **P156B_On_Test_Threshold** (function of ambient temperature) (P156B On Test Details on Supporting Tables:)	Diagnostic Status On Test Status AC On Time No active DTC's	Enabled Enabled Delay Time > 10 Sec. Fault bundles: ACHighSidePressSnsrCktFA ACFailedOnSD ACThrmlRefrigSpdVld ACCMLostComm	80 failures out of 100 samples Performed every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Calibration Incorrect	P158A	Type of cruise in Body Control Module does not match that in the Engine Control Module for 2.5 seconds	Type of cruise system in GMLAN $4E9 does not match with that in the Engine Control Module for a fix time.	2.5 seconds	DID $40 from BCM says cruise system is present (ECM recieves programmble information from Body Control Module) OR ECM will not receive Programmable information for Cruise from Body Control Module	True	fail continuously for greater than 2.5 seconds.	Type C, No SVS "Emissions Neutral Diagnostics – Special Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Torque Command Circuit	P15F2	This DTC monitors for an error in communication with the Hybrid Commanded Engine Torque Signal	Communication of the Alive Rolling Count or Protection Value for the the Hybrid Commanded Engine Torque Signal over CAN bus is incorrect for out of total samples	>= 10.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 10ms loop.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Object Detection Control Module Torque Request Signal Message Counter Incorrect	P15F6	Detects rolling count or protection value errors in Collision Preparation System Axle Torque Command serial data signal	If x of y rolling count / protection value faults occur, disable collision preparation system for duration of fault		Front Object Detection Module Torque Request Serial Data Error Diagnostic Enable	1.00	4 / 10 counts	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Automatic Braking Engine Torque Request Signal Message Incorrect	P15F8	Detects rolling count or protection value errors Rear Virtual Bumper Axle Torque Command serial data signal	If x of y rolling count / protection value faults occur, disable rear virtual bumper or collision preparation system for duration of fault		Automatic Braking Engine Torque Request Serial Data Error Diagnostic Enable	1.00	4 / 10 counts	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Control Speed Request Circuit Signal Message Counter Incorrect	P15F9	This DTC monitors for an error in communication with the Speed Request signal in $281	Communication of the Alive Rolling Count or Protection Value in the Speed Request signal over CAN bus is incorrect for out of total samples	 >= 10 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 25ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EVAP System Alarm Clock Signal Not Received (ELCP Sealed/ Vented Fuel System)	P162D	ECM did not receive VICM alarm clock feedback signal The ELCP EVAP diagnostics with propulsion system off will run many hours after the vehicle has been shut off when the EVAP system is in a stable condition. Since the ECM does not have the capability to wake itself up, a Vehicle Interface Control Module (VICM) is used to wake up the ECM at predetermined intervals to run the EVAP diagnostics. When the propulsion system transitions to off an alarm request is sent to the VICM. After that period of time has elapsed the VICM alarm clock wakes up the ECM. The ECM then requests another wake up and checks the diagnostic enable conditions. If the enable conditions are met and the EVAP diagnostics are able to complete then the future wake up request will be canceled at the next opportunity when	Whenever the propulsion system goes active, the diagnostic reads its internal timer and evaluates the results from the wake-up events that could have occurred. If the ECM did not receive feedback from the VICM that the alarm clock was set, the 5.0 hour wake-up event did not occur, and the ECM did not wake up for any reason from to then a failure has occurred. If the ECM did not receive feedback from the VICM that the alarm clock was set, the 7.0 hour wake-up event did not occur, and the ECM did not wake up for any reason from to then a failure has occurred. If the ECM did not receive feedback from the VICM that the alarm clock was set, the 9.5 hour wake-up event did not occur, and the ECM did not wake up for any reason from to then a failure has occurred.	4.3 hours 5.8 hours 6.0 hours 8.1 hours 8.2 hours 11.0 hours	Distance since assembly plant Drive distance Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 No Active DTC's Abort Conditions: Service bay test active	≥ 9.9 miles ≥ 0.1 miles ≥ 0 hours ≥ 0 hours VehicleSpeedSensor_FA ModuleOffTime_FA LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA	Once per each wake-up event when Propulsion System is not active Final decision is made when Propulsion System is Active 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		there is communication between the VICM and ECM. If the enable conditions are not met then the ECM will go back to sleep and wait for the next wake up to try and run the EVAP diagnostics. There are a total of three wake ups that the ECM can request until there is another transition from propulsion system on to off. This diagnostic indicates if the ECM received feedback from the VICM after a wake up request was made. A pass will be reported if feedback was received. A failure will be reported if no wake up occurred and no feedback was received. The DTC will be indeterminate if feedback was not received, but a VICM wake up occurred or the ECM was already awake in a valid window for some reason other than a VICM wake up.	At Propulsion System Active, if any of the wake-up events indicate a failure then the DTC fails.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module SIDI High Pressure Pump current monitor	P163A	This DTC Diagnoses the current from the control area and compares it with calibrated thresholds to set current high and low flags	SIDI fuel pump High Current Test Current SIDI fuel pump Low Current Test Current	 >= 11.00 Amps <= 0.10 Amps	Battery Voltage Low Side Fuel Pressure Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false andEngine movement detected is true and Manufacturers enable	>= 11 Volts > 0.300 MPa Enabled when a code clear is not active or not exiting device control Engine is not cranking	Current High/ Low 10 seconds failures out of 12.50 seconds sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active and Barometric Pressure Inlet Air Temp Fuel Temp	 >= 70.0 KPA >= -10.0 degC -10 <= Temp degC <= 132		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Voltage Correlation	P1682	Detect a continuous or intermittent out of correlation between the Run/Crank Ignition Voltage and the Powertrain Relay Ignition Voltage. The diagnostic monitors the difference in voltage between Run/Crank Voltage and the Powertrain Relay Ignition Voltage and fails the diagnostic when the voltage difference is too high. This diagnostic only runs when the powertrain is commanded on and the Run/Crank Voltage is greater than a threshold based on IAT or the powertrain ignition voltage is high enough the Run/Crank voltage is high enough.	|Run/Crank – PT Relay Ignition| >	3.00 Volts	Powertrain commanded on AND (Run/Crank voltage > Table, f(IAT). See supporting tables: **P1682_PT Relay Pull-in Run/Crank Voltage f(IAT)** OR PT Relay Ignition voltage) AND Run/Crank voltage	 > 5.50 Volts > 5.50 Volts	240 / 480 counts; or 0.175 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS SENT Comm Circuit Low (Gasoline applications ONLY)	P16A0	Detects a continuous or intermittent short low or open fault in the TPS SENT Communication Circuit by monitoring the voltage and failing the diagnostic when the voltage for the wave pulse is below state threshold as defined by SAE J2716 SENT Protocol. This diagnostic only runs when battery voltage is high enough.	Voltage for wave pulse is below state threshold as defined by SAE J2716 SENT Protocol	0.5 V	Run/Crank voltage	> 6.41 Volts	79 / 159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS SENT Comm Circuit High (Gasoline applications ONLY)	P16A1	Detects a continuous or intermittent short high fault in the TPS SENT Communication Circuit by monitoring the voltage and failing the diagnostic when the voltage for the wave pulse is above state threshold as defined by SAE J2716 SENT Protocol. This diagnostic only runs when battery voltage is high enough. Detects a High Circuit Fault in the TPS SENT Communication Circuit	Voltage for wave pulse is above state threshold as defined by SAE J2716 SENT Protocol	4.1 V	Run/Crank voltage	> 6.41 Volts	79 / 159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS SENT Comm Circuit Performance (Gasoline applications ONLY)	P16A2	Detects a message fault in the TPS SENT Communication Circuit by monitoring the message pulse time and failing the diagnostic when the time for the pulse is above a low time threshold or above a high time threshold or if the message age limit is greater than a time threshold. This diagnostic only runs when battery voltage is high enough. Detects a Message Fault in the TPS SENT Communication Circuit	Message Pulse < Message Pulse > or Message Age Limit >= or Signal CRC fails	0.125977 ms 0.209991 ms 3.125 ms	Run/Crank voltage	> 6.41 Volts	79 / 159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Voltage Correlation #2	P16A7	Detect a continuous or intermittent out of correlation between the Run/Crank Ignition Voltage and the Powertrain Relay Ignition Voltage #2. The diagnostic monitors the difference in voltage between Run/Crank Voltage and the Powertrain Relay Ignition Voltage and fails the diagnostic when the voltage difference is too high. This diagnostic only runs when the powertrain is commanded on and the Run/Crank Voltage is greater than a threshold based on IAT or the powertrain ignition voltage is high enough the Run/Crank voltage is high enough. Detect a continuous or intermittent out of correlation between the Run/Crank Ignition Voltage & the Powertrain Relay Ignition Voltage #2.	|Run/Crank – PT Relay Ignition| >	3.00 Volts	Powertrain commanded on AND (Run/Crank voltage > Table, f(IAT). See supporting tables: **P1682_PT Relay Pull-in Run/Crank Voltage f(IAT)** OR PT Relay Ignition voltage) AND Run/Crank voltage	> 5.50 Volts > 5.50 Volts	240 / 480 counts; or 0.175 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Controls Ignition Relay Feedback Circuit 2 High Voltage - (GEN III Controllers ONLY)	P16B3	Detects high voltage in the engine controls ignition relay feedback circuit 2. This diagnostic reports the DTC when high voltage is present. Monitoring occurs when the relay state is inactive.	Engine controls ignition relay feedback circuit 2 high voltage	Relay voltage >= 4.00	Powertrain relay high diag enable Powertrain relay state	= 1.00 = INACTIVE	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Pressure & Temperature Sensor Communication Circuit 3 Low Voltage	P16E4	This DTC determines if the SENT signal shorted low, this is determined by monitoring the number pulses on the SENT signal line received at the ECU and the SENT Signal Line State always indicating low.	The number pulses on the SENT signal line SENT Signal Line State	<= 40 = Low	SENT Sensor Communication Circuit Diagnostic Enabled SENT power up delay Enabled when a code clear is not active or not exiting device control	True >= 0.00 seconds	400 failures out of 500 samples 6.25 ms per sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Pressure & Temperature Sensor Communication Circuit 3 High Voltage	P16E5	This DTC determines if the SENT signal shorted low, this is determined by monitoring the number pulses on the SENT signal line received at the ECU and the SENT Signal Line State always indicating high.	The number pulses on the SENT signal line SENT Signal Line State	<= 40 = High	SENT Sensor Communication Circuit Diagnostic Enabled SENT power up delay	True >= 0.00 seconds Enabled when a code clear is not active or not exiting device control	400 failures out of 500 samples 6.25 ms per sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 1	P16F0	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor before receiving a valid message.		Run/Crank voltage	> 6.41 Volts	39 / 399 counts continuous; 12.5 ms /count in the ECM main processor	Type A, 1 Trips
			This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor after receiving a valid message.		Run/Crank voltage	> 6.41 Volts	159 / 399 counts continuous; 12.5 ms /count in the ECM main processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Redundant Memory Performance (Gasoline applications ONLY)	P16F3	Detect Processor Calculation faults due to RAM corruptions, ALU failures and ROM failures For all of the following cases: If the individual diagnostic threshold is equal to 2048 ms, this individual case is not applicable. If any of the following cases are X out of Y diagnostics and the fail (x) is greater than the sample (Y), this individual case is also not applicable.	Equivance Ratio torque compensation exceeds threshold	-132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	Type A, 1 Trips
			Absolute difference between Equivance Ratio torque compensation and its dual store out of bounds given by threshold	132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference of Accessory torque and its redundant calculation is out of bounds given by threshold range	132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Absolute difference of Filtered Air-per-cylinder and its redundant calculation is out of bounds given by threshold range	140.87 mg	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference between the previous Final Advance and the current Final Advance not Adjusted for Equivalence Ratio is out of bounds given by threshold range	34.58 degrees		Engine speed >0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Torque Learn offset is out of bounds given by threshold range	High Threshold 0.00 Nm Low Threshold 0.00	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				Nm				
			One step ahead calculation of air-per-cylinder and two step ahead is greater than threshold	80.00 mg		Engine speed > 1,400 rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Difference between Unmanaged Spark and PACS Spark is greater than threshold	34.58 degrees	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded Predicted Engine Torque and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Zero pedal axle torque is out of bounds given by threshold range	High Threshold 998.00 Nm Low Threshold -1,497.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Creep Coast Axle Torque is out of bounds given by threshold range	High Threshold 998.00 Nm Low Threshold -1,497.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Absolute difference of Friction torque and its redundant calculation is out of bounds given by threshold range	132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Arbitrated Air-Per-Cylinder filter coefficient is out of bounds given by threshold range	High Threshold 1.000 Low Threshold 0.074	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Launch spark is active but the launch spark redundant path indicates it should not be active	N/A		Engine speed < 7,800.00 or 7,900.00 rpm (hysteresis pair)	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Rate limited vehicle speed and its dual store do not equal	N/A		Time since first CAN message with vehicle speed >= 0.500 sec	10 / 20 counts; 25.0msec/count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Commanded engine torque due to fast actuators and its dual store do not equal	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded engine torque due to slow actuators and its dual store do not equal	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			TOS to wheel speed conversion factor is out of bounds given by threshold range	High Threshold: 1.10 T/C Range Hi 0.10 T/C Range Lo Low Threshold: 1.10 T/C Range Hi 0.10 T/C Range Lo	Ignition State	Accessory, run or crank	255 / 6 counts; 25.0msec/count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Cylinders active greater than commanded	5 cylinders		Engine run flag = TRUE > 2.00 s Number of cylinder events since engine run > 24 No fuel injector faults active	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Transfer case neutral request from four wheel drive logic does not match with operating conditions	N/A	Ignition State	Accessory, run or crank Transfer case range valid and not over-ridden FWD Apps only	7.00 / 10.00 counts; 25.0msec/count	
			Driver progression mode and its dual store do not equal	N/A	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							multipier	
			Predicted torque for uncorrected zero pedal determination is greater than calculated limit.	Table, f(Engine, Oil Temp). **P16F3_Speed Control External Load f(Oil Temp, RPM)** + 132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Engine Predicted Request Without Motor is greater than its redundant calculation plus threshold	131.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Engine Immediate Request Without Motor is greater than its redundant calculation plus threshold	131.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							down time multipier	
			Positive Torque Offset is greater than its redundant calculation plus threshold OR Positive Torque Offset is less than its redundant calculation minus threshold	132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded Predicted Engine Request is greater than its redundant calculation plus threshold	132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, down time	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							multipier 0.5	
			Commanded Hybrid Predicted Crankshaft Request is greater than its redundant calculation plus threshold	131.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Commanded Hybrid Immediate Crankshaft Request is less than its redundant calculation minus threshold	131.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Regeneration Brake Assist is not within a specified range	Brake Regen Assist < 0 Nm or Brake Regen Assist > 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Cylinder Spark Delta Correction exceeds the absolute difference as compared to Unadjusted Cylinder Spark Delta	34.58 degrees	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			1. Cylinder Torque Offset exceeds step size threshold OR	1. 132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			2. Sum of Cylinder Torque Offset exceeds sum threshold	2. 132.90 Nm				
			Engine Capacity Minimum Immediate Without Motor is greater than its dual store plus threshold	132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Engine Capacity Minimum Engine Off is greater than threshold	0 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Engine Capacity Minimum Engine Immediate Without Motor is greater than threshold	0 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded Immediate Engine Request is greater than its redundant calculation plus threshold	132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Engine Speed Lores Intake Firing (event based) calculation does not equal its redundant calculation	N/A		Engine speed greater than 0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Engine Speed Lores Intake Firing timing (event based) calculation does not equal its redundant calculation	N/A		Engine speed greater than 0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Idle speed control calculated predicted minimum torque request exceeds calculated torque limit	Table, f(Oil Temp, RPM). See supporting tables: **P16F3_Speed Control External Load f(Oil Temp, RPM)** + 132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Idle speed control calculated predicted minimum torque without reserves exceeds calculated torque limit	Table, f(Oil Temp, RPM). See supporting tables: **P16F3_Speed Control External Load f(Oil Temp, RPM)** +	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				132.90 Nm				
			Difference between Driver Requested Immediate Torque primary path and its secondary exceeds threshold	998.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Driver Immediate Request is less than its redundant calculation minus threshold	998.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Commanded Immediate Request is greater than its redundant calculation plus threshold	998.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			OR Commanded Immediate Request is less than its redundant calculation minus threshold				multipier	
			Commanded Immediate Response Type is set to Inactive	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Difference between Cruise Axle Torque Arbitrated Request and Cruise Axle Torque Request exceeds threshold	37.42 Nm		Cruise has been engaged for more than 4.00 seconds	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Desired engine torque request greater than redundant calculation plus threshold	131.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Engine min capacity above threshold	132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			No fast unmanaged retarded spark above the applied spark plus the threshold	15.00 Degree		Engine speed greater than 0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference of adjustment factor based on temperature and its dual store above threshold	2.76 m/s	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			1. Absolute difference of redundant calculated engine speed above threshold	1,808 RPM		Engine speed greater than 0 RPM	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			After throttle blade pressure and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Speed Control's Preditcted Torque Request and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Engine oil temperature and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Desired throttle position greater than redundant calculation plus threshold	10.00 percent	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference of the rate limited pre-throttle pressure and its redundant calculation greater than threshold	0.06 kpa	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Throttle desired torque above desired torque plus threshold	132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Desired filtered throttle torque exceeds the threshold plus the higher of desired throttle torque or modeled throttle torque	132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Torque feedback proportional term is out of allowable range or its dual store copy does not match	High Threshold 66.45 Nm Low Threshold -66.45 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Torque feedback integral term magnitude or rate of change is out of allowable range or its dual store	High Threshold 124.59 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			copy do not match	Low Threshold -132.90 Nm Rate of change threshold 8.31 Nm/loop			down time multipier	
			Difference of Final Torque feedback proportional plus integral term and its redundant calculation is out of bounds given by threshold range	High Threshold 132.90 Nm Low Threshold - 132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Difference of torque desired throttle area and	High Threshold	Ignition State	Accessory, run or crank	Up/down timer 2,048	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			its redundant calculation is out of bounds given by threshold range	2.50 % Low Threshold - 2.50 %			ms continuous, 0.5 down time multipier	
			Difference of torque model coefficients and its redundant calculation is out of bounds given by threshold range	High Threshold 0.0006730 Low Threshold - 0.0006730	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Difference of base friction torque and its redundant calculation is out of bounds given by threshold range	High Threshold 132.90 Nm Low Threshold - 132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Accessory drive friction torque is out of bounds given by threshold range	High Threshold 132.90 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			AC friction torque is greater than commanded by AC control software or less than threshold limit	High Threshold 0.00 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Difference of Oil temperature delta friction torque and its redundant calculation is out of bounds given by threshold range	High Threshold 132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				Low Threshold - 132.90 Nm				
			Generator friction torque is out of bounds given by threshold range	High Threshold 132.90 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Absolute difference between the Supercharger friction torque and its redundant calculation greater than threshold	132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Filtered Torque error magnitude or its increase rate of change is out of	High Threshold 132.90		Engine speed >0rpm MAF, MAP and Baro DTCs are false	Up/down timer 2,048 ms continuous,	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			allowable range or its dual store copy do not match	Nm Low Threshold -132.90 Nm Rate of change threshold 8.31 Nm/loop			0.5 down time multipier	
			Torque error compensation is out of bounds given by threshold range	High Threshold 132.90 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Delta Torque Baro compensation is out of bounds given by threshold	High Threshold 1.32	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous,	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			range	Nm Low Threshold -1.27 Nm			0.5 down time multipier	
			1. Difference of reserve torque value and its redundant calculation exceed threshold OR 2. Reserve request does not agree with operating conditions or Difference of final predicted torque and its redundant calculation exeed threshold OR 3. Rate of change of reserve torque exceeds threshold, increasing direction only OR 4. Reserve engine torque above allowable capacity threshold	1. 131.90 Nm 2. N/A 3. 131.90 Nm 4. 131.90 Nm	3. & 4.: Ignition State	1. & 2.: Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 132.90 Nm 3. & 4.: Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Engine Vacuum and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference of the calculated Intake Manifold Pressure during engine event versus during time event is greater than threshold	Table, f(Desired Engine Torque). See supporting tables: **P16F3_Delta MAP Threshold f(Desired Engine Torque)**		Engine speed >0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Min. Axle Torque Capacity is greater than threshold	-3,250.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Driver Predicted Request is greater than its redundant calculation plus threshold OR	998.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Driver Predicted Request is less than its redundant calculation minus threshold					
			Cold Delta Friction Torque and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Predicted torque for zero pedal determination is greater than calculated limit.	Table, f(Oil Temp, RPM). See supporting tables: **Speed Control External Load f(Oil Temp, RPM)** + 132.90 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded Predicted	1 Nm	Ignition State	Accessory, run or crank	Up/down timer	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Axle Torque and its dual store do not match				475 ms continuous, 0.5 down time multipier	
			Steady State Estimated Engine Torque and its dual store are not equal	N/A		AFM not changing from Active to Inactive and preload torque not changing and one loop after React command Engine speed >0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Difference of Weighting factor for number of cylinders fueled and its redundant calculation is above threshold	0.26		Engine run flag = TRUE > 0.20 s	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Difference of minimum spark advance limit and its redundant calculation is out of bounds given by threshold range	34.58 degrees	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Difference of commanded spark advance and adjusted delivered is out of bounds given by threshold range	34.58 degrees		Engine speed >0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference between Estimated Engine Torque and its dual store are above a threshold	132.90 Nm		Engine speed >0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference between Estimated Engine Torque without reductions due to torque control and its dual store are above a threshold	132.90 Nm		Engine speed >0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Difference of desired spark advance for managed torque and its redundant calculation is out of bounds given by threshold range	34.58 degrees		Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 132.90 Nm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference of Engine Capacity Minimum Running Immediate Brake Torque Excluding Cylinder Sensitivity and its redundant calculation is out of bounds given by threshold range	133 Nm		Engine speed >0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			One step ahead calculation of air-per-cylinder greater than two step ahead calculation by threshold for time	Threshold: Dynamically calculated based on current engine conditions Fault Pending Threshold: 100		Engine speed > 1,400 rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				ms				
			Rate limited cruise axle torque request and its dual store do not match within a threshold	37.42 Nm	Ignition State	Accessory, run or crank	Up/down timer 163 ms continuous, 0.5 down time multipier	
			1. Absolute difference of Calculated accelerator pedal position compensated for carpet learn and error conditions and its redundant calculation is out of bounds given by threshold range OR 2. Absolute difference of Calculated accelerator pedal position compensated for carpet learn and error conditions and its dual store do not equal OR	1. 5.00 % 2. N/A 3. N/A	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			3. Absolute difference of Calculated accelerator pedal position and its dual store do not equal					
			Commanded axle torque is greater than its redundant calculation by threshold	998.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Commanded axle torque is less than its redundant calculation by threshold	1,497.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Preload timer and its redundant calculation do not equal	N/A	Ignition State	Accessory, run or crank AFM apps only	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AC friction torque is greater than commanded by AC control software	0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Engine Speed Lores Intake Firing (time based) calculation does not equal its redundant calculation	N/A		Engine speed >0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference of the calculated spark offset for equivalence ratio and its redundant cacluation is greater than a threshold	34.58 degrees		Engine speed >0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Transmission Torque Request cacluations do not equal their dual stores	N/A		Run or Crank = TRUE > 0.50 s	16 / 32 counts; 25.0msec/count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Absolute difference of the predicted motor torque ACS and its redundant cacluation is greater than a threshold	0.01 Nm			Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference of maximum throttle area and its redundant cacluation is greater than a threshold	15 mm2			Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference of Desired TIAP and its redundant cacluation is greater than a threshold	5.00 kPa			Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Pedal learns and their redundant calculation do not equal		Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Throttle learns and their redundant calculation do not equal		Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Desired Throttle Position and its redundant calculation do not equal		Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Mode Switch Signal Circuit Include for programs that are NOT hybrid start stop conventional	P1762	BCM to ECM Rolling Count check for CAN frame $1E1. -- Only utilize when calibration variable KeINFG_e_HybridType does not equal CeINFR_e_StartStopConv. (Note: Not Equal To is represented by <>)	Rolling count value received from BCM does not match expected value	= TRUE	Engine Speed Engine Speed Engine speed between min/max for Vehicle Speed for Hybrid type	≥ 200 RPM ≤ 7,500 RPM ≥ 5.0 seconds ≤ 124.27 MPH ≥ 5.0 seconds <>CeINFR_e_StartStopConv	> 3 error counts for > 10.0 seconds 100 ms / sample	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Park Assistance System Performance	P18CB	Determines if Park assist active bit from EBCM is valid	Speed Error - APA active ($1C6/$1C7) above a vehicle speed threshold OR Initialization Error - APA active ($1C6/$1C7) without an active torque request OR Exit Error - APA transitions to inactive during active torque request above a vehicle speed threshold	> 10.00 APA active boolean transitions from False to True with Torque Intervention = No request APA active boolean transitions from True to False with Torque Intervention <> No request when vehicle speed is > 1.00	Power Mode Engine Running Status of traction in GMLAN message ($4E9) Ignition Voltage Run/Crank Activ	= Run = True = Traction Present > 6.41 volts > 0.50 seconds	>= 4 failures out of 10 Performed every 12.5ms >= 4 failures out of 10 Performed every 12.5ms When transition occurs, no number of samples Performed every 12.5ms	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Driver Intended Brake Torque Fault	P1B12	Detect a rolling count or protection value error in Driver Intended Brake Torque serial data. This is a plausibiliity test that will fail if there are enough X out of Y errors.	X of Y failure, or continuous criteria have been met for rolling count or protection errors for Driver Intended Brake Torque.			Propulsion System is active KeBRKI_b_TrqSerialDataFailEnbl == 1 Value of KeBRKI_b_TrqSerialDataFailEnbl is: 1 . (If 0, this test is disabled) Manufacturer Enable Counter is 0	9 / 17 counts or 0.488 seconds continuous; 25 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Powertrain Control Module (HPC) 2 Requested MIL Illumination	P1E00	Monitors the HPC 2 MIL request message to determine when the HPC has detected a MIL illuminating fault.	HPC 2 Module Emissions-Related DTC set and module is requesting MIL	HPC 2 Module Emissions-Related DTC set and module is requesting MIL		Time since power-up ≥ 3 seconds	Continuous	Type A, No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft Actuator Solenoid Circuit Low– Bank 1	P2088	Controller specific output driver circuit diagnoses the CAM phaser oil control valve solenoid high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	≤ 0.5 Ω impedance between signal and controller ground	System supply voltage Output driver is commanded on Ignition switch is in crank or run position	> 11.00 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft Actuator Solenoid Circuit High – Bank 1	P2089	Controller specific output driver circuit diagnoses the CAM phaser oil control valve solenoid high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	≤ 0.5 Ω impedance between signal and controller power	System supply Output driver is commanded on Ignition switch is in crank or run position	> 11.00 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Camshaft Actuator Solenoid Circuit Low – Bank 1	P2090	Controller specific output driver circuit diagnoses the CAM phaser oil control valve solenoid high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	≤ 0.5 Ω impedance between signal and controller ground	System supply voltage Output driver is commanded on Ignition switch is in crank or run position	> 11.00 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Camshaft Actuator Solenoid Circuit High – Bank 1	P2091	Controller specific output driver circuit diagnoses the CAM phaser oil control valve solenoid high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	≤ 0.5 Ω impedance between signal and controller power	System supply voltage Output driver Ignition switch	> 11.00 Volts On Crank or Run	20 failures out of 25 samples 250 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Post Catalyst Fuel Trim System Too Lean Bank 1	P2096	Determines if the post catalyst O2 sensor based fuel control system is indicating a lean exhaust gas condition. If the lean condition is such that the control system utilizes all or most of its available high limit authority (high limit = 100% authority), then P2096 will set. The monitor can be calibrated to fail based on the Average Integral Offset % Authority, the Average Total Offset % Authority or both combined. The Average Total Offset metric consists of the average of the Integral Offset+ Proportional Offset. Note: When the post catalyst O2 voltage is too lean, the post catalyst O2 integral and proportional offset control is increased (positive % authority). This applies a lean bias to fuel control in an attempt to counteract the lean condition. A perfectly balanced control system (no rich or lean bias required) is represented by integral	The Average Integral Offset % Authority AND The Average Total Offset % Authority (Note: any value greater than or equal to +100% effectively nullifies the Average Total Offset % Authority criteria) High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 18 % for >= 5.0 seconds AND the % Authority metric is approaching the failure threshold. Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 14 % for >= 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary.	>= 99.0 % >= 50.0 % If the P2096 is actively failing then the Average Integral Offset must be < 99.0 % and the Average Total Offset must be < 50.0 % for the diagnostic to report a pass.	The diagnostic is enabled during: Deceleration Idle Cruise Light Acceleration Heavy Acceleration Ambient Air Pressure Engine AirFlow Intake Manifold Pressure Induction Air Temperature Start-up Coolant Temp. PTO Intrusive diag. fuel control Ethanol Estimation in Progress O2 Heater Learned Resistance Long Term Secondary Fuel Trim Enabled for (see "**Long Term Secondary Fuel Trim Enable Criteria**" in Supporting Tables) High Vapor Conditions Green Cat System Condition	 No No Yes Yes Yes >= 70 kPa >= 0.0 g/s <= 10,000.0 >= 10 kPa <= 255 >= -20 deg. C <= 150 >= -20 deg. C (or OBD Coolant Enable Criteria = TRUE) Not Active Not Active Not Active = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") >= 0.1 seconds Not Present = Not Valid, Green Cat System condition is considered valid until the	Frequency: Continuous Monitoring in 100ms loop. The Integral and Total Offset % Authority metrics are sampled every 100ms and an average is calculated every 100.0 seconds (1,000 samples) before comparing to their respective failure thresholds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		and proportional offset values of "0" (i.e. 0% authority) and a post catalyst O2 sensor that is within its optimal operating range (neither rich nor lean).				accumulated air flow is greater than 360,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C and airflow is above 18 grams/sec.		
					No Fault Active for:	AmbientAirDefault AIR System FA Ethanol Composition Sensor FA ECT_Sensor_FA EGRValveCircuit_FA EGRValvePerformance_FA IAT_SensorFA CamSensorAnyLocationFA EvapEmissionSystem_FA EvapFlowDuringNonPurge_FA FuelTankPressureSnsrCkt_FA EvapPurgeSolenoidCircuit_FA EvapSmallLeak_FA EvapVentSolenoidCircuit_FA FuelInjectorCircuit_FA MAF_SensorFA MAF_SensorTFTKO MAP_SensorFA MAP_EngineVacuumStatus EngineMisfireDetected_FA A/F Imbalance Bank1 O2S_Bank_1_Sensor_1_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					For the cells identified as enabled (i.e. those containing a "Yes" at the beginning of the Enable Conditions column), the minimum accumulated samples required before the fuel control metric is considered usable for that cell (1 sample = 100ms): Deceleration Idle Cruise Light Acceleration Heavy Acceleration (Note: A value in any of the above operating "cells" that is an order of magnitude (or more) higher than other cells is an indication that the diagnostic is not capable of diagnosing in that cell).	O2S_Bank_1_Sensor_2_FA 300 300 300 300 300		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Post Catalyst Fuel Trim System Too Rich Bank 1	P2097	Determines if the post catalyst O2 sensor based fuel control system is indicating a rich exhaust gas condition. If the rich condition is such that the control system utilizes all or most of its available low limit authority (low limit = -100% authority), then P2097 will set. The monitor can be calibrated to fail based on the Average Integral Offset % Authority, the Average Total Offset % Authority or both combined. The Average Total Offset metric consists of the average of the Integral Offset+ Proportional Offset. Note: When the post catalyst O2 voltage is too rich, the post catalyst O2 integral and proportional offset control is decreased (negative % authority). This applies a lean bias to fuel control in an attempt to counteract the rich condition. A perfectly balanced control system (no rich or lean bias required) is represented by integral	The Average Integral Offset % Authority AND The Average Total Offset % Authority (Note: any value less than or equal to -100% effectively nullifies the Average Total Offset % Authority criteria) High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 18 % for >= 5.0 seconds. Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 14 % for >= 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary.	<= -99.0 % <= -50.0 % If the P2097 is actively failing then the Average Integral Offset must be > -99.0 % and the Average Total Offset must be > -50.0 % for the diagnostic to report a pass.	Same as P2096	Same as P2096	Frequency: Continuous Monitoring in 100ms loop. The Integral and Total Offset % Authority metrics are sampled every 100ms and an average is calculated every 100.0 seconds (1,000 samples) before comparing to their respective failure thresholds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		and proportional offset values of "0" (i.e. 0% authority) and a post catalyst O2 sensor that is within its optimal operating range (neither rich nor lean).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Throttle Actuator Position Performance	P2101	1) Detect a throttle positioning error. This is determined if the difference between measured throttle position and modeled throttle position is greater than a threshold or less than a threshold. This diagnostic only runs when the engine is running and the ignition voltage is high enough and there is not an ignition votage failure and the throttle position minimum learn is not active and the throttle is being controlled 2) Throttle control is driving the throttle in the incorrect direction. This is determined if the throttle position is greater than a threshold percent and the powertrain relay voltage is high enough and the throttle position minimum learn is active 3) Throttle control exceeds the reduced power limit. This is determined if the throttle position is greater and a threshold and the powertrain relay voltage is high enough and reduced power is active.	Difference between measured throttle position and modeled throttle position > OR Difference between modeled throttle position and measured throttle position >	10.00 percent 10.00 percent	Run/Crank voltage TPS minimum learn is not active and Throttle is being Controlled AND (Engine Running or Ignition Voltage) OR Ignition Voltage Ignition voltage failure is false (P1682)	> 6.41 Volts > 5.50 Volts > 8.41 Volts	15 counts; 12.5 ms/count in the primary processor	Type A, 1 Trips
			Throttle Position >	36.00 percent	Powertrain Relay voltage TPS minimum learn active	> 6.41 Volts = TRUE	11 counts; 12.5 ms/count in the primary processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 1 Lo	P2122	Detects a continuous or intermittent short low or open in the APP sensor #1 by monitoring the APP1 sensor percent Vref and failing the diagnostic when the APP1 percent Vref is too low. This diagnostic only runs when battery voltage is high enough. Detects a continuous or intermittent short low or open in the APP sensor #1 on the Main processor.	APP1 percent Vref	< 0.4625 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P06A3	19 / 39 counts; or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 1 Hi	P2123	Detects a continuous or intermittent short high in the APP sensor #1 by monitoring the APP1 sensor percent Vref and failing the diagnostic when the APP1 percent Vref is too high. This diagnostic only runs when battery voltage is high enough. Detect a continuous or intermittent short high in the APP sensor #1 on the Main processor.	APP1 percent Vref >	4.7500 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P06A3	19 / 39 counts; or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 2 Lo	P2127	Detects a continuous or intermittent short low or open in the APP sensor #2 by monitoring the APP2 sensor percent Vref and failing the diagnostic when the APP2 percent Vref is too low. This diagnostic only runs when battery voltage is high enough. Detects a continuous or intermittent short low or open in the APP sensor #2 on the Main processor.	APP2 percent Vref <	0.3250 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P0697	19 / 39 counts; or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 2 Hi	P2128	Detects a continuous or intermittent short high in the APP sensor #2 by monitoring the APP2 sensor percent Vref and failing the diagnostic when the APP2 percent Vref is too high. This diagnostic only runs when battery voltage is high enough. Detect a continuous or intermittent short high in the APP sensor #2 on the Main processor.	APP2 percent Vref >	2.6000 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P0697	19 / 39 counts; or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Throttle Position (TP) Sensor 1-2 Correlation	P2135	Detect a continuous or intermittent correlation fault between TPS sensors #1 and #2 on Main processor. 1.) The diagnostic monitors the difference in position between TPS1 and the TPS2 and fails the diagnostic when the difference is too high. This diagnostic only runs when the battery voltage is high enough. 2.) The diagnostic monitors the difference in reference voltage between normalized min TPS1 and the normalized min TPS2 and fails the diagnostic when the difference is too high. This diagnostic only runs when the battery voltage is high enough. Detects a continuous or intermittent correlation fault between TPS sensors #1 and #2 on Main processor	Difference between TPS1 displaced and TPS2 displaced >	6.797 % offset at min. throttle position with a linear threshold to 9.720 % at max. throttle position	Run/Crank voltage No TPS sensor faults No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts (P0122, P0123, P0222, P0223) P06A3	79 / 159 counts; or 58 counts continuous; 3.125 ms/count in the main processor	Type A, 1 Trips
			Difference between (normalized min TPS1) and (normalized min TPS2) >	5.000 % Vref	Run/Crank voltage No TPS sensor faults No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts (P0122, P0123, P0222, P0223) P06A3	79 / 159 counts; or 58 counts continuous; 3.125 ms/count in the main processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 1-2 Correlation	P2138	Detect a continuous or intermittent correlation fault between APP sensors #1 and #2 on Main processor. 1.) The diagnostic monitors the difference in position between APP1 and the APP2 and fails the diagnostic when the difference is too high. This diagnostic only runs when the battery voltage is high enough. 2.) The diagnostic also monitors the difference in reference voltage between normalized min APP1 and the normalized min APP2 and fails the diagnostic when the difference is too high. This diagnostic only runs when the battery voltage is high enough. Detects a continuous or intermittent correlation fault between APP sensors #1 and #2 on Main processor	Difference between APP1 displaced and APP2 displaced >	5.000 % offset at min. pedal position with a linear threshold to 10.001 % at max. pedal position	Run/Crank voltage No APP sensor faults No 5V reference errors or faulst for # 3 & # 4 5V reference circuits	> 6.41 Volts (P2122, P2123,P2127, P2128) (P06A3, P0697)	19 / 39 counts intermittent; or 15 counts continuous, 12.5 ms/count in the main processor	Type A, 1 Trips
			Difference between (normalized min APP1) and (normalized min APP2) >	5.000 % Vref	Run/Crank voltage No APP sensor faults No 5V reference errors or faulst for # 3 & # 4 5V reference circuits	> 6.41 Volts (P2122, P2123,P2127, P2128) (P06A3, P0697)	19 / 39 counts intermittent; or 15 counts continuous, 12.5 ms/count in the main processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 high side circuit shorted to ground	P2147	Controller specific output driver circuit diagnoses Injector 1 high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	25 amp >= through High Side Driver	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 high side circuit shorted to power	P2148	Controller specific output driver circuit diagnoses Injector 1 high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	<= 1 volt between signal and controller power	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 high side circuit shorted to ground	P2150	Controller specific output driver circuit diagnoses Injector 2 high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	25 amp >= through High Side Driver	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 high side circuit shorted to power	P2151	Controller specific output driver circuit diagnoses Injector 2 high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	<= 1 volt between signal and controller power	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 high side circuit shorted to ground	P2153	Controller specific output driver circuit diagnoses Injector 3 high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	25 amp >= through High Side Driver	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 high side circuit shorted to power	P2154	Controller specific output driver circuit diagnoses Injector 3 high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	<= 1 volt between signal and controller power	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 high side circuit shorted to ground	P2156	Controller specific output driver circuit diagnoses Injector 4 high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	25 amp >= through High Side Driver	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 high side circuit shorted to power	P2157	Controller specific output driver circuit diagnoses Injector 4 high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	<= 1 volt between signal and controller power	Battery Voltage Engine Run Time	>= 11 Volts >= 2 Seconds P062B not FA or TFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Vehicle Speed – Output Shaft Speed Correlation	P215B	Detect invalid vehicle speed source. This failure is set by two different conditions. Either the absolute difference between wheel speed vehicle speed and TOS vehicle speed is too high, or secure vehicle speed is not available.	The absolute difference between wheel speed vehicle speed and TOS vehicle speed greater than > OR Secure vehicle speed source is unavailable	6.21 mph		Time since first CAN activity > 0.5000 s Secure vehicle speed source is TOS vehicle speed or wheel speed vehicle speed Trans engaged state is equal to engaged.	400 / 800 counts for wheel speed correlation or 400 / 800 counts for TOS correlation; 25ms/count	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Minimum Throttle Position Not Learned	P2176	Detect when the throttle position minimum learn on the main processor is not learned. This diagnostic detects this by monitoring if the throttle position is greater than a threshold and the number of learn attempts is greater than a threshold. This diagnostic only runs when the battery voltage is high enough and the throttle position minimum learn is active. Throttle position sensors were not in the minmum learn window after multiple attempts to learn the minimum.	During TPS min learn on the Main processor, TPS percent Vref > AND Number of learn attempts >	0.5740 % Vref 10 counts	Run/Crank voltage TPS minimum learn is active No previous TPS min learn values stored in long term memory	> 6.41 Volts = TRUE	2.0 secs	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor 1 / 2 Correlation	P2199	Detects when the Intake Air Temperature (IAT) sensor and IAT2 sensor values do not correlate with each other. These two temperature sensors are both in the induction system, although they do have different sensor time constants and different positional relationships with components that produce heat. If these two temperature values differ by a large enough amount, the Intake Air Temperature 1 / 2 Correlation Diagnostic will fail. This diagnostic is enabled if the Powertrain Relay voltage is high enough.	ABS (IAT - IAT2)	> 55.0 deg C	Powertrain Relay Voltage for a time No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Bank 1 Air-Fuel Ratio Imbalance	P219A	This monitor determines if there is an Air Fuel Imbalance in the fueling system for a cylinder on a Bank 1. Detection is based on a the pre catalyst oxygen sensor voltage. The pre catalyst O2 voltage is used to generate a variance metric that represents the statistical variation of the O2 sensor voltage over a given engine cycle. This metric is proportional to the air-fuel ratio imbalance (variance is higher with an imbalance than without). The observed Variance is dependent on engine speed and load and is normalized by comparing it to a known "good system" result for that speed and load, and generating a Ratio metric. The Ratio metric is calculated by selecting the appropriate threshold calibration from a 17x17 table (see Supporting Table	Filtered Ratio > The Ratio metric is calculated by selecting the appropriate threshold calibration from a 17x17 table (see Supporting Table **P219A Variance Threshold Bank1 Table**) and subtracting it from the measured Variance. The result is then divided by a normalizer calibration from another 17 x 17 table (see Supporting Table **P219A Normalizer Bank1 Table**). This quotient is then multiplied by a quality factor calibration from a 17 x 17 table (see Supporting Table **P219A Quality Factor Bank1 Table**). This result is referred to as the Ratio. Note that the quality factor ranges between 0 and 1 and represents robustness to false diagnosis in the current operating region. Regions with low quality factors are not used.	0.60 If the diagnostic has reported a failure on the prior trip, the Filtered Ratio must fall below 0.51 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing when the Filtered Ratio remains near the initial failure threshold of 0.60 .	System Voltage Fuel Level Engine Coolant Temperature Cumulative engine run time Diagnostic enabled at Idle (regardless of other operating conditions) Engine speed range Engine speed delta during a short term sample period Mass Airflow (MAF) range Cumulative delta MAF during a short term sample period Filtered MAF delta between samples Note: first order lag filter coefficient applied to MAF = 0.050 Air Per Cylinder (APC) APC delta during short term sample period	no lower than 10.0 Volts for more than 0.2 seconds > 10.0 percent AND no fuel level sensor fault > -20 deg. C (or OBD Coolant Enable Criteria = TRUE) > 0.0 seconds No 800 to 10,000 RPM < 1,000 RPM 0 to 1,000 g/s < 1,000 g/s < 1,000.00 g/s 100 to 1,200 mg/cylinder < 1,000 mg/cylinder	Minimum of 1 test per trip, up to 8 tests per trip during RSR or FIR. The front O2 sensor voltage is sampled once per cylinder event. Therefore, the time required to complete a single test (when all enable conditions are met) decreases as engine speed increases. For example, 41.40 seconds of data is required at 1000 rpm while double this time is required at 500 rpm and half this time is required at 2000 rpm. This data is collected only when enable conditions are met, and as such significantly more operating time is required than is indicated above. Generally, a report will be	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		P219A Variance Threshold Bank1 Table) and subtracting it from the measured Variance. The result is then divided by a normalizer calibration from another 17 x 17 table (see Supporting Table **P219A Normalizer Bank1 Table**). This quotient is then multiplied by a quality factor calibration from a 17 x 17 table (see Supporting Table **P219A Quality Factor Bank1 Table**) . This result is referred to as the Ratio. Note that the quality factor ranges between 0 and 1 and represents robustness to false diagnosis in the current operating region. Regions with low quality factors are not used. Finally, a EWMA filter is applied to the Ratio metric to generate the Filtered Ratio malfunction criteria metric. Generally, a normal system will result in a negative Filtered Ratio while a failing system will result in a positive Filtered			Filtered APC delta between samples Note: first order lag filter coefficient applied to APC = 1.000 Spark Advance Throttle Area (percent of max) Intake Cam Phaser Angle Exhaust Cam Phaser Angle Quality Factor (QF) QF calibrations are located in a 17x17 lookup table versus engine speed and load (see Supporting Table **P219A Quality Factor Bank1 Table**). QF values less than “1” indicate that we don’t have 4sigma/2sigma robustness in that region. The quality of the data is determined via statistical analysis of Variance data. Fuel Control Status Closed Loop and Long Term FT Enabled for:	< 100.00 percent 0 to 100 degrees 0 to 200 percent 0 to 100 degrees 0 to 100 degrees >= 0.89 >= 1.2 seconds (Please see "**Closed Loop Enable Clarification**" and "**Long Term FT Enable Criteria**" in Supporting Tables)	made within 5 minutes of operation. For RSR or FIR, 16 tests must complete before the diagnostic can report.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Ratio. The range of the Filtered Ratio metric is application specific since both the emissions sensitivity and relationship between imbalance and the Variance metric are application specific. Some applications may need to command a unique cam phaser value before performing the above calculations since cam phasing has been shown to have an impact on overall signal quality. This application Does Not Use this feature.			Device Control AIR pump CASE learn EGR EVAP Engine Over Speed Protection Idle speed control PTO Injector base pulse width O2 learned htr resistance Rapid Step Response (RSR): RSR will trigger if the Ratio result from the last test is AND it exceeds the last Filtered ratio by Once triggered, the filtered ratio is reset to: Fast Initial Response (FIR): FIR will trigger when an NVM reset or code clear occurs. Once triggered, the filtered ratio is reset to: No Fault Active for:	Not active Not on Not active Not intrusive Not intrusive Not Active Normal Not Active Above min pulse limit = Valid (the O2 heater resistance has learned since NVM reset) >= 0.60 >= 0.30 0.00 0.00 EngineMisfireDetected_FA MAP_SensorFA MAF_SensorFA ECT_Sensor_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						TPS_ThrottleAuthorityDefaulted FuelInjectorCircuit_FA AIR System FA EvapExcessPurgePsbl_FA CamSensorAnyLocationFA FuelTrimSystemB1_FA O2S_Bank_1_Sensor_1_FA O2S_Bank_1_Sensor_2_FA WRAF_Bank_1_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure (BARO) Sensor Performance (naturally aspirated)	P2227	Detects a performance failure in the Barometric Pressure (BARO) sensor, such as when a BARO value is stuck in range. If the engine has been off for a sufficient amount of time, the pressure values in the induction system will have equalized. The BARO sensor value is checked to see if it is within the normal expected atmospheric pressure range. If it is not, then the BARO performance diagnostic will fail. When the engine is running, there is an estimate of barometric pressure that is determined with the Manifold Pressure (MAP) sensor, throttle position, engine air flow and engine speed. If the BARO value from the sensor is not similar to this barometric pressure estimate, then the BARO performance diagnostic will fail.	**Engine Running:** Difference between Baro Pressure reading and Estimated Baro when distance since last Estimated Baro update OR Difference between Baro Pressure reading and Estimated Baro when distance since last Estimated Baro update	 > 15.0 kPa <= 1.06 miles > 20.0 kPa > 1.06 miles	No Active DTCs:	AmbPresSnsrCktFA IAT_SensorFA MAF_SensorFA AfterThrottlePressureFA TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA	320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips
			Engine Not Rotating: Barometric Pressure OR Barometric Pressure	 < 50.0 kPa > 115.0 kPa	Time between current ignition cycle and the last time the engine was running Engine is not rotating No Active DTCs: No Pending DTCs:	> 10.0 seconds EngineModeNotRunTimer Error MAP_SensorCircuitFA AAP_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP	4 failures out of 5 samples 1 sample every 12.5 msec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure (BARO) Sensor Circuit Low (non-boosted applications, Gen III)	P2228	Detects a continuous short to ground in the Barometric Pressure (BARO) signal circuit by monitoring the BARO sensor output voltage and failing the diagnostic when the BARO voltage is too low. The BARO sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	BARO Voltage	< 39.3 % of 5 Volt Range (This is equal to 50.0 kPa)			320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure (BARO) Sensor Circuit High (non-boosted applications, Gen III)	P2229	Detects a continuous short to power or open circuit in the Barometric Pressure (BARO) signal circuit by monitoring the BARO sensor output voltage and failing the diagnostic when the BARO voltage is too high. The BARO sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	BARO Voltage	> 90.0 % of 5 Volt Range (This is equal to 115.0 kPa)			320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure (BARO) Sensor Circuit Intermittent	P2230	Detects a noisy or erratic signal in the barometric pressure (BARO) circuit by monitoring the BARO sensor and failing the diagnostic when the BARO signal has a noisier output than is expected. When the value of BARO in kilopascals (kPa) is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of BARO readings. The result of this summation is called a “string length”. Since the BARO signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic BARO signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current BARO reading - BARO reading from 12.5 milliseconds previous)	> 100 kPa 80 consecutive BARO readings			4 failures out of 5 samples Each sample takes 1.0 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Signal Stuck Lean Bank 1 Sensor 2	P2270	The P2270 diagnostic is the first in a sequence of six intrusive secondary O2 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary O2 sensor is stuck in a normal lean voltage range and thereby can no longer be used for secondary O2 sensor fuel control or for catalyst monitoring. This diagnostic increases the delivered fuel while monitoring the sensor signal and the accumulated mass air flow. This fault is set if the secondary O2 sensor does not achieve the required rich voltage before the accumulated mass air flow threshold is reached.	Post O2 sensor signal AND The Accumulated mass air flow monitored during the Stuck Lean Voltage Test	< 760 mvolts > 60 grams	No Active DTC's B1S2 DTC's Not active this key cycle System Voltage Learned heater resistance Green O2S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA O2S_Bank_ 1_TFTKO O2S_Bank_ 2_TFTKO P013A, P013B, P013E, P013F, P2270 or P2271 > 10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						is above 18.0 grams/sec.		
					Low Fuel Condition	= False		
					Only when FuelLevelDataFault	= False		
					Pedal position	≤ 10.0 %		
					Engine Airflow	2.0 ≤ gps ≤ 20.0		
					Closed loop integral	0.92 ≤ C/L Int ≤ 1.08		
					Closed Loop Active	= TRUE (Please see "**Closed Loop Enable Clarification**" in Supporting Tables).		
					Decel Fuel Cut Off	not inhibited		
					Evap	not in control of purge		
					Ethanol Estimation in Progress	= Not Active (Please see "**Ethanol Estimation in Progress**" in Supporting Tables).		
					Post fuel cell	= Enabled, refer to **Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests** for additional info.		
					Crankshaft Torque	< 125.0 Nm		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater (post sensor) on Time	≥ 30.0 sec		
					Transmission Temp	≥ -255.0 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Predicted Catalyst temp Fuel State ================= All of the above met for at least 0.0 seconds, and then check the following Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled) Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after initially enabled) ================= All of the above met for at least 2.0 seconds, and then the Force Cat Rich intrusive stage is requested. ================= During Stuck Lean test the following must stay TRUE or the test will abort: Commanded Fuel Crankshaft Torque	550 ≤ ºC ≤ 910 = DFCO possible ================== 1,050 ≤ RPM ≤ 3,500 1,000 ≤ RPM ≤ 3,650 40.4 ≤ MPH ≤ 77.7 36.0 ≤ MPH ≤ 80.8 0.96 ≤ EQR ≤ 1.08 < 110.0 Nm		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Signal Stuck Rich Bank 1 Sensor 2	P2271	The P2271 diagnostic is the fourth in a sequence of six intrusive secondary O2 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, & P013B. This DTC determines if the secondary O2 sensor is stuck in a normal rich voltage range and thereby can no longer be used for secondary O2 sensor fuel control or for catalyst monitoring. This diagnostic commands fuel cut off while monitoring the sensor signal and the accumulated mass air flow. This fault is set if the secondary O2 sensor does not achieve the required lean voltage before the accumulated mass air flow threshold is reached.	Post O2 sensor signal AND The Accumulated mass air flow monitored during the Stuck Rich Voltage Test	> 100 mvolts > 6.0 grams	No Active DTC's B1S2 DTC's Not Active this key cycle System Voltage Learned heater resistance Green O2S Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA Ethanol Composition Sensor FA O2S_Bank_ 1_TFTKO O2S_Bank_ 2_TFTKO P013A, P013B, P013E, P013F or P2270 > 10.0 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						is above 18.0 grams/sec.		
					Low Fuel Condition	= False		
					Only when FuelLevelDataFault	= False		
					Fuel State	= DFCO possible		
					DTC's Passed	= P2270 = P013E = P013A		
					================== After above conditions are met: DFCO mode is continued (w/o driver initiated pedal input).	=================		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SIDI High Pressure Pump Performance	P228C	This DTC determines if the high pressure pump is not able to maintain target pressure. The fault is set if the measured fuel rail pressure is lower than desired fuel pressure by a value that can impact emission and drivability for a number of pump events.	Fuel Pressure Error (Desired Pressure - Measure Pressure)	>= **P228C P2C1F - High Pressure Pump Control (HPC) fail threshold of pressure too low** Mpa (see supporting tables)	High Pressure Pump Performance Diagnostic Enable	True	Positive Pressure Error - 10.00 second failures out of 12.50 second samples	Type A, 1 Trips
					Battery Voltage	>= 11 Volts		
					Low Side Fuel Pressure	> 0.300 MPa		
					Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) andCam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false and	Enabled when a code clear is not active or not exiting device control Engine is not cranking		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Engine movement detected is true and Manufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active Barometric Pressure Inlet Air Temp Fuel Temp	 >= 70.0 KPA >= -10.0 degC -10 <=Temp degC <= 132		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SIDI High Pressure Pump Performance	P228D	This DTC determines if the high pressure pump is delivering high pressure that desired pressure. The fault is set if the measured fuel rail pressure is higher than desired fuel pressure by a value that can impact emission and drivability for a number of pump events.	Fuel Pressure Error (Desired Pressure - Measure Pressure)	<= **P228D P2C20 - High Pressure Pump Control (HPC) fail threshold for pressure too high** Mpa (see supporting tables)	High Pressure Pump Performance Diagnostic Enable	True	Negative Pressure Error - 10.00 second failures out of 12.50 second samples	Type A, 1 Trips
					Battery Voltage	>= 11 Volts		
					Low Side Fuel Pressure	> 0.300 MPa		
						Enabled when a code clear is not active or not exiting device control		
					Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt	Engine is not cranking		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					enabled on is false and Engine movement detected is true andManufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active Barometric Pressure Inlet Air Temp Fuel Temp	 >= 70.0 KPA >= -10.0 DegC -10 <= Temp degC <= 132		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #1 CIRCUIT LOW	P2300	Diagnoses Cylinder #1 Ignition Control (EST) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	≤ 100 Ω impedance between signal and controller ground	Engine running Ignition Voltage	 > 11.0	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #1 CIRCUIT High	P2301	Diagnoses Cylinder #1 Ignition Control (EST) output driver circuit for a Short to Power fault. Controller specific output driver circuit diagnoses the low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	≤ 100 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #2 CIRCUIT Low	P2303	Diagnoses Cylinder #2 Ignition Control (EST) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	≤ 100 Ω impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #2 CIRCUIT High	P2304	Diagnoses Cylinder #2 Ignition Control (EST) output driver circuit for a Short to Power fault	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	 ≤ 100 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #3 CIRCUIT Low	P2306	Diagnoses Cylinder #3 Ignition Control (EST) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	$\leq$ 100 Ω impedance between signal and controller ground	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #3 CIRCUIT High	P2307	Diagnoses Cylinder #3 Ignition Control (EST) output driver circuit for a Short to Power fault	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	 $\leq$ 100 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #4 CIRCUIT Low	P2309	Diagnoses Cylinder #4 Ignition Control (EST) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	$\leq$ 100 Ω impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #4 CIRCUIT High	P2310	Diagnoses Cylinder #4 Ignition Control (EST) output driver circuit for a Short to Power fault	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	 ≤ 100 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Pump Control Open Circuit (ELCP Sealed Fuel System)	P2400	Controller specific output driver circuit diagnoses the leak detection pump low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	≥ 200 K Ω impedence between ouput and controller ground			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Pump Control Circuit Low (ELCP Sealed Fuel System)	P2401	Controller specific output driver circuit diagnoses the leak detection pump low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	≤ 0.5 Ω impedence between output and controller ground			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Pump Control Circuit High (ELCP Sealed Fuel System)	P2402	Controller specific output driver circuit diagnoses the leak detection pump low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds. If the P2402 is active, an intrusive test is performed with the pump commanded on for 15 seconds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	≤ 0.5 Ω impedence between output and controller power			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Switching Valve Control Open Circuit (ELCP Sealed Fuel System)	P2418	Controller specific output driver circuit diagnoses the switching valve low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	≥ 200 K Ω impedence between output and controller ground			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Switching Valve Control Circuit Low (ELCP Sealed Fuel System)	P2419	Controller specific output driver circuit diagnoses the switching valve low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	≤ 0.5 Ω impedence between output and controller ground			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Switching Valve Control Circuit High (ELCP Sealed Fuel System)	P2420	Controller specific output driver circuit diagnoses the switching valve low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds. If the P2420 is active, an intrusive test is performed with the switching valve commanded on for 15 seconds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	≤ 0.5 Ω impedence between output and controller power			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EVAP System Vent Valve Stuck Closed (ELCP Sealed Fuel System)	P2422	This DTC detects a Diurnal Control Valve (DCV) that is stuck closed.There are two ways to run this diagnostic depending on the amount of pressure or vacuum in the fuel tank system. Fuel Tank Venting Section The DCV stuck closed diagnostic is performed in either the fuel tank venting or EVAP leak check sections. If there is a sufficient amount of pressure or vacuum in the fuel tank then the DCV stuck closed diagnostic will be performed in the fuel tank venting section by monitoring the change in the FTP sensor when the DCV is commanded open. In the fuel tank venting section, the ELCP vacuum pump is off, ELCP switching valve is in the vent position, and the DCV is open. After the DCV is commanded open, the FTP sensor is monitored for a change in pressure or vacuum	When sufficient pressure or vacuum exists in the fuel tank system When the Fuel Tank Pressure (FTP) sensor indicates a pressure or a vacuum With the DCV commanded opened, if the change in the FTP sensor reading is after then the DCV is stuck closed and the DTC fails. When no pressure or vacuum exists in the fuel tank system When the FTP sensor indicates a pressure or a vacuum With the DCV commanded opened, the ELCP switching valve in the pump position and the ELCP vacuum pump commanded on, if the leak between result minus the ELCP pressure sensor (gauge) vacuum reading is after then the DCV is stuck	> 697 Pa < -697 Pa. < 249 Pa 10 seconds < 697 Pa > -697 Pa. < 300 Pa 5 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 ****************************** ELCP hardware can be powered by battery or powertrain relay. For this application the ELCP hardware is powered by battery Voltage ****************************** Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ***************************** ≥ 10 volts ****************************** ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 %	Up to once per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		and compared to a threshold. Changes larger than the threshold indicate the DCV opened and a pass is reported for P2422. The DCV is closed and the pressure or vacuum in the fuel tank is allowed to stabilize for a period of time. A new fuel tank pressure or vacuum starting level is established before transitioning to the next test section. If no change in fuel tank pressure or vacuum is detected within a period of time after the DCV is commanded open, then a fail is reported for P2422. The DCV is commanded closed and the ELCP EVAP diagnostic test sequence is complete. If the DCV stuck closed diagnostic passes in the fuel tank venting section then the diagnostic is skipped in the EVAP leak check section. The DCV stuck closed diagnostic is performed	closed and the DTC fails.		Refueling request button pressed Service bay test active Device control exceeds No Active DTC's No Active DTC's TFTKO	 0.5 seconds FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P043E P043F P0451 P145C P145D P1462 P2421 P2450 P24B9		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		during the EVAP leak check section when there is not sufficient pressure or vacuum in the fuel tank. A short period of time after the start of the EVAP leak check section, the ELCP pressure sensor gauge calculation is compared to the leak between the ELCP vacuum pump and DCV result. With a properly functioning DCV, the ELCP pressure sensor gauge calculation vacuum level should drop when the DCV opens and not be close to the previous results a short time later. EVAP Leak Check Section The DCV stuck closed diagnostic is performed during the EVAP leak check section when there is not sufficient pressure or vacuum in the fuel tank. A short period of time after the EVAP leak check section starts, the ELCP pressure sensor gauge calculation is compared to the leak between result. If the DCV is stuck closed						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		then the vacuum will be greater than or close to the leak between result and a fail is reported for P2422. A pass is reported for P2422 if the vacuum level is sufficiently below the leak between result. The ELCP EVAP diagnostic test sequence will be complete if a failure is detected.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ELCP Switching Valve Control Performance (ELCP Sealed Fuel System)	P2450	This DTC detects a ELCP switching valve that is stuck. After the 1st reference vacuum measurement is complete, the ELCP switching valve transitions to the pump position. With a sealed system and a correctly functioning ELCP switching valve there will be an initial vacuum drop followed by a vacuum increase. The ELCP switching valve performance diagnostic compares the change (either a decrease or increase) from the 1st reference vacuum measurement to a threshold. If the change is less than the threshold then a fail is reported for P2450. If a failure is detected then the ELCP EVAP diagnostic test sequence is complete.	When the ELCP vacuum pump is commanded on and the ELCP switching valve transitions from vent to pump position, if the difference between the 1st 0.020" orifice reference vacuum measurement and the ELCP pressure sensor (gauge) vacuum reading is after then the ELCP switching value is stuck and the DTC fails.	< 400 Pa 5 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 ***************************** ELCP hardware can be powered by battery or powertrain relay. For this application the ELCP hardware is powered by battery Voltage ***************************** Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions:	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ***************************** ≥ 10 volts ***************************** ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds	Up to once per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Min fuel level slosh	≥ 190 %		
					Max fuel level slosh	≤ 200 %		
					Key up during test			
					Refueling request button pressed			
					Service bay test active			
					Device control exceeds	0.5 seconds		
					No Active DTC's	FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA		
					No Active DTC's TFTKO	P043E P043F P0451 P145C P145D P1462 P2422 P24B9		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Cooler Efficiency (Performance)	P2457	Diagnose EGR Cooler Heat Transfer Efficiency. The efficiency of the EGR cooler is determined by deciding the temperature drop of the EGR gasses before to after the EGR cooler relative to the coolant's ability to absorb the heat. If the cooler is not removing an acceptable amount of heat relative to what it should be able to remove the difference between the EGR gas temperature before the cooler relative to the Coolant temperature, the cooler is determined to be faulted. Diagnose EGR Cooler Heat Transfer Efficiency.	The ECM monitors the heat transfer efficiency from the exhaust gas to the coolant. if the efficiency drops below a calibrated level, the fault is set.	**Calculated instantaneous efficiency:** [((Up Stream temp - Down Stream temp) / (Up Stream temp - Coolant temp)) % + **EGR Efficiency Flow Offset**] **SUM over** 700 **samples:** **Determine Average efficiency:** Summation efficiency / 700 samples **Fail Threshold:** < 80.00 % efficient	Ignition switch System supply voltage Up stream exhaust gas temperature RPM BARO Ambient Temperature Coolant Temperature No Active DTCs	Crank or Run > 11.00 Volts > 200 C < 370 C > 1,100 RPM < 4,000 RPM > 70 kPa > -12 C > 60.00 C AND < 125.00 C P041E, P041C, P041D, P041B, P040E, P040C P040D, P040B, P0070, P0071, P0072, P0073, P2229, P2228, P222C, P222D, P0116, P0117, P0118, P0119, P111E P0128, P0101, P0102, P0103, P010B, P010C, P010D, P0403, P0489, P0490, P0404, P0405, P0406, P042E, P1426, P1437, P0107, P0108, P00C7, P0106, P2228, P2229, P0237, P0238, P0016, P0017, P0018, P0019, P0335, P0336, P0261, P0262, P0264, P0265, P0266, P0267, P0270, P0271, P0273, P0274, P0276, P0277, P0279, P0280, P0282, P0283, P0201, P0202,	700 samples 100 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P0203, P0204, P0205, P0206, P0207, P0208, P2147, P2148, P2150, P2151, P2153, P2154, P2156, P2157, P216B, P216C, P216E, P216F, P217B, P217C, P217E, P217F, P012B, P012C, P012D, P0300, P0351, P0352, P0353, P0354, P0355, P0356, P0357, P0358, P2300, P2301, P2303, P2304, P2306, P2307, P2309, P2310, P2312, P2313, P2315, P2316, P2318, P2319, P2321, P2322		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Pump Pressure Sensor Circuit Performance Diagnostic (ELCP Sealed Fuel System)	P24B9	ELCP Pressure Sensor Correlation Diagnostic The ambient check section The correlation of the ELCP pressure sensor to barometric pressure follows the ELCP vacuum pump stuck on diagnostic. For this diagnostic the ELCP vacuum pump is off, the DCV is closed, and the ELCP switching valve is in the vent position. The ELCP pressure sensor correlation is a X out of Y diagnostic that runs for a period of time. During this time, the ELCP pressure sensor reading is compared to the barometric pressure value which is based on the MAP sensor. Large deviations will increment the fail counter and a failure is reported for P24B9 when the fail count threshold is exceeded. The ELCP EVAP diagnostic test sequence is complete if a failure is detected. In a passing condition,	Propulsion System Not Active If the difference between the ELCP pressure sensor (absolute) reading and the barometric pressure value from the MAP sensor is then increment the fail counter. This diagnostic runs for	> 3,000 Pa 14 seconds.	Propulsion System Not Active Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 ***************************** ELCP hardware can be powered by battery or powertrain relay. For this application the ELCP hardware is powered by battery Voltage ***************************** Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions:	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours **************************** ≥ 10 volts ***************************** ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds	Once or twice per trip with Propulsion System Not Active, for each required wake-up event First time diagnostic runs, 50 failures out of 63 samples Second time diagnostic runs, 50 failures out of 63 samples 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		P24B9 will not report a pass at this time since this diagnostic is run again during the final check section. The final check section The correlation of the ELCP pressure sensor to barometric pressure is the same as in the ambient check section. For this diagnostic the ELCP vacuum pump is off, the DCV is closed, and the ELCP switching valve is in the vent position. The ELCP pressure sensor correlation is a X out of Y diagnostic that runs for a period of time. During this time, the ELCP pressure sensor reading is compared to the barometric pressure value which is based on the MAP sensor. Large deviations will increment the fail counter and a failure is reported for P24B9 when the fail count threshold is exceeded. The ELCP EVAP diagnostic test sequence is complete if a failure is detected. When the sample	Propulsion System Active After a stabilization time		Min fuel level slosh Max fuel level slosh Key up during test Refueling request button pressed Service bay test active Device control exceeds No Active DTC's No Active DTC's TFTKO	≥ 190 % ≤ 200 % 0.5 seconds FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P043E P043F P0451 P145C P145D P145E P145F P1462 P2421 P2422 P2450		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		counter exceeds the sample count threshold then a pass is reported for P24B9.	of When a recent barometric pressure update has occurred within the last if the difference between the ELCP pressure sensor (absolute) reading and the barometric pressure value from the MAP sensor is then increment the fail counter. When a recent barometric pressure update has not occurred within the last if the difference between the ELCP pressure sensor (absolute) reading and the barometric pressure value from the MAP sensor is then increment the fail counter.	10 seconds. 0.1 miles, > 15,000 Pa 0.1 miles, > 20,000 Pa	Propulsion System Active Min baro Max baro Min OAT ****************************** Conditions for corrected / estimated ambient temperature using OAT sensor to be valid = TRUE ****************************** Vehicle not in assembly plant (value must = 0) Run/Crank Voltage Purge is not enabled Abort Conditions: Refueling request button pressed Device control exceeds FTP correlation diagnostic (P0451) is running Purge Low Flow diagnostic (P0497) is running Vent Restriction diagnostic (P0446) is running No Active DTC's	≥ 70 kPa ≤ 110 kPa ≥ 4 °C ***************************** ***************************** 0 ≥ 11.0 volts 0.5 seconds MAP_SensorFA EnginePowerLimited	When Propulsion System Active 50 failures out of 63 samples 100 msec loop	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						AmbientAirDefault OAT_EstAmbTemp_FA		
					No Active DTC's TFTKO	P0443 P0458 P0459 P145D P2400 P2401 P2402 P2418 P2419 P2420 P2450 P24BA P24BB		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Pump Pressure Sensor Circuit Low Voltage (ELCP Sealed/ Vented Fuel System)	P24BA	This DTC will detect an ELCP pressure sensor signal that is too low out of range. The ELCP pressure sensor circuit out of range diagnostic compares the raw sensor voltage to a lower voltage threshold. It is an X out of Y diagnostic that runs continuously anytime the controller is awake. If the sensor voltage is below the lower voltage threshold, the low fail counter then increments. If the low fail counter reaches its threshold then a fail is reported for P24BA DTC. A pass is reported for P24BA DTC if the low sample counter reaches its threshold.	ELCP pressure sensor signal	< 0.70 volts (14.0 % of Vref or ~ 47 kPa)			640 failures out of 800 samples 12.5 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Pump Pressure Sensor Circuit High Voltage (ELCP Sealed/ Vented Fuel System)	P24BB	This DTC will detect an ELCP pressure sensor signal that is too high out of range. The ELCP pressure sensor circuit out of range diagnostic compares the raw sensor voltage to an upper voltage threshold. It is an X out of Y diagnostic that runs continuously anytime the controller is awake. If the sensor voltage is above the upper voltage threshold, the high fail counter then increments. If the high fail counter reaches its threshold then a fail is reported for P24BB DTC. A pass is reported for P24BB DTC if the high sample counter reaches its threshold.	ELCP pressure sensor signal	> 4.85 volts (97.0 % of Vref or ~ 120 kPa)			640 failures out of 800 samples 12.5 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Switch Accessory Position Circuit Low (EREV/ PHEV only)	P2537	Detects a low ignition switch accessory position curcuit. This diagnostic reports the DTC when this circuit is low. Monitoring occurs when the propulsion system has been active for a calibrated duration.	The ECM detects that the state of the accessory line is low when it should be high. The diagnostic is evaluated when Propulsion System Active time is > 5.0 seconds. Diagnostic fails when pass counts are	< 8 counts.			12.5 ms / sample Once per trip	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake System Control Module Requested MIL Illumination	P25A2	Monitors the Brake System Control Module MIL request message to determine when the Brake System Control Module has detected a MIL illuminating fault.	Brake System Control Module Emissions-Related DTC set and module is requesting MIL	Brake System Control Module Emissions-Related DTC set and module is requesting MIL		Time since power-up ≥ 3 seconds	Continuous	Type A, No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake System Control Module B Requested MIL Illumination	P25C9	Monitors the Brake System Control Module B MIL request message to determine when the Brake System Control Module B has detected a MIL illuminating fault.	Brake System Control Module B Emissions-Related DTC set and module is requesting MIL	Brake System Control Module B Emissions-Related DTC set and module is requesting MIL		Time since power-up ≥ 3 seconds	Continuous	Type A, No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position Signal Output Circuit Low	P2618	Controller specific output driver circuit diagnoses the crankshaft position output low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure.	Short to ground: <= 0.5 Ohms impedance between signal and controller ground Open Circuit: >= 200 K Ohms impedance between signal and controller ground	Powertrain Relay Voltage Engine is not cranking Crankshaft Position Output is commanded high	>= 11.0 Volts	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips Note: In certain controllers P2617 may also set (Crankshaft Position Signal Output Circuit / Open)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Power Off Timer Performance	P262B	This DTC determines if the hardware timer does not initialize or count properly. There are two tests to ensure proper functioning of the timer: Count Up Test (CUT) and Range Test (RaTe). Count Up Test (CUT): Verifies that the HWIO timer is counting up with the proper increment. Range Test (RaTe): When the run/crank is not active both the hardware and mirror timers are started. The timers are compared when module shutdown is initiated or run/crank becomes active.	Count Up Test: Time difference between the current read and the previous read of the timer Range Test: The variation of the HWIO timer and mirror timer is	> 1.50 seconds > 0.25 %.			Count Up Test: 4 failures out of 20 samples 1 sec / sample Continuous while run/crank is not active and until controller shutdown is initiated. Range Test: Once per trip when controller shutdown is initiated or run/ crank becomes active.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump "A" Low Flow / Performance	P2635	This DTC detects degradation in the performance of the electronically regulated fuel system	Filtered fuel rail pressure error	<= Low Threshold [Supporting Table] **P2635 Threshold Low** OR >= High Threshold [Supporting Table] **P2635 Threshold High**	a] Fuel Pres Sensor Circuit Low Fault Active (DTC P018C) b] Fuel Pres Sensor Circuit High Fault Active (DTC P018D) c] Fuel Pres Sensor Perf Fault Active (DTC P018B) d] Fuel Pump Circuit Low Fault Active (DTC P0231) e] Fuel Pump Circuit High Fault Active (DTC P0232) f] Fuel Pump Circuit Open Fault Active (DTC P023F) g] Reference Voltage Fault Status (DTC P0641) h] Fuel Pump Driver Control Module Overtemperature Fault Active (DTC P1255) j] Barometric Pressure Signal Valid (PPEI $4C1) k] Engine run time l] Emissions Fuel Level Low (PPEI $3FB) m] Fuel Pump Control Enabled	a] <> TRUE b] <> TRUE c] <> TRUE d] <> TRUE e] <> TRUE f] <> TRUE g] <> Active This Key h] <> TRUE j] == TRUE (for absolute fuel pressure sensor) k] >= 30 sec l] <> TRUE m] == TRUE	1 sample / 12.5 millisec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					n] Fuel Pump Control state p] System Voltage q] Fuel flow rate r] Fuel Pressure Control System	n] == Normal p] 11V< System V <32V q1] > 0.047 gram/sec AND q2] <= Max allowed fuel flow rate [Supporting Table] **P2635 Max Fuel Flow** r1] Not responding to overperformance due to pressure buildup during Deceleration Fuel Cut Off OR r2] Not responding to a decreasing desired fuel pres commnad		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Malfunction Indicator Lamp (MIL) Control Circuit (ODM) Low	P263A	Detects an inoperative malfunction indicator lamp control circuit. This diagnostic reports the DTC when a short to ground is detected.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: ≤ 0.5 Ω impedance between output and controller ground	Run/Crank Voltage Remote Vehicle Start is not active	Voltage ≥ 11.00 volts	1 failures out of 1 samples 50 ms / sample	Type B, No MIL NO MIL Note: In certain controllers P0650 may also set (MIL Control Open Circuit)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Malfunction Indicator Lamp (MIL) Control Circuit (ODM) High	P263B	Detects an inoperative malfunction indicator lamp control circuit. This diagnostic reports the DTC when a short to power is detected.	Voltage high during driver on state (indicates short to power)	Short to power: ≤ 0.5 Ω impedance between output and controller power	Run/Crank Voltage Remote Vehicle Start is not active	Voltage ≥ 11.00 volts	4 failures out of 5 samples 50 ms / sample	Type B, No MIL NO MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module SIDI High Pressure Pump min/ max authority During Catalyst Warm Up	P2C1E	This DTC determines when the high pressure pump control has reached to its max or min authority during Cataylst Warm up	High Pressure Fuel Pump Delivery Angle OR High Pressure Fuel Pump Delivery Angle	>= 92 ° <= 0 °	Catalyst Warm Up High Pressure Pump Performance Diagnostic Enable Battery Voltage Low Side Fuel Pressure Barometric Pressure Inlet Air Temp Fuel Temp Catalyst Warm up enabled (See Definition in Supporting Material below) Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) andCam or	True >= 11 Volts > 0.300 MPa Enabled when a code clear is not active or not exiting device control Engine is not cranking >= 70.0 KPA >= -10.0 degC -10 <= Temp degC <= 132 = True	Windup High/ Low 10.00 seconds failures out of 12.50 Seconds samples	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true andManufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SIDI High Pressure Pump Performance During Catalyst Warm Up	P2C1F	This DTC determines if the high pressure pump is not able to maintain target pressure Catalyst Warm Up. The fault is set if the measured fuel rail pressure is lower than desired fuel pressure by a value that can impact emission and drivability for a number of pump events.	Fuel Pressure Error (Desired Pressure - Measure Pressure)	>= **P228C P2C1F - High Pressure Pump Control (HPC) fail threshold of pressure too low** Mpa (see supporting tables)	Catalyst Warm Up High Pressure Pump Performance Diagnostic Enable Battery Voltage Low Side Fuel Pressure Catalyst Warm up enabled (See Definition in Supporting Material below) Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) andCam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and	True >= 11 Volts > 0.300 MPa = True Enabled when a code clear is not active or not exiting device control Engine is not cranking	Positive Pressure Error - 10.00 second failures out of 12.50 second samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true and Manufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active Barometric Pressure Inlet Air Temp Fuel Temp	>= 70.0 KPA >= -10.0 degC -10 <=Temp degC <= 132		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SIDI High Pressure Pump Performance During Catalyst Warm Up	P2C20	This DTC determines if the high pressure pump is delivering high pressure that desired pressure Catalyst Warm Up. The fault is set if the measured fuel rail pressure is higher than desired fuel pressure by a value that can impact emission and drivability for a number of pump events.	Fuel Pressure Error (Desired Pressure - Measure Pressure)	<= **P228D P2C20 - High Pressure Pump Control (HPC) fail threshold for pressure too high** Mpa (see supporting tables)	Catalyst Warm Up High Pressure Pump Performance Diagnostic Enable	True	Negative Pressure Error - 10.00 second failures out of 12.50 second samples	Type A, 1 Trips
					Battery Voltage	>= 11 Volts		
					Low Side Fuel Pressure	> 0.300 MPa		
					Catalyst Warm up enabled (See Definition in Supporting Material below)	= True		
					Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not	Enabled when a code clear is not active or not exiting device control Engine is not cranking		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					active and Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true andManufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active			
					Barometric Pressure	>= 70.0 KPA		
					Inlet Air Temp	>= -10.0 DegC		
					Fuel Temp	-10 <= Temp degC <= 132		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication Bus A Off	U0073	This DTC monitors for a BUS A off condition	Bus off failures exceeds before the sample time of is reached	5 counts (equivalent to 0.06 seconds) 0.56 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds CAN hardware is bus OFF for	 Not Active on Current Key Cycle Enabled Not Active Not Active > 6.41 Volts = run = 0 (1 indicates enabled) = Active > 11.00 Volts > 0.1125 seconds	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication (Powertrain Expansion CAN Bus) Bus Off	U0074	CAN bus is monitored continuously while GMLAN frames are being transmitted.	Bus status= Monitored continuously while GMLAN frames are being transmitted. Upon notification of bus off condition (passed up to the application from the handler), the algorithm checks for this condition every 1000ms.	=off	Vehicle Power mode: Any virtual network that the module participates in is: ECU operational condition: U0074_00_ENABLE =	Off, Accessory, Run active In ECU_COMM_Actie state. True	1000ms	Depends on the node

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Cruise Control Module	U0104	This DTC monitors for a loss of communication with the Cruise Control Module.	Message is not received from controller for Message $2CB Message $2CD	 ≥ 0.5 seconds ≥ 0.5 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	 Not Active on Current Key Cycle Enabled Not Active Not Active > 6.41 Volts = run = 0 (1 indicates enabled) = Active > 11.00 Volts > 0.4000 seconds	Diagnostic runs in 12.5 ms loop	Type C, No SVS "Emissions Neutral Diagnostics – Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					U0104	Not Active on Current Key Cycle		
					Cruise Control Module	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Steering Angle Sensor Module	U0126	This DTC monitors for a loss of communication with the Steering Angle Sensor Module	Message is not received from controller for Message $1E5	 ≥ 10.00 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	 Not Active on Current Key Cycle Enabled Not Active Not Active > 6.41 Volts = run = 0 (1 indicates enabled) = Active > 11.00 Volts > 0.4000 seconds	Diagnostic runs in 12.5 ms loop	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					U0126 Steering Angle Sensor Module	Not Active on Current Key Cycle is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Brake System Control Module	U0129	Detects that CAN serial data communication has been lost with the EBCM Transmission Control Module on GMLAN.	CAN messages are monitored continuously while GMLAN frames are being transmitted. Messages XXX and/or YYY, ...	=Undetected.	Controller On: Ignition: Non OBD Control Modules: Vehicle Power Mode condition: OBD Control Modules, e.g. ECM: Accessory Wake Up: Virtual Network condition: Bus off DTC U0073 U0129_00_ENABLE=	=True = Run or Crank or Accessory RUN Active Any Virtual Network that the module participates in is active. Not fault active Enabled	Depends on the CAN frame.	Depends on the node.

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Brake System Control Module	U0129	This DTC monitors for a loss of communication with the Brake System Control Module (OBD Module ID 7E5).	Message is not received from controller for Message $0C1 Message $0C5 Message $0D1 Message $1C6 Message $1C7 Message $1E9 Message $2F1 Message $2F9	 ≥ 0.5 seconds ≥ 0.5 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 0.5 seconds ≥ 0.5 seconds ≥ 10.0 seconds ≥ 10.0 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for U0129	 Not Active on Current Key Cycle Enabled Not Active Not Active > 6.41 Volts = run = 0 (1 indicates enabled) = Active > 11.00 Volts > 0.4000 seconds Not Active on Current Key	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Brake System Control Module	Cycle is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Body Control Module, BCM	U0140	Detects that CAN serial data communication has been lost with the BCM Transmission Control Module on HS GMLAN.	CAN messages are monitored continuously while GMLAN frames are being transmitted. Message $0F1, $12A, $139, $140, $142, $160, $1F1, $21D, $3F1 =	Undetected	Controller On: Ignition: Non OBD Control Modules: Vehicle Power Mode condition: OBD Control Modules, e.g. ECM: Accessory Wake Up: Virtual Network condition: Bus off DTC U0073 U0140_00_ENABLE=	=True = Run or Crank or Accessory RUN Active Any Virtual Network that the module participates in is active. Not fault active Enabled	Message: $0F1: 0.50 sec $12A: 10.00 sec $139: 0.00 sec $140: 10.00 sec $142: 0.00 sec $160: 0.00 sec $1F1: 0.50 sec $21D: 0.50 sec $3F1: 10.00 sec	DTC Type C.

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Body Control Module	U0140	This DTC monitors for a loss of communication with the Body Control Module.	Message is not received from controller for Message $0F1 Message $12A Message $1E1 Message $1F1 Message $1F3 Message $3C9 Message $3CB Message $3F1 Message $451 Message $4D7 Message $4E1 Message $4E9	≥ 0.5 seconds ≥ 10.0 seconds ≥ 0.5 seconds ≥ 0.5 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 0.5 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	Not Active on Current Key Cycle Enabled Not Active Not Active > 6.41 Volts = run = 0 (1 indicates enabled) = Active > 11.00 Volts > 0.4000 seconds	Diagnostic runs in 12.5 ms loop	Type C, No SVS "Emissions Neutral Diagnostics – Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					U0140 Body Control Module	Not Active on Current Key Cycle is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Active Grill Air Shutter Module A	U0284	This DTC monitors for a loss of communication on the LIN bus with Shutter Module A	ECM has lost communication over the LIN bus with Device 0 / Shutter 1 for	>= 3.00 counts	The following criteria have been enabled for	>= 400.00 milliseconds	LIN bus communication executes in 500ms loop	Type B, 2 Trips
					Power Mode	=Run		
					Run/Crank Voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Hybrid Powertrain Control Module	U0293	This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module.	Message is not received from controller for Message $0B4 Message $0D3 Message $186 Message $1DF Message $3C1	 ≥ 10.0 seconds ≥ 0.5 seconds ≥ 0.5 seconds ≥ 0.5 seconds ≥ 10.0 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	 Not Active on Current Key Cycle Enabled Not Active Not Active > 6.41 Volts = run = 0 (1 indicates enabled) = Active > 11.00 Volts > 0.4000 seconds	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					U0293 Hybrid Powertrain Control Module	Not Active on Current Key Cycle is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Engine Coolant Bypass Valve A	U0615	This DTC monitors for a loss of communication on the LIN bus with Engine Coolant Bypass Valve A	ECM has lost communication over the LIN bus with Engine Coolant Bypass Valve A	>= 3.00 counts	The following criteria have been enabled for Power Mode Run/Crank Voltage	>= 400.00 milliseconds =Run >= 11.00 Volts	LIN bus communication executes in 500ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Control Module LIN Bus 1	U1345	Detects that LIN serial data communication has been lost with the LIN Bus	Bus Status	= Off	Controller On Ignition	> 3 ms = Run/Crank OR = Accessory	1.0 second	DTC Type B Two Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Control Module LIN Bus 2	U1346	This DTC monitors for a LIN bus off condition on LIN Bus 2	LIN bus off failures	>= 3.00 counts	The following criteria have been enabled for	>= 400.00 milliseconds	Dependent on bus loading.	Type B, 2 Trips
					Power Mode	=Run		
					Run/Crank Voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Hybrid Powertrain Control Module on Bus B	U1817	This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module on Bus B	Message is not received from controller for Message $0A7 Message $1E3 Message $281	 ≥ 0.5 seconds ≥ 0.5 seconds ≥ 0.5 seconds	General Enable Criteria: U0074 Normal CAN transmission on Bus B Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	 Not Active on Current Key Cycle Enabled Not Active Not Active > 6.41 Volts = run = 0 (1 indicates enabled) = Active > 11.00 Volts > 0.4000 seconds	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					U1817	Not Active on Current Key Cycle		
					Hybrid Powertrain Control Module	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Hybrid Powertrain Control Module B on Bus B	U182D	This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module B on Bus B	Message is not received from controller for Message $1D8 Message $3C5 Message $3DA Message $3FF Message $4C2	 ≥ 0.5 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds	General Enable Criteria: U0074 Normal CAN transmission on Bus B Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	 Not Active on Current Key Cycle Enabled Not Active Not Active > 6.41 Volts = run = 0 (1 indicates enabled) = Active > 11.00 Volts > 0.4000 seconds	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					U182D	Not Active on Current Key Cycle		
					Hybrid Powertrain Control Module B (VICM)	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Fuel Pump Driver Control Module on Bus S	U18A2	This DTC monitors for a loss of communication with the Fuel Pump Driver Control Module on Bus S	Message is not received from controller for Message $0D5 Message $0D7	 ≥ 10.00 seconds ≥ 10.00 seconds	General Enable Criteria: U0076 Normal CAN transmission on Bus S Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Run/Crank Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	 Not Active on Current Key Cycle Enabled Not Active Not Active > 6.41 Volts = run = 0 (1 indicates enabled) =Active > 11.00 Volts > 0.4000 seconds	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					U18A2	Not Active on Current Key Cycle		
					Fuel Pump Driver Control Module	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
CGM Lost Communication with ECM	U18D5	This DTC monitors for a CGM Lost Communication with ECM error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the CGM Lost Communication with ECM DTC has set in the CGM.		General Enable Criteria: Message $3CF Central Gateway Module ECM	 is being received is present on the bus is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
CGM Lost Communication with HPCM1	U18D6	This DTC monitors for a CGM Lost Communication with HPCM1 error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the CGM Lost Communication with HPCM1 DTC has set in the CGM.		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type B, 2 Trips
					Message $3CF	is being received		
					Central Gateway Module	is present on the bus		
					HPCM1	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
CGM Lost Communication with HPCM2	U18DB	This DTC monitors for a CGM Lost Communication with HPCM2 error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the CGM Lost Communication with HPCM2 DTC has set in the CGM.		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type B, 2 Trips
					Message $3CF	is being received		
					Central Gateway Module	is present on the bus		
					HPCM2	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
CGM Lost Communication with BSCM1	U18DC	This DTC monitors for a CGM Lost Communication with BSCM1 error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the CGM Lost Communication with BSCM1 DTC has set in the CGM.		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type B, 2 Trips
					Message $3CF	is being received		
					Central Gateway Module	is present on the bus		
					BSCM1	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
CGM Lost Communication with BSCM2	U18DD	This DTC monitors for a CGM Lost Communication with BSCM2 error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the CGM Lost Communication with BSCM2 DTC has set in the CGM.		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type B, 2 Trips
					Message $3CF	is being received		
					Central Gateway Module	is present on the bus		
					BSCM2	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module High Speed CAN Bus Off	U2413	This DTC monitors for a Central Gateway Module High Speed CAN Bus Off error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the Central Gateway Module High Speed CAN Bus Off DTC has set in the CGM.		General Enable Criteria: Message $3CF Central Gateway Module	 is being received is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module High Speed Extension CAN Bus Off	U2414	This DTC monitors for a Central Gateway Module High Speed Extension CAN Bus Off error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the Central Gateway Module High Speed Extension CAN Bus Off DTC has set in the CGM.		General Enable Criteria: Message $3CF Central Gateway Module	 is being received is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module Chassis Expansion CAN Bus Off	U2415	This DTC monitors for a Central Gateway Module Chassis Expansion CAN Bus Off error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the Central Gateway Module Chassis Expansion CAN Bus Off DTC has set in the CGM.		General Enable Criteria: Message $3CF Central Gateway Module	 is being received is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Control Module Lost Communication with ECM [FPPM applications only]	U2616	To detect lost serial data communication from the power driver controller to the ECM	Timer - Fuel System Control message not received (FPPM Received Data Communication Status)	t > 10 s (Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate)	a) Chassis Fuel Pres Sys Type configuration selection b) Diagnostic Enabled c) Diagnostic System Disabled condition d) FPPM Control Alive Rolling Count Faulted e) FPPM serial data received [$0CE] f) Run_Crank Input Circuit Voltage g) Run_Crank Ignition Switch Position status h) Sensor Bus Relay On	a) == FCBR ECM FPPM Sys b) == TRUE c) <> True d) <> True e) == TRUE f) > 7.00 volts g) == TRUE h) == TRUE	64.00 failures / 80.00 samples 1 sample / 12.5 millisec	Type B, 2 Trips

Initial Supporting table - Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests

Description: This table describes the adaptive (Block Learn) cells in which to enable the Post (Secondary) Oxygen sensor response tests.
Note: When the table column heading matches the calibration value below it, that individual cell is enabled.

The cell numbers in the table are defined as:
CeFADR_e_Cell00_PurgOnAirMode5 = 0,
CeFADR_e_Cell01_PurgOnAirMode4 = 1,
CeFADR_e_Cell02_PurgOnAirMode3 = 2,
CeFADR_e_Cell03_PurgOnAirMode2 = 3,
CeFADR_e_Cell04_PurgOnAirMode1 = 4,
CeFADR_e_Cell05_PurgOnAirMode0 = 5,
CeFADR_e_Cell06_PurgOnIdle = 6,
CeFADR_e_Cell07_PurgOnDecel = 7,
CeFADR_e_Cell08_PurgOffAirMode5 = 8,
CeFADR_e_Cell09_PurgOffAirMode4 = 9,
CeFADR_e_Cell10_PurgOffAirMode3 = 10,
CeFADR_e_Cell11_PurgOffAirMode2 = 11,
CeFADR_e_Cell12_PurgOffAirMode1 = 12,
CeFADR_e_Cell13_PurgOffAirMode0 = 13,
CeFADR_e_Cell14_PurgOffIdle = 14,
CeFADR_e_Cell15_PurgOffDecel = 15

Value Units: Block Learn cell number
X Unit: Block Learn cell number

y/x	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Initial Supporting table - Multiple DTC Use - Response Cell Enable Table

Description: This table describes the Block learn cells which enable the Pre (Primary) Oxygen sensor response tests.
Note: When the table column heading matches the calibration value below it, that individual cell is enabled.

Value Units: Block Learn cell name and number
X Unit: Block Learn cell name and number

Multiple DTC Use - Response Cell Enable Table - Part 1

y/x	CeFADR_e_Cell00_PurgOnAirMode 5	CeFADR_e_Cell01_PurgOnAirMode 4	CeFADR_e_Cell02_PurgOnAirMode 3	CeFADR_e_Cell03_PurgOnAirMode 2
1	CeFADR_e_Cell00_PurgOnAirMode 5	CeFADR_e_Cell01_PurgOnAirMode 4	CeFADR_e_Cell02_PurgOnAirMode 3	CeFADR_e_Cell03_PurgOnAirMode 2

Multiple DTC Use - Response Cell Enable Table - Part 2

y/x	CeFADR_e_Cell04_PurgOnAirMode 1	CeFADR_e_Cell05_PurgOnAirMode 0	CeFADR_e_Cell06_PurgOnIdle	CeFADR_e_Cell07_PurgOnDecel
1	CeFADR_e_Cell04_PurgOnAirMode 1	CeFADR_e_Cell05_PurgOnAirMode 0	CeFADR_e_Cell06_PurgOnIdle	CeFADR_e_Cell07_PurgOnDecel

Multiple DTC Use - Response Cell Enable Table - Part 3

y/x	CeFADR_e_Cell08_PurgOffAirMode 5	CeFADR_e_Cell09_PurgOffAirMode 4	CeFADR_e_Cell10_PurgOffAirMode 3	CeFADR_e_Cell11_PurgOffAirMode 2
1	CeFADR_e_Cell08_PurgOffAirMode 5	CeFADR_e_Cell09_PurgOffAirMode 4	CeFADR_e_Cell10_PurgOffAirMode 3	CeFADR_e_Cell11_PurgOffAirMode 2

Multiple DTC Use - Response Cell Enable Table - Part 4

y/x	CeFADR_e_Cell12_PurgOffAirMode 1	CeFADR_e_Cell13_PurgOffAirMode 0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel
1	CeFADR_e_Cell12_PurgOffAirMode 1	CeFADR_e_Cell13_PurgOffAirMode 0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel

Initial Supporting table - Multiple DTC Use_Green Sensor Delay Criteria - Limit

Description: This Calibration is the acculmulated airflow limit above which the Green condition is expired
Used for: P0133, P013A, P013B, P013C, P013D, P013E, P013F, P014A, P014B, P0153, P015A, P015B, P015C, P015D, P1133, P1153, P2270, P2271, P2272 and P2273.
Note: This feature is only enabled when the vehicle is new and cannot be enabled in service.

Value Units: Grams
X Unit: Acculmulated Engine Airflow

y/x	CiOXYR_O2_Bank1_Sensor1	CiOXYR_O2_Bank1_Sensor2	CiOXYR_O2_Bank2_Sensor1	CiOXYR_O2_Bank2_Sensor2
1	120,000	120,000	120,000	120,000

Initial Supporting table - P0011_CamPosErrorLimIc1

Description: Maximum Intake Cam 1 phase error as a function of engine speed and engine oil temperature.

Value Units: Maximum Intake Cam 1 phase error (degCAM)
X Unit: Engine Oil Temperature (degC)
Y Units: Engine Speed (rpm)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
800	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
1,200	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
1,600	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
2,000	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
2,400	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
2,800	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
3,200	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
3,600	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
4,000	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
4,400	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
4,800	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
5,200	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
5,600	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
6,000	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
6,400	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
6,800	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5

Initial Supporting table - P0011_P0021_P05CC_P05CD_EngOilPressEnblIc

Description: Delay time before the oil pressure enable flag is set assuming all the oil pressure enable criteria are met

Value Units: Time (sec)
X Unit: Engine Coolant Temperature (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	3	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1	2

Initial Supporting table - P0011_P0021_P05CC_P05CD_HiEngSpdHiDsblIc

Description: Minimum engine speed to disable Intake cam

Value Units: Engine Speed (rpm)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000

Initial Supporting table - P0011_P0021_P05CC_P05CD_HiEngSpdLoEnblIc

Description: Maximum engine speed to enable Intake cam - works as hysteresis.

Value Units: Engine Speed (rpm)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800

Initial Supporting table - P0011_P0021_P05CC_P05CD_LoPresHiEnblIc

Description: Intake cam is enabled when oil pressure exceeds this value

Value Units: Engine Speed (rpm)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160

Initial Supporting table - P0011_P0021_P05CC_P05CD_LoPresLoDsblIc

Description: Intake cam is disabled when oil pressure falls below this value

Value Units: Engine Oil Pressure (kPa)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150

Initial Supporting table - P0011_P0021_P05CC_P05CD_LoRpmHiEnblIc

Description: Intake cam is enabled when engine speed exceeds this value.

Value Units: Engine Speed (rpm)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500

Initial Supporting table - P0011_P0021_P05CC_P05CD_LoRpmLoDsblIc

Description: Intake cam is disabled when engine speed is below this value.

Value Units: Engine Speed (rpm)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450

Initial Supporting table - P0011_P0021_P05CC_P05CD_P0014_P0024_P05CE_P05CF_ColdStartEngRunning

Description: Engine running time must be greater than this threshold during a cold start to enable cam phasing

Value Units: Time (sec)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - P0011_P05CC_StablePositionTimeIc1

Description: Minimum time for Intake Cam 1 phase position to be stable to enable performance diagnostic.

Value Units: Minimum time (sec)
X Unit: Engine Oil Temperature (degC)
Y Units: Engine Speed (rpm)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
800	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
1,200	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
1,600	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,000	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,400	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,800	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
3,200	100.0	80.0	11.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
3,600	100.0	80.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,000	100.0	80.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,400	100.0	80.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,800	100.0	80.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
5,200	100.0	80.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
5,600	100.0	80.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,000	100.0	80.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,400	100.0	80.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,800	100.0	80.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

Initial Supporting table - P0014_CamPosErrorLimEc1

Description: Maximum Exhaust Cam 1 phase error as a function of engine speed and engine oil temperature.

Value Units: Maximum Exhaust Cam 1 phase error (degCAM)
X Unit: Engine Oil Temperature (degC)
Y Units: Engine Speed (rpm)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
800	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
1,200	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
1,600	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
2,000	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
2,400	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
2,800	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
3,200	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
3,600	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
4,000	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
4,400	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
4,800	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
5,200	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
5,600	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
6,000	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
6,400	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
6,800	6.0	6.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5

Initial Supporting table - P0014_P0024_P05CE_P05CF_EngOilPressEnblEc

Description: Delay time before the oil pressure enable flag is set assuming all the oil pressure enable criteria are met

Value Units: Time (sec)
X Unit: Engine Coolant Temperature (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	3	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1	2

Initial Supporting table - P0014_P0024_P05CE_P05CF_HiEngSpdHiDsblEc

Description: Exhaust cam is disabled when engine speed exceeds this value

Value Units: Engine Speed (rpm)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000

Initial Supporting table - P0014_P0024_P05CE_P05CF_HiEngSpdLoEnblEc

Description: Exhaust cam is enabled when engine speed remains below this value

Value Units: Engine Speed (rpm)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800

Initial Supporting table - P0014_P0024_P05CE_P05CF_LoPresHiEnblEc

Description: Exhaust cam is enabled when oil pressure exceeds this value

Value Units: Engine Oil Pressure (kPa)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160

Initial Supporting table - P0014_P0024_P05CE_P05CF_LoPresLoDsblEc

Description: Exhaust cam is disabled when oil pressure falls below this value

Value Units: Engine Oil Pressure (kPa)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150

Initial Supporting table - P0014_P0024_P05CE_P05CF_LoRpmHiEnblEc

Description: Exhaust cam is enabled when engine speed exceeds this value.

Value Units: Engine Speed (rpm)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500

Initial Supporting table - P0014_P0024_P05CE_P05CF_LoRpmLoDsblEc

Description: Exhaust cam is disabled when engine speed is below this value.

Value Units: Engine Speed (rpm)
X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450

Initial Supporting table - P0014_P05CE_StablePositionTimeEc1

Description: Minimum time for Exhaust Cam 1 phase position to be stable to enable performance diagnostic.

Value Units: Minimum time (sec)
X Unit: Engine Oil Temperature (degC)
Y Units: Engine Speed (rpm)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
800	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
1,200	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
1,600	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,000	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,400	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,800	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
3,200	100.0	80.0	11.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
3,600	100.0	80.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,000	100.0	80.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,400	100.0	80.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,800	100.0	80.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
5,200	100.0	80.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
5,600	100.0	80.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,000	100.0	80.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,400	100.0	80.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,800	100.0	80.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

Initial Supporting table - P0016, P0017, P0018, P0019: Cam Correlation Oil Temperature Threshold

Description: P0016, P0017, P0018, P0019: Cam Correlation Oil Temperature Threshold

Value Units: Engine Run Time- Seconds
X Unit: Oil Temperature- C

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	300	300	160	18	18	18	18	10	3	3	3	3	3	3	3	3	3

Initial Supporting table - P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAP1 Residual Weight Factor based on RPM

Value Units: Weight Factor (Unitless)
X Unit: Engine Speed (RPM)

y/x	0	400	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	8,000
1	0.750	1.000	1.000	0.961	0.949	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Initial Supporting table - P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAP2 Residual Weight Factor based on RPM

Value Units: Weight Factor (Unitless)
X Unit: Engine Speed (RPM)

y/x	0	400	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	8,000
1	0.750	1.000	1.000	0.906	1.000	0.760	0.802	0.890	0.661	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Initial Supporting table - P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 TPS Residual Weight Factor based on RPM

Value Units: Weight Factor (Unitless)
X Unit: Engine Speed (RPM)

y/x	0	400	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	8,000
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Initial Supporting table - P0133_KnEOSD_t_ST_LRC_LimRS1

Description: X Table Axis for P0133

Value Units: Seconds
X Unit: X Table Axis for P0133, L2R Response time breakpoints for table

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	0.000	0.010	0.020	0.030	0.040	0.050	0.060	0.070	0.080	0.090	0.100	0.110	0.120	0.130	0.140	0.150	0.160

Initial Supporting table - P0133_KnEOSD_t_ST_RLC_LimRS1

Description: Y Table Axis for P0133

Value Units: Seconds
Y Units: Y Table Axis for P0133, R2L Response time breakpoints for table

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	0.000	0.010	0.020	0.030	0.040	0.050	0.060	0.070	0.080	0.090	0.100	0.110	0.120	0.130	0.140	0.150	0.160

Initial Supporting table - P0133_O2S Slow Response Bank 1 Sensor 1 Pass/Fail Threshold table

Description: This table discribes the Pass and Fail regions based on the diagnostic test result

Value Units: If the cell contains a "0" then the fault is indicated, if it contains a "1" a fault is not indicated.
X Unit: X axis is Lean to Rich response time (in sec), Please see the table below named "KnEOSD_t_ST_LRC_LimRS1" for the 17 X axis table breakpoints.
Y Units: Y axis is Rich to Lean response time (in sec), Please see the table below named "KnEOSD_t_ST_RLC_LimRS1" for the 17 Y axis table breakpoints.

y/x	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
11	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
12	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - P0401_SamplesAfterReset

Description: Total number of samples allowed after a reset. A greater number of samples allows the EWMA logic to make a decision sooner after a reset. Also used as the threshold of total sample counts above which a test can be considered complete for a particular trip. This is a function of barometric pressure to allow compliant response at different altitudes.

Value Units: Total number of samples allowed after a reset (samples)
X Unit: Barometric pressure (kPa)

y/x	65	70	75	80	85	90	95	100	105
1	20	20	20	15	10	10	10	10	10

Initial Supporting table - P0401_SamplesAfterStep

Description: Total number of samples needed after a step change. A greater number of samples allows the EWMA logic to make a decision sooner after a step change. Also used as the threshold of total step counts above which a test can be considered complete for a particular trip. This is a function of barometric pressure to allow compliant response at different altitudes.

Value Units: Total number of samples needed after a step change(samples)
X Unit: Barometric pressure (kPa)

y/x	65	70	75	80	85	90	95	100	105
1	15	15	15	15	15	15	15	15	15

Initial Supporting table - P0401_StepDelta

Description: Minimum difference between MAP difference and EWMA to trigger multiple tests for step change.This is a function of barometric pressure to allow compliant response at different altitudes.

Value Units: Minimum difference between MAP difference and EWMA (kPa)
X Unit: Barometric pressure (kPa)

y/x	65	70	75	80	85	90	95	100	105
1	15	15	15	15	15	15	15	15	15

Initial Supporting table - P0401_StepMAP_DIFF

Description: Minimum value of MAP difference to trigger multiple tests for step change.This is a function of barometric pressure to allow compliant response at different altitudes.

Value Units: Minimum value of MAP difference (kPa)
X Unit: Barometric pressure (kPa)

y/x	65	70	75	80	85	90	95	100	105
1	2	2	2	2	2	2	2	2	2

Initial Supporting table - P0401_StepSamplesPerTrip

Description: Maximum number of samples per trip after a step change. Also used as the threshold of trip step counts above which a test can be considered complete for a particular trip. This is a function of barometric pressure to allow compliant response at different altitudes.

Value Units: Maximum number of samples per trip after a step change (samples)
X Unit: Barometric pressure (kPa)

y/x	65	70	75	80	85	90	95	100	105
1	1	1	1	1	1	1	1	1	1

Initial Supporting table - P050D_P1400_CatalystLightOffExtendedEngineRunTimeExit

Description: Exit Catalyst Warm-up mode if Engine Run Time is greater than this value. This table is based on percent ethanol (x-axis) and catmon's NormRatio_EWMA value (y-axis). The NormRatio_EWMA value determines the state of the catalyst. Typically, NormRatio_EWMA values below 0.35 (0 is bad and 1 is good) represent catalysts that have degraded. The emission performance of these degraded catalysts can be improved by extending catalyst light off of GetE85R_Pct_FFS_CompAtEngFloat.

y/x	0	25	50	75	100
0.000	30	30	30	30	30
0.125	30	30	30	30	30
0.250	30	30	30	30	30
0.375	30	30	30	30	30
0.500	30	30	30	30	30
0.625	30	30	30	30	30
0.750	30	30	30	30	30
0.875	30	30	30	30	30
1.000	30	30	30	30	30

Initial Supporting table - P1400_ColdStartDiagnosticDelayBasedOnEngineRunTime

Description: Quality weight-based on engine run time. This allows adjustment of the weighting factors at various engine run times in order to prevent the updating of the cumulative quality timer or to change the value of the average qualified residual energy calculation to prevent false Fails of the diagnostic under circumstances inappropriate to update the calculation of the average qualified residual value.

y/x	0	4	8	10	12	16	20	24	30
1	0	0	1	1	1	1	1	1	1

Initial Supporting table - P1400_ColdStartDiagnosticDelayBasedOnEngineRunTimeCalAxis

Description: This is the x-axis for the KtCSED_K_TimeWght calibration table. Refer to the description for KtCSED_K_TimeWght for details.

y/x	1	2	3	4	5	6	7	8	9
1	0	4	8	10	12	16	20	24	30

Initial Supporting table - P1400_EngineSpeedResidual_Table

Description: This 1x17 table of engine exhaust flow values is used to calculate both the desired and the actual engine exhaust flow based on desired and actual engine speed. The desired engine exhaust flow is gathered from the desired engine speed (VeSPDR_n_EngDsrd). The value used for the actual engine exhaust flow is based on the actual engine RPM value.

y/x	100	300	500	700	800	850	880	925	980	1,025	1,050	1,100	1,300	1,500	1,800	2,000	2,200
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Initial Supporting table - P1400_SparkResidual_Table

Description: Predicted engine-out energy potential based on either the desired cold start spark advance value or the actual spark advance value. ExhEngyPerUnitMass calibration is used to calculate both desired exhaust energy and actual energy. The desired and actual exhaust energy per unit mass values are used in part to calculate the desired exhaust energy per unit time and actual exhaust energy per unit time. Both desired and actual go into the residual exhaust energy per unit time calculation.

y/x	-20	-17	-15	0	1	2	3	5	10
1	20.00	10.50	9.00	8.81	7.81	6.19	2.50	1.44	1.00

Initial Supporting table - P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on MAF Est

Description: P0101_P0106_P010B_P0121_P012B_P0236_P1101 MAF1 Residual Weight Factor based on MAF Est

Value Units: Weight Factor (Unitless)
X Unit: Estimated Engine Air Flow (Grams/Second)

y/x	0	50	70	73	76	79	82	85	89	95	100	110	150	170	200	230	250
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Initial Supporting table - P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on RPM

Description: P0101_P0106_P010B_P0121_P012B_P0236_P1101 MAF1 Residual Weight Factor based on RPM

Value Units: Weight Factor (Unitless)
X Unit: Engine Speed (RPM)

y/x	0	400	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	8,000
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Initial Supporting table - P0128_Maximum Accumulated Energy for Start-up ECT conditions - Alternate

Description: KtECTR_E_CTR_WrmUpEnrgyLimTest1

Value Units: Cooling system energy failure threshold (kJ)
X Unit: Minimum ECT for the key cycle (°C)

y/x	-10	0	10	30	51	69	76
1	3,537	2,998	2,459	1,382	250	250	250

Initial Supporting table - P0128_Maximum Accumulated Energy for Start-up ECT conditions - Primary

Description: KtECTR_E_CTR_WrmUpEnrgyLimTest0

Value Units: Cooling system energy failure threshold (kJ)
X Unit: Minimum ECT for the key cycle (°C)

y/x	-10	0	10	30	51	69	76
1	3,724	3,724	3,346	2,590	1,796	1,116	852

Initial Supporting table - P0606_Last Seed Timeout f(Loop Time)

Description: The max time for the Last Seed Timeout as a function of operating loop time sequence.

P0606_Last Seed Timeout f(Loop Time) - Part 1

y/x	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	200.000	200.000	200.000	200.000	200.000	200.000	200.000

P0606_Last Seed Timeout f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	200.000	200.000	500.000	8,191.875	8,191.875	8,191.875	

Initial Supporting table - P0606_PSW Sequence Fail f(Loop Time)

Description: Fail threshold for PSW per operating loop.

P0606_PSW Sequence Fail f(Loop Time) - Part 1

y/x	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	5	3	5	3	5	3	5

P0606_PSW Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	5	5	5	3	5	5	

Initial Supporting table - P0606_PSW Sequence Sample f(Loop Time)

Description: Sample threshold for PSW per operating loop.

P0606_PSW Sequence Sample f(Loop Time) - Part 1

y/x	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	4	4	4	4	4	4	4

P0606_PSW Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	4	4	4	4	4	4	

Initial Supporting table - P1682_PT Relay Pull-in Run/Crank Voltage f(IAT)

Description: The Run/Crank voltages required to pull in the PT relay as a function of induction air temperature.

Value Units: Run/Crank Voltages required to pull in PT Relay (V)
X Unit: Induction Air Temperature (deg C)

y/x	23.000	85.000	95.000	105.000	125.000
1.000	7.000	8.699	9.000	9.199	10.000

Initial Supporting table - P16F3_Delta MAP Threshold f(Desired Engine Torque)

Description: Engine Sync based and Time based delta pressure threshold above which Torque Security error is reported.

y/x	0.00	50.00	100.00	150.00	200.00	300.00
1.00	34.92	34.92	34.92	34.92	34.92	34.92

Initial Supporting table - P16F3_Speed Control External Load f(Oil Temp, RPM)

Description: Specifies the external load table for SPDR torque security as a function of engine oil temperature and engine RPM.

y/x	-40.00	-20.00	-10.00	0.00	50.00	90.00
700.00	4,096.00	4,096.00	4,096.00	4,096.00	4,096.00	4,096.00
900.00	4,096.00	4,096.00	4,096.00	4,096.00	4,096.00	4,096.00
1,100.00	70.00	70.00	70.00	70.00	60.00	50.00
1,400.00	45.00	42.00	38.00	35.00	35.00	35.00
1,600.00	32.89	29.44	27.18	25.55	18.09	15.26
1,800.00	34.82	31.10	28.67	26.92	19.35	16.51
2,000.00	37.64	32.56	30.68	29.85	21.71	18.36
2,200.00	40.80	35.20	33.13	32.22	23.24	19.84
2,500.00	43.58	39.76	37.58	36.01	26.21	23.06
2,700.00	42.72	38.90	36.72	35.15	25.34	22.19
3,000.00	40.65	36.83	34.65	33.08	23.27	20.13
3,300.00	36.87	33.05	30.87	29.30	19.49	16.35
3,500.00	13.41	9.58	7.41	5.84	-3.97	-7.12
3,700.00	7.50	3.67	1.50	-0.08	-9.88	-13.03
4,000.00	4.25	0.43	-1.75	-3.32	-13.13	-16.28
4,500.00	4.25	0.43	-1.75	-3.32	-13.13	-16.28
5,000.00	4.25	0.43	-1.75	-3.32	-13.13	-16.28

Initial Supporting table - 1st_FireAftrMisfr_Acel

Description: Used for P0300 - P0308, Multiplier for establishing the expected acceleration of the cylinder after the misfire

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	500	600	700	800	900	1,000	1,100	1,200	1,400	1,800	2,200	2,600	3,000	4,000	5,000	6,000	7,000
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Initial Supporting table - 1st_FireAftrMisfr_Jerk

Description: Used for P0300 - P0308, Multiplier for establishing the expected Jerk of the cylinder after the misfire

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	500	600	700	800	900	1,000	1,100	1,200	1,400	1,800	2,200	2,600	3,000	4,000	5,000	6,000	7,000
8	-0.71	-0.71	-0.71	-0.71	-0.71	-0.67	-0.64	-0.60	-0.67	-0.64	-0.53	-0.48	-0.43	-0.43	-0.43	-0.43	-0.43
12	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.71	-0.69	-0.60	-0.57	-0.53	-0.53	-0.53	-0.53	-0.53
16	-0.59	-0.59	-0.59	-0.59	-0.59	-0.64	-0.68	-0.73	-0.78	-0.76	-0.68	-0.65	-0.62	-0.62	-0.62	-0.62	-0.62
20	-0.58	-0.58	-0.58	-0.58	-0.58	-0.64	-0.69	-0.75	-0.83	-0.81	-0.70	-0.65	-0.61	-0.61	-0.61	-0.61	-0.61
24	-0.48	-0.48	-0.48	-0.48	-0.48	-0.60	-0.71	-0.83	-0.88	-0.83	-0.74	-0.73	-0.72	-0.72	-0.72	-0.72	-0.72
30	-0.38	-0.38	-0.38	-0.38	-0.38	-0.53	-0.68	-0.84	-0.88	-0.87	-0.81	-0.80	-0.79	-0.79	-0.79	-0.79	-0.79
40	-0.26	-0.26	-0.26	-0.26	-0.26	-0.42	-0.59	-0.75	-0.83	-0.94	-0.93	-0.88	-0.83	-0.83	-0.83	-0.83	-0.83
60	-0.26	-0.26	-0.26	-0.26	-0.26	-0.42	-0.59	-0.75	-0.83	-0.94	-0.93	-0.88	-0.83	-0.83	-0.83	-0.83	-0.83
100	-0.26	-0.26	-0.26	-0.26	-0.26	-0.42	-0.59	-0.75	-0.83	-0.94	-0.93	-0.88	-0.83	-0.83	-0.83	-0.83	-0.83

Initial Supporting table - 1stFireAfterMisJerkAFM

Description: Used for P0300 - P0308, Multiplier for establishing the expected jerk of the cylinder after the misfire if Active Fuel Management cylinder deact mode is active

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
8	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1	1
40	1	1	1	1	1	1	1	1	1
60	1	1	1	1	1	1	1	1	1
100	1	1	1	1	1	1	1	1	1

Initial Supporting table - 1stFireAftrMisAcelAFM

Description: Used for P0300 - P0308, Multiplier for establishing the expected acceleration of the cylinder after the misfire if Active Fuel Management cylinder deact mode is active

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
8	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1	1
40	1	1	1	1	1	1	1	1	1
60	1	1	1	1	1	1	1	1	1
100	1	1	1	1	1	1	1	1	1

Initial Supporting table - Abnormal Cyl Mode

Description: Used for P0300-P0308. Number of consecutive number of decelerating cylinders after the misfire that would be considered abnormal. (Cylinder Mode Equation)

Value Units: Number of consecutive number of decelerating cylinders (integer)
X Unit: thousands of RPM (rpm/1000)

y/x	0	1	2	3	4	5	6	7	8
1	2	2	2	2	2	2	2	2	2

Initial Supporting table - Abnormal Rev Mode

Description: Used for P0300-P0308. Abnormal Rev Mode Number of consecutive number of decelerating cylinders after the misfire that would be considered abnormal. (Rev Mode Equation)

Value Units: Number of consecutive number of decelerating cylinders (integer)
X Unit: thousands of RPM (rpm/1000)

y/x	0	1	2	3	4	5	6	7	8
1	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

Initial Supporting table - Abnormal SCD Mode

Description: Used for P0300-P0308. Number of consecutive number of decelerating cylinders after the misfire that would be considered abnormal. (SCD Mode Equation)

Value Units: Number of consecutive number of decelerating cylinders (integer)
X Unit: thousands of RPM (rpm/1000)

y/x	0	1	2	3	4	5	6	7	8
1	2	2	2	2	2	2	2	2	2

Initial Supporting table - Bank_SCD_Decel

Description: Used for P0300 - P0308, Mulitplier to SCD decel to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500
5	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
10	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
20	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
30	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
40	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
50	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
60	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
80	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
100	12.03	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00

Initial Supporting table - Bank_SCD_Jerk

Description: Used for P0300 - P0308, Mulitplier to Medres SCD jerk to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: mulitplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500
5	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
10	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
20	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
30	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
40	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
50	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
60	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
80	13.14	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
100	5.66	8.21	11.37	15.00	15.00	15.00	15.00	15.00	15.00

Initial Supporting table - BankCylModeDecel

Description: Used for P0300 - P0308, Mulitplier to Lores Decel to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	1,100	1,200	1,300	1,400	1,501	1,600	1,700	1,800	2,200	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
5	10.71	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
10	10.71	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
20	9.38	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
30	4.92	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
40	3.19	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
50	2.63	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
60	2.63	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
80	6.25	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
100	3.95	15.00	15.00	15.00	8.35	10.33	11.94	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00

Initial Supporting table - BankCylModeJerk

Description: Used for P0300 - P0308, Mulitplier to Lores Jerk to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	1,100	1,200	1,300	1,400	1,501	1,600	1,700	1,800	2,200	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
5	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
10	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
20	6.50	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
30	4.45	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
40	3.75	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
50	3.12	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
60	3.12	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
80	6.22	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
100	3.25	8.54	11.81	11.81	11.81	11.81	11.81	13.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00

Initial Supporting table - Catalyst_Damage_Misfire_Percentage

Description: Catalyst Damaging Misfire Percentage" Table whenever secondary conditions are met.

Value Units: percent misfire over 200 revolutions (%)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000
0	22.5	22.5	22.5	20.0	16.6	12.5	4.6	4.6
10	22.5	22.5	22.5	20.0	16.6	12.5	4.6	4.6
20	22.5	22.5	22.5	20.0	16.6	10.0	4.6	4.6
30	20.0	20.0	20.0	20.0	14.4	8.3	4.6	4.6
40	16.7	16.7	16.7	16.7	12.5	5.0	4.6	4.6
50	10.0	10.0	10.0	10.0	10.0	4.6	4.6	4.6
60	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
70	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
80	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
90	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
100	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6

Initial Supporting table - ClyAfterAFM_Decel

Description: Used for P0300 - P0308, Mulitplier to Lores decel to account for different pattern of misfire after a deactivated cylider.   Similar to the second cylinder of consecutive cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - ClyBeforeAFM_Jerk

Description: Used for P0300 - P0308, Mulitplier to Lores decel to account for different pattern of misfire before a deactivated cylider, but after an active cylinder that follows an deactive cylinder on engine that supports cylinder deactivation in non even fire patterns.. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
5	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
10	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
20	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
30	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
40	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
50	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
80	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
100	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60

Initial Supporting table - CombustModeIdleTbl

Description: Used for P0300 - P0308, Only used on Diesel engines. Combustion modes that will force use of Idle table. A value of CeCMBR_i_CombModesMax means not selected.

Value Units: Enumerated value of differant combustion modes (enumeration)
X Unit: Current Combustion Mode (enumeration)

CombustModeIdleTbl - Part 1

y/x	0	1	2	3	4	5
1	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax

CombustModeIdleTbl - Part 2

y/x	6	7	8	9	10	11
1	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax

CombustModeIdleTbl - Part 3

y/x	12	13	14	15	16	
1	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	

Initial Supporting table - ConsecCylModDecel

Description: Used for P0300 - P0308, Mulitplier to Lores decel to account for different pattern of the second cylinder of consecutive misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	1,100	1,200	1,300	1,400	1,501	1,600	1,700	1,800	2,200	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	0.82	0.82	0.82	0.82	0.82	1.01	0.66	1.02	0.64	0.64	1.02	1.73	1.65	1.60	1.33	1.30	1.30
8	0.82	0.82	0.82	0.82	0.82	1.01	0.66	1.02	0.64	0.64	1.02	1.73	1.65	1.60	1.33	1.30	1.30
12	0.82	0.82	0.82	0.82	0.82	1.01	0.66	1.02	0.64	0.64	1.02	1.73	1.65	1.60	1.33	1.30	1.30
16	1.22	1.22	1.22	1.22	1.22	1.23	1.47	1.17	1.07	1.07	1.40	1.73	1.65	1.60	1.33	1.30	1.30
20	1.32	1.32	1.32	1.32	1.32	1.58	1.53	1.53	1.48	1.29	1.28	1.27	1.50	1.78	1.77	1.70	1.70
24	1.32	1.32	1.32	1.32	1.32	1.58	1.55	1.56	1.46	1.50	1.28	1.27	1.34	1.33	2.00	2.17	2.17
26	1.23	1.23	1.23	1.23	1.23	1.76	1.46	1.44	1.42	1.42	1.38	1.68	1.49	1.19	1.33	2.33	2.33
30	0.83	0.83	0.83	0.83	0.83	0.90	1.22	1.54	1.49	1.44	1.33	1.26	1.31	1.38	1.27	1.29	1.29
50	0.83	0.83	0.83	0.83	0.83	0.90	1.08	1.26	1.98	1.78	1.73	1.64	1.64	1.62	1.57	1.45	1.45

Initial Supporting table - ConsecCylModeJerk

Description: Used for P0300 - P0308, Mulitplier to Lores Jerk to account for different pattern of the second cylinder of consecutive misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	1,100	1,200	1,300	1,400	1,501	1,600	1,700	1,800	2,200	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	0	0	0	0	0	0	-1	-1	-1	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	-1	-1	-1	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	-1	-1	-1	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	-1	-1	-1	-1	-1	-1	-5	0	0	0	0	0	0	0	0	0	0
50	-1	-1	-1	-1	-1	-1	-3	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - ConsecSCD_Decel

Description: Used for P0300 - P0308, Mulitplier to medres decel to account for different pattern of the second cylinder of consecutive misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500
2	-0.23	-0.23	-0.23	-0.23	-0.23	-0.23	0.35	0.00	0.00
8	-0.23	-0.23	-0.23	-0.23	-0.23	-0.23	0.35	-0.35	0.00
12	0.01	0.01	0.01	0.01	0.01	0.01	0.35	-0.35	0.25
16	0.01	0.01	0.01	0.01	0.01	0.01	0.55	0.36	0.53
20	0.14	0.14	0.14	0.14	0.14	0.14	0.10	0.24	0.15
24	0.13	0.13	0.13	0.13	0.13	0.13	-0.47	0.01	0.15
26	0.11	0.11	0.11	0.11	0.11	0.11	-1.05	-0.35	0.48
30	0.11	0.11	0.11	0.11	0.11	0.11	-1.82	-1.14	-1.19
50	0.11	0.11	0.11	0.11	0.11	0.11	-1.82	-0.89	-1.19

Initial Supporting table - ConsecSCD_Jerk

Description: Used for P0300 - P0308, Mulitplier to medres Jerk to account for different pattern of the second cylinder of consecutive misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500
2	-1.73	-1.73	-1.73	-1.73	-1.73	-1.73	-1.02	-2.10	-0.91
8	-2.00	-2.00	-2.00	-2.00	-2.00	-2.00	-1.09	-2.04	-1.02
12	-2.00	-2.00	-2.00	-2.00	-2.00	-2.00	-1.09	-2.04	-1.02
16	-1.86	-1.86	-1.86	-1.86	-1.86	-1.86	-1.00	-0.97	-0.78
20	-1.70	-1.70	-1.70	-1.70	-1.70	-1.70	-1.70	-2.25	-1.48
24	-1.76	-1.76	-1.76	-1.76	-1.76	-1.76	-1.76	-2.25	-1.48
26	-1.73	-1.73	-1.73	-1.73	-1.73	-1.73	-1.73	-2.46	-1.33
30	-3.65	-3.65	-3.65	-3.65	-3.65	-3.65	-3.65	-2.97	-3.12
50	-2.01	-2.01	-2.01	-2.01	-2.01	-2.01	-2.01	-2.10	-3.12

Initial Supporting table - CylAfterAFM_Jerk

Description: Used for P0300 - P0308, Mulitplier to Lores Jerk to account for different pattern of misfire after a deactivated cylider. Similar to the second cylinder of consecutive cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
5	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0

Initial Supporting table - CylBeforeAFM_Decel

Description: Used for P0300 - P0308, Mulitplier to Lores decel to account for different pattern of misfire before a deactivated cylider, but after an active cylinder that follows an deactive cylinder on engine that supports cylinder deactivation in non even fire patterns.. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - CylModeDecel

Description: Used for P0300-P0308. Crankshaft decel threshold. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time per cylinder (usec)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

CylModeDecel - Part 1

y/x	700	800	900	1,000	1,100	1,200	1,300	1,400	1,501	1,600	1,700	1,800	2,000
3	2,800	1,800	1,250	825	621	420	389	289	249	180	158	110	76
6	2,800	1,800	1,250	825	621	420	389	289	249	180	158	110	76
8	2,800	1,800	1,250	825	621	420	389	289	249	180	158	110	76
10	2,800	1,800	1,250	825	621	420	389	289	249	180	158	110	76
12	2,950	1,875	1,310	900	644	498	415	333	255	188	159	116	78
14	3,199	2,090	1,403	1,004	732	570	560	400	344	209	160	126	80
16	4,743	2,920	1,958	1,466	1,041	884	676	476	415	265	191	174	97
18	6,103	3,809	2,568	1,775	1,212	1,016	830	618	450	306	253	205	132
20	7,610	4,743	3,084	2,110	1,497	1,241	1,186	658	506	318	266	239	149
22	9,410	5,726	3,795	2,597	1,798	1,589	1,315	953	571	340	327	245	153
24	9,585	5,996	3,930	2,726	1,976	1,743	1,405	1,055	631	369	350	271	166
26	11,428	7,062	4,663	3,261	2,264	1,859	1,539	1,080	900	491	428	317	196
30	3,200	2,200	1,600	1,200	900	700	350	1,130	956	868	606	447	274
40	4,338	3,099	2,066	1,505	1,122	783	388	365	1,387	1,115	1,011	644	422
50	4,800	3,250	2,150	1,600	1,250	908	521	450	1,731	1,362	1,165	660	438
60	6,100	3,800	2,550	1,800	1,350	1,033	900	783	2,142	1,688	1,455	880	571
97	7,600	4,750	3,100	2,100	1,500	1,583	1,350	1,122	3,593	2,905	2,513	1,469	961

CylModeDecel - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
3	59	42	32	26	25	14	10	7	5	5	5	5	5
6	59	42	32	26	25	14	10	7	5	5	5	5	5
8	59	42	32	26	25	14	10	7	5	5	5	5	5
10	59	42	32	26	25	14	10	7	5	5	5	5	5
12	63	44	36	30	26	14	10	7	5	5	5	5	5
14	65	46	37	31	26	16	11	8	6	5	5	5	5
16	70	51	42	32	27	17	12	8	6	5	5	5	5
18	85	61	45	33	28	17	12	9	7	5	5	5	5
20	108	82	68	59	46	19	13	10	7	6	6	6	6
22	127	91	70	60	48	31	18	10	8	6	6	6	6
24	146	107	85	69	52	32	22	15	8	6	6	6	6

Initial Supporting table - CylModeDecel

26	158	118	90	73	55	34	24	18	12	6	6	6	6
30	201	134	99	79	62	43	29	20	15	10	10	10	10
40	311	210	147	120	100	56	36	26	20	16	16	16	16
50	318	261	178	142	116	70	46	31	26	19	19	19	19
60	420	316	220	176	142	73	48	36	28	20	20	20	20
97	704	535	364	292	235	132	85	62	50	36	36	36	36

Initial Supporting table - CylModeJerk

Description: Crankshaft jerk threshold. Thresholds are a function of rpm and % engine Load.

Value Units: Change in Delta time per cylinder from last cylinder (usec)
Y Units: percent load of max indicated torque (%)

CylModeJerk - Part 1

y/x	700	800	900	1,000	1,100	1,200	1,300	1,400	1,501	1,600	1,700	1,800	2,000
3	1,991	1,393	1,012	772	579	419	374	316	259	238	189	155	109
6	1,991	1,393	1,012	772	579	419	374	316	259	238	189	155	109
8	1,991	1,393	1,012	772	579	419	374	316	259	238	189	155	109
10	1,991	1,393	1,012	772	579	419	374	316	259	238	189	155	109
12	2,570	1,754	1,264	956	726	500	481	382	318	269	250	186	145
14	4,615	3,135	2,199	1,633	1,197	902	722	542	460	379	316	253	214
16	6,422	4,271	2,954	2,166	1,606	1,115	932	749	633	516	440	363	250
18	6,738	4,535	3,146	2,331	1,709	1,268	1,043	818	687	557	464	371	286
20	7,041	4,750	3,328	2,442	1,823	1,398	1,114	830	732	634	538	443	303
22	8,004	5,387	3,756	2,788	2,049	1,477	1,241	1,004	840	676	583	489	328
24	8,674	5,824	4,060	3,035	2,215	1,610	1,337	1,065	892	719	620	521	373
26	9,603	6,485	4,506	3,322	2,458	1,790	1,494	1,199	977	756	676	595	420
30	2,871	2,163	1,639	1,272	970	700	700	1,000	1,000	841	728	615	495
40	3,307	2,608	2,096	1,584	1,180	800	800	1,200	1,200	966	879	792	652
50	4,826	3,604	2,803	2,234	1,749	1,327	1,327	1,327	1,327	1,327	1,190	1,050	812
60	5,770	4,243	3,467	2,743	2,148	1,583	1,583	1,583	1,583	1,583	1,429	1,264	994
97	9,219	6,944	5,547	4,430	3,512	2,541	2,541	2,541	2,541	2,541	2,309	2,071	1,630

CylModeJerk - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
3	81	62	54	43	35	25	20	13	9	7	7	7	7
6	81	62	54	43	35	25	20	13	9	7	7	7	7
8	81	62	54	43	35	25	20	13	9	7	7	7	7
10	81	62	54	43	35	25	20	13	9	7	7	7	7
12	108	84	63	56	44	31	24	15	10	9	9	9	9
14	172	129	100	71	62	37	24	19	12	9	9	9	9
16	200	134	119	99	68	49	26	22	15	11	11	11	11
18	207	173	132	109	85	50	38	26	15	13	13	13	13
20	230	184	140	114	95	57	40	29	20	15	15	15	15
22	256	202	149	121	104	58	42	32	23	15	15	15	15
24	266	219	167	136	109	64	45	32	24	17	17	17	17

Initial Supporting table - CylModeJerk

26	318	242	193	147	112	72	50	34	28	19	19	19	19
30	371	261	208	162	148	91	60	45	33	22	22	22	22
40	507	380	270	243	200	110	70	57	42	28	28	28	28
50	586	428	334	298	239	135	91	64	56	41	41	41	41
60	732	545	404	362	291	157	104	74	64	50	50	50	50
97	1,205	888	656	597	478	292	181	128	110	83	83	83	83

Initial Supporting table - DeacCylInversionDecel

Description: Used for P0300 - P0308, Negative Torque can cause crank readings to invert (active cylinders appear weak & deactivated cylinders appear "strong" If deactivated cylinders don't decelerate at least this amount then the crank signal is inverting. Function of speed and load.

Value Units: Delta time per cylinder (usec)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
5	30	10	5	0	0	0	0	0	0
10	30	15	5	0	0	0	0	0	0
20	30	15	8	0	0	0	0	0	0
30	125	55	25	0	0	0	0	0	0
40	175	100	50	0	0	0	0	0	0
50	275	150	75	14	0	0	0	0	0
60	325	175	100	25	15	7	5	2	2
80	375	200	120	40	30	12	10	7	7
100	475	250	160	60	50	25	20	17	17

Initial Supporting table - DeacCylInversionJerk

Description: Used for P0300 - P0308, Negative Torque can cause crank readings to invert (active cylinders appear weak & deactivated cylinders appear "strong" If deactivated cylinders don't jerk at least this amount then the crank signal is inverting. Function of speed and load.

Value Units: Change in Delta time per cylinder from last cylinder (usec)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
5	100	25	10	5	5	2	0	0	0
10	250	80	30	18	10	2	0	0	0
20	350	150	100	35	16	5	2	0	0
30	600	300	185	75	20	15	5	4	4
40	800	450	230	100	30	19	14	5	5
50	950	600	350	115	45	25	18	12	12
60	1,025	650	450	200	90	40	30	20	20
80	1,100	700	475	225	100	50	35	25	25
100	1,250	800	535	275	120	70	45	40	40

Initial Supporting table - EngineOverSpeedLimit

Description: Engine OverSpeed Limit versus gear

Value Units: RPM
X Unit: Enumeration of transmission gear state (enumeration)

EngineOverSpeedLimit - Part 1

y/x	CeTGRR_e_TransGr1	CeTGRR_e_TransGr2	CeTGRR_e_TransGr3	CeTGRR_e_TransGr4	CeTGRR_e_TransGr5	CeTGRR_e_TransGr6	CeTGRR_e_TransGr9
1	5,800	5,800	5,800	5,800	5,800	5,800	5,800

EngineOverSpeedLimit - Part 2

y/x	CeTGRR_e_TransGr10	CeTGRR_e_TransGrNeut	CeTGRR_e_TransGrRvrs	CeTGRR_e_TransGrPark	CeTGRR_e_TransGr7	CeTGRR_e_TransGr8	
1	5,800	5,800	5,800	5,800	5,800	5,800	

Initial Supporting table - InfrequentRegen

Description: Used for P0300-P0308. Only used on Diesel engines. Initiates a misfire delay when the current combustion mode matchs a selection in the table. A value of CeCMBR_i_CombModesMax means not selected.

Value Units: Enumerated value of differant combustion modes (enumeration)
X Unit: Current Combustion Mode (enumeration)

InfrequentRegen - Part 1

y/x	0	1	2	3	4	5
1	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax

InfrequentRegen - Part 2

y/x	6	7	8	9	10	11
1	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax

InfrequentRegen - Part 3

y/x	12	13	14	15	16	
1	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	

Initial Supporting table - Number of Normals

Description: Used for P0300-P0308. Number of Normals for the Driveline Ring Filter
After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early.

Value Units: Number of Engine cycles after isolated misfire (Engine cycles)
X Unit: thousands of RPM   (rpm/1000)

y/x	0	1	2	3	4	5	6	7	8
1	2	2	2	2	2	2	2	2	2

Initial Supporting table - P00C6 - High Pressure Pump Control Mode timeout

Description: High Pressure Pump Control Mode timeout

Value Units: Time (Seconds)
X Unit: Coolant Temperature (Deg C)

y/x	-40	-32	-25	-25	-16	-8	0	8	16	20	24	32	40	48	64	80	96
1	12.0	12.0	11.5	11.5	9.0	7.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0

upporting table - P00C6 - maximum acceptable counts of fuel rail pressure below KtFHPD_p_HPS_PressFallLoThrsh after High Pressure Sta

Description: The maximum acceptable counts of fuel rail pressure below KtFHPD_p_HPS_PressFallLoThrsh after High Pressure Start (HPS) is executed but before engine is in run mode.

Value Units: maximum acceptable counts of fuel rail pressure below KtFHPD_p_HPS_PressFallLoThrsh after High Pressure Start (Count)
X Unit: Ethanol Precent (%)
Y Units: Coolant Temperature (Deg C)

y/x	-40	-32	-25	-25	-16	-8	0	8	16	20	24	32	40	48	64	80	96
0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
13	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
25	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
38	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
50	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
63	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
75	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
88	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
100	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Initial Supporting table - P00C6 - Minimum acceptable value of fuel rail pressure after High Pressure Start

Description: The minimum acceptable value of fuel rail pressure after High Pressure Start (HPS) is executed. This ensures the pressure does not fall off drastically after High Pressure Start (HPS) is executed, but before engine is in run mode.

Value Units: Minimum acceptable value of fuel rail pressure after High Pressure Start (Mpa)
X Unit: Ethanol Precent (%)
Y Units: Coolant Temperature (Deg C)

y/x	-40	-32	-25	-25	-16	-8	0	8	16	20	24	32	40	48	64	80	96
0	2.0	2.0	2.0	2.0	2.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
13	2.0	2.0	2.0	2.0	2.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
25	2.0	2.0	2.0	2.0	2.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
38	2.0	2.0	2.0	2.0	2.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
50	2.0	2.0	2.0	2.0	2.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
63	2.0	2.0	2.0	2.0	2.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
75	2.0	2.0	2.0	2.0	2.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
88	2.0	2.0	2.0	2.0	2.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
100	2.0	2.0	2.0	2.0	2.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6

Initial Supporting table - P00C6 - Minimum pressure in MPa that will exit High Pressure Start mode and allow fuel delivery

Description: This calibration is the minimum pressure in MPa that will exit High Pressure Start mode and allow fuel delivery

Value Units: Minimum pressure in MPa that will exit High Pressure Start mode and allow fuel delivery
X Unit: Ethanol Precent (%)
Y Units: Coolant Temperature (Deg C)

y/x	-40	-32	-25	-25	-16	-8	0	8	16	20	24	32	40	48	64	80	96
0	18.0	18.0	17.0	17.0	15.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
13	18.0	18.0	17.0	17.0	15.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
25	18.0	18.0	17.0	17.0	15.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
38	18.0	18.0	17.0	17.0	15.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
50	18.0	18.0	17.0	17.0	15.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
63	18.0	18.0	17.0	17.0	15.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
75	18.0	18.0	17.0	17.0	15.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
88	18.0	18.0	17.0	17.0	15.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
100	18.0	18.0	17.0	17.0	15.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Initial Supporting table - P0191 - High fail limit of fuel control due to high pressure sensor skewed High

Description: High fail limit of fuel control due to high pressure sensor skewed High error as Function of desired pressure

Value Units: Ratio
X Unit: Desired Pressure (Mpa)

y/x	1.50	3.00	4.00	10.00	15.00	20.00	25.00	30.00	35.00
1.00	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.09	1.05

Initial Supporting table - P0191 - Low fail limit of fuel control due to pressure sensor skewed low

Description: Low fail limit of fuel control due to pressure sensor skewed low error as Function of desired pressure

Value Units: Ratio
X Unit: Desired Pressure (Mpa)

y/x	1.50	3.00	4.00	10.00	15.00	20.00	25.00	30.00	35.00
1.00	0.75	0.75	0.75	0.75	0.79	0.82	0.86	0.92	0.95

Initial Supporting table - P0420_BestFailingOSCTableB1

Description: This table is a 9x17 table of baseline Best Failing (e.g. threshold converter) OSC times for catalyst Bank 1. The axis' for this table include the average airflow and the catalyst temperature. After OSC is measured for a specific temp and airflow,the BestFailing OSC value is found within this table for the measured temp and airflow and is used along with the OSC_TimeRaw (and the WorstPassing value) to calculate the Normalized Ratio for that specific test. The values in this table are based on the measured OSC for the identified BPU converter that is used for MIL illumination across the specific temp and airflow range for a given program.

y/x	1.81	2.12	2.43	2.73	3.04	3.35	3.65	3.96	4.27	4.57	4.88	5.19	5.49	5.80	6.11	6.41	6.72
534.00	1.28	1.15	1.02	0.90	0.82	0.76	0.69	0.63	0.57	0.52	0.49	0.46	0.45	0.44	0.43	0.42	0.42
571.00	1.29	1.16	1.03	0.92	0.83	0.77	0.71	0.65	0.59	0.54	0.51	0.49	0.46	0.45	0.44	0.43	0.42
607.00	1.30	1.17	1.03	0.92	0.83	0.78	0.73	0.68	0.61	0.55	0.52	0.50	0.48	0.46	0.45	0.44	0.43
644.00	1.31	1.17	1.05	0.94	0.84	0.79	0.74	0.69	0.62	0.57	0.54	0.52	0.49	0.48	0.46	0.45	0.44
681.00	1.32	1.18	1.07	0.95	0.85	0.80	0.75	0.70	0.63	0.57	0.54	0.53	0.50	0.49	0.47	0.46	0.45
718.00	1.34	1.21	1.11	0.97	0.86	0.81	0.76	0.71	0.64	0.58	0.55	0.53	0.51	0.50	0.48	0.47	0.46
754.00	1.37	1.23	1.13	0.98	0.87	0.82	0.77	0.72	0.65	0.60	0.56	0.54	0.52	0.51	0.49	0.48	0.46
791.00	1.38	1.24	1.12	1.00	0.88	0.83	0.78	0.73	0.66	0.61	0.57	0.55	0.53	0.52	0.50	0.49	0.48
828.00	1.39	1.25	1.14	1.01	0.89	0.84	0.79	0.74	0.67	0.62	0.58	0.56	0.54	0.53	0.51	0.50	0.48

Initial Supporting table - P0420_WorstPassingOSCTableB1

Description: This table is a 9x17 table of WorstPassing (e.g. 120k) OSC times for catalyst Bank 1. The axis' for this table include the average airflow and the catalyst temperature. After OSC is measured for a specific temp and airflow, the WorstPassing OSC value is found within this table for the measured temp and airflow and is used along with the OSC_TimeRaw (and the BestFailing OSC value) to calculate the Normalized Ratio for that specific test.The values in this table are based on the measured OSC for the WPA part across the temp and airflow range.

y/x	1.81	2.12	2.43	2.73	3.04	3.35	3.65	3.96	4.27	4.57	4.88	5.19	5.49	5.80	6.11	6.41	6.72
534.00	2.89	2.57	2.09	1.64	1.44	1.34	1.25	1.10	1.04	0.99	0.90	0.77	0.68	0.61	0.57	0.54	0.53
571.00	2.90	2.58	2.12	1.68	1.46	1.35	1.27	1.12	1.05	1.00	0.92	0.79	0.69	0.63	0.59	0.55	0.54
607.00	2.92	2.59	2.14	1.71	1.49	1.38	1.29	1.13	1.07	1.02	0.93	0.81	0.71	0.66	0.60	0.56	0.55
644.00	2.94	2.61	2.18	1.75	1.52	1.39	1.30	1.14	1.08	1.03	0.94	0.82	0.72	0.67	0.61	0.57	0.55
681.00	2.95	2.62	2.19	1.78	1.55	1.40	1.31	1.15	1.09	1.04	0.95	0.83	0.73	0.67	0.62	0.58	0.56
718.00	2.96	2.63	2.22	1.81	1.58	1.41	1.32	1.17	1.11	1.05	0.96	0.84	0.74	0.68	0.63	0.59	0.57
754.00	2.97	2.64	2.25	1.83	1.60	1.42	1.33	1.18	1.11	1.06	0.98	0.86	0.75	0.70	0.64	0.60	0.57
791.00	2.98	2.65	2.28	1.86	1.62	1.43	1.34	1.19	1.12	1.07	0.99	0.87	0.76	0.71	0.65	0.60	0.58
828.00	2.99	2.66	2.33	1.90	1.64	1.44	1.35	1.19	1.13	1.09	1.00	0.88	0.77	0.71	0.66	0.61	0.58

Initial Supporting table - P228C P2C1F - High Pressure Pump Control (HPC) fail threshold of pressure too low

Description: The High Pressure Pump Control (HPC) fail threshold of pressure too low test as a function of desired fuel pressure.

Value Units: Pressure Error - Desired pressure - Actual Pressure (Mpa)
X Unit: Desired Pressure (Mpa)

y/x	2	3	4	10	15	20	25	30	35
1	0	2	3	3	4	5	5	5	5

Initial Supporting table - P228D P2C20 - High Pressure Pump Control (HPC) fail threshold for pressure too high

Description: The High Pressure Pump Control (HPC) fail threshold for pressure too high test as a function of desired fuel pressure.

Value Units: Pressure Error - Desired pressure - Actual Pressure (Mpa)
X Unit: Desired Pressure (Mpa)

y/x	1.50	3.00	4.00	10.00	15.00	20.00	25.00	30.00	35.00
1	-3.00	-3.00	-3.00	-3.00	-4.00	-4.00	-4.00	-4.00	-4.00

Initial Supporting table - P2635 Max Fuel Flow

Description: P2635 Maximum Fuel Flow Disable Criteria
Maximum allowed fuel flow values above which the diagnostic is disabled

Value Units: grams / sec
X Unit: kPa [desired fuel pressure]
Y Units: Volts [device supply]

y/x	200.0	250.0	300.0	350.0	400.0	450.0	500.0	550.0	600.0
4.5	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
6.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
7.5	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
9.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
10.5	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
12.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
13.5	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
15.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
16.5	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
18.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
19.5	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
21.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
22.5	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
24.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
25.5	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
27.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
28.5	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0

Initial Supporting table - P2635 Threshold High

Description: P2635 Filtered Fuel Pressure Error High Threshold [under-performing pump]
Instantaneously calculated filtered fuel pressure error

Value Units: kPa
X Unit: kPa [desired fuel pressure]
Y Units: grams / sec [fuel flow]

y/x	200.0	250.0	300.0	350.0	400.0	450.0	500.0	550.0	600.0
0.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
1.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
3.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
4.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
6.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
7.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
9.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
10.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
12.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
13.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
15.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
16.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
18.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
19.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
21.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
22.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
24.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
25.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
27.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
28.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
30.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
31.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
33.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
34.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
36.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
37.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
39.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
40.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
42.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
43.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
45.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0

Initial Supporting table - P2635 Threshold High

46.5	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0
48.0	30.0	37.5	45.0	52.5	60.0	67.5	75.0	82.5	90.0

Initial Supporting table - P2635 Threshold Low

Description: P2635 Filtered Pressure Error Low Threshold [over-performing pump]
Instantaneously calculated filtered fuel pressure error

Value Units: kPa
X Unit: kPa [desired fuel pressure]
Y Units: grams / sec [fuel flow]

y/x	200.0	250.0	300.0	350.0	400.0	450.0	500.0	550.0	600.0
0.0	-260.0	-210.0	-160.0	-110.0	-60.0	-67.5	-75.0	-82.5	-90.0
1.5	-145.0	-125.0	-102.5	-81.3	-60.0	-67.5	-75.0	-82.5	-90.0
3.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
4.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
6.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
7.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
9.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
10.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
12.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
13.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
15.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
16.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
18.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
19.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
21.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
22.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
24.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
25.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
27.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
28.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
30.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
31.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
33.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
34.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
36.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
37.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
39.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
40.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
42.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
43.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
45.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0

Initial Supporting table - P2635 Threshold Low

46.5	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0
48.0	-30.0	-37.5	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0

- P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F - kaFULO_n_RP

Description: Max Engine Speed to allow Multipulse function of injector energy profile

Value Units: Max Engine Speed to allow Multipulse
X Unit: Injector Energy Profile
Y Units: Multipulse Mode (0 = Double Pulse, 1 = Triple Pulse)

y/x	0	1	2	3
0	3,600	3,600	3,600	3,600
1	3,000	3,000	3,000	3,000

- P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F - kaFULO_n_RP

Description: Max Engine Speed to allow Multipulse function of injector energy profile

Value Units: Max Engine Speed to allow Multipulse
X Unit: Injector Energy Profile
Y Units: Multipulse Mode (0 = Double Pulse, 1 = Triple Pulse)

y/x	0	1	2	3
0	3,600	3,600	3,600	3,600
1	3,000	3,000	3,000	3,000

Initial Supporting table - Pair_SCD_Decel

Description: Used for P0300 - P0308, Mulitplier to SCD_Decel to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500
2	0.61	0.61	0.61	0.61	0.61	0.61	0.67	0.72	0.72
8	0.61	0.61	0.61	0.61	0.61	0.61	0.67	0.72	0.72
12	0.61	0.61	0.61	0.61	0.61	0.61	0.67	0.72	0.72
16	0.61	0.61	0.61	0.61	0.61	0.61	0.65	0.69	0.69
20	0.91	0.91	0.91	0.91	0.91	0.91	0.80	0.69	0.69
24	0.91	0.91	0.91	0.91	0.91	0.91	0.82	0.73	0.73
26	0.84	0.84	0.84	0.84	0.84	0.84	0.81	0.77	0.77
30	0.84	0.84	0.84	0.84	0.84	0.84	0.61	0.39	0.39
50	0.84	0.84	0.84	0.84	0.84	0.84	0.62	0.39	0.39

Initial Supporting table - Pair_SCD_Jerk

Description: Used for P0300 - P0308, Mulitplier to P0300_SCD_Jerk to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500
2	1.31	1.31	1.31	1.31	1.31	1.31	1.42	1.52	1.52
8	1.31	1.31	1.31	1.31	1.31	1.31	1.42	1.52	1.52
12	1.31	1.31	1.31	1.31	1.31	1.31	1.41	1.52	1.52
16	1.31	1.31	1.31	1.31	1.31	1.31	1.41	1.52	1.52
20	1.56	1.56	1.56	1.56	1.56	1.56	1.58	1.59	1.59
24	1.76	1.76	1.76	1.76	1.76	1.76	1.70	1.65	1.65
26	1.84	1.84	1.84	1.84	1.84	1.84	1.75	1.65	1.65
30	1.84	1.84	1.84	1.84	1.84	1.84	1.60	1.36	1.36
50	1.84	1.84	1.84	1.84	1.84	1.84	1.60	1.36	1.36

Initial Supporting table - PairCylModeDecel

Description: Used for P0300 - P0308, Mulitplier to Cyl Mode Deceleration to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: mulitplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	1,100	1,200	1,300	1,400	1,501	1,600	1,700	1,800	2,200	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	0.42	0.42	0.48	0.54	0.50	0.46	0.49	0.53	0.55	0.42	0.62	0.74	0.86	0.80	0.80	0.65	0.65
8	0.42	0.42	0.48	0.54	0.50	0.46	0.49	0.53	0.55	0.42	0.62	0.74	0.86	0.80	0.80	0.65	0.65
12	0.42	0.42	0.48	0.54	0.50	0.46	0.49	0.53	0.55	0.42	0.62	0.74	0.86	0.80	0.80	0.65	0.65
16	0.50	0.50	0.51	0.52	0.53	0.53	0.53	0.53	0.55	0.69	0.62	0.74	0.86	0.80	0.80	0.65	0.65
20	0.41	0.41	0.41	0.42	0.61	0.80	0.75	0.70	0.67	0.71	0.71	0.87	0.81	0.80	0.80	0.65	0.65
24	0.41	0.41	0.41	0.42	0.61	0.81	0.81	0.81	0.67	0.74	0.81	0.87	0.81	0.97	0.80	0.65	0.65
26	0.41	0.41	0.44	0.47	0.59	0.71	0.73	0.76	0.75	0.79	0.85	0.90	0.96	0.94	0.80	0.65	0.65
30	0.65	0.65	0.50	0.35	0.34	0.33	0.42	0.51	0.61	0.61	0.79	0.88	0.86	0.86	0.79	0.65	0.65
50	0.65	0.65	0.50	0.35	0.34	0.33	0.42	0.51	0.61	0.61	0.79	0.88	0.86	0.86	0.79	0.65	0.65

Initial Supporting table - PairCylModeJerk

Description: Used for P0300 - P0308, Mulitplier to P0300_CylModeJerk to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	1,100	1,200	1,300	1,400	1,501	1,600	1,700	1,800	2,200	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	0.62	0.62	0.72	0.82	0.68	0.55	0.42	0.30	0.30	0.37	0.48	0.58	0.72	0.82	0.80	0.65	0.65
8	0.62	0.62	0.72	0.82	0.68	0.55	0.42	0.30	0.30	0.37	0.48	0.58	0.72	0.82	0.75	0.65	0.65
12	0.62	0.62	0.72	0.82	0.68	0.55	0.42	0.30	0.30	0.37	0.48	0.58	0.72	0.82	0.75	0.65	0.65
16	0.62	0.62	0.71	0.79	0.68	0.57	0.43	0.30	0.30	0.45	0.48	0.58	0.72	0.82	0.75	0.65	0.65
20	0.77	0.77	0.78	0.79	0.81	0.83	0.77	0.71	0.64	0.64	0.69	0.76	0.72	0.79	0.75	0.65	0.65
24	0.88	0.88	0.85	0.81	0.82	0.83	0.81	0.79	0.67	0.69	0.85	0.94	0.88	0.83	0.75	0.65	0.65
26	0.89	0.89	0.88	0.88	0.91	0.95	0.88	0.81	0.75	0.78	0.85	0.87	0.92	0.80	0.75	0.65	0.65
30	1.22	1.22	1.02	0.82	0.73	0.65	0.73	0.81	0.67	0.67	0.80	0.85	0.89	0.80	0.78	0.65	0.65
50	1.22	1.22	1.02	0.82	0.73	0.65	0.73	0.81	0.67	0.67	0.80	0.85	0.89	0.80	0.78	0.65	0.65

Initial Supporting table - Random_SCD_Decel

Description: Used for P0300 - P0308, Mulitplier to SCD_Decel to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.19	1.20
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.12	1.08
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.12	1.08
16	1.12	1.08	1.17	1.18	1.23	1.10	1.00	1.00	1.05
20	1.00	1.00	1.03	1.07	1.11	1.13	1.13	1.00	1.00
24	1.00	1.00	1.03	1.07	1.11	1.10	1.00	1.00	1.00
26	1.00	1.01	1.01	1.04	1.05	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50	1.00	1.00	1.00	1.00	1.00	1.00	1.19	1.00	1.00

Initial Supporting table - Random_SCD_Jerk

Description: Used for P0300 - P0308, Mulitplier to Random_SCD_Jerk to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500
2	1.10	1.00	1.07	1.15	1.20	1.12	1.15	1.15	1.05
8	1.00	1.00	1.03	1.05	1.09	1.11	1.14	1.07	1.00
12	1.00	1.00	1.03	1.05	1.09	1.11	1.14	1.07	1.00
16	1.20	1.18	1.18	1.08	1.08	1.07	1.00	1.10	1.12
20	1.06	1.06	1.04	1.07	1.08	1.00	1.00	1.09	1.10
24	1.02	1.02	1.04	1.03	1.09	1.00	1.00	1.00	1.10
26	1.00	1.02	1.04	1.03	1.04	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RandomAFM_Decl

Description: Used for P0300 - P0308, Mulitplier to Cylinder_Decel while in Cylnder Deactivation mode to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RandomAFM_Jerk

Description: Used for P0300 - P0308, Mulitplier to Cylinder_Jerk while in Cylnder Deactivation mode to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RandomCylModDecel

Description: Used for P0300 - P0308. Multiplier to CylMode_Decel. account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: Multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	1,100	1,200	1,300	1,400	1,501	1,600	1,700	1,800	2,200	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	1.01	1.16	1.09	1.33	1.15	1.40	1.29	1.45	1.45	1.61	1.60	2.14	2.00	2.14	2.00	2.00	2.00
8	1.01	1.16	1.09	1.33	1.15	1.40	1.29	1.45	1.45	1.61	1.60	2.14	2.00	2.14	2.00	2.00	2.00
12	1.01	1.16	1.09	1.33	1.15	1.40	1.29	1.45	1.45	1.61	1.60	2.14	2.00	2.14	2.00	2.00	2.00
16	1.29	1.27	1.28	1.36	1.48	1.80	1.92	1.96	2.20	2.77	2.54	2.74	2.64	2.67	2.55	2.20	2.20
20	1.09	1.00	1.00	1.09	1.52	1.85	1.81	1.89	2.05	2.07	2.07	2.16	2.39	2.89	2.92	3.00	3.00
24	1.08	1.00	1.00	1.01	1.43	1.85	1.81	1.50	1.50	2.04	2.09	2.16	2.14	2.57	3.00	3.00	3.00
26	1.05	1.00	1.00	1.13	1.12	1.64	1.66	1.80	1.70	2.00	2.10	2.20	2.28	2.28	2.46	3.00	3.00
30	3.00	3.00	2.50	1.26	1.00	1.00	1.01	1.45	1.65	1.90	2.05	2.20	2.16	2.12	2.37	2.29	2.29
50	3.00	3.00	3.00	3.00	1.00	1.00	1.01	1.45	1.65	1.70	2.00	2.20	2.16	2.04	2.22	2.29	2.29

Initial Supporting table - RandomCylModJerk

Description: Used for P0300 - P0308, Multiplier to CylMode_Jerk to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	1,100	1,200	1,300	1,400	1,501	1,600	1,700	1,800	2,200	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	1.03	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.03	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.08	1.08
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.07	1.07
26	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.13	1.00	1.08	1.08
30	2.00	2.00	2.00	1.23	1.02	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.05	1.05	1.05
50	2.00	2.00	1.94	1.23	1.02	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RandomRevModDecl

Description: Used for P0300 - P0308, Mulitplier to RevMode_Decel to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	3,000	3,500	4,000	4,500	5,000	5,500	6,000	7,000	8,000
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RepetSnapDecayAdjst

Description: Used for P0300 - P0308, If misfire is present in consecutive engine cycles, this multiplier is applied to the misfire jerk threshold and compared to a crankshaft snap value after the misfire has taken place.. Table lookup as a function of engine rpm.

Value Units: multiplier
X Unit: RPM

y/x	500	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RevMode_Decel

Description: Used for P0300-P0308. Crankshaft decel threshold. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time between revolutions (usec)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
3	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
50	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - Ring Filter

Description: Used for P0300-P0308. Driveline Ring Filter
After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early.

Value Units: Number of Engine cycles after isolated misfire (Engine cycles)
X Unit: thousands of RPM (rpm/1000)

y/x	0	1	2	3	4	5	6	7	8
1	4	4	4	4	4	4	4	4	4

Initial Supporting table - SCD_Decel

Description: Used for P0300-P0308 Crankshaft decel threshold. SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time per cylinder (usec)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	800	900	1,000	1,100	1,150	1,200	1,250	1,300	1,350	1,400	1,450	1,500
3	392	276	199	142	94	85	77	69	61	52	42	41	40
6	392	276	199	142	94	85	77	69	61	52	42	41	40
8	392	276	199	142	94	85	77	69	61	52	42	41	40
10	464	319	229	170	130	111	93	84	75	66	57	56	55
12	657	415	296	216	155	128	100	102	104	88	72	71	69
14	753	519	350	252	189	172	154	151	149	125	100	93	85
16	897	604	421	300	219	174	129	152	174	147	120	110	99
18	1,089	754	492	354	257	205	154	140	125	134	143	134	124
20	1,119	780	513	384	278	230	182	159	135	146	157	148	139
22	1,346	916	630	449	328	276	224	210	196	185	173	161	148
24	1,343	906	624	456	342	296	249	240	231	207	182	150	117
26	1,447	985	710	509	385	334	283	265	247	222	197	186	175
30	1,609	1,079	755	545	408	370	332	258	184	169	153	181	209
40	889	660	510	415	324	295	266	204	142	257	372	275	177
50	1,171	869	677	539	422	385	348	267	185	318	450	339	228
60	1,452	1,077	830	669	518	473	427	323	219	372	524	401	277
97	2,494	1,838	1,413	1,136	888	815	741	557	373	607	840	655	470

Initial Supporting table - SCD_Jerk

Description: Used for P0300-P0308. Crankshaft jerk threshold. SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load.

Value Units: Change in Delta time per cylinder from last cylinder (usec)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	800	900	1,000	1,100	1,150	1,200	1,250	1,300	1,350	1,400	1,450	1,500
3	284	206	146	104	77	71	65	62	58	49	40	39	38
6	284	206	146	104	77	71	65	62	58	49	40	39	38
8	284	206	146	104	77	71	65	62	58	49	40	39	38
10	379	268	192	144	108	94	80	75	70	64	58	54	49
12	480	334	243	182	141	121	100	95	90	85	80	75	70
14	703	476	343	259	196	175	154	140	125	111	97	92	86
16	881	596	423	319	240	212	183	160	137	119	100	95	89
18	987	674	476	378	287	237	188	183	177	153	128	120	112
20	1,073	747	530	393	293	262	230	207	183	160	137	129	121
22	1,184	808	588	423	318	278	237	222	207	175	142	139	135
24	1,311	893	620	468	338	294	249	233	217	196	176	158	140
26	1,441	966	679	510	384	324	263	246	229	210	190	176	162
30	1,475	1,023	740	555	427	376	324	230	135	165	195	200	204
40	2,283	1,568	1,126	838	641	546	451	423	396	378	360	289	218
50	2,742	1,900	1,357	1,012	773	660	547	490	433	424	414	354	294
60	3,290	2,262	1,630	1,216	932	792	652	585	519	513	506	427	348
97	5,297	3,655	2,639	1,965	1,507	1,287	1,068	922	777	813	850	702	553

Initial Supporting table - SnapDecayAfterMisfire

Description: Used for P0300 - P0308, multiplier times the ddt_jerk value used used to detect misfire at that speed and load to see if size of disturbance has died down as expected of real misfire. Table lookup as a function of engine rpm and trans gear ratio.

Value Units: multiplier
X Unit: RPM
Y Units: gear ratio

y/x	500	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - TOSSRoughRoadThres

Description: Used for P0300-P0308. Only used if Rough Road source = TOSS: dispersion value on Transmission Output Speed Sensor above which rough road is indicated present

Value Units: change in rpm per sec (rpm)
X Unit: Engine Speed (RPM)
Y Units: Transmission Speed (RPM)

y/x	600	800	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000
100	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
200	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
300	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
400	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
500	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
600	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
700	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
800	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
900	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,000	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,100	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,200	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,300	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,400	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Initial Supporting table - WaitToStart

Description: Used for P0300-P0308. Number of engine cycles to delay if diesel engine is cranked before wait to start lamp is extinguished. This lookup table determines the delay length by taking into account the coolant temperature.

Value Units: Number of Engine Cycles (integer)
X Unit: Engine Coolant (deg C)

y/x	-20	-10	0	10	20	30	40	50	60
1	0	0	0	0	0	0	0	0	0

Initial Supporting table - WSSRoughRoadThres

Description: Used for P0300-P0308. Only used if Wheel speed from ABS is used. If difference between wheel speed readings is larger than this limit, rough road is present

Value Units: acceleration
X Unit: Vehicle Speed (KPH)

y/x	0	12	24	36	48	60	72	85	97	109	121	133	145	157	169	181	193
1	0.40002	0.40002	0.40002	0.40002	0.40002	0.40002	0.42505	0.44995	0.47498	0.50000	0.50354	0.50720	0.51074	0.51428	0.51782	0.52148	0.52502

Initial Supporting table - ZeroTorqueAFM

Description: Used for P0300-P0308. Zero torque engine load while in Active Fuel Management. %of Max Brake Torque along the Neutral rev line, as a function of RPM and Baro

Value Units: Percent of Maximum Brake torque (%)
X Unit: RPM
Y Units: Barometric Pressure (kPa)

ZeroTorqueAFM - Part 1

y/x	700	800	900	1,000	1,100	1,200	1,300	1,400	1,501	1,600	1,700	1,800	2,000
65	4.50	4.30	4.10	3.90	3.70	3.50	4.10	4.70	4.75	4.80	4.80	4.80	4.80
75	4.50	4.30	4.10	3.90	3.70	3.50	4.10	4.70	4.75	4.80	4.80	4.80	4.80
85	4.50	4.30	4.10	3.90	3.70	3.50	4.10	4.70	4.75	4.80	4.80	4.80	4.80
95	4.50	4.30	4.10	3.90	3.70	3.50	4.10	4.70	4.75	4.80	4.80	4.80	4.80
105	4.50	4.30	4.10	3.90	3.70	3.50	4.10	4.70	4.75	4.80	4.80	4.80	4.80

ZeroTorqueAFM - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
65	4.70	4.50	4.40	4.25	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25
75	4.70	4.50	4.40	4.25	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25
85	4.70	4.50	4.40	4.25	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25
95	4.70	4.50	4.40	4.25	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25
105	4.70	4.50	4.40	4.25	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25

Initial Supporting table - ZeroTorqueEngLoad

Description: Used for P0300-P0308. %of Max Brake Torque that represents Zero Brake torque along the Neutral rev line, as a function of RPM and Baro

Value Units: Percent of Maximum Brake torque (%)
X Unit: RPM
Y Units: Barometric Pressure (kPa)

ZeroTorqueEngLoad - Part 1

y/x	700	800	900	1,000	1,100	1,200	1,300	1,400	1,501	1,600	1,700	1,800	2,000
65	4.50	4.30	4.10	3.90	3.70	3.50	4.10	4.70	4.75	4.80	4.80	4.80	4.80
75	4.50	4.30	4.10	3.90	3.70	3.50	4.10	4.70	4.75	4.80	4.80	4.80	4.80
85	4.50	4.30	4.10	3.90	3.70	3.50	4.10	4.70	4.75	4.80	4.80	4.80	4.80
95	4.50	4.30	4.10	3.90	3.70	3.50	4.10	4.70	4.75	4.80	4.80	4.80	4.80
105	4.50	4.30	4.10	3.90	3.70	3.50	4.10	4.70	4.75	4.80	4.80	4.80	4.80

ZeroTorqueEngLoad - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
65	4.70	4.50	4.40	4.25	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25
75	4.70	4.50	4.40	4.25	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25
85	4.70	4.50	4.40	4.25	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25
95	4.70	4.50	4.40	4.25	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25
105	4.70	4.50	4.40	4.25	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25

Initial Supporting table - Closed Loop Enable Clarification - KaFCLP_U_SlphrIntglOfst_Thrsh

Description: Integral Offset voltage thresholds (bank and cell specific cals) used with KeFCLP_Pct_CatAccuSlphrPostDsbl to check for sulphur poisoning.

Value Units: millivolts
X Unit: Post Catalyst Number

y/x	CiOXYR_O2_PostCat1	CiOXYR_O2_PostCat2
CiFCLP_Decel	2,048	2,048
CiFCLP_Idle	2,048	2,048
CiFCLP_Cruise	2,048	2,048
CiFCLP_LightAccel	2,048	2,048
CiFCLP_HeavyAccel	2,048	2,048

Initial Supporting table - Closed Loop Enable Clarification - KcFCLP_Cnt_O2RdyCyclesThrsh

Description: Number of times a post oxygen sensor value must be in range before declaring it ready

Value Units: Time (events * 12.5 milliseconds)

y/x	1
1	80

Initial Supporting table - Closed Loop Enable Clarification - KcFULC_O2_SensorReadyEvents

Description: Number of times a pre oxygen sensor value must be in range before declaring it ready

Value Units: Time (events * 12.5 milliseconds)

y/x	1
1	20

Initial Supporting table - Closed Loop Enable Clarification - KeEOSD_U_RichThrsh

Description: The oxygen sensor voltage above which a sensor will be considered failing during a Rich Test.

Value Units: Volts

y/x	1
1	1,050

Initial Supporting table - Closed Loop Enable Clarification - KeFCLP_dm_IntegrationAirflowMax

Description: Maximum allowed estimated airflow for post O2 integral terms to be updated.

Value Units: Grams per Second

y/x	1
1	512

Initial Supporting table - Closed Loop Enable Clarification - KeFCLP_Pct_CatAccuSlphrPostDsbl

Description: Sulphur percent threshold above which post integral learning is disabled if the threshold criteria KaFCLP_U_SlphrIntglOfst_Thrsh is also met.

Value Units: Percent

y/x	1
1	255

Initial Supporting table - Closed Loop Enable Clarification - KeFCLP_T_IntegrationCatalystMax

Description: Maximum allowed estimated catalytic converter temperature for post O2 integral terms to be updated.

Value Units: Celcius

y/x	1
1	950

Initial Supporting table - Closed Loop Enable Clarification - KeFCLP_T_IntegrationCatalystMin

Description: Minimum allowed estimated catalytic converter temperature to begin using post O2 integration correction terms. Converter temperature must remain above this threshold to ramp-in the post O2 integration adjustments. Once the ramp-in has started, a converter temperature below this threshold will freeze the ramp-in multiplier. Post O2 integration will not be allowed below this converter temperature

Value Units: Celcius

y/x	1
1	350

Initial Supporting table - Closed Loop Enable Clarification - KeFULC_T_WRAF_SensorReadyThrsh

Description: Pumping cell temperature threshold above which the wideband oxygen sensor will be considered ready for use

Value Units: Degrees Celcius

y/x	1
1	700

Initial Supporting table - Closed Loop Enable Clarification - KeWRSC_T_HtrCntrlCL

Description: WRAF heater temperature enabling threshold for transition from Open Loop to Closed Loop

Value Units: Degrees Celcius

y/x	1
1	628

Initial Supporting table - Closed Loop Enable Clarification - KeWRSI_T_PumpCurrentEnable

Description: WRAF heater temperature threshold for enabling the sensor pump current

Value Units: Degrees Celcius

y/x	1
1	628

Initial Supporting table - Closed Loop Enable Clarification - KfFCLL_T_AdaptiveLoCoolant

Description: LTM learning is inhibited if the engine coolant temperature is below this calibration.

Value Units: Degrees Celcius

y/x	1
1	35

Initial Supporting table - Closed Loop Enable Clarification - KfFCLP_U_O2ReadyThrshLo

Description: Voltage limit checked against when determining if a post converter oxygen sensor is in range

Value Units: millivolts

y/x	1
1	1,100

Initial Supporting table - Closed Loop Enable Clarification - KfFULC_U_O2_SensorReadyThrshLo

Description: Voltage limit checked against when determining if a pre converter oxygen sensor is in range

Value Units: millivolts

y/x	1
1	1,100

Initial Supporting table - Closed Loop Enable Clarification - KtFCLL_p_AdaptiveLowMAP_Limit

Description: Long term fuel learning is disabled below this MAP limit as a function of barometric pressure.

Value Units: KPa
X Unit: KPa

y/x	65	70	75	80	85	90	95	100	105
1	17.0	17.0	17.0	17.0	17.5	18.0	18.5	19.0	19.0

Initial Supporting table - Closed Loop Enable Clarification - KtFCLP_t_PostIntglDisableTime

Description: Disable integral offset after engine start for this amount of time as a function of start up coolant temperature.

Value Units: Time in seconds
X Unit: Degrees Celcius

y/x	-40	-29	-18	-6	5	16	28	39	50	61	73	84	95	106	118	129	140
1	60.0	60.0	60.0	60.0	47.0	33.0	20.0	20.0	20.0	20.0	20.0	15.0	15.0	15.0	12.0	12.0	12.0

Initial Supporting table - Closed Loop Enable Clarification - KtFCLP_t_PostIntglRampInTime

Description: Time required to ramp integral offset to desired value as a function of start up coolant temperature.

Value Units: Time in seconds
X Unit: Degrees Celcius

y/x	-40	-29	-18	-6	5	16	28	39	50	61	73	84	95	106	118	129	140
1	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Initial Supporting table - Closed Loop Enable Clarification - KtFSTA_t_ClosedLoopAutostart

Description: Engine run time following an autostart, as a function of begin run coolant, which must be exceeded to enable CLOSED LOOP.

Value Units: Time in seconds
X Unit: Degrees Celcius

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.0	1.0	1.0	1.0	1.0	1.0

Initial Supporting table - Closed Loop Enable Clarification - KtFSTA_t_ClosedLoopTime

Description: Engine run time, as a function of startup coolant temperature, which must be exceeded to enable CLOSED LOOP.

Value Units: Time in seconds
X Unit: Degrees Celcius

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	250.0	250.0	200.0	100.0	30.0	20.0	20.0	20.0	20.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Initial Supporting table - P043E First Reference Orifice Measurement

Description: First reference orifice measurement maximum value as a function of barometric pressure

Value Units: First reference orifice measurement maximum (kPa)
X Unit: Barometric pressure (kPa)

y/x	70	80	90	100	110
1	3.7	3.8	3.9	4.0	4.0

Initial Supporting table - P043E Second Reference Orifice Measurement

Description: Second reference orifice measurement maximum value as a function of barometric pressure

Value Units: Second reference orifice measurement maximum value (kPa)
X Unit: Barometric pressure (kPa)

y/x	70	80	90	100	110
1	4.2	4.3	4.4	4.6	4.6

Initial Supporting table - P043F First Reference Orifice Measurements

Description: First reference orifice measurement minimum value as a function of barometric pressure

Value Units: First reference orifice measurement minimum value (kPa)
X Unit: Barometric pressure (kPa)

y/x	70	80	90	100	110
1	1.2	1.3	1.4	1.5	1.5

Initial Supporting table - P043F Second Reference Orifice Measurements

Description: Second reference orifice measurement minimum value as a function of barometric pressure

Value Units: Second reference orifice measurement minimum value (kPa)
X Unit: Barometric pressure (kPa)

y/x	70	80	90	100	110
1	1.2	1.3	1.4	1.5	1.5

Initial Supporting table - P057B KtBRKI_K_CmpltTestPointWeight

Description:

y/x	0.000	0.003	0.013	0.028	0.043	0.053	0.086	0.129	1.000
1	0	0	0	0	1	1	1	1	1

Initial Supporting table - P057B KtBRKI_K_FastTestPointWeight

Description:

y/x	0.000	0.003	0.013	0.028	0.043	0.053	0.086	0.129	1.000
1	0	0	0	0	1	1	1	1	1

Initial Supporting table - DFCO_CoolEnblHi_Temp

Description:

y/x	-40	0	25
1	45.0	45.0	45.0

Initial Supporting table - DFCO_DelayAfterStart_Time

Description:

y/x	-30	-10	20	60	90
1	20.0	15.0	10.0	8.0	5.0

Initial Supporting table - DFCO_DsblLo_Vehicle_Speed

Description:

y/x	CeTCOR_e_NonEcoMode	CeTCOR_e_EcoMode
CeTGRR_e_TransGr1	0	0
CeTGRR_e_TransGr2	0	0
CeTGRR_e_TransGr3	0	0
CeTGRR_e_TransGr4	0	0
CeTGRR_e_TransGr5	0	0
CeTGRR_e_TransGr6	0	0
CeTGRR_e_TransGr9	0	0
CeTGRR_e_TransGr10	0	0
CeTGRR_e_TransGrNeut	0	0
CeTGRR_e_TransGrRvrs	0	0
CeTGRR_e_TransGrPark	0	0
CeTGRR_e_TransGr7	0	0
CeTGRR_e_TransGr8	0	0

Initial Supporting table - DFCO_EnblHi_Vehicle_Speed

Description:

y/x	CeTCOR_e_NonEcoMode	CeTCOR_e_EcoMode
CeTGRR_e_TransGr1	0.0	0.0
CeTGRR_e_TransGr2	0.0	0.0
CeTGRR_e_TransGr3	0.0	0.0
CeTGRR_e_TransGr4	0.0	0.0
CeTGRR_e_TransGr5	0.0	0.0
CeTGRR_e_TransGr6	0.0	0.0
CeTGRR_e_TransGr9	0.0	0.0
CeTGRR_e_TransGr10	0.0	0.0
CeTGRR_e_TransGrNeut	0.0	0.0
CeTGRR_e_TransGrRvrs	0.0	0.0
CeTGRR_e_TransGrPark	0.0	0.0
CeTGRR_e_TransGr7	0.0	0.0
CeTGRR_e_TransGr8	0.0	0.0

Initial Supporting table - DFCO_EngSpdEnblOfst

Description:

y/x	-1,750	-1,500	-1,250	-1,000	-700	-500	-300	-100	0
1	500	500	500	50	0	0	0	0	0

Initial Supporting table - CalculatedPerfMaxEc1

Description: Maximum desired camshaft position for Exhaust CAM - Bank1

Value Units: Maximum desired camshaft position (degCam)
X Unit: Engine Oil Temperature (degC)
[1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17]
[-40 -28 -16 -4 8 20 32 44 56 68 80 92 104 116 128 140 152]

Y Units: Engine Speed (rpm)
[1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17]
[400 800 1200 1600 2000 2400 2800 3200 3600 4000 4400 4800 5200 5600 6000 6400 6800]

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
2	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
3	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
4	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
5	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
6	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
7	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
8	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
9	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
10	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
11	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
12	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
13	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
14	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
15	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
16	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
17	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0

Initial Supporting table - CalculatedPerfMaxIc1

Description: Maximum desired camshaft position for Intake CAM - Bank1

Value Units: Maximum desired camshaft position (degCam)
X Unit: Engine Oil Temperature (degC)
[1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17]
[-40 -28 -16 -4 8 20 32 44 56 68 80 92 104 116 128 140 152]
Y Units: Engine Speed (rpm)
[1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17]
[400 800 1200 1600 2000 2400 2800 3200 3600 4000 4400 4800 5200 5600 6000 6400 6800]

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
2	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
3	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
4	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
5	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
6	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
7	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
8	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
9	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
10	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
11	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
12	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
13	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
14	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
15	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
16	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
17	25.5	25.5	27.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0

Initial Supporting table - P0521_P06DD_P06DE_OP_HiStatePressure

Description: Two Stage Oil Pump Oil Pressure in High State

Value Units: Nominal high state oil pressure (kPa)
X Unit: Engine oil temperature (deg C)

y/x	0.0	20.0	40.0	60.0	80.0	90.0	100.0	110.0	120.0
1,000.0	482.3	472.8	452.4	421.9	378.7	359.6	313.6	274.1	234.6
1,500.0	495.6	485.9	465.4	436.7	392.9	378.4	360.3	310.0	259.7
2,000.0	512.3	502.3	488.3	476.6	457.5	444.5	432.1	398.3	364.4
2,500.0	523.2	512.9	499.3	488.1	472.6	464.3	452.8	417.8	382.8
3,000.0	527.7	517.3	515.0	504.4	488.5	481.3	472.4	455.3	438.1
3,500.0	545.4	534.6	536.1	522.2	506.6	499.4	490.0	484.9	479.8
4,000.0	559.3	548.3	546.5	536.9	521.3	515.4	500.7	491.9	483.0
4,500.0	573.1	561.9	556.9	551.6	535.9	531.4	511.4	498.8	486.3
5,000.0	587.1	575.6	567.4	566.4	550.6	547.4	522.1	505.8	489.4

Initial Supporting table - P0521_P06DD_P06DE_OP_LoStatePressure

Description: Two Stage Oil Pump Oil Pressure in Low State

Value Units: Nominal low state oil pressure (kPa)
X Unit: Engine oil temperature (deg C)

y/x	0	20	40	60	80	90	100	110	120
1,000	265	260	242	236	225	218	210	205	199
1,500	268	262	245	239	230	225	217	212	207
2,000	274	269	251	250	244	240	235	229	222
2,500	283	277	256	254	249	246	241	237	233
3,000	287	281	266	260	255	252	247	244	240
3,500	295	289	277	266	260	256	251	249	246
4,000	304	298	289	269	263	259	255	253	251
4,500	312	306	295	271	266	262	258	257	256
5,000	320	314	303	274	269	264	262	262	262

Initial Supporting table - P06DD_P06DE_MaxEnableTorque_OP

Description: Two Stage Oil Pump Rationality Test Torque Max Enable Threshold

Value Units: Maximum engine torque (Nm)
X Unit: Engine speed (RPM)

y/x	0.0	750.0	1,500.0	2,250.0	3,000.0	3,750.0	4,500.0	5,250.0	6,000.0
1.0	0.0	0.0	115.0	131.0	139.0	148.0	150.0	0.0	0.0

Initial Supporting table - P06DD_P06DE_MinEnableTorque_OP

Description: Two Stage Oil Pump Rationality Test Torque Min Enable Threshold

Value Units: Min engine torque (Nm)
X Unit: Engine speed (RPM)

y/x	0.0	750.0	1,500.0	2,250.0	3,000.0	3,750.0	4,500.0	5,250.0	6,000.0
1.0	0.0	0.0	13.0	13.0	13.0	13.0	13.0	0.0	0.0

Initial Supporting table - P06DD_P06DE_MinOilPressT□res□

Description: Intrusive diagnostic minimum pressure limit that is a function of Engine Speed and Oil Temperature

Value Units: Minimum engine oil pressure threshold (kPa)
X Unit: Engine oil temperature (deg C)

y/x	0	20	40	60	80	90	100	110	120
1,000	25	32	38	45	52	59	65	68	71
1,500	25	32	38	45	52	59	65	68	71
2,000	25	32	38	45	52	59	65	68	71
2,500	25	32	38	45	52	59	65	68	71
3,000	25	32	38	45	52	59	65	68	71
3,500	25	32	38	45	52	59	65	68	71
4,000	25	32	38	45	52	59	65	68	71
4,500	25	32	38	45	52	59	65	68	71
5,000	25	32	38	45	52	59	65	68	71

Initial Supporting table - P06DD_P06DE_OP_StateC□angeMin

Description: Minimum allowed pressure change on a Two Stage Oil Pump state change

Value Units: Min pressure change (kPa)
X Unit: Engine oil temperature (deg C)

y/x	0.0	20.0	40.0	60.0	80.0	90.0	100.0	110.0	120.0
1,000.0	108.3	101.3	94.3	87.9	65.0	40.6	28.8	16.2	4.1
1,500.0	112.0	104.5	96.9	91.7	74.1	47.4	41.2	23.1	5.6
2,000.0	115.3	110.1	104.9	101.5	88.3	62.3	60.7	40.6	23.7
2,500.0	127.9	117.8	107.7	104.1	91.8	65.1	64.1	47.6	35.8
3,000.0	123.6	118.1	112.5	110.1	96.1	68.9	67.9	54.8	47.9
3,500.0	125.4	122.6	119.8	116.3	100.6	72.8	71.5	63.4	63.7
4,000.0	151.1	140.3	129.4	118.6	104.1	75.6	74.1	65.0	64.2
4,500.0	176.7	157.8	139.0	120.8	107.7	78.4	76.6	66.5	64.8
5,000.0	183.0	165.0	146.0	123.1	109.0	81.3	79.3	68.0	65.3

Initial Supporting table - P156A_Off_Test_Delay

Description: Delay time for AC High Side Pressure Rationality

Value Units: Delay time before running off test (seconds)
X Unit: Ambient Temperature (Deg C) KnACCD_T_HSP_RatOffTestPresMax

y/x	-10.0	20.0	50.0	80.0	110.0
1.0	20.0	20.0	20.0	20.0	20.0

Initial Supporting table - P156A_Off_Test_Threshold

Description: AC High Side Pressure Sensor Rationality Off Test Threshold

Value Units: A/C high side pressure (kPa)
X Unit: Ambient Temperature (Deg C) KnACCD_T_HSP_RatOffTestPresMax

y/x	-10	20	50	80	110
1	1,000	2,000	2,700	3,300	3,800

Initial Supporting table - P156B_On_Test_Threshold

Description: AC High Side Pressure Sensor Rationality On Test Threshold

Value Units: A/C high side pressure (kPa)
X Unit: Ambient Temperature (Deg C) KnACCD_T_HSPRat_OnTestPresMin

y/x	-10	20	50	80	110
1	65.0	320.0	500.0	650.0	800.0

Initial Supporting table - Down Stream Stk Temp Vrtn

Description: Minimum temperature movement required to pass the stuck diagnostic.

Value Units: Minimum temperature movement (degC)
X Unit: Downstream Temp sensor temp (degC)

y/x	-40	0	20	40	60	80	100	120
1	3	4	5	5	5	4	3	2

Initial Supporting table - EGR Efficiency Flow Offset

Description: Efficiency offset correction map to be applied to the HPE cooler efficiency calculation.

Value Units: Cooler Efficiency offset (%)
X Unit: Valve Total Flow (g/s)

y/x	1	5	10	20	30
1	0	0	0	0	0

Initial Supporting table - GearDownShftOffset

Description: Offset for Turbine Blade Protection - correction to turbo temperature for recent downshifts that can elevate temp for short period of time

Value Units: Offset for Turbine Blade Protection (degC)
X Unit: Turbo temp (degC)
Y Units: Engine Speed (rpm)

y/x	700	800	850	900	1,000
2,250	50	50	50	50	50
2,750	50	50	50	50	50
3,250	50	50	50	50	50
4,250	50	50	50	50	50
5,250	50	50	50	50	50

Initial Supporting table - Minimum Non-Purge Samples for Purge Vapor Fuel

Description: Number of Fuel Trim Monitor sample counts required to allow the Purge Vapor Fuel value to inhibit the Intrusive Rich test

Value Units: Sample Counts per loop rate of 100ms (divide by 10 to get seconds)
X Unit: Long Term Fuel Trim Cell I.D. (no units) (Only PurgeOff cells are used)

Minimum Non-Purge Samples for Purge Vapor Fuel - Part 1

y/x	CeFADR_e_Cell00_PurgOnAirMode5	CeFADR_e_Cell01_PurgOnAirMode4	CeFADR_e_Cell02_PurgOnAirMode3	CeFADR_e_Cell03_PurgOnAirMode2
1	65,535	65,535	65,535	65,535

Minimum Non-Purge Samples for Purge Vapor Fuel - Part 2

y/x	CeFADR_e_Cell04_PurgOnAirMode1	CeFADR_e_Cell05_PurgOnAirMode0	CeFADR_e_Cell06_PurgOnIdle	CeFADR_e_Cell07_PurgOnDecel
1	65,535	65,535	65,535	65,535

Minimum Non-Purge Samples for Purge Vapor Fuel - Part 3

y/x	CeFADR_e_Cell08_PurgOffAirMode5	CeFADR_e_Cell09_PurgOffAirMode4	CeFADR_e_Cell10_PurgOffAirMode3	CeFADR_e_Cell11_PurgOffAirMode2
1	65,535	65,535	65,535	65,535

Minimum Non-Purge Samples for Purge Vapor Fuel - Part 4

y/x	CeFADR_e_Cell12_PurgOffAirMode1	CeFADR_e_Cell13_PurgOffAirMode0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel
1	65,535	65,535	65,535	65,535

Initial Supporting table - P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage

Description: Identifies which Long Term Fuel Trim Cell I.D.s are used for diagnosis. Only cells identified as "CeFADD_e_NonSelectedCell" are not used for diagnosis.

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 1

y/x	CeFADR_e_Cell00_PurgOnAirMode5	CeFADR_e_Cell01_PurgOnAirMode4	CeFADR_e_Cell02_PurgOnAirMode3	CeFADR_e_Cell03_PurgOnAirMode2
1	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 2

y/x	CeFADR_e_Cell04_PurgOnAirMode1	CeFADR_e_Cell05_PurgOnAirMode0	CeFADR_e_Cell06_PurgOnIdle	CeFADR_e_Cell07_PurgOnDecel
1	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_NonSelectedCell

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 3

y/x	CeFADR_e_Cell08_PurgOffAirMode5	CeFADR_e_Cell09_PurgOffAirMode4	CeFADR_e_Cell10_PurgOffAirMode3	CeFADR_e_Cell11_PurgOffAirMode2
1	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 4

y/x	CeFADR_e_Cell12_PurgOffAirMode1	CeFADR_e_Cell13_PurgOffAirMode0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel
1	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_NonSelectedCell

Initial Supporting table - P219A Normalizer Bank1 Table

Description: Bank 1 Normalizer table used in the calculation of the Ratio for the current sample period.

Value Units: Unitless Scalar
X Unit: Engine Speed (RPM)
Y Units: Air Per Cylinder (APC) (mg/cylinder)

y/x	235	471	706	941	1,176	1,412	1,647	1,882	2,118	2,353	2,588	2,823	3,059	3,294	3,529	3,765	4,000
21	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
45	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
69	9,999.00	9,999.00	9,999.00	9,999.00	50.00	50.00	50.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
103	9,999.00	9,999.00	9,999.00	52.50	51.25	50.00	43.50	37.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
137	9,999.00	9,999.00	9,999.00	52.50	52.50	47.75	37.00	37.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
161	9,999.00	9,999.00	9,999.00	62.00	62.00	74.00	48.25	41.75	47.50	41.50	47.00	43.00	30.50	25.50	25.50	9,999.00	9,999.00
185	9,999.00	9,999.00	9,999.00	98.50	98.50	53.50	74.25	35.25	47.50	41.50	47.00	43.00	30.50	25.50	25.50	9,999.00	9,999.00
209	9,999.00	9,999.00	9,999.00	95.00	95.00	109.50	99.50	86.00	77.00	67.25	75.75	55.00	52.00	26.00	26.00	9,999.00	9,999.00
233	9,999.00	9,999.00	9,999.00	90.50	90.50	99.00	113.00	121.50	117.25	103.50	101.50	77.00	85.50	50.75	50.75	9,999.00	9,999.00
257	9,999.00	9,999.00	9,999.00	76.75	76.75	90.25	131.75	129.50	131.00	117.00	118.00	118.50	100.50	100.25	100.25	9,999.00	9,999.00
281	9,999.00	9,999.00	9,999.00	88.50	88.50	91.25	128.00	121.00	103.50	108.75	79.00	115.25	122.25	91.50	91.50	9,999.00	9,999.00
305	9,999.00	9,999.00	9,999.00	58.25	58.25	96.25	124.00	102.50	100.25	88.75	60.50	78.75	118.50	93.50	93.50	9,999.00	9,999.00
329	9,999.00	9,999.00	9,999.00	126.00	126.00	111.00	69.75	108.00	106.25	93.50	105.00	102.25	112.00	101.25	101.25	9,999.00	9,999.00
353	9,999.00	9,999.00	9,999.00	126.00	126.00	111.00	92.50	115.25	83.50	73.25	92.75	115.75	85.50	87.25	87.25	9,999.00	9,999.00
377	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	115.25	115.25	83.50	73.25	92.75	109.50	103.00	84.25	84.25	9,999.00	9,999.00
396	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	103.00	103.00	84.25	84.25	9,999.00	9,999.00
415	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00

Initial Supporting table - P219A Quality Factor Bank1 Table

Description: Bank 1 lookup table of Quality Factors used in the calculation of the Ratio for the current sample period

Value Units: Unitless Scalar
X Unit: Engine Speed (RPM)
Y Units: Air Per Cylinder (APC) (mg/cylinder)

y/x	235	471	706	941	1,176	1,412	1,647	1,882	2,118	2,353	2,588	2,823	3,059	3,294	3,529	3,765	4,000
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
103	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
137	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
161	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
185	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
209	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
233	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
257	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
281	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
305	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.95	1.00	1.00	1.00	0.00	0.00	0.00
329	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
353	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
377	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
396	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
415	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Initial Supporting table - P219A Variance Threshold Bank1 Table

Description: Bank 1 lookup table of Variance metric used to calculate the Ratio for the current sample period

Value Units: Unitless ratio
X Unit: Engine Speed (RPM)
Y Units: Air Per Cylinder (APC) (mg/cylinder)

y/x	235	471	706	941	1,176	1,412	1,647	1,882	2,118	2,353	2,588	2,823	3,059	3,294	3,529	3,765	4,000
21	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
45	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
69	9,999.00	9,999.00	9,999.00	9,999.00	34.00	34.00	34.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
103	9,999.00	9,999.00	9,999.00	52.75	43.25	34.00	43.00	52.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
137	9,999.00	9,999.00	9,999.00	52.75	52.75	58.50	52.00	52.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00
161	9,999.00	9,999.00	9,999.00	108.00	108.00	66.75	43.50	45.50	42.50	31.25	38.50	24.50	31.75	32.50	32.50	9,999.00	9,999.00
185	9,999.00	9,999.00	9,999.00	80.75	80.75	79.25	46.00	47.75	42.50	31.25	38.50	24.50	31.75	32.50	32.50	9,999.00	9,999.00
209	9,999.00	9,999.00	9,999.00	91.00	91.00	72.25	50.00	41.50	41.25	26.75	33.75	26.50	25.25	44.25	44.25	9,999.00	9,999.00
233	9,999.00	9,999.00	9,999.00	102.00	102.00	73.75	59.75	48.00	47.00	30.75	43.00	38.00	34.00	55.50	55.50	9,999.00	9,999.00
257	9,999.00	9,999.00	9,999.00	123.00	123.00	82.75	67.50	55.50	57.00	50.75	47.25	46.75	38.50	54.25	54.25	9,999.00	9,999.00
281	9,999.00	9,999.00	9,999.00	117.75	117.75	78.50	75.50	50.50	58.50	53.75	84.75	46.25	37.50	58.50	58.50	9,999.00	9,999.00
305	9,999.00	9,999.00	9,999.00	181.00	181.00	118.75	90.50	75.25	67.25	62.25	119.00	80.00	43.50	57.75	57.75	9,999.00	9,999.00
329	9,999.00	9,999.00	9,999.00	108.50	108.50	125.00	146.00	87.75	72.75	72.75	70.50	58.00	58.00	61.75	61.75	9,999.00	9,999.00
353	9,999.00	9,999.00	9,999.00	108.50	108.50	125.00	118.50	91.00	95.50	90.00	69.00	52.00	67.00	66.00	66.00	9,999.00	9,999.00
377	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	91.00	91.00	95.50	90.00	69.00	54.50	57.00	54.00	54.00	9,999.00	9,999.00
396	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	57.00	57.00	54.00	54.00	9,999.00	9,999.00
415	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00	9,999.00

Initial Supporting table - Piston Protection Airflow

Description: Mass of air per cylinder threshold above which piston protection will be enabled if it is currently disabled

Value Units: Air Per Cylinder (mg/cylinder)
X Unit: Engine Speed (rpm)

y/x	1,600	2,400	3,200	4,000	4,800	5,600	6,400	7,200	8,000
1	560	560	560	400	400	400	400	400	400

Initial Supporting table - UP Stream Stk Temp Vrtn

Description: Minimum temperature movement to pass the stuck diagnostic.

Value Units: Minimum temperature movement (degC)
X Unit: Upstream Temp sensor temp (degC)

y/x	-40	0	20	40	60	80	100	120
1	3	4	5	5	5	4	3	2

Initial Supporting table - P0326_P0331_AbnormalNoise_Thresh_AFM

Description: Fail threshold for the Knock Performance Abnormal Noise Diagnostic when engine IS in AFM mode

Value Units: Filtered background engine noise. Unit-less term from the Knock Detection Fast Fourier Transform (FFT) for a selected frequency range.
X Unit: Engine Speed (RPM)
Y Units: N/A

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Initial Supporting table - P0606_Last Seed Timeout f(Loop Time)

Description: The max time for the Last Seed Timeout as a function of operating loop time sequence.

Value Units: Max Time for Last Seed Timeout (ms)
X Unit: Operating Loop Sequence (enum)

P0606_Last Seed Timeout f(Loop Time) - Part 1

y/x	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	200.000	200.000	200.000	200.000	200.000	200.000	200.000

P0606_Last Seed Timeout f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	200.000	200.000	500.000	8,191.875	8,191.875	8,191.875	

Initial Supporting table - P0606_Program Sequence Watch Enable f(Core, Loop Time)

Description: The enabling flags for the program sequence watch as a function of processor core and operating loop time sequence.

Value Units: PSW enable flag (boolean)
X Unit: Processor Core (enum)
Y Units: Operating Loop Time Sequence (enum)

y/x	CeTSKR_e_CPU	CeTSKR_e_CPU2	CeTSKR_e_CPU3	CeTSKR_e_CPU4
CePISR_e_5msSeq	0	0	0	0
CePISR_e_6p25msSeq	1	1	0	0
CePISR_e_10msSeq	0	0	0	0
CePISR_e_12p5msSeq	1	1	0	0
CePISR_e_20msSeq	0	0	0	0
CePISR_e_25msSeq	1	1	0	0
CePISR_e_40msSeq	0	0	0	0
CePISR_e_50msSeq	0	0	0	0
CePISR_e_80msSeq	0	0	0	0
CePISR_e_100msSeq	0	0	0	0
CePISR_e_EventA_Seq	0	0	0	0
CePISR_e_EventB_Seq	0	0	0	0
CePISR_e_EventC_Seq	0	0	0	0

Initial Supporting table - P0606_PSW Sequence Fail f(Loop Time)

Description: Fail threshold for PSW per operating loop.

Value Units: Fail threshold for PSW (count)
X Unit: Operating Loop (enum)

P0606_PSW Sequence Fail f(Loop Time) - Part 1

y/x	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	5	3	5	3	5	3	5

P0606_PSW Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	5	5	5	3	5	5	

Initial Supporting table - P0606_PSW Sequence Sample f(Loop Time)

Description: Sample threshold for PSW per operating loop.

Value Units: Sample threshold for PSW (count)
X Unit: Operating Loop (enum)

P0606_PSW Sequence Sample f(Loop Time) - Part 1

y/x	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq	CePISR_e_40msSeq
1	4	4	4	4	4	4	4

P0606_PSW Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq	
1	4	4	4	4	4	4	

Initial Supporting table - P1682_PT Relay Pull-in Run/Crank Voltage f(IAT)

Description: The Run/Crank voltages required to pull in the PT relay as a function of induction air temperature.

Value Units: Run/Crank Voltages required to pull in PT Relay (V)
X Unit: Induction Air Temperature (deg C)

y/x	23.0	85.0	95.0	105.0	125.0
1	7.000	8.699	9.000	9.199	10.000

Initial Supporting table - P16F3_Delta MAP Threshold f(Desired Engine Torque)

Description: Engine Sync based and Time based delta pressure threshold above which Torque Security error is reported.

Value Units: Torque Security Threshold for Engine Sync and Time Based Delta Pressure (kPa)
X Unit: Desired Engine Torque (Nm)

y/x	0.00	50.00	100.00	150.00	200.00	300.00
1.00	34.92	34.92	34.92	34.92	34.92	34.92

Initial Supporting table - P16F3_Speed Control External Load f(Oil Temp, RPM)

Description: Specifies the external load table for SPDR torque security as a function of engine oil temperature and engine RPM.

Value Units: External Load Table for SPDR (Nm)
X Unit: Engine Oil Temperature (deg C)
Y Units: Engine Speed (RPM)

y/x	-40.00	-20.00	-10.00	0.00	50.00	90.00
700.00	4,096.00	4,096.00	4,096.00	4,096.00	4,096.00	4,096.00
900.00	4,096.00	4,096.00	4,096.00	4,096.00	4,096.00	4,096.00
1,100.00	70.00	70.00	70.00	70.00	60.00	50.00
1,400.00	45.00	42.00	38.00	35.00	35.00	35.00
1,600.00	32.89	29.44	27.18	25.55	18.09	15.26
1,800.00	34.82	31.10	28.67	26.92	19.35	16.51
2,000.00	37.64	32.56	30.68	29.85	21.71	18.36
2,200.00	40.80	35.20	33.13	32.22	23.24	19.84
2,500.00	43.58	39.76	37.58	36.01	26.21	23.06
2,700.00	42.72	38.90	36.72	35.15	25.34	22.19
3,000.00	40.65	36.83	34.65	33.08	23.27	20.13
3,300.00	36.87	33.05	30.87	29.30	19.49	16.35
3,500.00	13.41	9.58	7.41	5.84	-3.97	-7.12
3,700.00	7.50	3.67	1.50	-0.08	-9.88	-13.03
4,000.00	4.25	0.43	-1.75	-3.32	-13.13	-16.28
4,500.00	4.25	0.43	-1.75	-3.32	-13.13	-16.28
5,000.00	4.25	0.43	-1.75	-3.32	-13.13	-16.28

Initial Supporting table - RufCyl_Decel

Description: Used for P0300-P0308. Crankshaft decel threshold during Idle or GPF regen. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time per cylinder (usec)
X Unit: rpm
Y Units: percent load of max indicated torque (%)

RufCyl_Decel - Part 1

y/x	700	800	900	1,000	1,100	1,200	1,300	1,400	1,501	1,600	1,700	1,800	2,000
3	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
50	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

RufCyl_Decel - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
3	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufCyl_Decel

26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
50	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufCyl_Jerk

Description: Crankshaft jerk threshold during Idle or GPF regen. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time per cylinder (usec)
X Unit: rpm
Y Units: percent load of max indicated torque (%)

RufCyl_Jerk - Part 1

y/x	700	800	900	1,000	1,100	1,200	1,300	1,400	1,501	1,600	1,700	1,800	2,000
3	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
50	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

RufCyl_Jerk - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
3	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufCyl_Jerk

26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
50	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufSCD_Decel

Description: Used for P0300-P0308. Crankshaft decel threshold while in SCD mode during Idle or GPF regen. SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load. Note: Misfire's Load term is %, but not PID$04. PID $04 is not robust to temperature and alitiude shifts. (especially decel and jerk thresholds since they track actual air trapped in cylinder)

Value Units: Delta time per cylinder (usec)
X Unit: rpm
Y Units: percent load of max indicated torque (%)

RufSCD_Decel - Part 1

y/x	700	800	900	1,000	1,100	1,200	1,300	1,400	1,501	1,600	1,700	1,800	2,000
3	353	249	179	128	84	69	55	38	36	32,767	32,767	32,767	32,767
6	353	249	179	128	84	69	55	38	36	32,767	32,767	32,767	32,767
8	353	249	179	128	84	69	55	38	36	32,767	32,767	32,767	32,767
10	418	287	206	153	117	84	68	51	50	32,767	32,767	32,767	32,767
12	592	374	267	194	140	90	94	65	62	32,767	32,767	32,767	32,767
14	678	467	315	227	170	138	134	90	76	32,767	32,767	32,767	32,767
16	808	543	379	270	197	116	157	108	89	32,767	32,767	32,767	32,767
18	980	678	443	318	231	138	113	129	111	32,767	32,767	32,767	32,767
20	1,007	702	462	345	250	164	122	142	125	32,767	32,767	32,767	32,767
22	1,212	824	567	404	295	201	177	156	133	32,767	32,767	32,767	32,767
24	1,209	815	562	411	308	224	208	164	106	32,767	32,767	32,767	32,767
26	1,302	887	639	458	347	255	222	178	158	32,767	32,767	32,767	32,767
30	1,448	971	680	491	367	299	165	138	188	32,767	32,767	32,767	32,767
40	800	594	459	374	292	240	128	335	160	32,767	32,767	32,767	32,767
50	1,054	782	609	485	380	313	167	405	205	32,767	32,767	32,767	32,767
60	1,307	970	747	602	466	384	197	472	250	32,767	32,767	32,767	32,767
97	2,245	1,654	1,272	1,022	799	667	336	756	423	32,767	32,767	32,767	32,767

RufSCD_Decel - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
3	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufSCD_Decel

22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
50	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufSCD_Jerk

Description: Used for P0300-P0308. Crankshaft jerk threshold while in SCD mode during Idle or GPF regen. SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time per cylinder (usec)
X Unit: rpm
Y Units: percent load of max indicated torque (%)

RufSCD_Jerk - Part 1

y/x	700	800	900	1,000	1,100	1,200	1,300	1,400	1,501	1,600	1,700	1,800	2,000
3	256	185	131	94	69	59	52	44	34	32,767	32,767	32,767	32,767
6	256	185	131	94	69	59	52	44	34	32,767	32,767	32,767	32,767
8	256	185	131	94	69	59	52	44	34	32,767	32,767	32,767	32,767
10	341	241	173	129	97	72	63	58	44	32,767	32,767	32,767	32,767
12	432	300	219	164	127	90	81	77	63	32,767	32,767	32,767	32,767
14	633	429	309	233	176	139	113	100	78	32,767	32,767	32,767	32,767
16	793	536	381	287	216	165	123	107	80	32,767	32,767	32,767	32,767
18	889	607	429	340	258	169	160	138	101	32,767	32,767	32,767	32,767
20	966	672	477	354	264	207	165	144	109	32,767	32,767	32,767	32,767
22	1,065	727	529	381	286	214	186	157	122	32,767	32,767	32,767	32,767
24	1,180	804	558	421	304	224	195	177	126	32,767	32,767	32,767	32,767
26	1,297	870	611	459	346	237	206	189	146	32,767	32,767	32,767	32,767
30	1,327	921	666	499	385	292	121	149	183	32,767	32,767	32,767	32,767
40	2,055	1,411	1,014	754	577	406	356	340	196	32,767	32,767	32,767	32,767
50	2,468	1,710	1,221	911	696	492	390	381	264	32,767	32,767	32,767	32,767
60	2,961	2,036	1,467	1,094	839	587	467	461	313	32,767	32,767	32,767	32,767
97	4,767	3,289	2,375	1,768	1,356	961	699	732	498	32,767	32,767	32,767	32,767

RufSCD_Jerk - Part 2

y/x	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
3	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufSCD_Jerk

24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
50	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - P0324_PerCyl_ExcessiveKnock_Threshold

Description: Fail threshold for the Knock Performance per-cylinder Excessive Knock Diagnostic

Value Units: Filtered Knock Intensity. Unit-less term scaled from 0.0 (no knock) to 5.0 (maximum/large knock)
X Unit: Engine Speed (RPM)
Y Units: N/A

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	2.25	2.25	2.00	1.63	1.63	1.63	1.63	1.63	1.63	1.56	1.63	1.63	1.63	1.63	1.63	1.63	1.63

Initial Supporting table - P0325_P0330_OpenCktThrshMax (20 kHz)

Description: Knock Open Circuit Diagnostic Maximum Threshold when using the 20 kHz method (see "OpenMethod" description)

Value Units: Unit-less, filtered term from the Knock Detection Fast Fourier Transform (FFT) for the 20 kHz frequency range.
X Unit: Engine Speed (RPM).
Y Units: N/A

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	4,650	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.0000	2.0156	2.0000	2.0020	1.9648	1.9609	1.9648	1.9648	1.9629	1.9063	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Initial Supporting table - P0325_P0330_OpenCktThrshMax (Normal Noise)

Description: Knock Open Circuit Diagnostic Minimum Threshold when using the Normal Noise method (see "OpenMethod" description): When using the Normal Noise method (see "OpenMethod" description).

Value Units: Filtered background engine noise. Unit-less term from the Knock Detection Fast Fourier Transform (FFT) for a selected frequency range.
X Unit: Engine Speed (RPM)
Y Units: N/A

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.4668	0.4102	0.3672	0.3359	0.3145	0.2988	0.2930	0.2891	0.2891	0.2910	0.2930	0.2910	0.2891	0.2793	0.2656	0.2402	0.2070

Initial Supporting table - P0325_P0330_OpenCktThrshMin (20 kHz)

Description: Knock Open Circuit Diagnostic Minimum Threshold when using the 20 kHz method (see "OpenMethod" description)

Value Units: Unit-less, filtered term from the Knock Detection Fast Fourier Transform (FFT) for the 20 kHz frequency range.
X Unit: Engine (RPM)
Y Units: N/A

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	4,650	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.0000	0.6133	0.6152	0.6074	0.5898	0.5879	0.5898	0.5918	0.5938	0.5781	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Initial Supporting table - P0325_P0330_OpenCktThrshMin (Normal Noise)

Description: Knock Open Circuit Diagnostic Minimum Threshold when using the Normal Noise method (see "OpenMethod" description): When using the Normal Noise method (see "OpenMethod" description).

Value Units: Filtered background engine noise. Unit-less term from the Knock Detection Fast Fourier Transform (FFT) for a selected frequency range.
X Unit: Engine Speed (RPM)
Y Units: N/A

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.2422	0.1895	0.1523	0.1289	0.1191	0.1211	0.1387	0.1680	0.2090	0.2617	0.3281	0.4043	0.4941	0.5918	0.7012	0.8223	0.9531

Initial Supporting table - P0325_P0330_OpenMethod_2

Description: Defines which Knock Open Circuit Diagnostic method to use.

Value Units: Identifies one of two diagnostic methods (either 20 kHz or Normal Noise) used (as a function of engine speed) for Open Circuit detection
X Unit: Engine Speed Index, 500 to 8500 (RPM) by 500 rpm increments (Index 0, 1, 2.... 16 = 500, 1000, 1500.... 8500 RPM)
Y Units: N/A

P0325_P0330_OpenMethod_2 - Part 1

y/x	0	1	2	3	4
1	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz

P0325_P0330_OpenMethod_2 - Part 2

y/x	5	6	7	8	9
1	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz

P0325_P0330_OpenMethod_2 - Part 3

y/x	10	11	12	13	14
1	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz

P0325_P0330_OpenMethod_2 - Part 4

y/x	15	16			
1	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz			

Initial Supporting table - P0326_P0331_AbnormalNoise_CylsEnabled

Description: Specifies which cylinders will be used for the Abnormal Noise portion of the performance diagnostics (1 = cylinder used, 0 = cylinder not used)

Value Units: Boolean that indicates which engine cylinders are being used for the per-sensor Knock Performance diagnostic (0 = not used, 1 = used)
X Unit: Cylinder number in firing order (i.e. Cyl 0 = first cylinder in firing order, Cyl 1 = second cylinder in firing order....)
Y Units: N/A

y/x	0	1	2	3	4	5	6	7
1	1	1	1	1	0	0	0	0

Initial Supporting table - P0326_P0331_AbnormalNoise_Threshold

Description: Fail threshold for the Knock Performance Abnormal Noise Diagnostic when engine is NOT in AFM mode

Value Units: Filtered background engine noise. Unit-less term from the Knock Detection Fast Fourier Transform (FFT) for a selected frequency range.
X Unit: Engine Speed (RPM)
Y Units: N/A

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.302	0.302	0.302	0.302	0.077	0.083	0.067	0.058	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063

Initial Supporting table - P06B6_P06B7_OpenTestCktThrshMax

Description: Knock Open Circuit Minimum Threshold for Internal Circuit Diagnostic. Used only when the 20 kHz method is being used (see "OpenMethod" description). The Open Test Circuit ensures that the internal circuit used to generate the 20 kHz signal for the Open Circuit diags (P0325, P0330) is within range.

Value Units: Unit-less, filtered term from the Knock Detection Fast Fourier Transform (FFT) for the 20 kHz frequency range.
X Unit: Engine Speed (RPM)
Y Units: N/A

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	4,650	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.000	0.043	0.043	0.047	0.047	0.049	0.051	0.053	0.059	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Initial Supporting table - P06B6_P06B7_OpenTestCktThrshMin

Description: Knock Open Circuit Minimum Threshold for Internal Circuit Diagnostic. Used only when the 20 kHz method is being used (see "OpenMethod" description). The Open Test Circuit ensures that the internal circuit used to generate the 20 kHz signal for the Open Circuit diags (P0325, P0330) is within range.

Value Units: Unit-less, filtered term from the Knock Detection Fast Fourier Transform (FFT) for the 20 kHz frequency range.
X Unit: Engine Speed (RPM).
Y Units: N/A

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	4,650	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.000	0.020	0.020	0.021	0.021	0.023	0.023	0.025	0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
High Voltage System Interlock Circuit Low	P0A0C	The diagnostic monitors the sensed interlock voltage for values that are below a threshold when the HVIL circuit is commanded to 5 volts.	HVIL Sensed Percentage of 5 Volts	< -100 %	HVIL Commanded Status 12V Battery Voltage	5V > 10.2 V	4 failures out of 6 samples 12.5 ms /sample 50 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
High Voltage System Interlock Circuit High	P0A0D		HVIL Sensed % of 5 volts	> 200 %	HVIL Commanded Status 12V Battery Voltage	0V > 10.2 V	5 failures out of 8 samples 12.5 ms /sample 62.5 ms	The diagnostic monitors the sensed interlock voltage for values that are above a threshold. The threshold is different depending upon when the HVIL circuit is commanded to 5 volts or 0 volts.
			HVIL Sensed % of 5 volts	> 200 %	HVIL Commanded Status 12V Battery Voltage	5V > 10.2 V	4 failures out of 6 samples 12.5 ms /sample 75 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Positive Contactor Circuit Stuck Closed	P0AA1	The propulsion positive contactor is a high voltage relay that is used to connect the positive side of the high voltage battery to the positive side of the propulsion bus. This DTC detects when the propulsion positive contactor is stuck closed by monitoring for excessive voltage on the positive side of the propulsion bus when all contactors are commanded open for greater than a calibratible time. The calibratible time is necessary in order to guarantee that the propulsion bus has been fully discharged in order to prevent false failures.	Propulsion Positive Bus Voltage	> 30 Volts	Propulsion Bus Voltage Sensor Propulsion Positive Bus Voltage High Voltage Battery Voltage Sensor Battery Voltage Bus Voltage All Contactors Vehicle Speed Parameter	Not Failed Not Failed Not Failed Not Failed Not Failed Open for > 66 seconds < 20.00 kph	40 failures out of 50 samples 12.5 ms /sample 500 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Negative Contactor Circuit Stuck Closed	P0AA4	The propulsion negative contactor is a high voltage relay that is used to connect the negative side of the high voltage battery to the negative side of the propulsion bus. This DTC detects when the propulsion negative contactor is stuck closed by monitoring for excessive voltage on the negative side of the propulsion bus when all contactors are commanded open for greater than a calibratible time. The calibratible time is necessary in order to guarantee that the propulsion bus has been fully discharged in order to prevent false failures.	Propulsion Negative Bus Voltage	> 30 V	Propulsion Bus Voltage Sensor	Not Failed	40 failures out of 50 samples	Type B, 2 Trips
					Propulsion Negative Bus Voltage	Not Failed	12.5 ms /sample	
					High Voltage Battery Voltage Sensor	Not Failed		
					Battery Voltage	Not Failed		
					Bus Voltage	Not Failed		
					All Contactors	Open for > 66 seconds	500 ms	
					Vehicle Speed Parameter	< 20.00 kph		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage System Isolation Fault	P0AA6	This DTC will determine if the measured resistance between the positive or negative side of the high voltage battery and chassis ground Is below a threshold which indicates that the internals of the battery are no longer adequately isolated from chassis ground. Once failed the threshold to re-pass the DTC becomes stricter.	Active Isolation Resistance	< 325,000 Ohm	P0AA6 Propulsion Positive Contactor Propulsion Negative Contactor Charger Contactor	DTC Not Active Open Open Open	35 seconds Fail if last resistance measurement is below theshold AND any 5 measurements out of last 10 measurements are below resistance theshold. No more than one resistance measurement is taken per HPC2 Wakeup Cycle. Pass if any single resistance measurement exceeds resistance threshold	Type A, 1 Trips
			Active Isolation Resistance	< 425,000 Ohm	P0AA6 Propulsion Positive Contactor Propulsion Negative Contactor Charger Contactor	DTC Active Open Open Open	35 seconds Fail if last resistance measurement is below theshold AND any 5 measurements out of last 10 measurements are below resistance theshold.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							No more than one resistance measurement is taken per HPC2 Wakeup Cycle. Pass if any single resistance measurement exceeds resistance threshold	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Positive Contactor Control Circuit	P0AD9	Diagnoses the Propulsion Positive Contactor high side driver circuit for circuit faults. This monitor cannot detect short to ground faults.	The HPC2 detects that voltage is high during driver OFF state (indicates short to power or open circuit). It also detects that current is low during driver ON state (indicates open circuit).	Short to Power: Detected while OFF and output voltage is greater than the 12V battery voltage - 0.4V. Open Circuit: Detected while OFF and output voltage > 4V. Detected while ON and current sense feedback < 194 mA	12V Battery Voltage	> 10.2 V	40 failures out of 50 samples 12.5 ms /sample 500 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Negative Contactor Control Circuit	P0ADD	Diagnoses the Propulsion Negative Contactor high side driver circuit for circuit faults. This monitor cannot detect the short to ground fault.	The HPC2 detects that voltage is high during driver OFF state (indicates short to power or open circuit). It also detects that current is low during driver ON state (indicates open circuit).	Short to Power: Detected while OFF and output voltage is greater than the 12V battery voltage - 0.4V. Open Circuit: Detected while OFF and output voltage > 4V. Detected while ON and current sense feedback < 194 mA	12V Battery Voltage	> 10.2 V	40 failures out of 50 samples 12.5 ms /sample 500 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Precharge Contactor Control Circuit	P0AE4	Diagnoses the Precharge Contactor high side driver circuit for circuit faults. This monitor cannot detect the Open while OFF circuit fault and the short to ground fault.	The HPC2 detects that voltage is high during driver OFF state (indicates short to power). It also detects that current is low during driver ON state (indicates open circuit).	Short to Power: Detected while OFF and output voltage is greater than the 12V battery voltage - 0.4V. Open Circuit: Detected while ON and current sense feedback < 194 mA	12V Battery Voltage High Voltage Battery Current	> 10.2 V < 999 amp	40 failures out of 50 samples 12.5 ms /sample Continuous 500 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery System Precharge Time Too Long	P0C78	The precharge contactor is used to bring two high voltage circuits to the same voltage so that the propulsion contactors are prevented from damage prior to closing of the propulsion contactors. This DTC sets if the Propulsion Bus Voltage does not get within a percentage band of high voltage battery voltage within a calibratable amount of time during the precharge. If the amount of time expires without reaching the required voltage, then the DTC fails.	Propulsion Bus Voltage	Is less than 95 % or more than 105 % of high voltage battery pack voltage at 0.700 seconds from the start of contactor precharge	High Voltage Battery Voltage Sensor Propulsion Bus Voltage Sensor Propulsion Contactor Status RESS Heating Mode	Not Faulted Not Faulted Precharging OFF	Executed Once Per Precharge 0.700 seconds to fail less than 0.700 to pass	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Pilot Circuit Range/ Performance	P0CF4	This diagnostic tests the integrity of the Charge Control Pilot circuit. There are two tests to ensure proper functioning of the pilot. Part A: Sets when control pilot percent voltage is above a threshold OR aux micro logic state is in HIGH state OR main micro logic state is in LOW state Part B: Sets when control pilot percent voltage is above a high threshold OR control pilot percent voltage is below a low threshold OR aux micro logic state is in LOW state OR main micro logic state is in HIGH state. It requires both Part A and Part B to pass in order to pass the diagnostic.	**Part A:** Control Pilot Normalized Voltage OR Aux Micro Logic State OR Main Micro Logic State **Part B:** Control Pilot Normalized Voltage OR Aux Micro Logic State OR Main Micro Logic State Note: Control Pilot Normalized Voltage=Charging System Control Pilot Voltage / Battery Voltage	 > 0.03 High Low >0.55 OR < 0.30 Low High	System Voltage Charge Cord State Control Pilot Circuit Range/Performance **Part A:** Control Pilot Diagnostic Switch State Vehicle Speed **Part B:** Control Pilot Diagnostic Switch State Control Pilot Charging Switch State Charging Ventilation Switch State	>= 10.20 V Not Connected Not Completed this Key-Cycle Not Asserted > = 8.00 kph Asserted Open Open	30 failures out of 50 samples 100ms per sample 5.00 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Pilot Circuit Low	P0CF5	Monitors the control pilot signal for an out of range low condition.	Control Pilot Normalized Voltage Note: Control Pilot Normalized Voltage=Charging System Control Pilot Voltage / Battery Voltage	< 0.03	System Voltage Control Pilot Diag Switch Charge Cord State	>= 10.20 V Asserted Not Connected	30 failures out of 50 samples 100ms per sample 5.00 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Pilot Circuit High	P0CF6	Monitors the control pilot signal for an out of range high condition.	Control Pilot Normalized Voltage Note: Control Pilot Normalized Voltage=Charging System Control Pilot Voltage / Battery Voltage	> 0.55	System Voltage Charge Cord State Vehicle Speed	>= 10.20 V Not Connected >= 8.00 kph	30 failures out of 50 samples 100ms per sample 5.00 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Pilot Charging Switch Range/ Performance	P0CF9	Sets when the control pilot normalized voltage (percentage) is below a threshold or above a threshold	Control Pilot Normalized Voltage Note: Control Pilot Normalized Voltage=Charging System Control Pilot Voltage / Battery Voltage	< 0.14 OR > 0.28	System Voltage Control Pilot Diagnostic Switch Charge Cord State Control Pilot Circuit and Performance Diagnostics Control Pilot Charging Switch Range/ Performance Control Pilot Charging Ventilation Switch Range/ Performance	>= 10.20 V Closed Not Connected Completed this Key-Cycle Not Completed this Key-Cylcle Not Completed this Key-Cylcle	30 failures out of 50 samples 100ms per sample 5.00 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Pilot Charging Ventilation Switch Range/ Performance	P0D01	Sets when Control Pilot voltage is below a threshold or if it is above a threshold	Control Pilot Normalized Voltage Note: Control Pilot Normalized Voltage=Charging System Control Pilot Voltage / Battery Voltage	< 0.04 OR > 0.10	System Voltage Control Pilot Diagnostic Switch Charge Cord State Control Pilot Circuit Diagnostics Check Complete Control Pilot Charging Switch Performance Control Pilot Charging Ventilation Switch Range/ Performance	>= 10.20 V Closed Not Connected Completed this Key-Cycle Completed this Key-Cycle Not Completed this Key-Cycle	30 failures out of 50 samples 100ms per sample 5.00 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Charging System Positive Contactor Stuck Open	P0D09	The charging system positive contactor is used to connect the high voltage battery charger to the high voltage battery. This DTC diagnoses a stuck open positive charging contactor by monitoring for insufficient charger voltage at the end of an unsuccessful precharge.	Charger Voltage	< 10.00 Volts	Charger Contactor Precharge Contactor Time in Precharge Propulsion Negative Contactor Charger Voltage	Closed Closed >= 0.70 seconds Open Not Faulted		Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Charging System Positive Contactor Control Circuit	P0D0A	Diagnoses the Charging Contactor high side driver circuit for circuit faults. This monitor cannot detect short to ground faults.	The HPC2 detects that voltage is high during driver OFF state (indicates short to power or open circuit). It also detects that current is low during driver ON state (indicates open circuit).	Short to Power: Detected while OFF and output voltage is greater than the 12V battery voltage - 0.4V. Open Circuit: Detected while OFF and output voltage > 4V. Detected while ON and current sense feedback < 194 mA	12V Battery Voltage	> 10.2 V	40 failures out of 50 samples 12.5 ms /sample 500 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Charger Hybrid/EV System Precharge Time Too Long	P0D26	The precharge contactor is used to bring two high voltage circuits to the same voltage so that the charge contactors are prevented from damage prior to closing of the charge contactors. This DTC sets if the Charge Bus Voltage does not get within a percentage band of high voltage battery voltage within a calibratable amount of time during the precharge. If the amount of time expires without reaching the required voltage, then the DTC fails.	Charger Bus Voltage	Is less than 95 % or more than 105 % of high voltage battery pack voltage at 0.700 seconds from the start of contactor precharge	High Voltage Battery Voltage Sensor Charger Voltage Sensor Charger Contactor Status OR Propulsion Contactor Staus	Not Faulted Not Faulted Precharging Precharging	Executed Once Per Precharge 0.700 seconds to fail less than 0.700 to pass	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Charger Input AC Voltage Sensor Rationality	P0D3E	Sets when the AC charger input voltage sensor signal is outside a duty cycle threshold window when above a vehicle speed threshold.	AC Charger Input Voltage Sensor Duty Cycle	>= 12.00 OR <= 8.00	System Voltage Charger Enable Mask AC Input Voltage Sensor OORH AC Input Voltage Sensor OORL Vehcile Speed Valid Vehicle Speed	>= 10.20 V TRUE Not Fault Active Not Fault Active TRUE >= 16.00 kph	60 failures out of 80 samples 25ms per sample 2.00 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Charger Input Voltage Sensor Circuit Low	P0D3F	Monitors the AC charger input voltage sensor for an out of range low condition	AC Charger Input Voltage Sensor Duty Cycle OR AC Charger Input Voltage Sensor Duty Cycle	<= 8.00 AND > 0.00 = 100.00	System Voltage Charger Enable Mask	>= 10.20 V TRUE	30 failures out of 40 samples 25ms per sample 1.00 second	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Charger Input Voltage Sensor Circuit High	P0D40	Monitors the AC charger input voltage sensor signal for an out of range high condition	AC Charger Input Voltage Sensor Duty Cycle OR AC Charger Input Voltage Sensor Duty Cycle	>= 92.00 AND < 100.00 = 0.00	System Voltage Charger Enable Mask	>= 10.20 V TRUE	30 failures out of 40 samples 25ms per sample 1.00 second	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Charger DC Output Voltage Rationality	P0D4D	Sets when the difference between DC charger output voltage signal and battery DC input voltage signal is above a threshold.	abs[Charger DC Output Sensor Voltage - Battery DC Voltage]	> 30.00	System Voltage Charger Enable Mask Charger DC Output Voltage Sensor OORH Charger DC Output Voltage Sensor OORL Battery Voltage Sensor Charging Ready	>= 10.20 V TRUE Not Fault Active Not Fault Active Not Fault Active TRUE	320 failures out of 400 samples 25ms per sample 10.00 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Charger Hybrid/EV Battery Output Voltage Sensor Circuit Low	P0D4E	Monitors the charger output voltage sensor signal for an out of range low condition	DC Charger Output Voltage Sensor Duty Cycle OR DC Charger Output Voltage Sensor Duty Cycle	<= 8.00 AND > 0.00 = 100.00	System Voltage Charger Enable Mask	>= 10.20 V TRUE	30 failures out of 40 samples 25ms per sample 1.00 second	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Charger Hybrid/EV Battery Output Voltage Sensor Circuit High	P0D4F	Monitors the charger output voltage sensor signal for an out of range high condition	DC Charger Output Voltage Sensor Duty Cycle OR DC Charger Output Voltage Sensor Duty Cycle	>= 92.00 AND < 100.00 = 0.00	System Voltage Charger Enable Mask	>= 10.20 V TRUE	30 failures out of 40 samples 25ms per sample 1.00 second	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Proximity Detection Circuit Low	P0D58	Sets when Proximity Detection Circuit Voltage is below a threshold	Proximity Detection Circuit Voltage	< 4.20 V	System Voltage Vehicle Speed Shift Lever Position Vehicle Speed Valid	>= 10.20 V > 20.00 kph Not in Park TRUE	240 failures out of 400 samples 12.5ms per sample 5.00 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Proximity Detection Circuit High	P0D59	Sets when Proximity Detection Circuit Voltage is above a threshold	Proximity Detection Circuit Voltage	> 4.80 V	System Voltage Vehicle Speed Shift Lever Position Vehicle Speed Valid	>= 10.20 V > 20.00 kph Not in Park TRUE	240 failures out of 400 samples 12.5ms per sample 5.00 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Charger Hybrid/EV System Discharge Time Too Long	P0D5E	Discharging of high voltage circuits to voltage levels below 60 volts is necessary for safety purposes. This DTC can set two ways. First, this DTC sets if the Charger Bus Voltage does not fall below a calibratable voltage within a calibratable amount of time during a charger discharge. If the amount of time expires without reaching the required voltage, then the DTC fails. Second, this DTC sets if the charger voltage sensor is faulted and the propulsion negative bus voltage is faulted or the negative propulsion contactor is stuck closed. This second fail criteria is necessary in cases where there has been a loss of safety critical information. This DTC latches for safety reasons and further charging and propulsion are disabled until service is performed.	Charger Voltage DTC Clear	>= 58 V Must Send CPID	Negative Contactor Charger Contator DTC Not Active 12V Battery Maintenance Mode Charger Voltage 0x7E4 07 AE 32 02 02	Open Open P0D5E OFF Not Faulted	Executed Once Per any contactor (except precharge contactor) transitioning from closed to open < 4 seconds to pass 4 seconds to fail	Type A, 1 Trips
			Charger Voltage AND [Propulsion Negative Bus Voltage OR Propulsion Negative Contactor] DTC Clear	Faulted Faulted Faulted (Stuck Closed only) Must Send CPID	Negative Contactor Charger Contator DTC Not Active 12V Battery Maintenance Mode 0x7E4 07 AE 32 02 02	Open Open P0D5E OFF	4 seconds to fail Cannot Pass Case 2	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Charger Enable Circuit	P0E61	Monitors the charger 12V enable circuit for a faulted condition	Enable Line Hardware I/O fault Flag	TRUE	System Voltage Enable Line Hardware I/O fault Flag	>= 10.20 V Not Indeterminate	30 failures out of 40 samples 25ms per sample 1.00 second	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Charger Control Circuit	P0E65	Monitors the charger control circuit for a faulted condition	Command Line Hardware I/O fault Flag	TRUE	System Voltage Charger Enable Mask Command Line Hardware I/O fault Flag	>= 10.20 V TRUE Not Indeterminate	30 failures out of 40 samples 25ms per sample 1.00 second	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Charging System Contactor(s) Stuck Open	P1EBD	This DTC determines if the charger system contactors have opened by comparing charger voltage to high voltage battery voltage during propulsion or charging.	Charger Voltage	< 80 % of High Voltage Battery Voltage	12V Battery Voltage Charger Contactor Negative Contactor Charger Voltage High Voltage Battery Voltage	> 10.2 V Closed Closed Not Faulted Not Faulted	40 failures out of 50 samples, 12.5 ms /sample 500 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery System Contactor(s) Stuck Open	P1EC0	This DTC determines if the propulsion system contactors have opened by comparing propulsion bus voltage to high voltage battery voltage during propulsion.	Propulsion Bus Voltage	< 80 % of High Voltage Battery Voltage	Propulsion Positive Contactor	Closed	6 failures out of 6 samples	Type A, 1 Trips
					Negative Contactor	Closed	12.5 ms /sample Continuous	
					Charger Contactor	Closed		
					Propulsion Bus Voltage	Not Faulted		
					High Voltage Battery Voltage	Not Faulted		
					12V Battery Voltage	> 10.2 V	75 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Charger Total Output Power Performance	P1ECE	This monitor is an intrusive based diagnostic.There are two distinct sections of logic- a passive check logic section and an active or intrusive section of logic. The diagnostic fails on the active or instrusive logic only but can pass in either the active or passive sections.The diagnostic enablement is in three distinct but related pieces. There is common enable criteria that is shared by both the passive and active sections. Both the passive and active sections have other criteria as well that they do not share. To enable the intrusive or active logic, the passive portion of the diagnostic must have gone indeterminate , that is , not passing. That logic is described in the Passive Indeterminate Case. An indeterminate of the Passive Section is determined by comparing a calculated charger efficiency to a table look up value which is a function of	Output Power Active Calculated Efficiency (AC charger efficiency failure thresholds are tabled and a function of AC Input Power)	>= 167.00 % OR <= 62.76 % (See supporting table for charger efficiency threshold values)	System Voltage	>= 10.20 V	12 failures out of 16 samples 15 min per sample 4.00 hours	Type B, 2 Trips
					Charger Enable Mask	TRUE		
					Propulsion System Active	FALSE		
					HV Battery Current	Not Fault Active		
					HV Battery Voltage	Not Fault Active		
					Charge Power Level	AC Level 1 or AC Level 2		
					Battery Current Sensor Status	Valid		
					Power Electronics Coolant Loop Temperature	< 65.00 C (re-enables below 60.00 C if this threshold is crossed)		
					Power Electronics Coolant Loop Temperature	> -12.00 C (re-enables above -7.00 C if this threshold is crossed)		
					Power Electronics Coolant Loop Temperature Status	Valid		
					Thermal Mode Status	= Bypass Engage		
					Current Control Ready	= True		
					PASSIVE CHECK ENABLE:			
					Filtered AC Input Power	>= 600.00 s		
					Threshold for a certain amount of delay time	>= 60.00 s		
					Active Output Power	FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		AC input power. The table(s) are filled with values which are 67% or 167% of the nominal charger efficiency at that particular AC input power. If the calculated efficiency is less than the tabled value (low end) or greater than (high end) then a failure counter will be incremented and the passive check will mature. Once the fail counter reaches a calibration threshold , the passive check is said to be indeterminate. If the associated sample count reaches its calibration threshold before the failure counter does, then the passive check is said to have passed. A failure of the Active Section is detrmined by comparing the intrusive calculated charger efficiency to a table look up value which is a function of AC input power. The table(s) are filled with values which are 67% or 167% of the nominal charger efficiency at that particular AC input power. If the calculated			Shutdown Request Active Output Power Shutdown Complete ACTIVE CHECK ENABLE: Filtered AC Input Power Threshold for a certain amount of delay time Common Enable Condition Active check has not run OR it has been a certain amout of time since the Active Check has run Active Run on Reported Passive Failure Bit Passive Check Indeterminate Bit Passive Check has not Reported a Pass for a certain amount of time	 FALSE >= 600.00 s >= 5.00 s TRUE >= 900.00 s TRUE TRUE >= 900.00 s		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		efficiency is less than the tabled value (low end) or greater than (high end) then a failure counter will be incremented and the active check will mature. Once the fail counter reaches a calibration threshold , the active check is said to have failed. . If the associated sample count reaches its calibration threshold before the failure counter does, then the active check is said to have passed. The active check can take passes from the passive check and log them as passes in its fifo buffer, but only failures from the intrusive active check can be used to derive a diagnostic failure.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
System Isolation / Impact Sensor Fault - Hybrid Battery System Contactors Open	P1F17	When the Air Bag Module detects that a crash has occurred, it requests the HPC2 to latch open all high voltage contactors for safety reasons. When the Air Bag Module is faulty and a high voltage isolation fault is present, for safety reasons it is assumed that a vehicle crash has occurred. This DTC detects when these faults have occurred and contactors are latched open for safety reasons.	Control Module Hybrid Battery Voltage System Isolation Fault (P1AF0,P1AF2, or P1E22) in HPC1 DTC Clear	Active Must Send CPID	Rollover or Airbag or Inertial Sensors Run/Crank 0x7E4 07 AE 32 01 01	Not working ON	25 ms Once set, this DTC cannot pass. DTC passes when latch is not set.	Type A, 1 Trips
			Control Module Hybrid Battery Voltage System Isolation Fault (P1AF0,P1AF2, or P1E22) in HPC1 DTC Clear	Active Must Send CPID	Lost Communication with Inflatable Restraint Sensing and Diagnostic Module on Bus F (U184E) Run/Crank 0x7E4 07 AE 32 01 01	Active ON	25 ms Once set, this DTC cannot pass. DTC passes when latch is not set.	
			Lost Comm with HPC1 DTC Clear	Active Must Send CPID	Lost Communication with Inflatable Restraint Sensing and Diagnostic Module on Bus F (U184E) Run/Crank 0x7E4 07 AE 32 01 01	Active ON	25 ms Once set, this DTC cannot pass. DTC passes when latch is not set.	
			Lost Comm with HPC1 DTC Clear	Active Must Send CPID	Rollover or Airbag or Inertial Sensors Run/Crank 0x7E4 07 AE 32 01 01	Not working ON	25 ms Once set, this DTC cannot pass. DTC passes when latch is not set.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
System Isolation/ Coolant Level Sensor Fault - Hybrid/EV Battery Charging System	P1FFF	This DTC checks the integrity of the charging system by monitoring if the battery pack is suffering from a low coolant level condition or if the battery pack has an isolation fault.	RESS Coolant Level Sensor Circuit Fault Active RESS Coolant Level Low Battery Isolation Status Active Isolation Circuit Fault Active	TRUE TRUE Isolation Test Failed TRUE			Diagnostic will fail as soon as any of the malfunction criteria transitions to their threshold value	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Precharge Current Too High	P3061	This DTC sets if battery current remains over a threshold during precharge for a calibratable amount of time.	High Voltage Battery Current	> 3.00 Amperes	High Voltage Battery Current High Voltage Battery Voltage Contactor Status OR Charger Contactor Status	Not Faulted Not Faulted Precharging	7 consecutive failed samples 12.5 ms /sample 87.50 ms to Fail Successful Precharge to Pass	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ambient Air Temperature Sensor Range/ Performance	P0071	The purpose of the rationality diagnostic is to detect and report a failure of the sensor when rationalized with other sensors in the vehicle. This diagnostic will run after the soak conditions are met. If the enable conditions are met and if the temperature difference of the compared sensors is greater than their calibrated thresholds, the fail counter will be incremented. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS.	If Sensor Select Calibration is **CeOATD_e_Select_IAT_ECT**, then use the following conditions:	= CeOATD_e_Select_IAT_ECT	Main Diagnostic Enable calibration is **TRUE**	= TRUE	8 seconds out of a 10 seconds window	Type B, 2 Trips
					12V System Voltage	> 10.20 V		
					Power mode for	= Run < 20.00 s		
			Absolute difference between Outside Air Temperature and Inlet Air Temperature	> 28.00	Ambient Air Temperature Sensor Range/ Performance DTC P0071	= Not Test Passed This Key On, Not Test Failed This Key On		
			If ECT Compare Enable calibration is **True**, then also use the condition:	= TRUE	Compressor running	= FALSE		
					Propulsion Off Timer	> 21,600.00 s		
			Absolute difference between Outside Air Temperature and Engine Coolant Temperature	> 28.00	Power Electronic Pump Off time	> 3,600.00 s		
					Compressor Off time	> 3,600.00 s		
					Charger Off time	> 3,600.00 s		
			If Sensor Select Calibration is **CeOATD_e_Select_HSRP**, then use the following condition:	= CeOATD_e_Select_IAT_ECT	Power electronic pump DTCs P0CE9, P1F44, P1F45	= Not Fault Active		
					Outside air temperature circuit DTCs P0072, P0073	= Not Fault Active		
					Run crank DTCs P2534, P2535	= Not Fault Active		
			Absolute difference between Outside Air Temperature and High Side Refrigerant Pressure converted to Temperature	> 9,999.00	Propulsion System Off Time Signal Status DTCs P16FD, P16FE, P2610, P262B, P1683	= Not Fault Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If Sensor Select Calibration is **CeOATD_e_Select_IAT_ECT**, then use the following conditions:	= CeOATD_e_Select_IAT_ECT		
					Inlet air temperature DTCs P0110, P0111, P0112, P0113, P0114	= Not Fault Active		
					Engine coolant temperature DTCs P0115, P0116, P0117, P0118, P0119	= Not Fault Active		
					Absolute difference between Inlet Air Temperature and Engine Coolant Temperature	< 9,999.00		
					If Sensor Select Calibration is **CeOATD_e_Select_HSRP**, then use the following conditions:	= CeOATD_e_Select_IAT_ECT		
					Compressor CPU Temperature	> -10.00 °C		
					Compressor CPU Temperature sensor DTCs P0D71, P0D72, P0D73, P0D74, U016B, P15CA	= Not Fault Active		
					HSRP sensor DTCs P0532, P0533	= Not Fault Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ambient Air Temperature Sensor Circuit Low Input	P0072	This diagnostic detects if the temperature sensor has an out of range low circuit fault. If the enable conditions are met and the temperature sensor voltage read is below a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Sensor voltage	< 2.00 % (0.10 V) of reference voltage	Main Diagnostic Enable calibration is **TRUE** 12V System Voltage	= TRUE > 10.20 V	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ambient Air Temperature Sensor Circuit High Input	P0073	This diagnostic detects if the temperature sensor has an out of range high circuit fault. If the enable conditions are met and the temperature sensor voltage read is above a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Sensor voltage	> 96.00 % (4.80 V) of reference voltage	Main Diagnostic Enable calibration is **TRUE** 12V System Voltage	= TRUE > 10.20 V	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ambient Air Temperature Sensor Circuit Intermittent	P0074	This diagnostic detects if the temperature sensor circuit has an intermittent circuit fault. The string length is the addition of absolute difference between consecutive readings for a calibrated number of samples. If the string length is greater than the calibrated fail threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Ambient/Outside Air Temperature (OAT) sensor string length Where: "String Length" is the sum of "Diff" calculated over And where: "Diff" = ABS (current OAT reading - OAT sensor value from 250 milliseconds previous)	> 50.00 % 4 consecutive OAT samples	Main Diagnostic Enable calibration is **TRUE** 12V System Voltage	TRUE > 10.20 V	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 1 Control Circuit	P0480	This diagnostic detects if the host controller has detected an open, short to ground or short to voltage fault on the output circuit. If the enable conditions are met and a fault is detected on the circuit, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	If Front End Cooling Fan is Active, then any of the following conditions is met: Front End Cooling Fan Control Circuit Current Front End Cooling Fan Control Circuit Current If Front End Cooling Fan is Inactive, then the following condition is met: Front End Cooling Fan Control Circuit Current	< 200 mA > 3 A < 80 uA	Main Diagnostic Enable calibration is **TRUE** 12V System Voltage	= TRUE > 10.20 V	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Fill Door Switch Stuck Closed	P04B6	Fuel Door Position Rationality	Fuel door opened AND refuel request AND refuel detected (10% delta fuel level change)	False True True	Fuel Fill Door Switch Stuck Closed Diagnostic Enable Calibration	= TRUE	50ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Fill Door Position Sensor/ Switch Circuit	P04B8	Detects if sensor reading is invalid	Fuel Fill Door Position Sensor reading within an invalid range	65.88 %< Reported Position <= 81.56 %	Fuel Fill Door Position Sensor/Switch Circuit Diagnostic calibration	= TRUE	6 out of 8 samples @ 500ms per sample 3 seconds out of a 4 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Fill Door Position Sensor/ Switch Circuit Low	P04B9	Detects if the Circuit is Shorted to Ground	Fuel Fill Door Position Sensor reading below a threshold	Reported Position< 22.40 %	Fuel Fill Door Position Sensor/Switch Circuit Low Diagnostic Calibration	= TRUE	6.00 out of 8.00 samples @ 500ms per sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Fill Door Position Sensor/ Switch Circuit High	P04BA	Detects if the Circuit is Shorted to Battery	Fuel Fill Door Position Sensor reading above a threshold	Reported Position > 94.50 %	Fuel Fill Door Position Sensor/Switch Circuit High Diagnostic Enable Calibration	= TRUE	6.00 out of 8.00 samples @ 500ms per sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Fill Door Lock Control Circuit/Open	P04BB	Detects a fault in the Fuel Fill Door Lock/ Unlock Control Circuit	Hardware Reported Test Result for OPEN Circuit	Fault =TRUE	Fuel Fill Door Lock Control Circuit/Open Diagnostic Enable Calibration	= TRUE	80.00 % of total number samples @ 50ms per sample	Type A, 1 Trips
			OR		The Hardware reported test result, for an open circuit or short to power condition	≠ INDETERMINATE	0.5 seconds out of a 0.6 seconds window	
			Hardware Reported Test Result for SHORT Circuit to Battery		The door lock driver circuit must be active to assert an Unlock OR	=ASSERT UNLOCK		
					The door lock driver circuit must be active to assert Lock state	=ASSERT LOCK		
			Hardware Reported Test Result for SHORT Circuit to Ground	Fault =TRUE	Fuel Fill Door Lock Control Circuit/Open Diagnostic Enable Calibration	= TRUE	64.00 out of 80.00 samples @ 50ms per sample	
					The door lock driver circuit is NOT active	=ASSERT NONE	3.2 seconds out of a 4 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Fill Door Open Request Sensor/ Switch Circuit	P04C8	Detects if the circuit resistance is incorrect	Switch sensor reading within invalid range	65.88 %< Reported Position <= 81.56 %	Fuel Fill Door Open Request Sensor/Switch Circuit Diagnostic Enable Calibration	= TRUE	6.00 out of 8.00 samples @ 500ms per sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Fill Door Open Request Sensor/ Switch Circuit Low	P04CA	Detects if the circuit is shorted to ground	Fuel Fill Door Lock Request Switch sensor reading less than threshold	Reported Position< 22.94 %	Fuel Fill Door Open Request Sensor/Switch Circuit Low Diagnostic Enable Calibration	= TRUE	6.00 out of 8.00 samples @ 500ms per sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Fill Door Open Request Sensor/ Switch Circuit High	P04CB	Detects if the Circuit is shorted to battery or open	Fuel Fill Door Request Switch sensor reading above threshold	Reported Position > 94.50 %	Fuel Fill Door Open Request Sensor/Switch Circuit High Diagnostic Enable Calibration	= TRUE	6.00 out of 8.00 samples @ 500ms per sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Air Conditioning Refrigerant Charge Loss	P0534	Refrigerant charge loss is inferred from monitoring the low side refrigerant pressure (LSRP) sensor reading under compressor running and compressor off cases. For the compressor running case, this diagnostic will run after the soak conditions are met. If the enable conditions are met and the LSRP sensor reading drops below a calibration look up table value for longer than a calibrated time then a FAIL is reported. The compressor running look up table is used for pressure calibration threshold values based on ambient temperature. A diagnostic PASS is reported when failure criteria has not been met after a calibrated maximum evaluation time. For the compressor off case, this diagnostic will run after the soak conditions are met. The LSRP sensor reading is compared to a calibration look up table for the threshold	CASE 1: Determine low refrigerant charge fail: Compressor running Low Side Refrigerant Pressure based on Minimum of OAT Raw or OAT Filtered for Low Side Pressure Exceeded Threshold Time	< **P0534 Case 1 - Compressor ON Fail Threshold** (kPa) (See Supporting Tables) > 3.0 s	Main Diagnostic Enable calibration is **TRUE** 12V System Voltage Air Conditioning Refrigerant Pressure Sensor B DTCs P2517, P2518, P2516, P151C Air Conditioning Refrigerant Pressure Sensor B Stuck Performance DTC P2516 Air Conditioner Refrigerant Charge Loss DTC P0534 Control Module Internal Performance DTC P0606 OAT Corrected Status* OAT Emission Status** *See Freeform section "OAT Corrected Status" **See Freeform section "OAT Emission Status" Compressor Running Flag Compressor Status Any of the following conditions are met: a) Continuous Compressor RPM	= TRUE > 10.2 V = Not Fault Active = Not Test Failed This Key ON = Not Test Failed This Key ON, Not Test Passed This Key ON = Not Fault Active = Valid or Uninitialized = Valid or Uninitialized = True = Normal Operation	< 60.0 s	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		pressure value based on ambient temperature. A separate table is used for the compressor off fail and compressor off pass cases. If the enable conditions are met and the LSRP sensor reading drops below the threshold value from the compressor off fail look up table for longer than a calibrated time then a FAIL is reported. If the enable criteria are met and LSRP sensor reading exceeds the compressor off pass look up table value for longer than a calibrated time then a PASS is reported.			check (Run Mode) b) Continuous Compressor RPM check (Charge Mode) Compressor Off Time Any of the following conditions are met: Condition 1: a) Propulsion System Active b) Run Crank Active Condition 2: a) Charge Function Available Electric Compressor Control CPID ($35) If Use Compressor OFF Failed Disablement Calibration is **TRUE**, then use the condition: Air Conditioner Refrigerant Charge Loss DTC P0534	> 500.00 RPM to Enable < 250 RPM to Disable (Hysteresis) > 500 RPM to Enable < 250 RPM to Disable (Hysteresis) > 3,600 s = True = True = True = Not Active = FALSE = Not Failed in the OFF case (Case 2A)		
			CASE 2A: Determine low refrigerant charge fail: Compressor off Low Side Refrigerant		Main Diagnostic Enable calibration is **TRUE** 12V System Voltage	= TRUE > 10.2 V	< 30.0 s	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Pressure based on Minimum of OAT Raw or OAT Filtered for Low Side Pressure Exceeded Threshold Time	< **P0534 Case 2 - Compressor OFF Fail Threshold** (kPa) (See Supporting Tables) > 30.0 s	Air Conditioning Refrigerant Pressure Sensor B DTCs P2517, P2518, P2516, P151C Air Conditioning Refrigerant Pressure Sensor B Not Plausible DTC P151C Control Module Internal Performance DTC P0606 OAT Corrected Status* OAT Emission Status ** *See Freeform section "OAT Corrected Status" **See Freeform section "OAT Emission Status" Compressor Off Time Compressor Running Flag If Use Compressor ON Failed Disablement Calibration is **TRUE**, then use the condition: Air Conditioner Refrigerant Charge Loss DTC P0534	= Not Fault Active = Not Test Failed This Key ON = Not Fault Active = Valid or Uninitialized = Valid or Uninitialized > 3,600 s = False = FALSE = Not Failed in the ON case (Case 1)		
			CASE 2B: Determine low refrigerant charge pass: Compressor off		Main Diagnostic Enable calibration is **TRUE** 12V System Voltage	= TRUE > 10.2 V	up to 480.0 s	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Low Side Refrigerant Pressure based on Minimum of OAT Raw or OAT Filtered for Low Side Pressure did not exceed threshold Time	> **P0534 Case 2 - Compressor OFF Pass Threshold** (kPa) (See Supporting Tables) > 480.0 s	LSRP Pressure Sensor DTCs P2517, P2518, P2516, P151C LSRP Pressure Sensor DTCs P151C Control Module Internal Performance DTC P0606 OAT Corrected Status OAT Emission Status Compressor Off Time Compressor Running Flag If Use Compressor ON Failed Disablement Calibration is **TRUE**, then use the condition: AC Charge Loss DTC P0534	= Not Fault Active = Not Test Failed This Key ON = Not Fault Active = Valid or Uninitialized = Valid or Uninitialized > 3,600 s = False = FALSE = Not Failed in the ON case (Case 1)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
System Voltage Low	P0562	Detects if the 12V battery input voltage is below a threshold	Battery voltage is below a threshold	≤ 10.20 volts	Engine Speed	>= 0.00 rpm	0.00 ms	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Read Only Memory (Rom)	P0601	See Malfunction criteria for Case Description.	This DTC will be stored if any software or calibration checksum is incorrect - Case 1 - Calculated Checksum does not match stored checksum				Runs once per powerup	Type A, 1 Trips
			Flash ECC Circuit Test - Case 2 - Failed detection of invalid data written to ECC			Continuous	1s loop, 3 failures in powerup cycle	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Not Programmed	P0602	Indicates that the Control Module needs to be programmed	'No Start' Calibration is set to true which is only available on a new un-programmed Module			Continuous	1s loop, 1 failure	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Long Term Memory Reset	P0603	Non-volatile memory checksum error	Checksum at power-up does not match checksum at power-down			Runs at battery connect OR after a controller reset OR When Battery Backed RAM failure detected OR next controller init when Failure counter increments to 1 OR Fault is active OR Test not passed since code clear OR Test failed this key on OR MIL Request is ON	2 consecutive failed samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Random Access Memory (RAM) Failure	P0604	RAM ECC Circuit Test	Failed validation of test data written to ECC			Continuous	1s loop, 3 failures in powerup cycle	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Internal Performance	P0606	See Malfunction criteria for Case Description.	ALU and Register Test - Case 1 - Control Module fails to execute a diagnostic test algorithm			Continuous	1s loop, 3 failures in powerup cycle	Type A, 1 Trips
			Program Sequence Counter - Case 2 - Incorrect sequence of frame executionProgram Sequence Counter	10 samples in incorrect sequence in consecutive order		Continuous	1s loop, 3 failures in powerup cycle	
			Configuration Registers Test - Case 3 - Comparison of current configuration register settings with predefined values fails			Continuous	1s loop, 3 failures in powerup cycle	
			MMU Test - Case 4 - Test of memory management related instructions fails	Fails MMU instruction		Continuous	1s loop, 3 failures in powerup cycle	
			MMU Configuration Fault - Case 5 - Verifies MMU TLB's are properly configured for the application	TLB set incorrectly		Continuous	1s loop, 3 failures in powerup cycle	
			Stack Limits Test - Case 6 - Verifies stack usage does not exceed maximum stack size	Stack usage exceeds 100%		Continuous	1s loop, 3 failures in powerup cycle	
			Clock Status - Case 7 - Checks for loss of lock/ clock, forces a reset if failed			Continuous	1s loop, 3 failures in powerup cycle	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Auxiliary ALU Test - Case 8 - Auxiliary microprocessor fails to run a defined diagnostic algorithm			Continuous	100ms loop, 3 failures in powerup cycle	
			Auxiliary RAM Test - Case 9 - Auxiliary microprocessor fails a write/read data diagnostic RAM test			Continuous	1s loop, 3 failures in powerup cycle	
			Auxiliary ROM Test - Case 10 - Auxiliary microprocessor ROM checksum error			Continuous	2.5s loop, 3 failures in powerup cycle	
			Auxiliary Register Configuration Test - Case 11 - Configuration register values do not match expected pre-configured values			Continuous	100ms loop, 3 failures in powerup cycle	
			Auxiliary Stack Test - Case 12 - Auxiliary microprocessor stack underflow or overflow			Continuous	100ms loop, 3 failures in powerup cycle	
			Seed and Key Test - Case 13 - Seed and key test failed - invalid order, timeout, incorrect seed, incorrect key			Continuous	100ms loop, 3 failures in powerup cycle	
			Main Detected Seed Incorrect Order - Case 14 - Seed and key test failed - main microprocessor received seed from the auxiliary icroprocessor out of order			Continuous	100ms loop, 3 failures in powerup cycle	
			Main Detected Unknown			Continuous	100ms loop, 3	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Seed - Case 15 - Seed and key test failed - main microprocessor received an unknown seed				failures in powerup cycle	
			Internal IO Diagnostic (BVREF) - Case 16 - 5V reference voltages out of range	10.46 % above or below		Continuous	1s loop, 3 failures in powerup cycle	
			Internal IO Diagnostic (Analog 25% reference line) - Case 17 - 25% reference line out of range	Reference less than 22% or greater than 28%		Continuous	1s loop, 3 failures in powerup cycle	
			Internal IO Diagnostic (Analog 75% reference line) - Case 18 - 75% reference line out of range	Reference less than 72% or greater than 78%		Continuous	1s loop, 3 failures in powerup cycle	
			SPI Fault Detection Test - Case 19 - SPI B, C, or D fault detected			Continuous	1s loop, 3 failures in powerup cycle	
			SPI B Fault Detection Test - Case 20 - Fault detected via echo test on SPI bus B			Continuous	1s loop, 3 failures in powerup cycle	
			SPI C Fault Detection Test - Case 21- Fault detected via echo test on SPI bus C			Continuous	1s loop, 3 failures in powerup cycle	
			SPI D Fault Detection Test - Case 22 - Fault detected via echo test on SPI bus D			Continuous	1s loop, 3 failures in powerup cycle	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Long Term Memory Performance	P062F	Update BINVDM operation	Battery independent non-volatile status update failed				Runs at controller shutdown and after new data is written to EEPROM (which is checked every 600 seconds) 2 consecutive failed samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Wake-up Circuit Performance	P06E4	Detects a fault in the Control Module Output Wake-Up Circuit	Case 1: Short to Ground		Diagnostic Enabled	=TRUE	480.00 failed samples within 560.00 samples 1 sample every 12.5ms	Type B, 2 Trips
					Control Module Output Wake-Up Circuit Enabled	=TRUE		
			Case 2:Short to Battery or Open circuit		Diagnostic Enabled	=TRUE		
					Control Module Output Wake-Up Circuit Enabled	=FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Pack State of Charge Low	P0A7D	This diagnostic monitors for high voltage battery state of charge (SOC) which is too low. It monitors the SOC during each driving cycle. At the start of each driving cycle, if the SOC is below the SOC too low threshold, a maximum time is computed that represents worst case how much engine on time (generator on time) would be necessary in order to get the SOC back into range and above the SOC too low threshold. Once this time expires, the monitor is enabled and will accumulate sample counts. The monitor will accumulate fail counts if the SOC is not in range. The diagnostic will make a single pass/fail determination at the end of each driving cycle but only if there was sufficient distance accumulated that driving cycle. When driving cycles are too short to make a pass/ fail decision, the fail/ sample counters will be carried over to the next driving cycle so that	SOC	< 10.50	System Voltage (Applicable to this Program/MY: TRUE)	> 10.20 V	Drive cycle complete with total distance driven > 50.00 km AND Ratio of low SOC distance to total distance driven > 0.50	Type B, 2 Trips
					Transmission Shifter Position (Applicable to this Program/MY: FALSE)	!= Neutral		
					Hood Position (Applicable to this Program/MY: FALSE)	!= Open		
					Battery Temperature	>= -10.00 C		
					Vehicle Speed	> 15.00 km/h		
					Re-entry delay surpassed	**KtBSED_Cf_BSL_ReentryDelay** *(10.50 - SOC) (see Supporting Tables)		
					U0100	No active DTC		
					Hybrid/EV Battery Pack Voltage Sensor Fault Active (see Fault Bundle page)	No active DTCs		
					Hybrid/EV Battery Current Sensor Fault Active (see Fault Bundle page)	No active DTCs		
					Hybrid/EV Battery Temperature Sensor Fault Active (see Fault Bundle page)	No active DTCs		
			Pass		System Voltage (Applicable to this Program/MY: TRUE)	> 10.20 V	Drive cycle complete with total distance driven > 50.00	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		they are not abandoned. At the end of each driving cycle in which sufficient pass/ fail data has been collected, the diagnostic will fail if the ratio of fail counts to sample counts is greater than a failure threshold and will pass otherwise. The diagnostic also can pass more quickly at the end of shorter driving cycles but only of the fail count = 0 (SOC was in range the entire enabled portion of the driving cycle) and sample counts are greater than some minimum fast pass threshold.			Transmission Shifter Position (Applicable to this Program/MY: FALSE) Hood Position (Applicable to this Program/MY: FALSE) Battery Temperature Vehicle Speed Re-entry delay surpassed U0100 Hybrid/EV Battery Pack Voltage Sensor Fault Active (see Fault Bundle page) Hybrid/EV Battery Current Sensor Fault Active (see Fault Bundle page) Hybrid/EV Battery Temperature Sensor Fault Active (see Fault Bundle page)	!= Neutral != Open >= -10.00 C > 15.00 km/h **KtBSED_Cf_BSL_ReentryDelay** *(10.50 - SOC) (see Supporting Tables) No active DTC No active DTCs No active DTCs No active DTCs	km AND Ratio of low SOC distance to total distance driven < 0.50	
			Fast Pass		System Voltage (Applicable to this Program/MY: TRUE) Transmission Shifter Position (Applicable to this Program/MY: FALSE)	> 10.20 V != Neutral	Drive cycle complete with total distance driven > 10.00 km AND	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Hood Position (Applicable to this Program/MY: FALSE)	!= Open	Distance driven with low SOC = 0 km	
					Battery Temperature	>= -10.00 C		
					Vehicle Speed	> 15.00 km/h		
					Re-entry delay surpassed	**KtBSED_Cf_BSL_ReentryDelay** *(10.50 - SOC) (see Supporting Tables)		
					U0100	No active DTC		
					Hybrid/EV Battery Pack Voltage Sensor Fault Active (see Fault Bundle page)	No active DTCs		
					Hybrid/EV Battery Current Sensor Fault Active (see Fault Bundle page)	No active DTCs		
					Hybrid/EV Battery Temperature Sensor Fault Active (see Fault Bundle page)	No active DTCs		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Pack Over temperature	P0A7E	This diagnostic detects if the maximum battery temperature is above a threshold. If the enable conditions are met and the temperature is above a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	High Voltage Battery Max Temperature	> 54.00 °C	Main Enable Calibration is **TRUE**	= TRUE	5 seconds out of a 6.3 seconds window	Type A, 1 Trips
					High Volatge Battery temperature status DTCs			
					Hybrid/EV Battery Temperature Sensor Circuit Low **	= Not Fault Active		
					Hybrid/EV Battery Temperature Sensor Circuit High **	= Not Fault Active		
					Hybrid/EV Battery Temperature Sensor Circuit Range/ Performance **	= Not Fault Active		
					Loss of Communication with Battery Energy Control Module **	= Not Fault Active		
					** See Fault Bundle Definitions section for the above fault bundles			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Pack Deterioration	P0A7F	This diagnostic monitor compares the calculated hybrid/EV battery pack power capability against a calibrated failure threshold table. The calculated battery power capability is a function of the sensed battery voltage, current, and temperature. The "minimum threshold" is the minimum battery power required to meet necessary vehicle emissions performance at ~ 15 % state of charge (SOC) at 20 C. A new battery would be expected to have reasonably large amounts of power under these conditions, and reduced power capability as the SOC or temperature drops. Because the power capability drops with decreasing SOC below the ~ 15 % point, the failure threshold is reduced proportionally with decreasing SOC from the ~ 15 % point. Above the ~ 15 % point, the failure threshold is held constant with increasing SOC. Because the power capability drops with	Calculated battery discharge power limits	< **KtBSED_P_BPD_D_EndOfLifePwrThrsh** (kW) - see Supporting Tables	Hybrid/EV Battery Temperature	< 50.00 ºC, AND > 20.00 ºC	50 failures 100 ms /sample	Type B, 2 Trips
					Hybrid/EV Battery SOC	> 15.00 %, AND < 100.00 %		
					Run Crank Active	= TRUE		
					Hybrid/EV Battery Pack Voltage Sensor Fault Active (see Fault Bundle page)	No active DTCs		
					Hybrid/EV Battery Current Sensor Fault Active (see Fault Bundle page)	No active DTCs		
					Hybrid/EV Battery Temperature Sensor Fault Active (see Fault Bundle page)	No active DTCs		
					Actual battery power exceedance of power limits in terms of % overshoot multiplied by seconds of duration	< 80.00 %-Sec		
			Calculated battery charge power limits	< **KtBSED_P_BPD_C_EndOfLifePwrThrsh** (kW) - see Supporting Tables	Hybrid/EV battery Temperature	< 50.00 ºC, AND > 20.00 ºC	50 failures 100 ms /sample	
					Hybrid/EV battery SOC	> 0.00 %, AND < 100.00 %		
					Run Crank Active	= TRUE		
						No active DTCs		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		decreasing temperature below the 20 C point, the failure threshold is reduced proportionally with decreasing temperature from the 20 C point. Above the 20 C point, the failure threshold is held constant with increasing temperature. If the calculated battery power capability falls below the failure threshold (which is a function of SOC and battery temperature) for greater than the calibrated amount of time, the diagnostic will fail. If an entire drive cycle (time betweeen rising and falling edges of Run Crank) is completed without failing, and the measured battery power exceeds the failure threshold (which is a function of SOC and temperature) for at least a calibrated amount of time, then the diagnostic will pass.			Hybrid/EV Battery Pack Voltage Sensor Fault Active (see Fault Bundle page) Hybrid/EV Battery Current Sensor Fault Active (see Fault Bundle page) Hybrid/EV Battery Temperature Sensor Fault Active (see Fault Bundle page) Actual battery power exceedance of power limits in terms of % overshoot multiplied by seconds of duration	No active DTCs No active DTCs < 80.00 %-Sec		
			(DTC Pass) Actual battery discharge power	> **KtBSED_P_BPD_D_ MinPassPowerThrsh** (kW) for 1.00 second - see Supporting Tables	Hybrid/EV battery temperature Hybrid/EV battery SOC Run Crank Transition No failure of the discharging power limit monitor during this drive cycle Hybrid/EV Battery Pack Voltage Sensor Fault Active (see Fault Bundle page) Hybrid/EV Battery Current Sensor Fault Active	< 50.00 ºC, AND > 20.00 ºC > 15.00 %, AND < 100.00 % True -> False No active DTCs No active DTCs		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(see Fault Bundle page)			
					Hybrid/EV Battery Temperature Sensor Fault Active (see Fault Bundle page)	No active DTCs		
			(DTC Pass) Actual battery charge power	> **KtBSED_P_BPD_C_ MinPassPowerThrsh** (kW) for 1.00 second - see Supporting Tables	Hybrid/EV battery temperature	< 50.00 ºC, AND > 20.00 ºC		
					Hybrid/EV battery SOC	> 0.00 %, AND < 100.00 %		
					Run Crank Transition	True -> False		
					No failure of the discharging power limit monitor during this drive cycle			
					Hybrid/EV Battery Pack Voltage Sensor Fault Active (see Fault Bundle page)	No active DTCs		
					Hybrid/EV Battery Current Sensor Fault Active (see Fault Bundle page)	No active DTCs		
					Hybrid/EV Battery Temperature Sensor Fault Active (see Fault Bundle page)	No active DTCs		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Temperature Sensor A Range/ Performance	P0A9C	This diagnostic verifies that the hybrid/EV battery temperature sensor is neither inappropriately high nor low. It compares the sensed battery temperature with an average comprised of other battery temperature sensors. If the absolute value of the difference between the sensed battery temperature and the average is greater than the failure threshold for sufficient time, the diagnostic will fail.	Absolute value of the difference between the temperature input and the average of other battery temperature sensors	> 20.00 ºC	System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Temperature Sensor Circuit Low (see Fault Bundle page) Hybrid/EV Battery Temperature Sensor Circuit High (see Fault Bundle page) Loss of Communication with Battery Energy Control Module (see Fault Bundle page)	> 10.20 V No active DTCs No active DTCs No active DTCs	50 failures out of 67 samples 25 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Pack Voltage Sense Circuit Rationality	P0ABB	This diagnostic verifies that the hybrid/EV battery pack voltage sensor is neither inappropriately high nor low. It compares the sensed battery pack voltage with the sum of the battery cell voltages. If the absolute value of the difference between the sensed battery pack voltage and the sum of the battery cell voltages is greater than the failure threshold for sufficient time, the diagnostic will fail.	Absolute value of the difference between the battery pack voltage and the sum of the battery cell voltages	> 12.00 V	P0ABC, P0ABB Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	No active DTCs No active DTCs	20 failures out of 25 samples 25 ms /sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Pack Current Sensor A Circuit	P0ABF	This diagnostic detects if the primary (or course) current sensor is stuck in range. It monitors the sensed battery current before, during, and immediately after a precharge of the propulsion high voltage bus. The measurement taken prior to precharge is the baseline measurement that should correspond to zero current. All subsequent measurements will be referenced to this measurement. There are 3 stages of the current sensor stuck in range monitor. Stage 1 of the monitor is enabled during a high voltage bus precharge event. Only those precharge events where the bus voltage rises substantially from a relative low voltage to near battery voltage shall be used. Stage 1 of the monitor is not enabled if this voltage rise is too small (see Minimum Precharge High Voltage Delta in diagram below) because the current is	Present Battery Current - Initial Battery Current AND Present Battery Current - Initial Battery Current	< 1.00 A < 1.00 A	System Voltage (Applicable for this Program/MY: TRUE) HV Bus Precharging Battery Voltage - HV Bus Voltage HV Bus Precharging Transition	> 10.20 V =TRUE > 40.00 V TRUE -> FALSE	80.00 samples 25 ms / sample	
			Present Battery Current - Initial Battery Current	> 1.00 A	System Voltage (Applicable for this Program/MY: TRUE) HV Bus Precharging	> 10.20 V =TRUE	20.00 samples 25 ms / sample	
			Present Battery Current - Initial Battery Current	> 1.00 A	System Voltage (Applicable for this Program/MY: TRUE) P0ABF Contactors still closed from previous fail determination (see criteria for Fail case)	> 10.20 V Not active	20.00 samples 25 ms / sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		expected to be near zero in these instances risking false fails. In Stage 1, if the current measured (during precharge) is below a threshold, the current sensor must not be stuck and hence, P0ABF passes. However, if the current measured during precharge is at or below this same threshold, then stage 2 of the monitor is enabled. Stage 2 of the monitor is enabled shortly after the main contactor is fully closed. At this time it is expected that high voltage devices like the propulsion inverter and the Auxiliary Power Module (APM) will draw some current that can be measured by the current sensor. If insufficient current is measured during Stage 2, then P0ABF will fail. Otherwise it will pass. This diagnostic monitors for a hybrid/ EV battery current sensor which is stuck in range. During the precharge of the traction power inverter module if the difference						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		in current from before precharge to during precharge is not large enough, the diagnostic will fail.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Temperature Sensor B Range/ Performance	P0AC6	This diagnostic verifies that the hybrid/EV battery temperature sensor is neither inappropriately high nor low. It compares the sensed battery temperature with an average comprised of other battery temperature sensors. If the absolute value of the difference between the sensed battery temperature and the average is greater than the failure threshold for sufficient time, the diagnostic will fail.	Absolute value of the difference between the temperature input and the average of other battery temperature sensors	> 20.00 ºC	System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Temperature Sensor Circuit Low (see Fault Bundle page) Hybrid/EV Battery Temperature Sensor Circuit High (see Fault Bundle page) Loss of Communication with Battery Energy Control Module (see Fault Bundle page)	> 10.20 V No active DTCs No active DTCs No active DTCs	50 failures out of 67 samples 25 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Temperature Sensor C Range/ Performance	P0ACB	This diagnostic verifies that the hybrid/EV battery temperature sensor is neither inappropriately high nor low. It compares the sensed battery temperature with an average comprised of other battery temperature sensors. If the absolute value of the difference between the sensed battery temperature and the average is greater than the failure threshold for sufficient time, the diagnostic will fail.	Absolute value of the difference between the temperature input and the average of other battery temperature sensors	> 20.00 ºC	System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Temperature Sensor Circuit Low (see Fault Bundle page) Hybrid/EV Battery Temperature Sensor Circuit High (see Fault Bundle page) Loss of Communication with Battery Energy Control Module (see Fault Bundle page)	> 10.20 V No active DTCs No active DTCs No active DTCs	50 failures out of 67 samples 25 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Temperature Sensor D Range/ Performance	P0AE9	This diagnostic verifies that the hybrid/EV battery temperature sensor is neither inappropriately high nor low. It compares the sensed battery temperature with an average comprised of other battery temperature sensors. If the absolute value of the difference between the sensed battery temperature and the average is greater than the failure threshold for sufficient time, the diagnostic will fail.	Absolute value of the difference between the temperature input and the average of other battery temperature sensors	> 20.00 ºC	System Voltage (Applicable for this Program/MY: TRUE)	> 10.20 V	50 failures out of 67 samples 25 ms / sample	Type B, 2 Trips
					Hybrid/EV Battery Temperature Sensor Circuit Low (see Fault Bundle page)	No active DTCs		
					Hybrid/EV Battery Temperature Sensor Circuit High (see Fault Bundle page)	No active DTCs		
					Loss of Communication with Battery Energy Control Module (see Fault Bundle page)	No active DTCs		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery System Voltage Correlation	P0AF8	This diagnostic verifies that the hybrid/EV battery pack voltage sensor is neither inappropriately high nor low. It compares the sensed battery pack voltage sensor with either the traction power inverter module's (TPIM) high voltage bus sensor or the high voltage battery charger bus voltage sensor. If the absolute value of the difference between the sensed battery voltage and the comparison sensor voltage is greater than the failure threshold for sufficient time, the diagnostic will fail. This monitor intended to be an additional rationality monitor to P0ABB, for safety purposes.	Absolute value of the difference between the battery pack voltage and the TPIM bus voltage	> 13.95 V	Battery Pack Connected to TPIM Hybrid/EV Battery Pack Voltage Sensor Fault Active (see Fault Bundle page) P1AF5, P1B0C, P1B41, P1AF7, P1B44, P1B42, P1ED1, P1EF1, P1E1B, U1817	= TRUE No active DTCs No active DTCs	400 failures out of 500 samples 25 ms /sample	Type A, 1 Trips
			Absolute value of the difference between the battery pack voltage and the charger bus voltage	> 14.95 V	Battery Pack Connected to Charger Battery Pack Connected to TPIM Hybrid/EV Battery Pack Voltage Sensor Fault Active (see Fault Bundle page) P0D4E, P0D4F, P1EEB, P1EEC, P0D5C, P1ECE, P16C5	= TRUE = FALSE No active DTCs No active DTCs	400 failures out of 500 samples 25 ms /sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery System Voltage Low	P0AFA	This diagnostic monitors for hybrid/EV battery pack voltage too low. It is a system monitor that checks the pack voltage by comparing its value against a battery temperature-dependent threshold. If the voltage is below the failure threshold for sufficient time, the diagnostic will fail. For safety reasons, failures of this DTC cannot be cleared with a code clear until the failure is de-latched by a service technician using the CPID in secondary parameters. To pass, battery pack voltage must be above its respective battery temperature-dependent threshold.	Hybrid/EV battery pack voltage	< **KtBSED_U_BUV_PackVoltThresh** (V) - see Supporting Tables	Hybrid/EV Battery Pack Voltage Sensor Fault Active (see Fault Bundle page) DTC Clear: Must Send CPID	No active DTCs 0x7E4 07 AE 32 0C 0C 00 00 00	360 failures out of 450 samples 25 ms /sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery System Voltage High	P0AFB	This diagnostic monitors for hybrid/EV battery pack voltage too high. It is a system monitor that checks the pack voltage by comparing its value against a battery temperature-dependent threshold. If the voltage is above the failure threshold for sufficient time, the diagnostic will fail. For safety reasons, failures of this DTC cannot be cleared with a code clear until the failure is de-latched by a service technician using the CPID in secondary parameters. To pass, the battery pack voltage must be below its respective battery temperature-dependent threshold.	Hybrid/EV battery pack voltage	> **KtBSED_U_BOV_PackVoltThresh** (V) - see Supporting Tables	Hybrid/EV Battery Pack Voltage Sensor Fault Active (see Fault Bundle page) DTC Clear: Must Send CPID	No active DTCs 0x7E4 07 AE 32 0C 0C 00 00 00	360 failures out of 450 samples 25 ms /sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Pack Current Sensor A/B Correlation	P0B13	This diagnostic verifies that both hybrid/EV battery pack current sensors are neither inappropriately high nor low. It compares sensor A with sensor B. If the absolute value of the difference between both sensors is greater than the failure threshold for sufficient time, the diagnostic will fail.	Absolute value of the difference between hybrid/EV battery current sensors A and B	> 10.00 A	Sensor B current OR Sensor A current P0AC1, P0AC2, P1EBA, P0B10, P0B11, P1EBB Loss of Communication with Battery Energy Control Module (see Fault Bundle page)	Between -20.00 A and 20.00 A Between -20.00 A and 20.00 A No active DTCs No active DTCs	400 failures out of 500 samples 25 ms /sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense A Circuit Range/ Performance	P0B3C	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense B Circuit Range/ Performance	P0B41	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense C Circuit Range/ Performance	P0B46	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense D Circuit Range/ Performance	P0B4B	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense E Circuit Range/ Performance	P0B50	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense F Circuit Range/ Performance	P0B55	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense G Circuit Range/ Performance	P0B5A	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense H Circuit Range/ Performance	P0B5F	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense I Circuit Range/ Performance	P0B64	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense J Circuit Range/ Performance	P0B69	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense K Circuit Range/ Performance	P0B6E	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense L Circuit Range/ Performance	P0B73	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense M Circuit Range/ Performance	P0B78	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense N Circuit Range/ Performance	P0B7D	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense O Circuit Range/ Performance	P0B82	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense P Circuit Range/ Performance	P0B87	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense Q Circuit Range/ Performance	P0B8C	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense R Circuit Range/ Performance	P0B91	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense S Circuit Range/ Performance	P0B96	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense T Circuit Range/ Performance	P0B9B	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense U Circuit Range/ Performance	P0BA0	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense V Circuit Range/ Performance	P0BA5	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense W Circuit Range/ Performance	P0BAA	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense X Circuit Range/ Performance	P0BAF	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense Y Circuit Range/ Performance	P0BB4	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense Z Circuit Range/ Performance	P0BB9	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Temperature Sensor E Range/ Performance	P0BC3	This diagnostic verifies that the hybrid/EV battery temperature sensor is neither inappropriately high nor low. It compares the sensed battery temperature with an average comprised of other battery temperature sensors. If the absolute value of the difference between the sensed battery temperature and the average is greater than the failure threshold for sufficient time, the diagnostic will fail.	Absolute value of the difference between the temperature input and the average of other battery temperature sensors	> 20.00 ºC	System Voltage (Applicable for this Program/MY: TRUE)	> 10.20 V	50 failures out of 67 samples 25 ms / sample	Type B, 2 Trips
					Hybrid/EV Battery Temperature Sensor Circuit Low (see Fault Bundle page)	No active DTCs		
					Hybrid/EV Battery Temperature Sensor Circuit High (see Fault Bundle page)	No active DTCs		
					Loss of Communication with Battery Energy Control Module (see Fault Bundle page)	No active DTCs		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Pack State of Charge High	P0C30	This diagnostic monitors for high voltage battery state of charge (SOC) which is too high. It monitors the SOC during each driving cycle. At the start of each driving cycle, if the SOC is above the SOC too high threshold, a maximum time is computed that represents, worst case, how much electric motor on time would be necessary in order to get the SOC back into range and below the SOC too high threshold. Once this time expires, the monitor is enabled and will accumulate sample counts. The monitor will accumulate fail counts if the SOC is not in range. The diagnostic will make a single pass/ fail determination at the end of each driving cycle but only if there was sufficient distance accumulated that driving cycle. When driving cycles are too short to make a pass/ fail decision, the fail/ sample counters will be carried over to the next driving cycle so that	SOC	> **KtBSER_Pct_SOC_MaxInit** + 102.00 (see Supporting Tables)	System Voltage (Applicable to this Program/MY: TRUE)	> 10.20 V	Drive cycle complete with total distance driven > 50.00 km AND Ratio of high SOC distance to total distance driven > 0.50	Type B, 2 Trips
					Transmission Shifter Position (Applicable to this Program/MY: FALSE)	!= Neutral		
					Hood Position (Applicable to this Program/MY: FALSE)	!= Open		
					Battery Temperature	>= -10.00 C		
					Vehicle Speed	> 15.00 km/h		
					Re-entry delay surpassed	**KtBSED_Cf_BSH_ReentryDelay** *(SOC - [**KtBSER_Pct_SOC_MaxInit** + 102.00]) (see Supporting Tables)		
					U0100	No active DTC		
					Hybrid/EV Battery Pack Voltage Sensor Fault Active (see Fault Bundle page)	No active DTCs		
					Hybrid/EV Battery Current Sensor Fault Active (see Fault Bundle page)	No active DTCs		
					Hybrid/EV Battery Temperature Sensor Fault Active (see Fault Bundle page)	No active DTCs		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		they are not abandoned. At the end of each driving cycle in which sufficient pass/fail data has been collected, the diagnostic will fail if the ratio of fail counts to sample counts is greater than a failure threshold and will pass otherwise. The diagnostic also can pass more quickly at the end of shorter driving cycles but only if the fail count = 0 (SOC was in range the entire enabled portion of the driving cycle) and sample counts are greater than some minimum fast pass threshold.	Pass		System Voltage (Applicable to this Program/MY: TRUE)	> 10.20 V	Drive cycle complete with total distance driven > 50.00 km AND Ratio of high SOC distance to total distance driven< 0.50	
					Transmission Shifter Position (Applicable to this Program/MY: FALSE)	!= Neutral		
					Hood Position (Applicable to this Program/MY: FALSE)	!= Open		
					Battery Temperature	>= -10.00 C		
					Vehicle Speed	> 15.00 km/h		
					Re-entry delay surpassed	**KtBSED_Cf_BSH_ReentryDelay** *(SOC - [**KtBSER_Pct_SOC_MaxInit** + 102.00]) (see Supporting Tables)		
					U0100	No active DTC		
					Hybrid/EV Battery Pack Voltage Sensor Fault Active (see Fault Bundle page)	No active DTCs		
					Hybrid/EV Battery Current Sensor Fault Active (see Fault Bundle page)	No active DTCs		
					Hybrid/EV Battery Temperature Sensor Fault Active (see Fault Bundle page)	No active DTCs		
			Fast Pass		System Voltage	> 10.20 V	Drive cycle	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(Applicable to this Program/MY: TRUE)		complete with total distance driven > 10.00 km	
					Transmission Shifter Position (Applicable to this Program/MY: FALSE)	!= Neutral	AND	
							Distance travelled with high SOC = 0 km	
					Hood Position (Applicable to this Program/MY: FALSE)	!= Open		
					Battery Temperature	>= -10.00 C		
					Vehicle Speed	> 15.00 km/h		
					Re-entry delay surpassed	**KtBSED_Cf_BSH_ReentryDelay** *(SOC - [**KtBSER_Pct_SOC_MaxInit** + 102.00]) (see Supporting Tables)		
					U0100	No active DTC		
					Hybrid/EV Battery Pack Voltage Sensor Fault Active (see Fault Bundle page)	No active DTCs		
					Hybrid/EV Battery Current Sensor Fault Active (see Fault Bundle page)	No active DTCs		
					Hybrid/EV Battery Temperature Sensor Fault Active (see Fault Bundle page)	No active DTCs		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Temperature Sensor F Range/ Performance	P0C34	This diagnostic verifies that the hybrid/EV battery temperature sensor is neither inappropriately high nor low. It compares the sensed battery temperature with an average comprised of other battery temperature sensors. If the absolute value of the difference between the sensed battery temperature and the average is greater than the failure threshold for sufficient time, the diagnostic will fail.	Absolute value of the difference between the temperature input and the average of other battery temperature sensors	> 20.00 ºC	System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Temperature Sensor Circuit Low (see Fault Bundle page) Hybrid/EV Battery Temperature Sensor Circuit High (see Fault Bundle page) Loss of Communication with Battery Energy Control Module (see Fault Bundle page)	> 10.20 V No active DTCs No active DTCs No active DTCs	50 failures out of 67 samples 25 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Pack Coolant Temperature Sensor Circuit Range/ Performance	P0C43	This diagnostic verifies that the hybrid/EV battery coolant temperature sensor is neither inappropriately high nor low. The monitor runs once after a sufficiently long vehicle soak that is intended to ensure that temperature sensors are all equalized. A sufficiently long soak is defined as all high voltage contactors and battery heater have been open/off for a long enough time. If the soak is long enough, it compares the battery coolant temperature with 1) the average of the battery cell temperature and 2) the ambient air temperature. If the battery coolant temperature is too high or too low compared to both of the other readings, then the diagnostic will FAIL. Otherwise it will PASS.	If Use Average High Voltage Battery Temperature calibration is **TRUE**, then use following criteria: Absolute difference between Inlet Coolant Temperature and Average HV Battery If Use Outside Air Temperature calibration is **TRUE**, then use following criteria: Absolute difference between Inlet Coolant Temperature and Outside Air Temperature	= TRUE >= 23.00 °C = TRUE >= 22.00 °C	Main Enable Calibration is **TRUE** Power mode (Bus wake up time) 12V System Voltage Diagnostic maximum run time All High Voltage Battery contactors Open Outside Air Temperature Control Module Internal Performance DTC P0606 High Voltage Battery Inlet Coolant Temperature DTCs P0C44, P0C45, P0C46 If Use Outside Air Temperature calibration is **TRUE**, then use following condition: OAT Arbitrated Status* If Use Average High Voltage Battery Temperature calibration is **TRUE**, then use following condition: High Voltage Battery Temperature DTCs	= TRUE > 1.00 s = 10.20 V < 20.00 s >= 14,400.00 s -9,999.00 °C <= Temperature <= 9,999.00 °C = Not Fault Active = Not Fault Active = TRUE = VALID = TRUE	8 seconds out of a 10 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					P0A9C, P0A9D, P0A9E Loss of Communication with Battery Energy Control Module ** High Voltage Battery Inlet Coolant Temperture Performance DTC P0C43 *See Freeform section "OAT Arbitrated Status" ** See Fault Bundle Definitions section for the above fault bundles	= Not Fault Active = Not Fault Active = Not Test Failed This Key On, Not Test Passed This Key On		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Pack Coolant Temperature Sensor A Circuit Intermittent/ Erratic	P0C46	This diagnostic detects if the temperature sensor circuit has an erratic circuit fault. The string length is the addition of the absolute difference between consecutive readings for a calibrated number of samples. If the string length is greater than the calibrated fail threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	High Voltage Battery Inlet Coolant Temperature sensor Value String Length Where: "String Length" is the sum of "Diff" calculated over And Where: "Diff"=ABS (current High Voltage Battery Inlet Coolant Temp reading - High Voltage Battery Inlet Coolant Temp sensor value from previous 100 milliseconds sample)	> 64.00 °C 10.00 consecutive Inlet Coolant Temp Samples	Main Enable Calibration is **TRUE** 12V System Voltage High Voltage Battery Inlet Coolant Temperature sensor Status DTCs P0C44, P0C45 Loss of Communication with Battery Energy Control Module * * See Fault Bundle Definitions section for the above fault bundles	= TRUE > 10.20 V = Not Fault Active = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Pack Coolant Pump Control Circuit/Open	P0C47	This diagnostic detects if the host controller has detected a short to ground, short to power, or open fault on the output control circuit. If the enable conditions are met and a fault is detected on the circuit, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	If High Voltage Battery Coolant Pump is ON, then any of the following conditions are met: a) High Volatge Battery Coolant Pump Control line current b) High Volatge Battery Coolant Pump Control line current If High Voltage Battery Coolant Pump is OFF, then any of the following conditions are met: High Volatge Battery Coolant Pump Control line current	< 200mA > 3A < 120uA	Main Enable Calibration is **TRUE** 12V System Voltage If Use Pump Enable Signal calibration is **TRUE**, then use following condition: High Volatge Battery Coolant Pump Enable Signal If Coolant Pump Discrete/ PWM Type calibration is **TRUE**, then use following condition: High Volatge Battery Coolant Pump Control Duty Cycle Command If Coolant Pump Discrete/ PWM Type calibration is **FALSE**, then use following conditions: If Coolant Pump Discrete Enable calibration is **CeDIAG_e_CDE_Actuated** (Pump ON), then use the following condition: a) High Volatge Battery Coolant Pump Enable Signal	= TRUE > 10.20 V = TRUE = True = TRUE -9,999.00 % <= PWM Duty Cycle <= 9,999.00 % = TRUE = CeDIAG_e_CDE_NonActuated = True	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If Coolant Pump Discrete Enable calibration is **CeDIAG_e_CDE_NonActuated** (Pump OFF), then use the following condition:	= CeDIAG_e_CDE_NonActuated		
					a) High Volatge Battery Coolant Pump Enable Signal	= False		
					If Coolant Pump Discrete Enable calibration is **CeDIAG_e_CDE_Both** (Pump ON or Pump OFF), then use the following condition:	= CeDIAG_e_CDE_NonActuated		
					a) High Volatge Battery Coolant Pump Enable Signal	=True OR False		
					High Volatge Battery Coolant Pump Control Circuit Fault State*	= NOT Indeterminate		
					*Circuit Fault State is Indeterminate if the ECU is not reporting Fail or Pass on the circuit being diagnosed			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Electronics Coolant Pump Control Circuit/Open	P0CE9	This diagnostic detects if the host controller has detected a short to ground, short to power, or open fault on the output control circuit. If the enable criteria are met and a fault is detected on the circuit, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met.	If Power Electronics Coolant Pump is ON, then any of the following conditions are met:		Main Diagnostics Enable calibration is **TRUE**	= TRUE	4 seconds out of a 5 seconds window	Type B, 2 Trips
					12V System Voltage	> 10.20 V		
			Power Electronics Coolant Pump Control Circuit Current	< 200 mA	If Use Run/Crank Active calibration is **TRUE**, then use the following condition:	= FALSE		
			Power Electronics Coolant Pump Control Circuit Current	>3A	All of the following conditions are met for:	>= 10.00 s		
			If Power Electronics Coolant Pump is OFF, then the following condition is met:		a) Run/Crank Active Signal	= True		
					b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= Not Fault Active		
			Power Electronics Coolant Pump Control Circuit Current	< 120 uA	If Use Pump Enable Signal calibration is **TRUE**, then use the following condition:	= TRUE		
					Power Electronics Coolant Pump Enable Signal	= True		
					If Coolant Pump Discrete/ PWM Type calibration is **TRUE**, then use the following condition:	= TRUE (TRUE means PWM)		
					Power Electronics Coolant Pump Control Duty Cycle Command	-9,999.00 % <= PWM Duty Cycle <= 9,999.00 %		
					If Coolant Pump Discrete/ PWM Type calibration is			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					FALSE, then use the following conditions:	= TRUE (FALSE means discrete)		
					If Coolant Pump Discrete Enable calibration is **CePCOR_e_CDE_Actuated** (Pump ON), then use the following condition:	= CeDIAG_e_CDE_NonActuated		
					a) Power Electronics Coolant Pump Enable Signal	= True		
					If Coolant Pump Discrete Enable calibration is **CePCOR_e_CDE_NonActuated** (Pump OFF), then use the following condition:	= CeDIAG_e_CDE_NonActuated		
					a) Power Electronics Coolant Pump Enable Signal	= False		
					If Coolant Pump Discrete Enable calibration is **CePCOR_e_CDE_Both** (Pump ON or Pump OFF), then use the following condition:	= CeDIAG_e_CDE_NonActuated		
					a) Power Electronics Coolant Pump Enable Signal	= True OR False		
					Power Electronics Coolant Pump Control Circuit Fault State*	= NOT Indeterminate		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					*Circuit Fault State is Indeterminate if the ECU is not reporting Fail or Pass on the circuit being diagnosed			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Electronics Coolant Temperature Sensor Circuit Range/ Performance	P0CEF	This diagnostic verifies that the Hybrid/EV electronics coolant temperature sensor is neither inappropriately high nor low. The monitor runs once after a sufficiently long vehicle soak that is intended to ensure that temperature sensors are all equalized. A sufficiently long soak is defined as: AC compressor, power electronics pump, and propulsion system have been off for a calibrated soak time. If the soak is long enough, it compares the power electronics coolant temperature with two of the following sensors: 1) the outside air temperature (OAT), 2) the transmission oil temperature and 3) the high side refrigerant pressure as a function of Temperature. Comparison sensor selection is calibrateable. If the electronics coolant temperature is too high or too low compared to the other sensor readings, the fail counter will increment. If the calibrated fail	If Use Outside Air Temperature Sensor calibration is **TRUE**, then use following criteria: Absolute difference between Power Electronics Coolant Temperature and Outside Air Temperature If Use Transmission Fluid Temperature Sensor calibration is **TRUE**, then use following criteria: Absolute difference between Power Electronics Coolant Temperature and Transmission Fluid Temperature If Use Air Conditioning Refrigerant Pressure Sensor calibration is **TRUE**,then use following criteria: Absolute difference between Power Electronics Coolant Temperature and High Side Refrigerant Pressure Temperature	= TRUE > 27.00 °C = TRUE > 27.00 °C = TRUE > 28.00 °C	Main Diagnostics Enable calibration is **TRUE** 12V System Voltage If Use Run/Crank Active calibration is **TRUE**, then use the following condition: All of the following conditions are met for: a) Run/Crank Active Signal b) Ignition Switch Run/ Start Position DTCs P2534, P2535 All of the following conditions are met for: Any of the following conditions are met for: a) Compressor ON Signal b) Compressor ON Signal All of the following conditions are met for: Any of the following conditions are met: a) Power Electronics Coolant Pump Enable	= TRUE > 10.20 V = FALSE >= 10.00 s = True = Not Fault Active > 3,600.00 s = False = True for > 30.00 s > 3,600.00 s	8 seconds out of a 10 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met.then the diagnostic will FAIL. Otherwise it will PASS.			Signal b) Power Electronics Coolant Pump Enable Signal c) Power Electronics Coolant Pump Control Duty Cycle Command d) Power Electronics Coolant Pump DTCs P0CE9, P0CEB, P0CEC,P0CED, P1F44, P1F45, P19FA, P19FB All of the following conditions are met for: Any of the following conditions are met: a) High Voltage Battery Charge ON Signal b) High Voltage Battery Charge ON Signal Propulsion System Off Timer Propulsion System Off Time Signal Status DTCs P16FD, P16FE, P2610, P262B, P1683 Power Electronics Coolant Temperature Sensor DTCs P0CF0,	= False = True for > 20.00 s < 100.00 % = Not Fault Active > 3,600.00 s = False = True for > 20.00 s > 18,000.00 s = Not Fault Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					P0CF1	= Not Fault Active		
					Power Electronics Coolant Temperature Sensor DTC P0CEF	= Not Test Pass This Key On **AND** Not Test Fail This Key On		
					If Use Outside Air Temperature Sensor calibration is **TRUE**, then use the following condition:	= TRUE		
					Ambient Air Temperature Sensor DTCs P0071, P0072, P0073, P0074:	= Not Fault Active		
					Outside Air Temperature	>= -9,999.00		
					If Use Transmission Fluid Temperature Sensor calibration is **TRUE**, then use the following condition:	= TRUE		
					Transmission Fluid Temperature Sensor DTCs P0711, P0712, P0713:	= Not Fault Active		
					If Use Air Conditioning Refrigerant Pressure Sensor calibration is **TRUE**, then use the following condition:	= TRUE		
					Air Conditioning Refrigerant Pressure Sensor DTCs P0530, P0531,			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					P0532, P0533	= Not Fault Active		
					Compressor ON Signal	= False		
					Diagnostic Run Timer	< 20.00 s		
					If the following conditions are met, Diagnostic Run Timer will start			
					If Diagnostics Enable During Run Crank Active Or Charging calibration is **TRUE**, then use the following conditions:	= TRUE		
					Any of the following conditions are met:			
					a) Run Crank Active	= True		
					b) Propulsion System Active	= True		
					c) High Voltage Battery Charge ON Signal	= True		
					If Diagnostics Enable During Run Crank Active Or Charging calibration is **FALSE**, then use following condition:	= TRUE		
					Any of the following conditions are met:			
					a) Run Crank Active	= True		
					b) Propulsion System			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Active	= True		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Electronics Coolant Temperature Sensor Circuit Low	P0CF0	This diagnostic detects if the temperature sensor has a out of range low circuit fault. If the enable criteria are met and the temperature sensor voltage read is below a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met.	Power Electronics Temperature Sensor Voltage	< 4.00 % (0.20 V) of reference voltage	Main Diagnostics calibration is **TRUE** 12V System Voltage If Use Run/Crank Active calibration is **TRUE**, then use the following conditions: All of the following conditions are met for: a) Run/Crank Active Signal b) Ignition Switch Run/ Start Position DTCs P2534, P2535:	= TRUE > 10.20 V = FALSE >= 10.00 s = True = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Electronics Coolant Temperature Sensor Circuit High	P0CF1	This diagnostic detects if the temperature sensor has a out of range high circuit fault. If the enable criteria are met and the temperature sensor voltage read is above a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met.	Power Electronics Temperature Sensor Voltage Sensor voltage	> 98.00 % (4.90 V) of reference voltage	Main Diagnostics calibration is **TRUE** 12V System Voltage If Use Run/Crank Active calibration is **TRUE**, then use the following conditions: All of the following conditions are met for: a) Run/Crank Active Signal b) Ignition Switch Run/ Start Position DTCs P2534, P2535	= TRUE > 10.20 V = FALSE >= 10.00 s = True = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Electronics Coolant Temperature Sensor Circuit Intermittent/ Erratic	P0CF2	This diagnostic detects if the temperature sensor circuit has an erratic circuit fault. The string length is the addition of the absolute difference between consecutive readings for a calibrated number of samples. If the string length is greater than the calibrated fail threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met.	Power Electronics Coolant Temperature String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = Absolute difference between present Power Electronics Coolant Temperature Sensor reading and previous Power Electronics Coolant Temperature Sensor reading	> 90.00 °C 4.00 consecutive temperature sensor samples at 250ms	Main Diagnostics calibration is **TRUE** 12V System Voltage If Use Run/Crank Active calibration is **TRUE**, then use the following conditions: All of the following conditions are met for: a) Run/Crank Active Signal b) Ignition Switch Run/ Start Position DTCs P2534, P2535 Power Electronics Coolant Temperature Sensor Mask	= TRUE > 10.20 V = FALSE >= 10.00 s = True = Not Fault Active = True	1 seconds out of a 1.25 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
A/C Compressor Motor Voltage Sensor Performance	P0D69	The purpose of the Compressor Voltage Sensor performance diagnostic is to detect and report a failure of the sensor when rationalized with Vehicle High Voltage Battery Voltage sensor. If the enable conditions are met and the voltage difference of the compared sensors is greater than the calibrated threshold, the fail counter will be incremented. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL, and if not it will report a PASS.	Absolute difference between High Voltage Battery Cell Voltage and Compressor Sensed Input Voltage* * Compressor Sensed Input Voltage is transmitted by the compressor over HS GMLAN bus to the Host controller	> 30.00 V	Main Diagnostic Enable calibration is **TRUE**	= TRUE	8 seconds out of a 10 seconds window	Type B, 2 Trips
					Compressor Sensor Signal Message Counter Incorrect DTC P15CA	= Not Fault Active		
					Compressor Voltage Sensor Circuit DTCs P0D6A, P0D6B	= Not Fault Active		
					High Voltage Battery DTCs P0ABB, P0ABC, P0ABD, (U0111 AND U185A)	= Not Fault Active		
					High Voltage Contactor DTCs P3061, P0C78, P0AD9, P0AA4, P0D5E, P1EC3	= Not Fault Active		
					High Voltage Positive, Negative and Charging Contactors for time	= Closed >= 1.00 s		
					All of the following conditions are met for:	>= 1.00 s		
					12V System Voltage	> 10.20 V		
					Compressor Loss of Comm DTC U016B	= Not Fault Active		
					Any of the following conditions are met:			
					Condition 1: Accessory On Signal	= True		
					Condition 2:			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					All of the following conditions are met: a) Run Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	 = True = Not Fault Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
A/C Compressor Motor Voltage Sensor Circuit High	P0D6A	This diagnostic detects if the Compressor HV Voltage sensor has an out of range high circuit fault. If the enable conditions are met and compressor has detected an instantaneous out of range high fault on the sensor, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Compressor High Voltage Input Voltage Value* * AC Compressor evaluates the malfunction criterion and transmits an instantaneous fault indication signal over the serial GMLAN bus	> 527.25 V	Main Diagnostic Enable calibration is **TRUE**	= TRUE	4 seconds out of a 5 seconds window	Type B, 2 Trips
					Compressor Sensor Status Message Counter Incorrect DTC P15CB	= Not Fault Active		
					All of the following conditions are met for:	>= 1.00 s		
					12V System Voltage	> 10.20 V		
					Compressor Loss of Comm DTC U016B	= Not Fault Active		
					Any of the following conditions are met:			
					Condition 1: Accessory On Signal	= True		
					Condition 2: All of the following conditions are met:			
					a) Run Crank Active Signal	= True		
					b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= Not Fault Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
A/C Compressor Motor Voltage Sensor Circuit Low	P0D6B	This diagnostic detects if the Compressor HV Voltage sensor has a out of range low circuit fault. If the enable conditions are met and compressor has detected an instantaneous out of range low fault on the sensor, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Compressor High Voltage Input Voltage Value* * AC Compressor evaluates the malfunction criterion and transmits an instantaneous fault indication signal over the serial GMLAN bus	< 27.75 V	Main Diagnostic Enable calibration is **TRUE** Compressor Sensor Status Message Counter Incorrect DTC P15CB High Voltage Positive, Negative and Charging Contactors for time High Voltage Contactor DTCs P3061, P0C78, P0AD9, P0AA4, P0D5E, P1EC3 All of the following conditions are met for: 12V System Voltage Compressor Loss of Comm DTC U016B Any of the following conditions are met: Condition 1: Accessory On Signal Condition 2: All of the following conditions are met: a) Run Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= TRUE = Not Fault Active = Closed > 1.00 sec = Not Fault Active >= 1.00 s > 10.20 V = Not Fault Active = True = True = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Electric A/C Compressor Control Module Internal Temperature Sensor Performance	P0D71	The purpose of the rationality diagnostic is to detect and report a failure or offset of the Compressor CPU Temperature Sensor when rationalized with other temperature sensors. This diagnostic will run after the compressor soak conditions are met. If the enable conditions are met and if the temperature difference of the compared sensors is greater than their calibrated thresholds, the fail counter will be incremented. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS	If Enable CPU-IGBT Comparison Calibration is **TRUE**, then use the condition: Absolute difference between Compressor CPU Temperature Sensor reading and Compressor IGBT Temperature Sensor reading* If Enable CPU-OAT Comparison Calibration is **TRUE**, then use the condition: Absolute difference between Compressor CPU Temperature Sensor reading and Ambient Air Temperature Sensor reading If Enable CPU-IAT Comparison Calibration is **TRUE**, then use the condition: Absolute difference between Compressor CPU Temperature Sensor reading and Intake Air Temperature Sensor reading	= TRUE > 22.00 °C = TRUE > 22.00 °C = FALSE > 9,999.00 °C	Main Diagnostic Enable calibration is **TRUE** Compressor Sensor Signal Message Counter Incorrect DTC P15CA Compressor Speed Feedback Control Module Internal Performance DTC P0606 Time since Compressor motor last ran Compressor CPU Temp Sensor circuit DTCs P0D72, P0D73, P0D74 If OAT Enablement Override Calibration is **FALSE**, then use the following conditions: Ambient Air Temperature Filtered OAT Corrected Status* If Engine Heat Override Calibration is **FALSE**, then use the following conditions: Absolute difference between Engine Coolant Temperature and Ambient Air Temperature Filtered	= TRUE = Not Fault Active <= 0.00 RPM = Not Fault Active > 7,200.00 s = Not Fault Active = FALSE > -7.00 °C = Valid = TRUE < 9,999.00	8 seconds out of a 10 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			If Enable CPU-HSRP Temp Comparison Calibration is **TRUE**, then use the condition:	= FALSE	Engine Coolant Temp Sensor DTCs P0115, P0116, P0117, P0118, P0119	= Not Fault Active		
			Absolute difference between Compressor CPU Temperature Sensor reading and HSRP converted to Temperature	> 9,999.00 °C	OAT Corrected Status*	= Valid		
					*See Freeform section "OAT Corrected Status"			
			* Compressor CPU Temperature Sensor reading and Compressor IGBT Temperature Sensor reading are transmitted by the compressor over HS GMLAN bus to the Host controller		If Enable CPU-IGBT Comparison Calibration is **TRUE**, then use the following condition:	= TRUE		
					IGBT Temperature Sensor Circuit DTCs P0D77, P0D78, P0D79	= No Fault Active		
					If Enable CPU-OAT Comparison Calibration is **TRUE**, then use the condition:	= TRUE		
					OAT Emission Status**	= Valid		
					**See Freeform section "OAT Emission Status"			
					If Enable CPU-IAT Comparison Calibration is **TRUE**, then use the condition:	= FALSE		
					Intake Air Temperature sensor			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					DTCs P0110, P0111, P0112, P0113, P0114	= Not Fault Active		
					If Enable CPU-HSRP Temp Comparison Calibration is **TRUE**, then use the condition:	= FALSE		
					HSRP sensor DTCs P0532, P0533	= Not Fault Active		
					All of the following conditions are met for:	>= 1.00 s		
					12V System Voltage	> 10.20 V		
					Compressor Loss of Comm DTC U016B	= Not Fault Active		
					Any of the following conditions are met:			
					Condition 1: Accessory On Signal	= True		
					Condition 2: All of the following conditions are met:			
					a) Run Crank Active Signal	= True		
					b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= Not Fault Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Electric A/C Compressor Control Module Internal Temperature Sensor Circuit High	P0D72	This diagnostic detects if the Compressor CPU temperature sensor has an out of range high circuit fault. If the enable conditions are met and compressor has detected an instantaneous out of range high fault on the sensor, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Compressor CPU Temperature Sensor Value* * AC Compressor evaluates the malfunction criterion and transmits an instantaneous fault indication signal over serial GMLAN bus	< -40 degC	Main Diagnostic Enable calibration is **TRUE** Compressor Sensor Status Message Counter Incorrect DTC P15CB All of the following conditions are met for: 12V System Voltage Compressor Loss of Comm DTC U016B Any of the following conditions are met: Condition 1: Accessory On Signal Condition 2: All of the following conditions are met: a) Run Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= TRUE = Not Fault Active >= 1.00 s > 10.20 V = Not Fault Active = True = True = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Electric A/C Compressor Control Module Internal Temperature Sensor Circuit Low	P0D73	This diagnostic detects if the Compressor CPU Temperature sensor has a out of range low circuit fault. If the enable conditions are met and compressor has detected an instantaneous out of range low fault on the sensor, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Compressor CPU Temperature Sensor Value* * AC Compressor evaluates the malfunction criterion and transmits an instantaneous fault indication signal over serial GMLAN bus	> 150 degC	Main Diagnostic Enable calibration is **TRUE** Compressor Sensor Status Message Counter Incorrect DTC P15CB All of the following conditions are met for: 12V System Voltage Compressor Loss of Comm DTC U016B Any of the following conditions are met: Condition 1: Accessory On Signal Condition 2: All of the following conditions are met: a) Run Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= TRUE = Not Fault Active >= 1.00 s > 10.20 V = Not Fault Active = True = True = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Electric A/C Compressor Control Module Output Driver Temperature Sensor Performance	P0D76	The purpose of the rationality diagnostic is to detect and report a failure of the Compressor IGBT Temperature Sensor when rationalized with other temperature sensors. This diagnostic will run after the compressor soak conditions are met. If the enable conditions are met and if the temperature difference of the compared sensors is greater than their calibrated thresholds, the fail counter will be incremented. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS	If Enable IGBT-CPU Comparison Calibration is **TRUE**, then use the condition: Absolute difference between Compressor IGBT Temperature Sensor reading and Compressor CPU Temperature Sensor reading* If Enable IGBT-OAT Comparison Calibration is **TRUE**, then use the condition: Absolute difference between Compressor IGBT Temperature Sensor reading and Ambient Air Temperature Sensor reading If Enable IGBT-IAT Comparison Calibration is **TRUE**, then use the condition: Absolute difference between Compressor IGBT Temperature Sensor reading and Intake Air Temperature Sensor reading	= TRUE > 22.00 °C = TRUE > 22.00 °C = FALSE > 9,999.00 °C	Main Diagnostic Enable calibration is **TRUE** Compressor Sensor Signal Message Counter Incorrect DTC P15CA Compressor Speed Feedback Control Module Internal Performance DTC P0606 Time since Compressor motor last ran Compressor IGBT Temp Sensor circuit DTCs P0D77, P0D78, P0D79 If OAT Enablement Override Calibration is **FALSE**, then use the following conditions: Ambient Air Temperature Filtered OAT Corrected Status* Engine Heat Override Calibration is **FALSE**, then use the following conditions: Absolute difference between Engine Coolant Temperature and Ambient Air Temperature Filtered	= TRUE = Not Fault Active <= 0.00 RPM = Not Fault Active > 7,200.00 s = Not Fault Active = FALSE > -7.00 °C = Valid = TRUE < 9,999.00	8 seconds out of a 10 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			If Enable IGBT-HSRP Temp Comparison Calibration is **TRUE**, then use the condition: Absolute difference between Compressor IGBT Temperature Sensor reading and HSRP converted to Temperature * Compressor CPU Temperature Sensor reading and Compressor IGBT Temperature Sensor reading is transmitted by the compressor over HS GMLAN bus to the Host controller Note: All used sensor comparisons must fail at the same time for the diagnostic to start incrementing the fail counter	= FALSE > 9,999.00 °C	Engine Coolant Temp Sensor DTCs P0115, P0116, P0117, P0118, P0119: OAT Corrected Status* *See Freeform section "OAT Corrected Status" If Enable IGBT-CPU Comparison Calibration is **TRUE**, then use the condition: CPU Temperature Sensor Circuit DTCs P0D72, P0D73, P0D74 If Enable IGBT-OAT Comparison Calibration is **TRUE**, then use the condition: OAT Emission Status** **See Freeform section "OAT Emission Status" If Enable IGBT-IAT Comparison Calibration is **TRUE**, then use the condition: Intake Air Temperature sensor	= Not Fault Active = Valid = TRUE = No Fault Active = TRUE = Valid = FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					DTCs P0110, P0111, P0112, P0113, P0114	= Not Fault Active		
					If Enable IGBT-HSRP Temp Comparison Calibration is **TRUE**, then use the condition:	= FALSE		
					HSRP sensor DTCs P0532, P0533	= Not Fault Active		
					All of the following conditions are met for:	>= 1.00 s		
					12V System Voltage	> 10.20 V		
					Compressor Loss of Comm DTC U016B	= Not Fault Active		
					Any of the following conditions are met:			
					Condition 1: Accessory On Signal	= True		
					Condition 2: All of the following conditions are met:			
					a) Run Crank Active Signal	= True		
					b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= Not Fault Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Electric A/C Compressor Control Module Output Driver Temperature Sensor Circuit High	P0D77	This diagnostic detects if the Compressor IGBT temperature sensor has a out of range high circuit fault. If the enable conditions are met and compressor has detected an instantaneous out of range high fault on the sensor, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Compressor IGBT Temperature Sensor Value* * AC Compressor evaluates the malfunction criterion and transmits an instantaneous fault indication signal over serial GMLAN bus	< -40 degC	Main Diagnostic Enable calibration is **TRUE** Compressor Sensor Status Message Counter Incorrect DTC P15CB All of the following conditions are met for: 12V System Voltage Compressor Loss of Comm DTC U016B Any of the following conditions are met: Condition 1: Accessory On Signal Condition 2: All of the following conditions are met: a) Run Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= TRUE = Not Fault Active >= 1.00 s > 10.20 V = Not Fault Active = True = True = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Electric A/C Compressor Control Module Output Driver Temperature Sensor Circuit Low	P0D78	This diagnostic detects if the Compressor IGBT temperature sensor has a out of range low circuit fault. If the enable conditions are met and compressor has detected an instantaneous out of range low fault on the sensor, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Compressor IGBT Temperature Sensor Value* * AC Compressor evaluates the malfunction criterion and transmits an instantaneous fault indication signal over serial GMLAN bus	> 150 degC	Main Diagnostic Enable calibration is **TRUE** Compressor Sensor Status Message Counter Incorrect DTC P15CB All of the following conditions are met for: 12V System Voltage Compressor Loss of Comm DTC U016B Any of the following conditions are met: Condition 1: Accessory On Signal Condition 2: All of the following conditions are met: a) Run Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= TRUE = Not Fault Active >= 1.00 s > 10.20 V = Not Fault Active = True = True = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Bypass Valve A Secondary Command Signals Message Counter Incorrect	P10BF	This diagnostic detects if the Engine Coolant Bypass Valve Command data transmitted from ECM to HPC2 is not being updated. The Alive Rolling Count value will be updated in a sequence of (0, 1, 2, 3, 0, 1…) with each message transmission. If the enable criteria are met and the received ARC value is different than expected, the fail counter will increment. If the calibrated fail counts threshold is met before the calibrated sample counts, the diagnostic will report a FAIL and if not it will report a PASS. This diagnostic will continue to report as long as the enablement criteria are met.	Serial Communication message $3FA: Heater Valve Alive Rolling Count	Not equal to Mod4 (Previous Heater Valve Alive Rolling Count +1)	Main Diagnostic Enable calibration is **TRUE** 12V System Voltage Engine Coolant Bypass Valve A Secondary Command Signal Message Received Event If Accessory Run/Crank Override calibration is **FALSE**, then use any of the following conditions: Accessory On Signal All of the following conditions are met: a) Run/Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= TRUE > 10.20 V = TRUE = TRUE = TRUE = TRUE = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission (EVAP) System Pressure Incorrect During Fuel Fill Door Open Request	P1461	Detects incorrect EVAP System pressure during a Fuel Fill Door Open Request	The Fuel Tank Vapor Pressure does NOT fall within a pressure range	Fuel Tank Vapor Pressure >= 0.623 Kpa OR Fuel Tank Vapor Pressure < -0.623 Kpa	Evaporative Emission (EVAP) System Pressure Incorrect During Fuel Fill Door Open Request Diagnostic Enable Calibration A request to refuel the vehicle has been detected	= TRUE =TRUE	120.00 sec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan Signal Circuit Performance	P148A	The purpose of the performance diagnostic is to detect and report an in-range failure of the cooling fan PWM signal input circuitry. If the enable conditions are met, the diagnostic will monitor the difference between cooling fan hard wire duty cycle speed to the cooling fan CAN bus duty cycle speed and the difference between the input cooling fan pulse width modulation time period to an expected cooling fan time period set calibration. When the difference exceeds one of the calibrated fault thresholds, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Any of the following conditions is met:		Main Diagnostic Enable calibration is **TRUE**	= TRUE	8 seconds out of a 10 seconds window	Type B, 2 Trips
					12V System Voltage	> 10.20 V		
					Any of the following conditions is met:			
			Absolute difference between Hardware Front End Cooling Fan Duty Cycle and GMLAN Front End Cooling Fan Duty Cycle	>= 30.00 %	Run/Crank Active Signal	= FALSE		
					Accessory On Signal	= TRUE		
					Lost Communication With Hybrid Powertrain Control Module DTC U0293	= Not Fault Active		
			Absolute difference between Hardware Front End Cooling Fan Time Period and Expected Front End Cooling Fan Time Period (10.00 ms)	> 0.20000 ms	Cooling Fan Signal Circuit DTCs P148B, P148C	= Not Fault Active		
					Control Module Power Off Timer Performance DTC P262B	= Not Fault Active		
					Any of the following conditions is met for	>= 43.00 s		
					Propulsion System Active Signal	= TRUE		
					All of the following conditions are met:			
					a) Propulsion System Active Signal	= FALSE		
					b) Energy Storage System Thermal Condition Request	= Active Cooling		
					c) Engine Cooling Fan			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Operation Enable	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan Signal Circuit Low	P148B	This diagnostic detects if the cooling fan PWM signal input has an out of range low circuit fault. If the enable conditions are met and the duty cycle read is below a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Hardware Front End Cooling Fan Duty Cycle	< 3.00 %	Main Diagnostic Enable calibration is **TRUE** 12V System Voltage	= TRUE > 10.20 V	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan Signal Circuit High	P148C	This diagnostic detects if the cooling fan PWM signal input has an out of range high circuit fault. If the enable conditions are met and the duty cycle read is above a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Hardware Front End Cooling Fan Duty Cycle	> 97.00 %	Main Diagnostic Enable calibration is **TRUE**	= TRUE	4 seconds out of a 5 seconds window	Type B, 2 Trips
					12V System Voltage	> 10.20 V		
					Control Module Power Off Timer Performance DTC P262B	= Not Fault Active		
					Any of the following conditions is met for	>= 43.00 s		
					Propulsion System Active Signal	= TRUE		
					All of the following conditions are met:			
					a) Propulsion System Active Signal	= FALSE		
					b) Energy Storage System Thermal Condition Request	= Active Cooling		
					c) Engine Cooling Fan Operation Enable	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Air Conditioning Refrigerant Pressure Sensor B Rationality	P151C	The purpose of the rationality diagnostic is to detect and report a failure of the low side refrigerant pressure (LSRP) sensor when rationalized with the high side refrigerant pressure (HSRP) sensor. This diagnostic will run after the soak conditions are met. If the enable conditions are met and if the pressure difference of the compared sensor is greater than the calibrated threshold, the fail counter will be incremented. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS.	Absolute difference between Low Side Refrigerant Pressure and High Side Refrigerant Pressure	> 200.0 kpa	Main Diagnostic Enable calibration is **TRUE**	= TRUE	8 seconds out of a 10 seconds window	Type B, 2 Trips
					12V System Voltage	> 10.2 V		
					Air Conditioning Refrigerant Pressure Sensor B Circuit DTCs P2517, P2518	= Not Fault Active		
					Air Conditioning Regrigerant Perssure Sensor Circuit DTCs P0533, P0532	= Not Fault Active		
					Ambient Air Temperature Sensor DTCs P0074, P0073, P0072, P0071	= Not Fault Active		
					Control Module Internal Performance DTC P0606	= Not Fault Active		
					Any of the following conditions are met:			
					Accessory On Signal	= True		
					Run Crank Active Signal	= False		
					OAT Emission Status*	= Valid		
					*See Freeform section "OAT Emission Status"			
					Compressor Running Flag	= False		
					High Side Refrigerant Pressure	0.0 kPa < HSRP < 675.0 kPa		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Compressor Off Time	> 3,600 s		
					Outside Air Temperature Raw	-9,999.00 deg C < OAT Raw < 9,999.00 deg C		
					If Override IAT_ECT Sensor Calibration is **FALSE**, then use the following conditions:	= TRUE		
					Engine coolant temperature sensor DTCs P0119, P0118, P0117, P0116	= Not Fault Active		
					Absolute difference between Engine Coolant Temperature and Outside Air Temperature Filtered	> 9,999.00 deg C		
					OAT Corrected Status**	= Valid		
					**See Freeform section "OAT Corrected Status"			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Electric A/C Compressor Motor Input Current - Positive Contactor State Not Plausible	P154F	The purpose of the rationality diagnostic is to detect and report a failure of the Compressor Current Sensor when the feedback current value transmitted by the compressor is not correct for its operating conditions. If the enable conditions are met and if the current sensor reading is outside the calibrated threshold for the given operating condition, the fail counter will be incremented. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS	**Case 1** - HV Battery Contactors Open (Motor Not spinning) Compressor Electrical Current* *Measured and Reported by the compressor over serial GMLAN bus	< -1.00 A OR > 1.00 A	Main Diagnostic Enable calibration is **TRUE**	= TRUE	8 seconds out of a 10 seconds window	Type B, 2 Trips
					Compressor Sensor Signal Message Counter Incorrect DTC P15CA	= Not Fault Active		
					Compressor Sensor DTCs P1F0C, P1F0D, P0D69, P0D6A, P0D6B, P15CA, P1F0A	= Not Fault Active		
					HSRP Sensor DTCs P0532, P0533	= Not Fault Active		
					High Voltage Contactor DTCs P3061, P0C78, P0AD9, P0AA4, P0D5E, P1EC3	= Not Fault Active		
					High Voltage Positive, Negative and Charge Contactors for time	= Open > 1.00 s		
					All of the following conditions are met for:	>= 1.00 s		
					12V System Voltage	> 10.20 V		
					Compressor Loss of Comm DTC U016B	= Not Fault Active		
					Any of the following conditions are met:			
					Condition 1: Accessory On Signal	= True		
					Condition 2: All of the following conditions are met:			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					a) Run Crank Active Signal	= True		
					b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= Not Fault Active		
			Case 2 - HV Battery Contactors Closed and Compressor Motor Commanded OFF (0 RPM Speed Requested)		Main Diagnostic Enable calibration is **TRUE**	= TRUE	8 seconds out of a 10 seconds window	
					Compressor Sensor Signal Message Counter Incorrect DTC P15CA	= Not Fault Active		
			Compressor Electrical Current*	< -1.00 A OR > 1.00 A	Compressor Sensor DTCs P1F0C, P1F0D, P0D69, P0D6A, P0D6B, P15CA, P1F0A	= Not Fault Active		
			*Measured and Reported by the compressor over serial GMLAN bus		HSRP Sensor DTCs P0532, P0533	= Not Fault Active		
					High Voltage Contactor DTCs P3061, P0C78, P0AD9, P0AA4, P0D5E, P1EC3	= Not Fault Active		
					Any of the following conditions are met:			
					Compressor Speed Feedback	< 60.00 RPM		
					Climate Control HV Device Shutdown Command	= True		
					High Voltage Positive, Negative and Charge Contactors for time	= Closed > 1.00 s		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					All of the following conditions are met for:	>= 1.00 s		
					12V System Voltage	> 10.20 V		
					Compressor Loss of Comm DTC U016B	= Not Fault Active		
					Any of the following conditions are met:			
					Condition 1: Accessory On Signal	= True		
					Condition 2: All of the following conditions are met:			
					a) Run Crank Active Signal	= True		
					b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= Not Fault Active		
			Case 3 - HV Battery Contactors Closed and Compressor Commanded ON (Motor Spinning)		Main Diagnostic Enable calibration is **TRUE**	= TRUE	8 seconds out of a 10 seconds window	
					Compressor Sensor Signal Message Counter Incorrect DTC P15CA	= Not Fault Active		
			Compressor Electrical Current*	< 0.20 A OR > 27.00 A	Compressor Sensor DTCs P1F0C, P1F0D, P0D69, P0D6A, P0D6B, P15CA, P1F0A	= Not Fault Active		
			*Measured and Reported by the compressor over serial GMLAN bus		HSRP Sensor DTCs P0532, P0533	= Not Fault Active		
					High Voltage Contactor			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					DTCs P3061, P0C78, P0AD9, P0AA4, P0D5E, P1EC3	= Not Fault Active		
					High Side Refrigerant Pressure	200.00 kPa to 2,300.00 kPa		
					HV Battery Voltage	300.00 V to 410.00 V		
					Compressor Speed Feedback	1,000.00 RPM to 8,600.00 RPM		
					High Voltage Positive, Negative and Charge Contactors	= Closed		
					for time	> 1.00 s		
					All of the following conditions are met for:	>= 1.00 s		
					12V System Voltage	> 10.20 V		
					Compressor Loss of Comm DTC U016B	= Not Fault Active		
					Any of the following conditions are met:			
					Condition 1: Accessory On Signal	= True		
					Condition 2: All of the following conditions are met:			
					a) Run Crank Active Signal	= True		
					b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= Not Fault Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
A/C Compressor Control Module Ignition Switch Run/ Start Position Circuit Low	P15B9	This diagnostic detects if the hardwired Run/ Crank wakeup circuit to the Compressor is stuck Low. If the enable conditions are met and the instantaneous Run/ Crank hardwire status reported by the compressor does not match the Host Controller's internal status of the Run/Crank terminal, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Compressor Run Crank Hardwire Signal status* *Reported by the AC Compressor over HS GMLAN serial interface	= False	Main Diagnostic Enable calibration is **TRUE** All of the following conditions are met for: 12V System Voltage Compressor Loss of Comm DTC U016B Run Crank Active Signal Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535 Compressor Signal Message Counter Incorrect DTC P15C8	= TRUE > 2.00 sec > 10.20 V = Not Fault Active = True = Not Fault Active = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
A/C Compressor Control Module Ignition Switch Run/ Start Position Circuit High	P15BA	This diagnostic detects if the hard wired Run/ Crank wakeup circuit to the Compressor is stuck High. If the enable conditions are met and the Run/Crank hardwire instantaneous status reported by the compressor does not match the Host Controller's internal status of the Run/Crank terminal, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Compressor Run Crank Hardwire Signal status* *Reported by the AC Compressor over HS GMLAN serial interface	= True	Main Diagnostic Enable calibration is **TRUE** All of the following conditions are met for: 12V System Voltage Compressor Loss of Comm DTC U016B Run Crank Active Signal Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535 Accessory On Signal Compressor Signal Message Counter Incorrect DTC P15C8	= TRUE > 2.00 sec > 10.20 V = Not Fault Active = False = Not Fault Active = True = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Bypass Valve A Position Sensor Circuit Range/ Performance - Unexpected Position Change Detected (LIN Device)	P15C5	This diagnostic detects if the valve position feedback has drifted out of park position during controller sleep when the valve should not be moving. Once HPC2 wakes up, this diagnostic will monitor the valve feedback status during the first commanded movement for a calibrated amount of time. If the valve encounters any under travel, over travel, unexpected movements or any internal faults, the diagnostic will report a FAIL immediately upon detection. If there are no failures indicated during this evaluation time, the diagnostic will report a PASS. If the enable criteria are no longer met during the evaluation time, this diagnostic will be disabled.	Valve Position Feedback Status* * A faulted valve will set feedback status to Not Initialized. If a faulted valve is commanded to move, the feedback status will set to Indeterminate. Faults include under travel, over travel, unexpected movements, position sensor circuit faults, motor coil faults, broken gears/shaft and loss of power.	= Not Initialized OR = Indeterminate	Main Diagnostic Enable calibration is **TRUE** 12V System Voltage Lost Communication DTCs U1346, U0615, U1818 Engine Coolant Bypass Valve A Command Signals Message Counter Incorrect DTC P1008 Valve Move Enable Command Signal If Use Valve ARC calibration is **TRUE**, then use the following condition: Engine Coolant Bypass Valve A Secondary Command Signals Message Counter Incorrect DTC P10BF If Accessory On Override calibration is **FALSE**, then use the following condition: Accessory On Signal If Propulsion System Active Override calibration is **FALSE**, then use the following conditions:	= TRUE > 10.20 V = Not Fault Active = Not Fault Active = TRUE = TRUE = Not Fault Active = TRUE = TRUE = TRUE	<= 10.70 s	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Propulsion System Active Signal	= TRUE		
					Control Module Power Off Timer Performance DTC P262B	= Not Fault Active		
					If Valve Use Move Enable Transition calibration is **TRUE**, then use the following condition:	= FALSE		
					Valve Move Enable Command Signal	Transitions to TRUE		
					If Valve Use Move Enable Transition calibration is **FALSE**, then use the following conditions:	= FALSE		
					Condition 1	Transitions to TRUE		
					Where Condition 1: a) Valve Move Enable Command Signal	= TRUE		
					b) Valve Torque Boost Command Signal	= Nominal Torque Set		
					c) Valve Position Command Signal	<= 0.00 % OR >= 100.00 %		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Electric A/C Compressor Signal Message Counter Incorrect	P15C8	This diagnostic detects when the Compressor Data Packet Alive Rolling Count serial data signal received by the host controller from the compressor is not being updated. Each GMLAN message transmitted by the compressor contains an incrementing counter value (0, 1, 2, 3, 0..) known as Alive Rolling Count. Host Controller performs instantaneous evaluation on each received message to check that the rolling counts are incrementing in sequence. If an error is determined, the instantaneous fail counter is incremented. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Serial Communication message $22E: Compressor Data Packet Alive Rollling Count index value* * Alive Rolling Count value is transmitted by the compressor and the malfunction criterion is evaluated by the host controller	Not Equal to Mod4 (Previous Message Rolling Count value +1)	Main Diagnostic Enable calibration is **TRUE** Alive Rolling Count Check Enable calibration is **TRUE** All of the following conditions are met for: 12V System Voltage Compressor Loss of Comm DTC U016B Any of the following conditions are met: Condition 1: Accessory On Signal Condition 2: All of the following conditions are met: a) Run Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= TRUE = TRUE >= 1.00 s > 10.20 V = Not Fault Active = True = True = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Electric A/C Compressor Status Message Counter Incorrect	P15C9	This diagnostic detects when the Compressor Device State Packet Alive Rolling Count serial data signal received by the host controller from the compressor is not being updated. Each GMLAN message transmitted by the compressor contains an incrementing counter value (0, 1, 2, 3, 0..) known as Alive Rolling Count. Host Controller performs instantaneous evaluation on each received message to check that the rolling counts are incrementing in sequence. If an error is determined, the instantaneous fail counter is incremented. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Serial Communication message $22E: Compressor Device State Packet Alive Rollling Count index value * Alive Rolling Count value is transmitted by the compressor and the malfunction criterion is evaluated by the host controller	Not Equal to Mod4 (Previous Message Rolling Count value +1)	Main Diagnostic Enable calibration is **TRUE** Alive Rolling Count Check Enable calibration is **TRUE** All of the following conditions are met for: 12V System Voltage Compressor Loss of Comm DTC U016B Any of the following conditions are met: Condition 1: Accessory On Signal Condition 2: All of the following conditions are met: a) Run Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= TRUE = TRUE >= 1.00 s > 10.20 V = Not Fault Active = True = True = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Electric A/C Compressor Sensor Signal Message Counter Incorrect	P15CA	This diagnostic detects when the Compressor Sensor Data Packet Alive Rolling Count serial data signal received by the host controller from the compressor is not being updated. Each GMLAN message transmitted by the compressor contains an incrementing counter value (0, 1, 2, 3, 0..) known as Alive Rolling Count. Host Controller performs instantaneous evaluation on each received message to check that the rolling counts are incrementing in sequence. If an error is determined, the instantaneous fail counter is incremented. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Serial Communication message $222: Compressor Sensor Data Packet Alive Rollling Count index value * Alive Rolling Count value is transmitted by the compressor and the malfunction criterion is evaluated by the host controller	Not Equal to Mod4 (Previous Message Rolling Count value +1)	Main Diagnostic Enable calibration is **TRUE** Alive Rolling Count Check Enable calibration is **TRUE** All of the following conditions are met for: 12V System Voltage Compressor Loss of Comm DTC U016B Any of the following conditions are met: Condition 1: Accessory On Signal Condition 2: All of the following conditions are met: a) Run Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= TRUE = TRUE >= 1.00 s > 10.20 V = Not Fault Active = True = True = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Electric A/C Compressor Sensor Status Message Counter Incorrect	P15CB	This diagnostic detects when the Compressor Sensor State Packet Alive Rolling Count serial data signal received by the host controller from the compressor is not being updated. Each GMLAN message transmitted by the compressor contains an incrementing counter value (0, 1, 2, 3, 0..) known as Alive Rolling Count. Host Controller performs instantaneous evaluation on each received message to check that the rolling counts are incrementing in sequence. If an error is determined, the instantaneous fail counter is incremented. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Serial Communication message $22E: Compressor Sensor State Packet Alive Rollling Count index value * Alive Rolling Count value is transmitted by the compressor and the malfunction criterion is evaluated by the host controller	Not Equal to Mod4 (Previous Message Rolling Count value +1)	Main Diagnostic Enable calibration is **TRUE** Alive Rolling Count Check Enable calibration is **TRUE** All of the following conditions are met for: 12V System Voltage Compressor Loss of Comm DTC U016B Any of the following conditions are met: Condition 1: Accessory On Signal Condition 2: All of the following conditions are met: a) Run Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= TRUE = TRUE >= 1.00 s > 10.20 V = Not Fault Active = True = True = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Fill Door Switch Wake-up Circuit Performance	P169D	Detects a circuit fault in the Fuel Fill Door Switch Wake-Up Circuit	Refuel Request Wake- up circuit state not equal to Refuel request Switch Postion State		Fuel Fill Door Switch Wake-up Circuit Performance Diagnostic Enable Calibration	= TRUE		Type B, 2 Trips
					No Active DTCs for the Open Request Sensor/ Switch Circuit	P04C8, P04CA, P04CB		
			Case 1: Fuel Fill Door Switch Wake-Up Circuit Active	=FALSE	Fuel Fill Door Open Switch Request	=TRUE	4.00 out of 4.00 samples @ 50ms per sample	
			Case 2: Fuel Fill Door Switch Wake-Up Circuit Active	=TRUE	Fuel Fill Door Open Switch Request	=FALSE	64.00 out of 80.00 samples @ 50ms per sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
A/C Compressor Control Module Wake-up Circuit Performance	P16B7	This diagnostic detects if the hardwired Accessory wakeup circuit to the Compressor is stuck Low. If the enable conditions are met and the Accessory hardwire instantaneous status reported by the compressor does not match the Host Controller's internal status of the Accessory terminal, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Compressor Accessory Wakeup Hardwire Signal status* *Reported by the AC Compressor over HS GMLAN bus interface	= False	Main Diagnostic Enable calibration is **TRUE** All of the following conditions are met for: 12V Battery Voltage Compressor Loss of Comm DTC U016B Accessory On Signal Compressor Signal Message Counter Incorrect DTC P15C8	= TRUE > 2.00 sec > 10.20 V = Not Fault Active = True = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
A/C Compressor Control Module Random Access Memory (RAM) Error	P16B8	The purpose of the RAM diagnostic is to detect and report a failure or error on RAM portion of the memory which is embedded inside the compressor's internal microcontroller chip. A Pattern Read/ Write error detection routine is performed by the compressor microcontroller at every boot-up. The Host Controller monitors the instantaneous status reported by the compressor. If the enable conditions are met and a RAM fault is detected, the diagnostic will report a FAIL, and if not, it will report a PASS.	RAM Read/Write Error State* *This RAM self-check routine is performed by compressor's internal microcontroller as part of the bootup sequence. Evaluated error state is transmitted by the compressor over GMLAN bus to the host controller	= Faulted	Main Diagnostic Enable calibration is **TRUE**	= TRUE	Instantaneously at Compressor Bootup Event	Type B, 2 Trips
					Compressor Status Message Counter Incorrect DTC P15C9	= Not Fault Active		
					All of the following conditions are met for:	>= 1.00 s		
					12V System Voltage	> 10.20 V		
					Compressor Loss of Comm DTC U016B	= Not Fault Active		
					Any of the following conditions are met:			
					Condition 1: Accessory On Signal	= True		
					Condition 2: All of the following conditions are met:			
					a) Run Crank Active Signal	= True		
					b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= Not Fault Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
A/C Compressor Control Module Read Only Memory (ROM) Error	P16B9	The purpose of the ROM diagnostic is to detect and report a failure or error on the Read-Only portion of the memory which is embedded inside the compressor's internal microcontroller chip. A Checksum error detection routine is performed by the compressor microcontroller at every boot-up. The Host Controller monitors the instantaneous status reported by the compressor. If the enable conditions are met and a ROM fault is detected, the diagnostic will report a FAIL, and if not, it will report a PASS.	ROM Checksum Error State* *This ROM Checksum routine is executed by compressor's internal microcontroller as part of the bootup sequence. Evaluated error state is transmitted by the compressor over GMLAN bus to the host controller	= Faulted	Main Diagnostic Enable calibration is **TRUE** Compressor Status Message Counter Incorrect DTC P15C9 All of the following conditions are met for: 12V System Voltage Compressor Loss of Comm DTC U016B Any of the following conditions are met: Condition 1: Accessory On Signal Condition 2: All of the following conditions are met: a) Run Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= TRUE = Not Fault Active >= 1.00 s > 10.20 V = Not Fault Active = True = True = Not Fault Active	Instantaneously at Compressor Bootup Event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
A/C Compressor Control Module Keep Alive Memory (KAM) Error	P16BA	The purpose of the KAM diagnostic is to detect and report a failure or error on the Electrically Erasable Programmable Read-Only Memory (EEPROM) Integrated Circuit component located on the compressor's internal circuit board. A Checksum error detection routine is performed by the compressor microcontroller at every boot-up. The Host Controller monitors the instantaneous status reported by the compressor. If the enable conditions are met and a ROM fault is detected, the diagnostic will report a FAIL, and if not, it will report a PASS.	EEPROM Checksum Error state* *This EEPROM Checksum routine is executed by compressor's internal microcontroller as part of the bootup sequence. Evaluated error state is transmitted by the compressor over GMLAN bus to the host controller	= Faulted	Main Diagnostic Enable calibration is **TRUE** Compressor Status Message Counter Incorrect DTC P15C9 All of the following conditions are met for: 12V System Voltage Compressor Loss of Comm DTC U016B Any of the following conditions are met: Condition 1: Accessory On Signal Condition 2: All of the following conditions are met: a) Run Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= TRUE = Not Fault Active >= 1.00 s > 10.20 V = Not Fault Active = True = True = Not Fault Active	Instantaneously at Compressor Bootup Event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Electronics Coolant Pump Feedback Circuit High Voltage	P19FA	This diagnostic detects if the feedback speed is out of range high. If the enable criteria are met and the feedback speed read is above a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met.	Power Electroncis Coolant Pump Feedback Frequency Power Electroncis Coolant Pump Feedback PWM Duty Cycle	750.00 Hz <= Frequency <= 999,999,961,690,316,000,000,000,000,000,000,000.00 Hz -9,999.00 % <= PWM Duty Cycle <= 9,999.00 %	All of the following conditions are met for: Main Diagnostics Enable calibration is **TRUE** 12V System Voltage If Use Run/Crank Active calibration is **TRUE**, then use following conditions: All of the following conditions are met for: a) Run/Crank Active Signal b) Ignition Switch Run/Start Position Circuit DTCs P2534, P2535 Power Electronics Coolant Pump Enable Power Electronics Coolant Pump Control PWM Duty Cycle Command	>= 3.00 s = TRUE > 10.20 V = FALSE >= -9,999.00 s = True = Not Fault Active = True 11.00 % <= PWM Duty Cycle <= 100.00 %	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Electronics Coolant Pump Feedback Circuit Low Voltage	P19FB	This diagnostic detects if the feedback speed is out of range low. If the enable criteria are met and the feedback speed read is below a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met.	Power Electroncis Coolant Pump Feedback Frequency Power Electroncis Coolant Pump Feedback PWM Duty Cycle	0.00 Hz <= Frequency <= 8.60 Hz -9,999.00 % <= PWM Duty Cycle <= 9,999.00 %	All of the following conditions are met for: Main Diagnostics Enable calibration is **TRUE** 12V System Voltage If Use Run/Crank Active calibration is **TRUE**, then use following conditions: All of the following conditions are met for: a) Run/Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535 Power Electronics Coolant Pump Enable Power Electronics Coolant Pump Control PWM Duty Cycle Command	>= 3.00 s = TRUE > 10.20 V = FALSE >= -9,999.00 s = True = Not Fault Active = True 11.00 % <= PWM Duty Cycle <= 100.00 %	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Electronics Coolant Pump Feedback Circuit Performance	P19FC	The purpose of the performance diagnostic is to detect and report a failure of the pump feedback circuit. If the enable criteria are met, the speed difference between the commanded speed to the pump feedback speed is calculated. For the pump actuated state (pump ON), the speed difference is filtered and when this filtered difference exceeds the calibrated fault threshold, the diagnostic reports a FAIL. If filtered speed difference does not exceed the calibrated fault threshold, the diagnostic reports a PASS. The diagnostic will continue to report as long as the enablement criteria are met. For the pump non-actuated state (pump OFF), if the feedback speed exceeds the calibrated fault threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the	Power electronics coolant pump in actuated state (pump on) If Power electronics coolant pump DTC P19FC is Not Fault Active, then use any of the following conditions: Filtered difference between Command Speed and Feedback speed Filtered difference between Command Speed and Feedback speed If Power electronics Coolant pump DTC P19FC is Fault Active, then use any of the following conditions: Filtered difference between Command Speed and Feedback speed Filtered difference between Command	< **P19FC PCOD Pump Feedback Fault Low Threshold** (RPM) > **P19FC PCOD Pump Feedback Fault High Threshold** (RPM) < **P19FC PCOD Pump Feedback Repass Low Threshold** (RPM)	Pump ON Diagnostics calibration is **TRUE** All of the following conditions are met for: 12V System Voltage If Use Run/Crank Active calibration is **TRUE**, then use following conditions: All of the following conditions are met for: a) Run/Crank Active Signal b) Ignition Switch Run/ Start Position DTCs P2534, P2535 Power Electronics Coolant Pump Enable Power Electronics Coolant Pump DTCs P0CE9, P0CEB, P0CEC,P0CED, P1F44, P1F45, P19FA, P19FB Power Electronics Coolant Pump Duty Cycle Command: Power Electronics Coolant Temperature Sensor DTCs P0CF0, P0CF1 If Do Not Use Power	= TRUE >= 5.00 s > 10.20 V = FALSE >= -9,999.00 s = True = Not Fault Active = True = Not Fault Active 11.00 % < Pulse Width Modulation Duty Cycle < 90.00 % = Not Fault Active	Continuous check every 250ms (Fail time up to 57s depending on the severity of the problem. Speed error of higher magnitude will cause the diagnostic to fail quicker)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met.	Speed and Feedback speed	> **P19FC PCOD Pump Feedback Repass High Threshold** (RPM) (See supporting tables for above threshold values)	Electronic Temperature Sensor calibration is **FALSE**, then use following conditions: All of the following conditions are met: a) Power Electronics Coolant Temperature b) Power Electronics Coolant Temperature Sensor DTCs P0CF0, P0CF1, P0CF2, P0CEF	= FALSE -20.00 °C < Temperature < 9,999.00 °C = Not Fault Active		
			Power electronics coolant pump in non-actuated state (pump off) Power Electronics Coolant Pump Speed Feedback	> 250.00 RPM	Pump OFF Diagnostics calibration is **TRUE** 12V System Voltage If Use Run/Crank Active calibration is **TRUE**, then use the following conditions: All of the following conditions are met for: a) Run/Crank Active Signal b) Ignition Switch Run/ Start Position DTCs P2534, P2535 Power Electronics Coolant Pump Enable If Disable Pump Off Diag	= TRUE > 10.20 V = FALSE >= -9,999.00 s = True = Not Fault Active = False for >= 10.00 s	8 seconds out of a 10 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					During Pump On Fail calibration is **TRUE**, then use the following condition:	= TRUE		
					Power Electronic Coolant Pump DTC P19FC	= Not Fault Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Pack Coolant Pump Feedback Circuit High Voltage	P19FD	This diagnostic detects if the feedback speed is out of range high. If the enable conditions are met and the feedback speed read is above a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	High Volatge Battery Coolant Pump Feedback Frequency High Volatge Battery Coolant Pump Feedback PWM Duty Cycle	750.00 Hz <= Pump Feedback Frequency <= 999,999,961,690,316, 000,000,000,000,000, 000,000.00 Hz -9,999.00 % <= PWM Duty Cycle <= 9,999.00 %	All of the following conditions are met for: Main Enable Calibration is **TRUE** 12V System Voltage High Volatge Battery Coolant Pump Enable High Volatge Battery Coolant Pump Control PWM Duty Cycle Command	>= 3.00 s = TRUE > 10.20 V = TRUE 11.00 % <= PWM Duty Cycle <= 100.00 %	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Pack Coolant Pump Feedback Circuit Low Voltage	P19FE	This diagnostic detects if the feedback speed is out of range low. If the enable conditions are met and the feedback speed read is below a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	High Volatge Battery Coolant Pump Feedback Frequency High Volatge Battery Coolant Pump Feedback PWM Duty Cycle	0.00 Hz <=Pump Feedback Frequency <= 8.60 Hz -9,999.00 % <= PWM Duty Cycle <= 9,999.00 %	All of the following conditions are met for Main Enable Calibration is **TRUE** 12V System Voltage High Volatge Battery Coolant Pump Enable High Volatge Battery Coolant Pump Control PWM Duty Cycle Command	> 3.00 s = TRUE > 10.20 V = TRUE 11.00 % <= PWM Duty Cycle <= 100.00 %	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Pack Coolant Pump Feedback Circuit Performance	P19FF	The purpose of the performance diagnostic is to detect and report a failure of the coolant pump or the pump feedback circuit. If the enable conditions are met, the difference between the commanded speed to the component feedback speed is calculated. The monitor can detect faults when the pump is either commanded on or commanded off. When the pump is commanded on, the speed difference is filtered and when the difference exceeds the calibrated fault threshold, the diagnostic reports a FAIL. If filtered speed difference does not exceed the calibrated fault threshold, the diagnostic reports a PASS. When the pump is commanded off, and the speed read is above a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will	High Volatge Battery Coolant Pump in actuated state (pump on) If High Volatge Battery Coolant Pump DTC P19FF is Not Fault Active, then use any following conditions: Filtered difference between Command Speed and Feedback speed Filtered difference between Command Speed and Feedback speed If High Volatge Battery Coolant Pump DTC P19FF is Fault Active, then use any following conditions: Filtered difference between Command Speed and Feedback speed Filtered difference between Command Speed and Feedback	< **P19FF RESS Pump Feedback Fault low Threshold** (RPM) > **P19FF RESS Pump Feedback Fault high Threshold** (RPM) < **P19FF RESS Pump Feedback Repass Low Threshold** (RPM)	Main Enable Calibration is **TRUE** All of the following conditions are met for 12V System Voltage High Volatge Battery Coolant Pump Enable High Volatge Battery Coolant Pump Control PWM Duty Cycle Command High Volatge Battery Coolant Pump DTCs P1E8C, P1E8D, P0C47, P19FD, P19FE If Do Not Use High Volatge Battery Inlet Coolant Temperature Sensor calibration is **FALSE**, then use following conditions: a) High Volatge Battery Inlet Coolant Temperature Sensor b) High Volatge Battery Inlet coolant Temperature Sensor DTCs P0C43, P0C44, P0C45,P0C46	= TRUE >= 5.00 s > 10.20 V = TRUE 11.00 % <=PWM Duty Cycle <= 90.00 % = Not Fault Active = FALSE -20.00 °C <= Temperature <= 9,999.00 °C = Not Fault Active	Continuous check every 100ms. (Fail time between 8s and 252s depending on the severity of the problem. Speed error of higher magnitude will cause the diagnostic to fail quicker)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	speed	> **P19FF RESS Pump Feedback Repass High Threshold** (RPM) (See supporting tables for the above threshold values)				
			High Volatge Battery Coolant Pump in non-actuated state (Pump Off): High Volatge Battery Coolant Pump speed feedback	> 250.00 RPM	Main Enable Calibration is **TRUE** 12V System Voltage High Volatge Battery Coolant Pump Enable If Disable Pump Off Diag During Pump On Fail calibration is **TRUE**, then use the following conditions: High Volatge Battery Coolant Pump Actuated State DTC P19FF	= TRUE > 10.20 V = FALSE for >= 10.00 s = TRUE = Not Fault Active	8 seconds out of a 10 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AA Circuit Range/ Performance	P1B16	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AB Circuit Range/ Performance	P1B19	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AC Circuit Range/ Performance	P1B1C	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AD Circuit Range/ Performance	P1B1F	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AE Circuit Range/ Performance	P1B22	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AF Circuit Range/ Performance	P1B25	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AG Circuit Range/ Performance	P1B45	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AH Circuit Range/ Performance	P1B48	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AI Circuit Range/ Performance	P1B4B	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AJ Circuit Range/ Performance	P1B4E	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AK Circuit Range/ Performance	P1B51	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AL Circuit Range/ Performance	P1B54	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AM Circuit Range/ Performance	P1B57	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AN Circuit Range/ Performance	P1B5A	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AO Circuit Range/ Performance	P1B5D	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AP Circuit Range/ Performance	P1B60	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AQ Circuit Range/ Performance	P1B63	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AR Circuit Range/ Performance	P1B66	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AS Circuit Range/ Performance	P1B69	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AT Circuit Range/ Performance	P1B6C	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AU Circuit Range/ Performance	P1B6F	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AV Circuit Range/ Performance	P1B72	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AW Circuit Range/ Performance	P1B75	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AX Circuit Range/ Performance	P1B78	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AY Circuit Range/ Performance	P1B7B	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AZ Circuit Range/ Performance	P1B7E	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BA Circuit Range/ Performance	P1B81	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BB Circuit Range/ Performance	P1B84	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BC Circuit Range/ Performance	P1B87	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BD Circuit Range/ Performance	P1B8A	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BE Circuit Range/ Performance	P1B8D	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BF Circuit Range/ Performance	P1B90	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BG Circuit Range/ Performance	P1B93	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BH Circuit Range/ Performance	P1B96	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BI Circuit Range/ Performance	P1B99	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BJ Circuit Range/ Performance	P1B9C	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BK Circuit Range/ Performance	P1B9F	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BL Circuit Range/ Performance	P1BA2	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BM Circuit Range/ Performance	P1BA5	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BN Circuit Range/ Performance	P1BA8	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BO Circuit Range/ Performance	P1BAB	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BP Circuit Range/ Performance	P1BAE	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BQ Circuit Range/ Performance	P1BB1	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BR Circuit Range/ Performance	P1BB4	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BS Circuit Range/ Performance	P1BB7	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BT Circuit Range/ Performance	P1BBA	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BU Circuit Range/ Performance	P1BBD	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BV Circuit Range/ Performance	P1BC0	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BW Circuit Range/ Performance	P1BC3	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BX Circuit Range/ Performance	P1BC6	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BY Circuit Range/ Performance	P1BC9	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE)	> 10.20 V	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips
					Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample	> 0.022 V		
					Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	No active DTCs		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BZ Circuit Range/ Performance	P1BCC	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CA Circuit Range/ Performance	P1BCF	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CB Circuit Range/ Performance	P1BD2	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CC Circuit Range/ Performance	P1BD5	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CD Circuit Range/ Performance	P1BD8	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CE Circuit Range/ Performance	P1BDB	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CF Circuit Range/ Performance	P1BDE	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CG Circuit Range/ Performance	P1BE1	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CH Circuit Range/ Performance	P1BE4	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CI Circuit Range/ Performance	P1BE7	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CJ Circuit Range/ Performance	P1BEA	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CK Circuit Range/ Performance	P1BED	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CL Circuit Range/ Performance	P1BF0	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CM Circuit Range/ Performance	P1BF3	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CN Circuit Range/ Performance	P1BF6	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CO Circuit Range/ Performance	P1BF9	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CP Circuit Range/ Performance	P1BFC	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CQ Circuit Range/ Performance	P1E01	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CR Circuit Range/ Performance	P1E04	This diagnostic verifies that the hybrid/EV cell voltage sensor is not stuck in range. It compares changes in sensed voltage over time with other cell sensed voltages. If sufficient samples elapse with unchanging sensor's voltage while the rest of the cell voltages are trending over time, the diagnostic will fail.	Difference in cell voltage from previous data sample to present data sample	trended at least 0.005 V in the same direction as the average cell voltage trended	System Voltage (Applicable for this Program/MY: TRUE) Absolute difference in calculated average cell voltage from previous cell voltage data sample to present cell voltage data sample Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	> 10.20 V > 0.022 V No active DTCs	35 failures out of 40 samples 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Pack Coolant Pump Enable Circuit Low	P1E8C	This diagnostic detects if the host controller has detected a short to ground on the output enable circuit. If the enable conditions are met and a fault is detected on the circuit, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	High Voltage Battery Coolant Pump Enable Output Current	>0.6A	Main Enable Calibration is **TRUE** 12V System Voltage If Coolant Pump Discrete/ PWM Type calibration is **TRUE**, then use following condition: High Volatge Battery Coolant Pump Control Duty Cycle Command If Coolant Pump Discrete/ PWM Type calibration is **FALSE**, then use following conditions: If Coolant Pump Discrete Enable calibration is **CeDIAG_e_CDE_Actuated** (Pump ON), then use the following condition: a) High Volatge Battery Coolant Pump Enable Signal If Coolant Pump Discrete Enable calibration is **CeDIAG_e_CDE_NonActuated** (Pump OFF), then use the following condition: a) High Volatge	= TRUE > 10.20 V = FALSE -9,999.00 % <= PWM Duty Cycle <= 9,999.00 % = FALSE = CeDIAG_e_CDE_NonActuated = True = CeDIAG_e_CDE_NonActuated	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Battery Coolant Pump Enable Signal	= False		
					If Coolant Pump Discrete Enable calibration is **CeDIAG_e_CDE_Both** (Pump ON or Pump OFF), then use the following condition:	= CeDIAG_e_CDE_NonActuated		
					a) High Volatge Battery Coolant Pump Enable Signal	=True OR False		
					High Volatge Battery Coolant Pump Control Circuit Fault State*	= NOT Indeterminate		
					*Circuit Fault State is Indeterminate if the ECU is not reporting Fail or Pass on the circuit being diagnosed			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Pack Coolant Pump Enable Circuit High	P1E8D	This diagnostic detects if the host controller has detected an open or a short to power on the output enable circuit. If the enable conditions are met and a fault is detected on the circuit, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Any of the following criteria are met: a)High Voltage Battery Coolant Pump Enable Output current b) High Voltage Battery Coolant Pump Enable Output voltage	 >35uA <4.5V	Main Enable Calibration is **TRUE** 12V System Voltage If Coolant Pump Discrete/ PWM Type calibration is **TRUE**, then use following condition: High Volatge Battery Coolant Pump Control Duty Cycle Command If Coolant Pump Discrete/ PWM Type calibration is **FALSE**, then use following conditions: If Coolant Pump Discrete Enable calibration is **CeDIAG_e_CDE_Actuated** (Pump ON), then use the following condition: a) High Volatge Battery Coolant Pump Enable Signal If Coolant Pump Discrete Enable calibration is **CeDIAG_e_CDE_NonActuated** (Pump OFF), then use the following condition:	= TRUE > 10.20 V = FALSE -9,999.00 % <= PWM Duty Cycle <= 9,999.00 % = FALSE = CeDIAG_e_CDE_NonActuated = True = CeDIAG_e_CDE_NonActuated	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					a) High Volatge Battery Coolant Pump Enable Signal If Coolant Pump Discrete Enable calibration is **CeDIAG_e_CDE_Both** (Pump ON or Pump OFF), then use the following condition: a) High Volatge Battery Coolant Pump Enable Signal High Volatge Battery Coolant Pump Control Circuit Fault State* *Circuit Fault State is Indeterminate if the ECU is not reporting Fail or Pass on the circuit being diagnosed	= False = CeDIAG_e_CDE_NonActuated =True OR False = NOT Indeterminate		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Hybrid/EV Battery Cell Overvoltage	P1EAB	This diagnostic monitors for hybrid/EV battery cell voltage too high. It is a system monitor that checks each cell's voltage by comparing their values collected using a secondary cell voltage sensing system against a calibratable threshold. If the voltage is above the failure threshold for sufficient time, the diagnostic will fail. For safety reasons, failures of this DTC cannot be cleared with a code clear and must be cleared by a service technician using the CPID in secondary parameters. To pass all cell voltages must be below the threshold.	Cell Voltage	> 4.5 V	System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) DTC Clear: Must Send CPID	> 10.20 V No active DTCs 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 100 samples 25 ms /sample	Type A, 1 Trips
			Any battery interface control module response to request to NOT test overvoltage signal	= Overvoltage signal detected	Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) Run Crank Transitions to DTC Clear: Must Send CPID	> 312 V > 10.20 V No active DTCs = ON for > 5 seconds 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 80 samples 25 ms /sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Cell Overvoltage Signal/ Circuit Performance	P1EAC	This diagnostic monitors the battery interface control module's secondary voltage sensing system for its ability to detect a voltage which is too high. Each battery interface control module has the ability to enter an over voltage performance test where it applies a high voltage on its secondary voltage sensing input. These performance tests are not continuous monitors and instead are run once to completion on each run-crank rising edge transition. Upon failure the test is retried a calibrated number of times. If the calibrated number of retries is exceeded, the test will fail. If any of these tests fail, the diagnostic will fail. If all of these tests pass, the diagnostic will pass.	Any battery interface control module response to request to test overvoltage signal	= Overvoltage signal not detected > 10 seconds	Run Crank Transitions to Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	= ON for > 5 seconds > 312 V > 10.20 V No active DTCs	Failure after 4 retries without a pass	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module A Cell Overvoltage Signal/ Circuit Performance	P1EAD	This diagnostic monitors the battery interface control module's secondary voltage sensing system for its ability to detect a voltage which is too high. Each battery interface control module has the ability to enter an over voltage performance test where it applies a high voltage on its secondary voltage sensing input. These performance tests are not continuous monitors and instead are run once to completion on each run-crank rising edge transition. Upon failure the test is retried a calibrated number of times. If the calibrated number of retries is exceeded, the test will fail. If any of these tests fail for this module, the diagnostic will fail. If all of these tests for this module pass, the diagnostic will pass.	Any response from this battery interface control module to the request to test the overvoltage signal	= Overvoltage signal not detected > 10 seconds	Run Crank Transitions to Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	= ON for > 5 seconds > 312 V > 10.20 V No active DTCs	Failure after 4 retries without a pass	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module B Cell Overvoltage Signal/ Circuit Performance	P1EAE	This diagnostic monitors the battery interface control module's secondary voltage sensing system for its ability to detect a voltage which is too high. Each battery interface control module has the ability to enter an over voltage performance test where it applies a high voltage on its secondary voltage sensing input. These performance tests are not continuous monitors and instead are run once to completion on each run-crank rising edge transition. Upon failure the test is retried a calibrated number of times. If the calibrated number of retries is exceeded, the test will fail. If any of these tests fail for this module, the diagnostic will fail. If all of these tests for this module pass, the diagnostic will pass.	Any response from this battery interface control module to the request to test the overvoltage signal	= Overvoltage signal not detected > 10 seconds	Run Crank Transitions to Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	= ON for > 5 seconds > 312 V > 10.20 V No active DTCs	Failure after 4 retries without a pass	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module C Cell Overvoltage Signal/ Circuit Performance	P1EAF	This diagnostic monitors the battery interface control module's secondary voltage sensing system for its ability to detect a voltage which is too high. Each battery interface control module has the ability to enter an over voltage performance test where it applies a high voltage on its secondary voltage sensing input. These performance tests are not continuous monitors and instead are run once to completion on each run-crank rising edge transition. Upon failure the test is retried a calibrated number of times. If the calibrated number of retries is exceeded, the test will fail. If any of these tests fail for this module, the diagnostic will fail. If all of these tests for this module pass, the diagnostic will pass.	Any response from this battery interface control module to the request to test the overvoltage signal	= Overvoltage signal not detected > 10 seconds	Run Crank Transitions to Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	= ON for > 5 seconds > 312 V > 10.20 V No active DTCs	Failure after 4 retries without a pass	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module D Cell Overvoltage Signal/ Circuit Performance	P1EB0	This diagnostic monitors the battery interface control module's secondary voltage sensing system for its ability to detect a voltage which is too high. Each battery interface control module has the ability to enter an over voltage performance test where it applies a high voltage on its secondary voltage sensing input. These performance tests are not continuous monitors and instead are run once to completion on each run-crank rising edge transition. Upon failure the test is retried a calibrated number of times. If the calibrated number of retries is exceeded, the test will fail. If any of these tests fail for this module, the diagnostic will fail. If all of these tests for this module pass, the diagnostic will pass.	Any response from this battery interface control module to the request to test the overvoltage signal	= Overvoltage signal not detected > 10 seconds	Run Crank Transitions to Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	= ON for > 5 seconds > 312 V > 10.20 V No active DTCs	Failure after 4 retries without a pass	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
High Voltage Energy Management Communication Bus Enable Circuit	P1EB9	Detects a fault in the High Voltage Energy Management Communication (HVEM) Bus Enable Circuit	Short to Ground		Diagnostic Enabled HVEM Bus Enabled	= TRUE =TRUE	480.00 failed samples within 560.00 samples 1 sample every 12.5ms	Type A, 1 Trips
			Short to Battery or open circuit		Diagnostic Enabled HVEM Bus Enabled	= TRUE =FALSE	480.00 failed samples within 560.00 samples 1 sample every 12.5ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Pack Heater Transistor Control Circuit/Open	P1EC3	This diagnostic detects if the host controller has detected a short to ground, short to power, or open fault on the output control circuit. If the enable conditions are met and a fault is detected on the circuit, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Any of the following conditions are met when High Voltage Battery Heater is OFF: a) High Voltage Battery Heater Transistor Control Circuit b)High Voltage Battery Heater Transistor Control Circuit Any of the following conditions are met when High Voltage Battery Heater is ON: a) High Voltage Battery Heater Transistor Control Circuit b) High Voltage Battery Heater Transistor Control Circuit	> (12V System Voltage - 0.4V) > 3V AND < 100uA < 160mOhms < 600mA	Main Enable Calibration is **TRUE** 12V System Voltage If Check High Voltage Battery Heater is Powered calibration is **TRUE**, then use the following condition: High Voltage Battery Heater Powered Status* If High Voltage Battery Heater Discrete/PWM Type calibration is **TRUE**, then use the following condition: Heater control Commanded PWM If High Voltage Battery Heater Discrete/PWM Type calibration is **FALSE**, then use the following conditions: If High Voltage Battery Heater Discrete Enable calibration is **CeDIAG_e_CDE_Actuated** (Heater ON), then use the following condition: a) High Voltage Battery Heater Enable	TRUE > 10.20 V = FALSE = Not Stale = TRUE (TRUE means PWM) 0.00 % < PWM Duty Cycle < 100.00 % = TRUE (FALSE means discrete) = CeDIAG_e_CDE_Both	2 seconds out of a 4 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Signal	=True		
					If High Voltage Battery Heater Discrete Enable calibration is **CeDIAG_e_CDE_NonActuated** (Heater OFF), then use the following condition:	= CeDIAG_e_CDE_Both		
					a) High Voltage Battery Heater Enable Signal	= False		
					If High Voltage Battery Heater Discrete Enable calibration is **CeDIAG_e_CDE_Both** (Heater ON or OFF), then use the following condition:	= CeDIAG_e_CDE_Both		
					a) High Voltage Battery Heater Enable Signal	= True OR False		
					High Voltage Battery Heater Transistor Control Circuit Fault State**	= NOT Indeterminate		
					**Transistor Control Circuit Fault State is Indeterminate if the ECU is not able to determine Fail or Pass on the circuit being diagnosed			
					* Stale means that data is Temporarily not available			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Pack Heater Performance	P1EC6	This diagnostic verifies that the Hybrid/EV battery heater is functioning. The monitor is an intrusive monitor which runs once per drive cycle. It will run after the charge cord is plugged in or after the propulsion system is activated and hybrid battery active heating is requested. Once started, the monitor will read the battery coolant temperature while it turns on the battery heater for a set time. After that it will turn the heater off and monitor the battery coolant temperature at the inlet of the battery for a calibrated temperature rise since the beginning of the test. If the temperature does not rise more than the calibrated threshold within a set time, the diagnostic will FAIL. Otherwise if the temperature rise exceeds the calibrated threshold within the set time, the diganostic will PASS.	Any of the following criteria are met: a) Compressor is running and Inlet Coolant Temperature Sensor temperature rise b) Compressor is not running and Inlet Coolant Temperature Sensor temperature rise	 < 3.00 °C < 3.00 °C	Any of the following conditons is met: Propulsion System Active Enable Calibration is **TRUE** Plugged In Charging Mode Enable Calibration is **TRUE**	 = TRUE = TRUE	154.10 seconds to fail	Type B, 2 Trips
					Main Enable Calibration is **TRUE**	= TRUE		
					12V System Voltage	> 10.20 V		
					Propulsion System Active	= TRUE		
					Charge Function Available	= FALSE		
					Rechargable Energy Storage System Thermal Mode	= Active heat request		
					High Volatge Battery Inlet Coolant Temperature	-9,999.00 °C < Temperature < 20.00 °C		
					High Volatge Battery Inlet Coolant Temperature Sensor DTCs P0C44, P0C45, P0C43, P0C46	= Not Fault Active		
					High Voltage Energy Management Fault Severity Status *	= Not Fault Active		
					High Volatge Battery Coolent Level Sensor DTCs P1FFB, P1FFC, P1FFD, P1FFE	= Not Fault Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					High Volatge Battery Coolat Pump DTCs P19FE, P19FD, P19FF, P0C47, P1E8C, P1E8D	= Not Fault Active		
					High Voltage Battery Heater Voltage	> 280.00 V		
					High Voltage Battery Heater Voltage status DTCs P0ABC, P0ABD, P0ABB, U185A, U0111, P0D4F, P0D4E, P0D4D, P0E61	= Not Fault Active		
					High Voltage Battery Heater IGBT circuit DTC P1EC3	= Not Fault Active		
					High Voltage Battery Heater Performance DTC P1EC6	= Not Test Failed This Key On, Not Test Passed This Key On		
					If Plugged In Charging Mode Enable Calibration is **TRUE**, then use any of the following conditions:	= TRUE		
					Heater Only mode calibration is **TRUE**	= FALSE		
					**Heat Only Request signal	= FALSE		
					**Plugged in pre-charge heating			
					* See Fault Bundle			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Definitions section for the above fault bundles			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
A/C Compressor Motor Speed Performance	P1F0A	The purpose of the performance diagnostic is to detect and report a failure of the compressor. If the compressor is commanded to run and other enable conditions are met, the difference between the commanded speed to the compressor's feedback speed is calculated. The speed difference is filtered and when the difference exceeds the calibrated fault threshold, the diagnostic reports a FAIL. If filtered speed difference does not exceed the calibrated fault threshold, the diagnostic reports a PASS. Compressor Speed Feedback is also diagnosed when the compressor is not being commanded to run. In this case, if the enable conditions are met, and the compressor feedback speed is greater than a calibrateable threshold, the diagnostic reports a FAIL. If speed feedback does not exceed the calibrated fault threshold, the	HV Compressor Motor in actuated state (Compressor on) If HV Compressor Motor DTC P1F0A is Not Fault Active, then use any of the following conditions: Filtered difference between Command Speed and Feedback Speed Filtered difference between Command Speed and Feedback Speed If HV Compressor Motor DTC P1F0A is Fault Active, then use any of the following conditions: Filtered difference between Command Speed and Feedback Speed	> **P1F0A Compressor ON Speed Feedback Fail Threshold High** (RPM) < **P1F0A Compressor ON Speed Feedback Fail Threshold Low** (RPM) > **P1F0A Compressor ON Speed Feedback Repass Threshold High** (RPM)	Compressor ON Diagnostic Enable calibration is **TRUE** All of the following conditions are met for: Compressor Sensor Signal Message Counter incorrect DTC P15CA Compressor Speed Request HSRP Sensor DTCs P0532, P0533 High Voltage Battery DTCs P0ABB, P0ABC, P0ABD, (U0111 AND U185A) High Voltage Contactor DTCs P3061, P0C78, P0AD9, P0AA4, P0D5E, P1EC3 Compressor CPU Temp Sensor DTCs P0D71, P0D72, P0D73, P0D74, U016B, P15CA Climate Control HV Device Shutdown Command Compressor Commanded to Run	= TRUE > 6.00 s = Not Fault Active 960.00 RPM to 8,600.00 RPM = Not Fault Active = Not Fault Active = Not Fault Active = Not Fault Atcive = False = True	Continuous check every 250ms (Fail time up to 1700s* depending on the severity of the problem. Speed error of higher magnitude will cause the diagnostic to fail quicker) *Fault reporting shall be delayed by 200.00 sec if the compressor sets degraded operation flag to True. Filter error will keep updating during this delay time.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		diagnostic reports a PASS.	Filtered difference between Command Speed and Feedback Speed	< **P1F0A Compressor ON Speed Feedback Repass Threshold Low** (RPM) (See supporting tables for the above threshold values)	High Side Refrigerant Pressure Value High Voltage Battery Cell Voltage High Voltage Positive, Negative and Charging Contactors for time All of the following conditions are met for: a) 12V System Voltage b) Compressor Loss of Comm DTC U016B c) Any of the following conditions are met: Condition 1: Accessory On Signal Condition 2: All of the following conditions are met: a) Run Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	< 2,800.00 kPa > 270.00 V = Closed > 1.00 s >= 1.00 s > 10.20 V = Not Fault Active = True = True = Not Fault Active		
			HV Compressor Motor in non-actuated state (Compressor off)		Compressor OFF Diagnostic Enable calibration is **TRUE**	= TRUE	8 seconds out of a 10 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Compressor Speed Feedback	> 960.00 RPM	All of the following conditions are met for:	>= 1.00 s		
					12V System Voltage	> 10.20 V		
					Compressor Loss of Comm DTC U016B	= Not Fault Active		
					Any of the following conditions are met:			
					Condition 1: Accessory On Signal	= True		
					Condition 2: All of the following conditions are met:			
					a) Run Crank Active Signal	= True		
					b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= Not Fault Active		
					If Disable Compressor Off Diag During Compressor On Fail calibration is TRUE, then use the following condition:			
					Compressor Motor Speed DTC P1F0A	= Not Fault Active		
					Any of the following conditions are met for:	> 10.00 s		
					Compressor Speed Request	< 959.00 RPM		
					Climate Control High Voltage Device			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Shutdown Commanded	= True		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Electric A/C Compressor Control Module A/C Compressor Motor Current Feedback Circuit Low	P1F0C	This diagnostic detects if the Compressor Current sensor has an out of range Low circuit fault. If the enable conditions are met and compressor has detected an instantaneous out of range low fault on the sensor, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Compressor DC Link Current Sensor Value * This malfunction criteria is evaluated internal to the compressor and instantaneous evaluation state is transmitted back to the host controller	< -3.29 A	Main Diagnostic Enable calibration is **TRUE** Compressor Sensor Status Message Counter Incorrect DTC P15CB All of the following conditions are met for: 12V System Voltage Compressor Loss of Comm DTC U016B Any of the following conditions are met: Condition 1: Accessory On Signal Condition 2: All of the following conditions are met: a) Run Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= TRUE = Not Fault Active >= 1.00 s > 10.20 V = Not Fault Active = True = True = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Electric A/C Compressor Control Module A/C Compressor Motor Current Feedback Circuit High	P1F0D	This diagnostic detects if the Compressor Current sensor has an out of range High circuit fault. If the enable conditions are met and compressor has detected an instantaneous out of range high fault on the sensor, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Compressor DC Link Current Sensor Value * This malfunction criteria is evaluated internal to the compressor and instantaneous evaluation state is transmitted back to the host controller	> 32.71 A	Main Diagnostic Enable calibration is **TRUE** Compressor Sensor Status Message Counter Incorrect DTC P15CB All of the following conditions are met for: 12V System Voltage Compressor Loss of Comm DTC U016B Any of the following conditions are met: Condition 1: Accessory On Signal Condition 2: All of the following conditions are met: a) Run Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= TRUE = Not Fault Active >= 1.00 s > 10.20 V = Not Fault Active = True = True = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Electronics Coolant Pump Enable Circuit Low	P1F44	This diagnostic detects if the host controller has detected a short to ground on the output enable circuit. If the enable criteria are met and a fault is detected on the circuit, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met.	Power Electronics Coolant Pump Enable Output Current	> 0.6 A	Main Diagnostics Enable calibration is **TRUE** 12V System Voltage If Use Run/Crank Active calibration is **TRUE**, then use the following conditions: All of the following conditions are met for: a) Run/Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535 If Coolant Pump Discrete Type calibration is **TRUE**, then use the following conditions: Power Electronics Coolant Pump Control Duty Cycle Command: If Coolant Pump Discrete Type calibration is **FALSE**, then use the following conditions: If Coolant Pump Discrete Enable calibration is **CePCOR_e_CDE_Actuated** (Pump ON)**,** then use the following condition:	= TRUE > 10.20 V = FALSE >= 10.00 s = True = Not Fault Active = FALSE (TRUE means PWM) -9,999.00 % <= PWM Duty Cycle <= 9,999.00 % = FALSE (FALSE means discrete) = CeDIAG_e_CDE_Actuated	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					a) Power Electronics Coolant Pump Enable Signal	= True		
					If Coolant Pump Discrete Enable calibration is **CePCOR_e_CDE_NonActuated** (Pump OFF), then use the following condition:	= CeDIAG_e_CDE_Actuated		
					a) Power Electronics Coolant Pump Enable Signal	= False		
					If Coolant Pump Discrete Enable calibration is **CePCOR_e_CDE_Both** (Pump ON or Pump OFF), then use the following condition:	= CeDIAG_e_CDE_Actuated		
					a) Power Electronics Coolant Pump Enable Signal	= True or False		
					Power Electronics Coolant Pump Enable Circuit Fault State*	= NOT Indeterminate		
					*Circuit Fault State is Indeterminate if the ECU is not reporting Fail or Pass on the circuit being diagnosed			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Electronics Coolant Pump Enable Circuit High	P1F45	This diagnostic detects if the host controller has detected an open or a short to power on the output enable circuit. If the enable criteria are met and a fault is detected on the circuit, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met.	Any of the following conditions are met: Power Electronics Coolant Pump Enable Output Current Power Electronics Coolant Pump Enable Output Voltage	 > 35uA < 4.5V	Main Diagnostics Enable calibration is **TRUE** 12V System Voltage If Use Run/Crank Active calibration is **TRUE**, then use the following conditions: All of the following conditions are met for: a) Run/Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535: If Coolant Pump Discrete Type calibration is **FALSE**, then use the following conditions: Power Electronics Coolant Pump Control Duty Cycle Command: If Coolant Pump Discrete Type calibration is **TRUE**, then use the following conditions: If Coolant Pump Discrete Enable calibration is **CePCOR_e_CDE_Actuated** (Pump ON)**,** then use the following condition:	= TRUE > 10.20 V = FALSE >= 10.00 s = True = Not Fault Active = FALSE (TRUE means PWM) -9,999.00 % <= PWM Duty Cycle <= 9,999.00 % = FALSE (FALSE means discrete) = CeDIAG_e_CDE_NonActuated	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					a) Power Electronics Coolant Pump Enable Signal	= True		
					If Coolant Pump Discrete Enable calibration is **CePCOR_e_CDE_NonActuated** (Pump OFF), then use the following condition:	= CeDIAG_e_CDE_NonActuated		
					a) Power Electronics Coolant Pump Enable Signal	= False		
					If Coolant Pump Discrete Enable calibration is **CePCOR_e_CDE_Both** (Pump ON or Pump OFF), then use the following condition:	= CeDIAG_e_CDE_NonActuated		
					a) Power Electronics Coolant Pump Enable Signal	= True or False		
					Power Electronics Coolant Pump Enable Circuit Fault State*	= NOT Indeterminate		
					*Circuit Fault State is Indeterminate if the ECU is not reporting Fail or Pass on the circuit being diagnosed			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Pack Coolant Level Sensor Circuit	P1FFB	This diagnostic detects if the sensor reading has an in-range but invalid region circuit fault. If the enable criteria are met and the voltage read is with a calibrated voltage range, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met.	High Voltage Battery Coolant Level Sensor Sensed Voltage	2.85 V <= Voltage <= 3.11 V	Main Enable Calibration is **TRUE** 12V System Voltage	= TRUE > 10.2 V	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Pack Coolant Level Sensor Circuit Low Voltage	P1FFC	This diagnostic detects if the sensor has a out of range low circuit fault. If the enable criteria are met and the sensor voltage read is below a calibrated voltage threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met.	High Voltage Battery Coolant Level Sensor Sensed Voltage	<= 1.37 V	Main Enable Calibration is **TRUE** 12V System Voltage	= TRUE > 10.2 V	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Pack Coolant Level Sensor Circuit High Voltage	P1FFD	This diagnostic detects if the sensor has a out of range high or open circuit fault. If the enable criteria are met and the sensor voltage read is above a calibrated voltage threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met.	High Voltage Battery Coolant Level Sensor Sensed Voltage	>= 4.00 V	Main Enable Calibration is **TRUE** 12V System Voltage	= TRUE > 10.2 V	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Pack Coolant Level Low	P1FFE	This diagnostic detects if the high voltage battery coolant level is normal (switch open) or low (switch closed) based on the sensor voltage reading. If the enable criteria are met and the sensor voltage read is within the coolant level low calibrated region then the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, a FAIL THIS KEY (FTK) flag is set and FTK is stored into a memory buffer. A calibrated total number of samples is used to define number of most recent stored values in the buffer to sum the number of FTKs stored. If the total number of FTK incidences exceeds the calibrated threshold value then a FAIL is reported. If the enable criteria are met and the sensor voltage read is within the normal coolant level calibrated region then the fail counter will not increment but the	High Voltage Battery Coolant Level Sensor Sensed Voltage	1.38 V <= Voltage <= 2.84 V	Main Enable Calibration is **TRUE** High Voltage Battery Coolant Level Sensor DTCs P1FFB, P1FFC, P1FFD, P1FFE If use High Voltage Battery Coolant Pump calibration is **TRUE**, then all of the following conditions are met for: High Voltage Battery Coolant Pump DTCs P19FE, P19FD, P19FF, P0C47, P1E8C, P1E8D High Voltage Battery Coolant Pump Duty Cycle is If use High Voltage Battery Temperature calibration is **TRUE**, then all of the following conditions are met for: High Voltage Battery Temperature High Voltage Battery temperature status DTCs Hybrid/EV Battery Temperature Sensor Circuit High **	= TRUE = Not Fault Active = FALSE > 30.00 s = Not Fault Active -9,999.00 % <= PWM Duty Cycle< 9,999.00 % = TRUE >30.00 s 0.00 °C <= Temperature < 120.00 °C = Not Fault Active	4 seconds out of a 5 seconds window and failed 2 of 3 drive cycles	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		sample counter will increment. When the sample count matures per the sample count calibration threshold value then a PASS THIS KEY (PTK) flag is stored to memory. At the end of the current trip, if a FTK has not been stored for the current trip and a PTK has been registered and the total number of FTK incidences does not exceed the calibrated threshold value then a diagnostic PASS will be reported.			Hybrid/EV Battery Temperature Sensor Circuit Low **	= Not Fault Active		
					Hybrid/EV Battery Temperature Sensor Circuit Range/ Performance **	= Not Fault Active		
					Loss of Communication with Battery Energy Control Module **	= Not Fault Active		
					Any of the following conditions are met:			
					Condition 1: If use Vehicle Speed calibration is **TRUE**, then	= TRUE		
					all of the following conditions are met for:	> 30.0 s		
					Vehicle Speed	-1.0 KPH <= Speed < 1.0 KPH		
					Output Speed Sensor DTCs P0721, P077B, P215C	= Not Fault Active		
					Loss of Communication DTCs U0100, U0101, U0111, U185A	= Not Fault Active		
					Condition 2: If use Propulsion System Active calibration is **TRUE**, then use the following conditions:	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Propulsion System Off Time	> 30.0 s		
					Vehicle Speed	<= 1.0 KPH		
					Propulsion System Off Time Signal Status DTCs P16FD, P16FE, P2610, P262B, P1683	= Not Fault Active		
					Ignition Off Timer DTC P2610	= Not Fault Active		
					Output Speed Sensor DTCs P0721, P077B, P215C	= Not Fault Active		
					Loss of Communication DTCs U0100, U0101, U0111, U185A	= Not Fault Active		
					** See Fault Bundle Definitions section for the above fault bundles			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Air Conditioning Refrigerant Pressure Sensor B Stuck Performance	P2516	The purpose of the low side refrigerant pressure (LSRP) sensor stuck diagnostic is to detect and report a failure of the sensor stuck in range. This diagnostic will run after the soak conditions are met. If the enable conditions are met then the sensor reading is expected to vary and update when the compressor starts running. If the difference between LSRP sensor reading when the compressor starts running and the LSRP sensor reading while the compressor is running is less than a calibrated threshold after a calibrated time then the diagnostic will report a FAIL, otherwise a PASS will be reported.	Difference between Low Side Refrigerant Pressure at instant when compressor starts running and Low Side Refrigerant Pressure at present execution instant	< 4.0 kpa for 180.0 s of compressor running	Main Diagnostic Enable calibration is **TRUE**	= TRUE	< 180.0 s (Diagnostic will pass immediately if greater than 4.0 kPa pressure delta is observed after compressor starts to run)	Type B, 2 Trips
					12V System Voltage	> 10.2 V		
					OAT Corrected Status*	= Valid or Uninitialized		
					*See Freeform section "OAT Corrected Status"			
					Control Module Internal Performance DTC P0606	= Not Fault Active		
					Any of the following conditions are met:			
					Accessory On Signal	= True		
					Run Crank Active Signal	= False		
					Compressor Off Time	> 3,600 s		
					Compressor Running Flag	= TRUE		
					Compressor Running Flag TRUE for	< 185.0 s		
					Air Conditioning Refrigerant Pressure Sensor B Stuck Performance DTC P2516	= Not Test Passed This Key On		
					If Override IAT_ECT Sensor Calibration is **FALSE**, then use the following conditions:	= TRUE		
					Engine coolant temperature sensor			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					DTCs P0119, P0118, P0117, P0116	= Not Fault Active		
					Absolute difference between Engine Coolant Temperature and Outside Ambient Temperature Filtered	> 9,999.0 deg C		
					OAT Corrected Status	= Valid		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
A/C Refrigerant Pressure Sensor B Circuit Low	P2517	This diagnostic detects if the low side refrigerant pressure (LSRP) sensor has an out of range low or open circuit fault. The diagnostic uses the ratio of the LSRP sensor voltage read to the sensor reference voltage value. If the enable conditions are met and the ratio falls below a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Sensor voltage	< 2 % (0.10 V) of reference voltage	Main Diagnostic Enable calibration is **TRUE** 12V System Voltage	= TRUE > 10.2 V	1.6 seconds out of a 2 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
A/C Refrigerant Pressure Sensor B Circuit High	P2518	This diagnostic detects if the low side refrigerant pressure (LSRP) sensor has an out of range high circuit fault. The diagnostic uses the ratio of the LSRP sensor voltage read to the sensor reference voltage value. If the enable conditions are met and the ratio exceeds a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Sensor voltage	> 98 % (4.90 V) of reference voltage	Main Diagnostic Enable calibration is **TRUE** 12V System Voltage	= TRUE > 10.2 V	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Switch Run/ Start Position Circuit Low	P2534	Detects a run crank relay open circuit	Run Crank Line Voltage	< 2 volts	Diagnostic Enabled CAN Communication ECM Run/Crank Active Data	= TRUE Enabled Available and Active	2.5 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Switch Run/ Start Position Circuit High	P2535	Detects a run crank relay short to power	Run Crank Line Voltage	> 5 volts	Diagnostic Enabled CAN Communication ECM Run/Crank Active Data	= TRUE Enabled Available and False	2.5 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Switch Accessory Position Circuit Low	P2537	See Malfunction criteria for Case Description	Detects an accessory position circuit open	False	P2537	Not Test Failed This Key On and Not Test Passed This Key On	0.1 seconds (8 * 0.0125)	Type B, 2 Trips
					Propulsion System	Active		
					Propulsion System Active Time	> 0.5 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Hood Switch Performance	P257D	Detects if the Vehicle Hood Switch is in an Electrically Invalid Range (Rationality Check)	Hood Switch Position Sensor reading within an invalid range	Within the following ranges: 67.80 % < reading <= 71.50 % 43.40 % < reading <= 45.70 % 14.60 % < reading <= 17.20 %	Battery System in Range	= TRUE	80 failed samples within 100 samples 1 sample every 12.5ms 1250 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Hood Switch Circuit Low Voltage	P257E	Detects if the Vehicle Hood Switch is Shorted to Ground	Hood Switch Position Sensor reading below a threshold	<= 14.60 %	Battery System in Range	= TRUE	80 failed samples within 100 samples 1 sample every 12.5ms 1250 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Hood Switch Circuit High Voltage	P257F	Detects if the Vehicle Hood Switch is Shorted to Battery	Hood Switch Position Sensor reading above a threshold	>= 71.50 %	Battery System in Range	= TRUE	80 failed samples within 100 samples 1 sample every 12.5ms 1250 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Power Off Timer Performance	P262B	Detects a fault in the internal Control Module off-timer	The absolute value of the difference between the Control Module 'Off' Timer and Control Module 'On' Timer exceeds a threshold	0.056 * Off Timer	Diagnostic Enabled RunCrank 'On' Time DTCs Not Active	= TRUE > 60.00 seconds P0601, P0602, P0603, P062F, P0604 and P0606	Runs once per drive cycle (when Run/ Crank transitions from TRUE to FALSE).	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Bypass Valve Position Sensor Stop/ Minimum Stop Performance (LIN Device)	P26A9	This diagnostic detects if the valve has failed to reach the commanded position. If the enable criteria are met, the diagnostic will start a passive test and evaluate valve movements after a calibrated amount of time. If the diagnostic detects any actuator faults, the diagnostic will initiate an Intrusive Learn to determine a final PASS/FAIL decision. However if there are no faults detected, the diagnostic will report a PASS. The Intrusive Test will command the valve from one end stop to the other and repeated for a calibrated number of times. If there are no failures indicated at the end of Intrusive Test, the diagnostic will report a PASS. If not, the diagnostic will start another Intrusive Learn. If the valve still fails and the total number of Intrusive Tests exceeds a calibrated threshold, the diagnostic will report a FAIL.	Passive Test		All of the following conditions are met for:	>= 1.50 s	12.00 s	Type B, 2 Trips
			Any of the following conditions is met		Main Diagnostic Enable calibration is **TRUE**	= TRUE		
			The absolute difference between Valve Position Feedback and Position Command	> 4.71 %	12V System Voltage	> 10.20 V		
			Valve Position Feedback Status*	= Not Initialized OR = Indeterminate	Lost Communication DTCs U1346, U0615, U1818	= Not Fault Active		
			Passive test has been enabled for	12.00 s	Engine Coolant Bypass Valve A Command Signals Message Counter Incorrect DTC P1008	= Not Fault Active		
			The passive test monitors the valve position feedback and status. If the passive test determines a potential actuator fault, then the intrusive test is enabled.		If Use Valve ARC calibration is **TRUE**, then use the following condition:	= TRUE		
					Engine Coolant Bypass Valve A Secondary Command Signals Message Counter Incorrect DTC P10BF	= Not Fault Active		
			* A faulted valve will set feedback status to Not Initialized. If a faulted valve is commanded to move, the feedback status will set to Indeterminate. Faults include under travel, overtravel, unexpected movements, position sensor circuit faults, motor coil faults, broken gears/shaft and		If Accessory Run/ Crank Override calibration is **FALSE**, then use any of the following conditions:	= TRUE		
					Condition 1: Accessory On Signal	= TRUE		
					Condition 2: All of the following			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			loss of power.		conditions are met: a) Run/Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	 = TRUE = Not Fault Active		
			Intrusive Test Any of the following conditions is met The absolute difference between Valve Position Feedback and Position Command Valve Position Feedback Status* Intrusive test has been enabled for The intrusive test runs once every drive cycle when the enable conditions are met, but may be enabled again if the passive test has determined a potential fault. * A faulted valve will set feedback status to Not Initialized. If a faulted	 > 4.71 % = Not Initialized OR = Indeterminate 24.00 s	All of the following conditions are met for: Main Diagnostic Enable calibration is **TRUE** 12V System Voltage Lost Communication DTCs U1346, U0615, U1818 Engine Coolant Bypass Valve A Command Signals Message Counter Incorrect DTC P1008 If Use Valve ARC calibration is **TRUE**, then use the following condition: Engine Coolant Bypass Valve A Secondary Command Signals Message Counter Incorrect DTC P10BF If Accessory Run/ Crank Override	≥ 1.50 s = TRUE > 10.20 V = Not Fault Active = Not Fault Active = TRUE = Not Fault Active	24.00 s	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			valve is commanded to move, the feedback status will set to Indeterminate. Faults include under travel, overtravel, unexpected movements, position sensor circuit faults, motor coil faults, broken gears/shaft and loss of power.		calibration is **FALSE**, then use any of the following conditions:	= TRUE		
					Condition 1: Accessory On Signal	= TRUE		
					Condition 2: All of the following conditions are met:			
					a) Run/Crank Active Signal	= TRUE		
					b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= Not Fault Active		
					Any of the following conditions are met:			
					Condition 1: Passive Test Result	= FAIL		
					Condition 2: Valve Initialization Relearn Enable calibration is **TRUE**	= TRUE		
					Valve Position Feedback Status	= Not Initialized OR = Indeterminate		
					Condition 3: Valve Engine Coolant Temperature Relearn Enable calibration is **TRUE**	= TRUE		
					LIN Valve OBD Learn Enable Count*	≥ 1.00		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					*The LIN Valve OBD Learn Enable Count will increment by 1 per drive cycle if all of the following conditions are met:			
					Engine Coolant Temperature Sensor DTCs P0116, P0117, P0118, P0119	= Not Fault Active		
					Lost Communication with Hybrid Powertrain Control Module on Bus B	= Not Fault Active		
					Propulsion System Active Signal	= TRUE		
					Control Module Power Off Timer Performance DTC P262B	= Not Fault Active		
					Any of the following conditions are met:			
					a) Engine Coolant Temperature	≥ 58.00 °C		
					b) Legislated Diagnostics Minimum Engine Coolant Temperature Reached Signal	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module A Cell Overvoltage	P3240	This diagnostic monitors for hybrid/EV battery cell voltage too high. It is a system monitor that checks each cell's voltage in this module by comparing their values collected using a secondary cell voltage sensing system against a calibratable threshold. If the voltage is above the failure threshold for sufficient time, the diagnostic will fail. For safety reasons, failures of this DTC cannot be cleared with a code clear and must be cleared by a service technician using the CPID in secondary parameters. To pass all cell voltages in this module must be below the threshold.	Cell Voltage	> 4.5 V	System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) DTC Clear: Must Send CPID	> 10.20 V No active DTCs 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 100 samples 25 ms /sample	Type A, 1 Trips
			Any response from this battery interface control module to request to NOT test the overvoltage signal	= Overvoltage signal detected	Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) Run Crank Transitions to DTC Clear: Must Send CPID	> 312 V > 10.20 V No active DTCs = ON for > 5 seconds 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 80 samples 25 ms /sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module B Cell Overvoltage	P3241	This diagnostic monitors for hybrid/EV battery cell voltage too high. It is a system monitor that checks each cell's voltage in this module by comparing their values collected using a secondary cell voltage sensing system against a calibratable threshold. If the voltage is above the failure threshold for sufficient time, the diagnostic will fail. For safety reasons, failures of this DTC cannot be cleared with a code clear and must be cleared by a service technician using the CPID in secondary parameters. To pass all cell voltages in this module must be below the threshold.	Cell Voltage	> 4.5 V	System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) DTC Clear: Must Send CPID	> 10.20 V No active DTCs 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 100 samples 25 ms /sample	Type A, 1 Trips
			Any response from this battery interface control module to request to NOT test the overvoltage signal	= Overvoltage signal detected	Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) Run Crank Transitions to DTC Clear: Must Send CPID	> 312 V > 10.20 V No active DTCs = ON for > 5 seconds 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 80 samples 25 ms /sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module C Cell Overvoltage	P3242	This diagnostic monitors for hybrid/EV battery cell voltage too high. It is a system monitor that checks each cell's voltage in this module by comparing their values collected using a secondary cell voltage sensing system against a calibratable threshold. If the voltage is above the failure threshold for sufficient time, the diagnostic will fail. For safety reasons, failures of this DTC cannot be cleared with a code clear and must be cleared by a service technician using the CPID in secondary parameters. To pass all cell voltages in this module must be below the threshold.	Cell Voltage	> 4.5 V	System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) DTC Clear: Must Send CPID	> 10.20 V No active DTCs 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 100 samples 25 ms /sample	Type A, 1 Trips
			Any response from this battery interface control module to request to NOT test the overvoltage signal	= Overvoltage signal detected	Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) Run Crank Transitions to DTC Clear: Must Send CPID	> 312 V > 10.20 V No active DTCs = ON for > 5 seconds 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 80 samples 25 ms /sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module D Cell Overvoltage	P3243	This diagnostic monitors for hybrid/EV battery cell voltage too high. It is a system monitor that checks each cell's voltage in this module by comparing their values collected using a secondary cell voltage sensing system against a calibratable threshold. If the voltage is above the failure threshold for sufficient time, the diagnostic will fail. For safety reasons, failures of this DTC cannot be cleared with a code clear and must be cleared by a service technician using the CPID in secondary parameters. To pass all cell voltages in this module must be below the threshold.	Cell Voltage	> 4.5 V	System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) DTC Clear: Must Send CPID	> 10.20 V No active DTCs 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 100 samples 25 ms /sample	Type A, 1 Trips
			Any response from this battery interface control module to request to NOT test the overvoltage signal	= Overvoltage signal detected	Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) Run Crank Transitions to DTC Clear: Must Send CPID	> 312 V > 10.20 V No active DTCs = ON for > 5 seconds 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 80 samples 25 ms /sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module E Cell Overvoltage	P3244	This diagnostic monitors for hybrid/EV battery cell voltage too high. It is a system monitor that checks each cell's voltage in this module by comparing their values collected using a secondary cell voltage sensing system against a calibratable threshold. If the voltage is above the failure threshold for sufficient time, the diagnostic will fail. For safety reasons, failures of this DTC cannot be cleared with a code clear and must be cleared by a service technician using the CPID in secondary parameters. To pass all cell voltages in this module must be below the threshold.	Cell Voltage	> 4.5 V	System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) DTC Clear: Must Send CPID	> 10.20 V No active DTCs 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 100 samples 25 ms /sample	Type A, 1 Trips
			Any response from this battery interface control module to request to NOT test the overvoltage signal	= Overvoltage signal detected	Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) Run Crank Transitions to DTC Clear: Must Send CPID	> 312 V > 10.20 V No active DTCs = ON for > 5 seconds 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 80 samples 25 ms /sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module E Cell Overvoltage Signal/ Circuit Performance	P3245	This diagnostic monitors the battery interface control module's secondary voltage sensing system for its ability to detect a voltage which is too high. Each battery interface control module has the ability to enter an over voltage performance test where it applies a high voltage on its secondary voltage sensing input. These performance tests are not continuous monitors and instead are run once to completion on each run-crank rising edge transition. Upon failure the test is retried a calibrated number of times. If the calibrated number of retries is exceeded, the test will fail. If any of these tests fail for this module, the diagnostic will fail. If all of these tests for this module pass, the diagnostic will pass.	Any response from this battery interface control module to the request to test the overvoltage signal	= Overvoltage signal not detected > 10 seconds	Run Crank Transitions to Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	= ON for > 5 seconds > 312 V > 10.20 V No active DTCs	Failure after 4 retries without a pass	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module F Cell Overvoltage	P3246	This diagnostic monitors for hybrid/EV battery cell voltage too high. It is a system monitor that checks each cell's voltage in this module by comparing their values collected using a secondary cell voltage sensing system against a calibratable threshold. If the voltage is above the failure threshold for sufficient time, the diagnostic will fail. For safety reasons, failures of this DTC cannot be cleared with a code clear and must be cleared by a service technician using the CPID in secondary parameters. To pass all cell voltages in this module must be below the threshold.	Cell Voltage	> 4.5 V	System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) DTC Clear: Must Send CPID	> 10.20 V No active DTCs 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 100 samples 25 ms /sample	Type A, 1 Trips
			Any response from this battery interface control module to request to NOT test the overvoltage signal	= Overvoltage signal detected	Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) Run Crank Transitions to DTC Clear: Must Send CPID	> 312 V > 10.20 V No active DTCs = ON for > 5 seconds 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 80 samples 25 ms /sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module F Cell Overvoltage Signal/ Circuit Performance	P3247	This diagnostic monitors the battery interface control module's secondary voltage sensing system for its ability to detect a voltage which is too high. Each battery interface control module has the ability to enter an over voltage performance test where it applies a high voltage on its secondary voltage sensing input. These performance tests are not continuous monitors and instead are run once to completion on each run-crank rising edge transition. Upon failure the test is retried a calibrated number of times. If the calibrated number of retries is exceeded, the test will fail. If any of these tests fail for this module, the diagnostic will fail. If all of these tests for this module pass, the diagnostic will pass.	Any response from this battery interface control module to the request to test the overvoltage signal	= Overvoltage signal not detected > 10 seconds	Run Crank Transitions to Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	= ON for > 5 seconds > 312 V > 10.20 V No active DTCs	Failure after 4 retries without a pass	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module G Cell Overvoltage	P3248	This diagnostic monitors for hybrid/EV battery cell voltage too high. It is a system monitor that checks each cell's voltage in this module by comparing their values collected using a secondary cell voltage sensing system against a calibratable threshold. If the voltage is above the failure threshold for sufficient time, the diagnostic will fail. For safety reasons, failures of this DTC cannot be cleared with a code clear and must be cleared by a service technician using the CPID in secondary parameters. To pass all cell voltages in this module must be below the threshold.	Cell Voltage	> 4.5 V	System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) DTC Clear: Must Send CPID	> 10.20 V No active DTCs 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 100 samples 25 ms /sample	Type A, 1 Trips
			Any response from this battery interface control module to request to NOT test the overvoltage signal	= Overvoltage signal detected	Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) Run Crank Transitions to DTC Clear: Must Send CPID	> 312 V > 10.20 V No active DTCs = ON for > 5 seconds 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 80 samples 25 ms /sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module G Cell Overvoltage Signal/ Circuit Performance	P3249	This diagnostic monitors the battery interface control module's secondary voltage sensing system for its ability to detect a voltage which is too high. Each battery interface control module has the ability to enter an over voltage performance test where it applies a high voltage on its secondary voltage sensing input. These performance tests are not continuous monitors and instead are run once to completion on each run-crank rising edge transition. Upon failure the test is retried a calibrated number of times. If the calibrated number of retries is exceeded, the test will fail. If any of these tests fail for this module, the diagnostic will fail. If all of these tests for this module pass, the diagnostic will pass.	Any response from this battery interface control module to the request to test the overvoltage signal	= Overvoltage signal not detected > 10 seconds	Run Crank Transitions to Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	= ON for > 5 seconds > 312 V > 10.20 V No active DTCs	Failure after 4 retries without a pass	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module H Cell Overvoltage	P324A	This diagnostic monitors for hybrid/EV battery cell voltage too high. It is a system monitor that checks each cell's voltage in this module by comparing their values collected using a secondary cell voltage sensing system against a calibratable threshold. If the voltage is above the failure threshold for sufficient time, the diagnostic will fail. For safety reasons, failures of this DTC cannot be cleared with a code clear and must be cleared by a service technician using the CPID in secondary parameters. To pass all cell voltages in this module must be below the threshold.	Cell Voltage	> 4.5 V	System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) DTC Clear: Must Send CPID	> 10.20 V No active DTCs 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 100 samples 25 ms /sample	Type A, 1 Trips
			Any response from this battery interface control module to request to NOT test the overvoltage signal	= Overvoltage signal detected	Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) Run Crank Transitions to DTC Clear: Must Send CPID	> 312 V > 10.20 V No active DTCs = ON for > 5 seconds 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 80 samples 25 ms /sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module H Cell Overvoltage Signal/ Circuit Performance	P324B	This diagnostic monitors the battery interface control module's secondary voltage sensing system for its ability to detect a voltage which is too high. Each battery interface control module has the ability to enter an over voltage performance test where it applies a high voltage on its secondary voltage sensing input. These performance tests are not continuous monitors and instead are run once to completion on each run-crank rising edge transition. Upon failure the test is retried a calibrated number of times. If the calibrated number of retries is exceeded, the test will fail. If any of these tests fail for this module, the diagnostic will fail. If all of these tests for this module pass, the diagnostic will pass.	Any response from this battery interface control module to the request to test the overvoltage signal	= Overvoltage signal not detected > 10 seconds	Run Crank Transitions to Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	= ON for > 5 seconds > 312 V > 10.20 V No active DTCs	Failure after 4 retries without a pass	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module I Cell Overvoltage	P324C	This diagnostic monitors for hybrid/EV battery cell voltage too high. It is a system monitor that checks each cell's voltage in this module by comparing their values collected using a secondary cell voltage sensing system against a calibratable threshold. If the voltage is above the failure threshold for sufficient time, the diagnostic will fail. For safety reasons, failures of this DTC cannot be cleared with a code clear and must be cleared by a service technician using the CPID in secondary parameters. To pass all cell voltages in this module must be below the threshold.	Cell Voltage	> 4.5 V	System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) DTC Clear: Must Send CPID	> 10.20 V No active DTCs 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 100 samples 25 ms /sample	Type A, 1 Trips
			Any response from this battery interface control module to request to NOT test the overvoltage signal	= Overvoltage signal detected	Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) Run Crank Transitions to DTC Clear: Must Send CPID	> 312 V > 10.20 V No active DTCs = ON for > 5 seconds 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 80 samples 25 ms /sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module I Cell Overvoltage Signal/ Circuit Performance	P324D	This diagnostic monitors the battery interface control module's secondary voltage sensing system for its ability to detect a voltage which is too high. Each battery interface control module has the ability to enter an over voltage performance test where it applies a high voltage on its secondary voltage sensing input. These performance tests are not continuous monitors and instead are run once to completion on each run-crank rising edge transition. Upon failure the test is retried a calibrated number of times. If the calibrated number of retries is exceeded, the test will fail. If any of these tests fail for this module, the diagnostic will fail. If all of these tests for this module pass, the diagnostic will pass.	Any response from this battery interface control module to the request to test the overvoltage signal	= Overvoltage signal not detected > 10 seconds	Run Crank Transitions to Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	= ON for > 5 seconds > 312 V > 10.20 V No active DTCs	Failure after 4 retries without a pass	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module J Cell Overvoltage	P324E	This diagnostic monitors for hybrid/EV battery cell voltage too high. It is a system monitor that checks each cell's voltage in this module by comparing their values collected using a secondary cell voltage sensing system against a calibratable threshold. If the voltage is above the failure threshold for sufficient time, the diagnostic will fail. For safety reasons, failures of this DTC cannot be cleared with a code clear and must be cleared by a service technician using the CPID in secondary parameters. To pass all cell voltages in this module must be below the threshold.	Cell Voltage	> 4.5 V	System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) DTC Clear: Must Send CPID	> 10.20 V No active DTCs 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 100 samples 25 ms /sample	Type A, 1 Trips
			Any response from this battery interface control module to request to NOT test the overvoltage signal	= Overvoltage signal detected	Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) Run Crank Transitions to DTC Clear: Must Send CPID	> 312 V > 10.20 V No active DTCs = ON for > 5 seconds 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 80 samples 25 ms /sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module J Cell Overvoltage Signal/ Circuit Performance	P324F	This diagnostic monitors the battery interface control module's secondary voltage sensing system for its ability to detect a voltage which is too high. Each battery interface control module has the ability to enter an over voltage performance test where it applies a high voltage on its secondary voltage sensing input. These performance tests are not continuous monitors and instead are run once to completion on each run-crank rising edge transition. Upon failure the test is retried a calibrated number of times. If the calibrated number of retries is exceeded, the test will fail. If any of these tests fail for this module, the diagnostic will fail. If all of these tests for this module pass, the diagnostic will pass.	Any response from this battery interface control module to the request to test the overvoltage signal	= Overvoltage signal not detected > 10 seconds	Run Crank Transitions to Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	= ON for > 5 seconds > 312 V > 10.20 V No active DTCs	Failure after 4 retries without a pass	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module K Cell Overvoltage	P3250	This diagnostic monitors for hybrid/EV battery cell voltage too high. It is a system monitor that checks each cell's voltage in this module by comparing their values collected using a secondary cell voltage sensing system against a calibratable threshold. If the voltage is above the failure threshold for sufficient time, the diagnostic will fail. For safety reasons, failures of this DTC cannot be cleared with a code clear and must be cleared by a service technician using the CPID in secondary parameters. To pass all cell voltages in this module must be below the threshold.	Cell Voltage	> 4.5 V	System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) DTC Clear: Must Send CPID	> 10.20 V No active DTCs 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 100 samples 25 ms /sample	Type A, 1 Trips
			Any response from this battery interface control module to request to NOT test the overvoltage signal	= Overvoltage signal detected	Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) Run Crank Transitions to DTC Clear: Must Send CPID	> 312 V > 10.20 V No active DTCs = ON for > 5 seconds 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 80 samples 25 ms /sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module K Cell Overvoltage Signal/ Circuit Performance	P3251	This diagnostic monitors the battery interface control module's secondary voltage sensing system for its ability to detect a voltage which is too high. Each battery interface control module has the ability to enter an over voltage performance test where it applies a high voltage on its secondary voltage sensing input. These performance tests are not continuous monitors and instead are run once to completion on each run-crank rising edge transition. Upon failure the test is retried a calibrated number of times. If the calibrated number of retries is exceeded, the test will fail. If any of these tests fail for this module, the diagnostic will fail. If all of these tests for this module pass, the diagnostic will pass.	Any response from this battery interface control module to the request to test the overvoltage signal	= Overvoltage signal not detected > 10 seconds	Run Crank Transitions to Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	= ON for > 5 seconds > 312 V > 10.20 V No active DTCs	Failure after 4 retries without a pass	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module L Cell Overvoltage	P3252	This diagnostic monitors for hybrid/EV battery cell voltage too high. It is a system monitor that checks each cell's voltage in this module by comparing their values collected using a secondary cell voltage sensing system against a calibratable threshold. If the voltage is above the failure threshold for sufficient time, the diagnostic will fail. For safety reasons, failures of this DTC cannot be cleared with a code clear and must be cleared by a service technician using the CPID in secondary parameters. To pass all cell voltages in this module must be below the threshold.	Cell Voltage	> 4.5 V	System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) DTC Clear: Must Send CPID	> 10.20 V No active DTCs 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 100 samples 25 ms /sample	Type A, 1 Trips
			Any response from this battery interface control module to request to NOT test the overvoltage signal	= Overvoltage signal detected	Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page) Run Crank Transitions to DTC Clear: Must Send CPID	> 312 V > 10.20 V No active DTCs = ON for > 5 seconds 0x7E4 07 AE 32 0C 0C 00 00 00	80 failures out of 80 samples 25 ms /sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module L Cell Overvoltage Signal/ Circuit Performance	P3253	This diagnostic monitors the battery interface control module's secondary voltage sensing system for its ability to detect a voltage which is too high. Each battery interface control module has the ability to enter an over voltage performance test where it applies a high voltage on its secondary voltage sensing input. These performance tests are not continuous monitors and instead are run once to completion on each run-crank rising edge transition. Upon failure the test is retried a calibrated number of times. If the calibrated number of retries is exceeded, the test will fail. If any of these tests fail for this module, the diagnostic will fail. If all of these tests for this module pass, the diagnostic will pass.	Any response from this battery interface control module to the request to test the overvoltage signal	= Overvoltage signal not detected > 10 seconds	Run Crank Transitions to Inverter voltage System Voltage (Applicable for this Program/MY: TRUE) Hybrid/EV Battery Cell Voltage Sensor Fault Active (see Fault Bundle page)	= ON for > 5 seconds > 312 V > 10.20 V No active DTCs	Failure after 4 retries without a pass	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication Bus A Off	U0073	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.	CAN Controller Interface in a Bus Off State	=TRUE	Controller On ECU is sending/ receiving on CAN (Battery Voltage OR Battery Voltage Transition: From To for time required)	=TRUE =TRUE >= 10.20 V <= 10.20 V >= 11.00 V >= 5,000.00 ms	5 failures out of 5 samples 1 s loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication Bus B Off	U0074	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.	CAN Controller Interface in a Bus Off State	=TRUE	Controller On ECU is sending/ receiving on CAN (Battery Voltage OR Battery Voltage Transition: From To for time required)	=TRUE =TRUE >= 10.20 V <= 10.20 V >= 11.00 V >= 5,000.00 ms	5 failures out of 5 samples 1 s loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication Bus H Off	U007A	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.	CAN Controller Interface in a Bus Off State	=TRUE	Controller On ECU is sending/ receiving on CAN (Battery Voltage OR Battery Voltage Transition: From To for time required)	=TRUE =TRUE >= 10.20 V <= 10.20 V >= 11.00 V >= 5,000.00 ms	5 failures out of 5 samples 1 s loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With ECM on Bus A	U0100	Detects that CAN serial data communication has been lost with the ECM on Bus A	Messages have not been received from the ECM for a specified time	≥ 500ms	Controller On Bus A Communication Enabled Bus A Off Inhibit (Battery Voltage OR Battery Voltage Transition: From To for time required)	=TRUE >= 5 seconds =FALSE > 10.20 V <= 10.20 V >= 11.00 V >= 5,000.00 ms	Runs in 10ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Battery Energy Control Module	U0111	Detects that CAN serial data communication has been lost with the Battery Energy Control Module on Bus A	Messages have not been received from the BECM for a specified time	≥ 500ms	Controller On Bus A Communication Enabled Bus A Off Inhibit (Battery Voltage OR Battery Voltage Transition: From To for time required)	=TRUE >= 5 seconds =FALSE > 10.20 V <= 10.20 V >= 11.00 V >= 5,000.00 ms	Runs in 10ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Brake System Control Module	U0129	Detects that CAN serial data communication has been lost with the Brake System Control Module on Bus A	Messages have not been received from the EBCM for a specified time	≥ 500ms	Controller On Bus A Communication Enabled Bus A Off Inhibit (Battery Voltage OR Battery Voltage Transition: From To for time required)	=TRUE >= 5 seconds =FALSE > 10.20 V <= 10.20 V >= 11.00 V >= 5,000.00 ms	Runs in 10ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Electric A/C Compressor Control Module	U016B	Detects that CAN serial data communication has been lost with the Electric A/C Compressor Control Module on Bus A	Messages have not been received from the EACCM for a specified time	≥ 500ms	Controller On Bus A Communication Enabled Bus A Off Inhibit (Battery Voltage OR Battery Voltage Transition: From To for time required)	=TRUE >= 5 seconds =FALSE > 10.20 V <= 10.20 V >= 11.00 V >= 5,000.00 ms	Runs in 10ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Hybrid Powertrain Control Module	U0293	Detects that CAN serial data communication has been lost with the Hybrid Powertrain Control Module on Bus A	Messages have not been received from the HCP for a specified time	≥ 500ms	Controller On Bus A Communication Enabled Bus A Off Inhibit (Battery Voltage OR Battery Voltage Transition: From To for time required)	=TRUE >= 5 seconds =FALSE > 10.20 V <= 10.20 V >= 11.00 V >= 5,000.00 ms	Runs in 10ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Hybrid Powertrain Control Module on Bus B	U1817	Detects that CAN serial data communication has been lost with the Hybrid Powertrain Control Module on Bus B	Messages have not been received from the HCP for a specified time	≥ 500ms	Controller On Bus B Communication Enabled Bus B Off Inhibit (Battery Voltage OR Battery Voltage Transition: From To for time required)	=TRUE >= 5 seconds =FALSE > 10.20 V <= 10.20 V >= 11.00 V >= 5,000.00 ms	Runs in 10ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With ECM on Bus B	U1818	Detects that CAN serial data communication has been lost with the ECM on Bus B	Messages have not been received from the ECM for a specified time	≥ 500ms	Controller On Bus B Communication Enabled Bus B Off Inhibit (Battery Voltage OR Battery Voltage Transition: From To for time required)	=TRUE >= 5 seconds =FALSE > 10.20 V <= 10.20 V >= 11.00 V >= 5,000.00 ms	Runs in 10ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Battery Energy Control Module on Bus H	U185A	Detects that CAN serial data communication has been lost with the Battery Energy Control Module on Bus H	Messages have not been received from the Battery Energy Control Module for a specified time	≥ 500ms	Controller On Bus H Communication Enabled Bus H Off Inhibit (Battery Voltage OR Battery Voltage Transition: From To for time required)	=TRUE >= 5 seconds =FALSE > 10.20 V <= 10.20 V >= 11.00 V >= 5,000.00 ms	Runs in 10ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Electric A/C Compressor Control Module Lost Communication with Hybrid Powertrain Control Module B	U1860	This diagnostic detects when there is a one-sided loss of communication on the HS GMLAN Bus where the Compressor is able to transmit but not receive serial data from the host controller. This function monitors the instantaneous status reported by the Compressor based on its internal processing of the CAN bus status. If GMLAN message $236 has not been received by the compressor for more than 250ms, it will transmit a faulted message to the host controller. If the enable conditions are met and faulted message has been received from the compressor, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement conditions are met.	Compressor Detected Loss of Communication with Host Controller (Fault detected by the compressor CAN Handler - Messages have not been received from the Host Controller for 250ms)	= True	Main Diagnostic Enable calibration is **TRUE** Compressor Signal Message Counter Incorrect DTC P15C8 All of the following conditions are met for: 12V System Voltage Compressor Loss of Comm DTC U016B Any of the following conditions are met: Condition 1: Accessory On Signal Condition 2: All of the following conditions are met: a) Run Crank Active Signal b) Ignition Switch Run/ Start Position Circuit DTCs P2534, P2535	= TRUE = Not Fault Active >= 1.00 s > 10.20 V = Not Fault Active = True = True = Not Fault Active	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Improper Wake-up Performance	U3012	Control Module Wake-up Circuit Performance (Self Wakeup Fault)	Control module unable to do a Self Wakeup when there is a request to do so		Diagnostic Enabled	= TRUE	Runs once at powerup if a Self-Wakeup request was active last power down	Type A, 1 Trips
					Self-Wakeup Requested	=TRUE		

Initial Supporting table - KtBSED_Cf_BSH_ReentryDelay

Description:

y/x	0	1	2	3	4	5	6	7	8
1	0	0	0	0	0	0	0	0	0

Initial Supporting table - KtBSED_Cf_BSL_ReentryDelay

Description:

y/x	0	1	2	3	4	5	6	7	8
1	0	0	0	0	0	0	0	0	0

Initial Supporting table - KtBSED_P_BPD_C_EndOfLifePwrThrsh

Description:

y/x	-30	-20	-10	0	20	30	50
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Initial Supporting table - KtBSED_P_BPD_C_MinPassPowerThrsh

Description:

y/x	-30	-20	-10	0	20	30	50
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Initial Supporting table - KtBSED_P_BPD_D_EndOfLifePwrThrsh

Description:

y/x	-30	-20	-10	0	20	30	50
10	-3.73	-3.13	-6.98	-11.55	-39.21	-75.00	-75.00
20	-5.12	-9.33	-17.39	-34.45	-75.00	-75.00	-75.00
30	-6.29	-14.00	-24.97	-46.17	-75.00	-75.00	-75.00
50	-7.83	-18.25	-32.03	-57.44	-75.00	-75.00	-75.00
70	-9.01	-21.40	-38.38	-66.69	-75.00	-75.00	-75.00
80	-9.25	-22.08	-39.74	-69.34	-75.00	-75.00	-75.00
90	-9.46	-22.67	-40.88	-71.81	-75.00	-75.00	-75.00

Initial Supporting table - KtBSED_P_BPD_D_MinPassPowerThrsh

Description:

y/x	-30	-20	-10	0	20	30	50
10	-3.73	-3.13	-6.98	-11.55	-39.21	-75.00	-75.00
20	-5.12	-9.33	-17.39	-34.45	-75.00	-75.00	-75.00
30	-6.29	-14.00	-24.97	-46.17	-75.00	-75.00	-75.00
50	-7.83	-18.25	-32.03	-57.44	-75.00	-75.00	-75.00
70	-9.01	-21.40	-38.38	-66.69	-75.00	-75.00	-75.00
80	-9.25	-22.08	-39.74	-69.34	-75.00	-75.00	-75.00
90	-9.46	-22.67	-40.88	-71.81	-75.00	-75.00	-75.00

Initial Supporting table - KtBSED_U_BOV_PackVoltThresh

Description:

y/x	-30	-20	-10	0	10	20	30	40	50
1	438	438	438	438	438	438	438	438	438

Initial Supporting table - KtBSED_U_BUV_PackVoltThresh

Description:

y/x	-30	-20	-10	0	10	20	30	40	50
1	149	149	149	155	165	165	165	165	165

Initial Supporting table - KtBSER_Pct_SOC_MaxInit

Description:

y/x	49	50	51	52	53	54	54	55	56
1	97	95	94	92	91	90	90	90	90

Initial Supporting table - P0534 Case 1 - Compressor ON Fail Threshold

Description: LSRP fail/pass threshold for compressor running case as a function of OAT Temp Raw or Filtered

Value Units: Low side refrigerant pressure fail threshold (kPa)
X Unit: OAT Temp Raw or Filtered (deg C)

y/x	5	5	8	10	13	16	18	21	24	26	29	32	34	37	40	42	45
1	0	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90

Initial Supporting table - P0534 Case 2 - Compressor OFF Fail Threshold

Description: LSRP fail threshold for compressor off/soaked as a function of OAT Temp Raw or Filtered

Value Units: Low side refrigerant pressure fail threshold (kPa)
X Unit: OAT Temp Raw or Filtered (deg C)

y/x	5	5	8	10	13	16	18	21	24	26	29	32	34	37	40	42	45
1	0	78	100	123	145	175	204	236	270	304	337	375	418	464	512	563	617

Initial Supporting table - P0534 Case 2 - Compressor OFF Pass Threshold

Description: LSRP pass threshold for compressor off/soaked as a function of OAT Temp Raw or Filtered

Value Units: Low side refrigerant pressure pass threshold (kPa)
X Unit: OAT Temp Raw or Filtered (deg C)

y/x	5	5	8	10	13	16	18	21	24	26	29	32	34	37	40	42	45
1	9,999	150	150	150	150	180	209	241	275	309	342	380	423	469	517	568	622

Initial Supporting table - P19FC PCOD Pump Feedback Fault High Threshold

Description: Pump commanded speed and pump feedback speed difference high fail threshold as a function of pump commanded speed

Value Units: Pump Feedback Fault High Threshold (RPM)
X Unit: Pump commanded Speed (RPM)

y/x	10	11	20	30	40	50	60	70	80	90
1	800	800	800	800	800	800	800	800	800	800

Initial Supporting table - P19FC PCOD Pump Feedback Fault Low Threshold

Description: Pump commanded speed and pump feedback speed difference low fail threshold as a function of pump commanded speed

Value Units: Pump Feedback Fault High Threshold (RPM)
X Unit: Pump commanded Speed (RPM)

y/x	10	11	20	30	40	50	60	70	80	90
1	-800	-800	-800	-800	-800	-800	-800	-800	-800	-800

Initial Supporting table - P19FC PCOD Pump Feedback Repass High Threshold

Description: Pump commanded speed and pump feedback speed differencer repass high threshold as a function of pump commanded speed

Value Units: Pump Feedback Repass High Threshold (RPM)
X Unit: Pump commanded Speed (RPM)

y/x	10	11	20	30	40	50	60	70	80	90
1	600	600	600	600	600	600	600	600	600	600

Initial Supporting table - P19FC PCOD Pump Feedback Repass Low Threshold

Description: Pump commanded speed and pump feedback speed differencer repass low threshold as a function of pump commanded speed

Value Units: Pump Feedback Repass Low Threshold (RPM)
X Unit: Pump commanded Speed (RPM)

y/x	10	11	20	30	40	50	60	70	80	90
1	-600	-600	-600	-600	-600	-600	-600	-600	-600	-600

Initial Supporting table - P19FF RESS Pump Feedback Fault high Threshold

Description: Pump commanded speed and pump feedback speed difference high fail threshold as a function of commanded pump duty cycle

Value Units: Speed feedback difference high fault threshold (RPM)
X Unit: Commanded duty Cycle (%)

y/x	10	11	20	30	40	50	60	70	80	90
1	450	450	450	450	450	450	450	450	450	450

Initial Supporting table - P19FF RESS Pump Feedback Fault low Threshold

Description: Pump commanded speed and pump feedback speed difference low fail threshold as a function of commanded pump duty cycle

Value Units: Speed feedback difference low fault threshold (RPM)
X Unit: Commanded duty Cycle (%)

y/x	10	11	20	30	40	50	60	70	80	90
1	-450	-450	-450	-450	-450	-450	-450	-450	-450	-450

Initial Supporting table - P19FF RESS Pump Feedback Repass High Threshold

Description: Pump commanded speed and pump feedback speed difference Repass high fail threshold as a function of commanded RESS pump duty cycle

Value Units: Repass Speed feedback difference high fault threshold (RPM)
X Unit: Commanded duty Cycle (%)

y/x	10	11	20	30	40	50	60	70	80	90
1	250	250	250	250	250	250	250	250	250	250

Initial Supporting table - P19FF RESS Pump Feedback Repass Low Threshold

Description: Pump commanded speed and pump feedback speed difference Repass low fail threshold as a function of commanded RESS pump duty cycle

Value Units: Repass Speed feedback difference low fault threshold (RPM)
X Unit: Commanded duty Cycle (%)

y/x	10	11	20	30	40	50	60	70	80	90
1	-250	-250	-250	-250	-250	-250	-250	-250	-250	-250

Initial Supporting table - P1F0A Compressor ON Speed Feedback Fail Threshold High

Description: Compressor Speed Feedback Rationality High Fail Threshold for Compressor ON case as a function of Commanded Speed

Value Units: Compressor speed fail high threshold (RPM)
X Unit: Compressor commanded speed (RPM)

y/x	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
1	900	900	900	900	900	900	900	900	900	900

Initial Supporting table - P1F0A Compressor ON Speed Feedback Fail Threshold Low

Description: Compressor Speed Feedback Rationality Low Fail Threshold for Compressor ON case as a function of Commanded Speed

Value Units: Compressor speed fail low threshold (RPM)
X Unit: Compressor commanded speed (RPM)

y/x	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
1	-900	-900	-900	-900	-900	-900	-900	-900	-900	-900

Initial Supporting table - P1F0A Compressor ON Speed Feedback Repass Threshold High

Description: Compressor Speed Feedback Rationality High Repass Threshold for Compressor ON case as a function of Commanded Speed

Value Units: Compressor speed repass high threshold (RPM)
X Unit: Compressor commanded speed (RPM)

y/x	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
1	875	875	875	875	875	875	875	875	875	875

Initial Supporting table - P1F0A Compressor ON Speed Feedback Repass Threshold Low

Description: Compressor Speed Feedback Rationality Low Repass Threshold for Compressor ON case as a function of Commanded Speed

Value Units: Compressor speed repass low threshold (RPM)
X Unit: Compressor commanded speed (RPM)

y/x	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
1	-875	-875	-875	-875	-875	-875	-875	-875	-875	-875

Initial Supporting table - CompON_RepassHi

Description: Compressor Speed Feedback Rationality - Compressor ON - Repass Threshold High

y/x	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
1	875	875	875	875	875	875	875	875	875	875

Initial Supporting table - CompON_RepassLo

Description: Compressor Speed Feedback Rationality - Compressor ON - Repass Threshold Low

y/x	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
1	-875	-875	-875	-875	-875	-875	-875	-875	-875	-875

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Internal Performance	P0A1F	VITM Software Watchdog	If Watchdog resets controller	1	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	True True >= 9V	N/A Immediate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Temperature Sensor Circuit Low	P0A9D	Sets when Temperature Sensor 1 falls below a threshold	Temperature Sensor 1	> 87.5C (ADC Count < 135)	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True True	1.4 seconds in a 2 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Temperature Sensor Circuit High	P0A9E	Sets when Temperature Sensor 1 falls above a threshold	Temperature Sensor 1	< -40C (ADC Count > 4008)	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True True	1.4 seconds in a 2 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Pack Voltage Sense Circuit Low	P0ABC	If Pack side Voltage is below Threshold	Pack Voltage	< 24V (ADC Count < 197)	Diagnostic Enable	True	1.6 s in a 2 s window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM System Voltage	>= 9V		
			DTC Pass	Pack Voltage >= 24V (ADC Count >= 197)			25 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Pack Voltage Sense Circuit High	P0ABD	If Pack side Voltage is above Threshold	Pack Voltage	> 479V (ADC Count > 3925)	Diagnostic Enable	True	1.6 s in a 2 s window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM System Voltage	>= 9V		
			DTC Pass	Pack Voltage <= 479V (ADC Count <=3925)			25 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Pack Current Sensor Circuit Low	P0AC1	If Coarse Current is below Threshold	Coarse Current	< -573A (ADC Count <82)	Diagnostic Enable	True	1.6 s in a 2 s window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM System Voltage	>= 9V		
			DTC Pass	Coarse Current >= -573A (ADC Count >= 82)			25 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Pack Current Sensor Circuit High	P0AC2	If Coarse Current is above Threshold	Coarse Current	> 303A (ADC Count > 4013)	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	True True >= 9V	1.6 s in a 2 s window	Type A, 1 Trips
			DTC Pass	Coarse Current <= 303A (ADC Count <= 4013)			25 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery 2 Temperature Sensor Circuit Low Voltage	P0AC7	Sets when Temperature Sensor 2 falls below a threshold	Temperature Sensor 2	> 87.5C (ADC Count < 135)	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True True	1.4 seconds in a 2 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery 2 Temperature Sensor Circuit High Voltage	P0AC8	Sets when Temperature Sensor 2 falls above a threshold	Temperature Sensor 2	< -40C (ADC Count > 4008)	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True True	1.4 seconds in a 2 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery 3 Temperature Sensor Circuit Low Voltage	P0ACC	Sets when Temperature Sensor 3 falls below a threshold	Temperature Sensor 3	> 87.5C (ADC Count < 135)	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True True	1.4 seconds in a 2 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery 3 Temperature Sensor Circuit High Voltage	P0ACD	Sets when Temperature Sensor 3 falls above a threshold	Temperature Sensor 3	< -40C (ADC Count > 4008)	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True True	1.4 seconds in a 2 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery 4 Temperature Sensor Circuit Low Voltage	P0AEA	Sets when Temperature Sensor 4 falls below a threshold	Temperature Sensor 4	> 87.5C (ADC Count < 135)	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True True	1.4 seconds in a 2 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery 4 Temperature Sensor Circuit High Voltage	P0AEB	Sets when Temperature Sensor 4 falls above a threshold	Temperature Sensor 4	< -40C (ADC Count > 4008)	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True True	1.4 seconds in a 2 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Pack Current Sensor B Circuit Low	P0B10	If Fine Current is below Threshold	Fine Current	< -24A (ADC Count < 82)	Diagnostic Enable	True	1.6 s in a 2 s window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM System Voltage	>= 9V		
			DTC Pass	Fine Current >= -24A (ADC Count >= 82)			25 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Pack Current Sensor B Circuit High	P0B11	If Fine Current is above Threshold	Fine Current	> 24A (ADC Count > 4013)	Diagnostic Enable	True	1.6 s in a 2 s window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM System Voltage	>= 9V		
			DTC Pass	Fine Current <= 24A (ADC Count <= 4013)			25 ms	

<table>
<tr><th>Component/ System</th><th>Fault Code</th><th>Monitor Strategy Description</th><th>Malfunction Criteria</th><th>Threshold Value</th><th>Secondary Parameters</th><th>Enable Conditions</th><th>Time Required</th><th>MIL Illum.</th></tr>
<tr><td>Hybrid Battery Voltage Sense A Circuit</td><td>P0B3B</td><td>Sets when cell voltage is detected open</td><td>|1st Cell V – 2nd Cell V| or Cell V_gate on

Case 1: Single Power Line - Positive side
Affected Cell Voltage when Cell Balance Gate is on

Case 2: General Sense Line
|1st Cell V – 2nd Cell V|

Case 3: Common Power Line
|1st Cell V – 2nd Cell V|

Case 4: Common Ground Line
|1st Cell V – 2nd Cell V|

Case 5: Single Ground Line
Affected Cell Voltage when Cell Balance Gate is on

Case 6: Splice Line
Splice Cap Voltage

Case 7: BusBar Splice
Splice Cap Voltage</td><td>Case 1:
Cell V_On Gate < 36mV

Case 2:
|1st Cell V – 2nd Cell V| >= 1.3V

Case 3 :
|1st Cell V – 2nd Cell V| >= 1.3V

Case 4 :
|1st Cell V – 2nd Cell V| >= 1.3V

Case 5 :
Cell V_On Gate < 36mV

Case 6:
Splice Cap Voltage > 0.1V

Case 7:
Splice Cap Voltage > 0.5V</td><td>Diagnostic Enable

Run/Crank, Accessory/ Run or HVEM EB Comm Enable

No Active DTCs associated with Slave Loss of Comm

No Active DTCs associated with Open Sense Line

2nd Protection Self Test Diagnostic

No Active DTCs associated with Slave Cell Balancing Fault

No Active DTCs associated with Slave Internal Performance</td><td>True

True

Slave Loss of Comm Fault

Open Sense Line Fault

Not Running

Slave Cell Balancing Fault

Slave Internal Performance Fault</td><td>0.6 seconds out of a 0.6 second window</td><td>Type A, 1 Trips</td></tr>
</table>

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense A Circuit Low	P0B3D	Sets when cell voltage is detected below threshold	Cell Voltage A	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense A Circuit High	P0B3E	Sets when cell voltage is detected above threshold	Cell Voltage A	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense B Circuit	P0B40	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.6 seconds out of a 0.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense B Circuit Low	P0B42	Sets when cell voltage is detected below threshold	Cell Voltage B	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense B Circuit High	P0B43	Sets when cell voltage is detected above threshold	Cell Voltage B	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense C Circuit	P0B45	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.6 seconds out of a 0.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense C Circuit Low	P0B47	Sets when cell voltage is detected below threshold	Cell Voltage C	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense C Circuit High	P0B48	Sets when cell voltage is detected above threshold	Cell Voltage C	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense D Circuit	P0B4A	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.6 seconds out of a 0.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense D Circuit Low	P0B4C	Sets when cell voltage is detected below threshold	Cell Voltage D	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense D Circuit High	P0B4D	Sets when cell voltage is detected above threshold	Cell Voltage D	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense E Circuit	P0B4F	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.6 seconds out of a 0.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense E Circuit Low	P0B51	Sets when cell voltage is detected below threshold	Cell Voltage E	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense E Circuit High	P0B52	Sets when cell voltage is detected above threshold	Cell Voltage E	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense F Circuit	P0B54	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.6 seconds out of a 0.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense F Circuit Low	P0B56	Sets when cell voltage is detected below threshold	Cell Voltage F	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense F Circuit High	P0B57	Sets when cell voltage is detected above threshold	Cell Voltage F	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense G Circuit	P0B59	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.6 seconds out of a 0.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense G Circuit Low	P0B5B	Sets when cell voltage is detected below threshold	Cell Voltage G	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense G Circuit High	P0B5C	Sets when cell voltage is detected above threshold	Cell Voltage G	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense H Circuit	P0B5E	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.6 seconds out of a 0.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense H Circuit Low	P0B60	Sets when cell voltage is detected below threshold	Cell Voltage H	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense H Circuit High	P0B61	Sets when cell voltage is detected above threshold	Cell Voltage H	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense I Circuit	P0B63	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.6 seconds out of a 0.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense I Circuit Low	P0B65	Sets when cell voltage is detected below threshold	Cell Voltage I	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense I Circuit High	P0B66	Sets when cell voltage is detected above threshold	Cell Voltage I	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense J Circuit	P0B68	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.6 seconds out of a 0.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense J Circuit Low	P0B6A	Sets when cell voltage is detected below threshold	Cell Voltage J	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense J Circuit High	P0B6B	Sets when cell voltage is detected above threshold	Cell Voltage J	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense K Circuit	P0B6D	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.6 seconds out of a 0.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense K Circuit Low	P0B6F	Sets when cell voltage is detected below threshold	Cell Voltage K	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense K Circuit High	P0B70	Sets when cell voltage is detected above threshold	Cell Voltage K	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense L Circuit	P0B72	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.6 seconds out of a 0.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense L Circuit Low	P0B74	Sets when cell voltage is detected below threshold	Cell Voltage L	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense L Circuit High	P0B75	Sets when cell voltage is detected above threshold	Cell Voltage L	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense M Circuit	P0B77	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.6 seconds out of a 0.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense M Circuit Low	P0B79	Sets when cell voltage is detected below threshold	Cell Voltage M	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense M Circuit High	P0B7A	Sets when cell voltage is detected above threshold	Cell Voltage M	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense N Circuit	P0B7C	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense N Circuit Low	P0B7E	Sets when cell voltage is detected below threshold	Cell Voltage N	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense N Circuit High	P0B7F	Sets when cell voltage is detected above threshold	Cell Voltage N	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense O Circuit	P0B81	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense O Circuit Low	P0B83	Sets when cell voltage is detected below threshold	Cell Voltage O	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense O Circuit High	P0B84	Sets when cell voltage is detected above threshold	Cell Voltage O	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense P Circuit	P0B86	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense P Circuit Low	P0B88	Sets when cell voltage is detected below threshold	Cell Voltage P	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense P Circuit High	P0B89	Sets when cell voltage is detected above threshold	Cell Voltage P	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense Q Circuit	P0B8B	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense Q Circuit Low	P0B8D	Sets when cell voltage is detected below threshold	Cell Voltage Q	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense Q Circuit High	P0B8E	Sets when cell voltage is detected above threshold	Cell Voltage Q	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

<table>
<tr><th>Component/ System</th><th>Fault Code</th><th>Monitor Strategy Description</th><th>Malfunction Criteria</th><th>Threshold Value</th><th>Secondary Parameters</th><th>Enable Conditions</th><th>Time Required</th><th>MIL Illum.</th></tr>
<tr><td>Hybrid Battery Voltage Sense R Circuit</td><td>P0B90</td><td>Sets when cell voltage is detected open</td><td>|1st Cell V – 2nd Cell V| or Cell V_gate on

Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on

Case 2: General Sense Line |1st Cell V – 2nd Cell V|

Case 3: Common Power Line |1st Cell V – 2nd Cell V|

Case 4: Common Ground Line |1st Cell V – 2nd Cell V|

Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on

Case 6: Splice Line Splice Cap Voltage

Case 7: BusBar Splice Splice Cap Voltage</td><td>Case 1: Cell V_On Gate < 36mV

Case 2: |1st Cell V – 2nd Cell V| >= 1.3V

Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V

Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V

Case 5 : Cell V_On Gate < 36mV

Case 6: Splice Cap Voltage > 0.1V

Case 7: Splice Cap Voltage > 0.5V</td><td>Diagnostic Enable

Run/Crank, Accessory/ Run or HVEM EB Comm Enable

No Active DTCs associated with Slave Loss of Comm

No Active DTCs associated with Open Sense Line

2nd Protection Self Test Diagnostic

No Active DTCs associated with Slave Cell Balancing Fault

No Active DTCs associated with Slave Internal Performance</td><td>True

True

Slave Loss of Comm Fault

Open Sense Line Fault

Not Running

Slave Cell Balancing Fault

Slave Internal Performance Fault</td><td>0.8 seconds out of a 1.6 second window</td><td>Type A, 1 Trips</td></tr>
</table>

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense R Circuit Low	P0B92	Sets when cell voltage is detected below threshold	Cell Voltage R	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense R Circuit High	P0B93	Sets when cell voltage is detected above threshold	Cell Voltage R	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense S Circuit	P0B95	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense S Circuit Low	P0B97	Sets when cell voltage is detected below threshold	Cell Voltage S	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense S Circuit High	P0B98	Sets when cell voltage is detected above threshold	Cell Voltage S	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense T Circuit	P0B9A	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense T Circuit Low	P0B9C	Sets when cell voltage is detected below threshold	Cell Voltage T	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense T Circuit High	P0B9D	Sets when cell voltage is detected above threshold	Cell Voltage T	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense U Circuit	P0B9F	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense U Circuit Low	P0BA1	Sets when cell voltage is detected below threshold	Cell Voltage U	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense U Circuit High	P0BA2	Sets when cell voltage is detected above threshold	Cell Voltage U	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense V Circuit	P0BA4	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense V Circuit Low	P0BA6	Sets when cell voltage is detected below threshold	Cell Voltage V	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense V Circuit High	P0BA7	Sets when cell voltage is detected above threshold	Cell Voltage V	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense W Circuit	P0BA9	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense W Circuit Low	P0BAB	Sets when cell voltage is detected below threshold	Cell Voltage W	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense W Circuit High	P0BAC	Sets when cell voltage is detected above threshold	Cell Voltage W	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense X Circuit	P0BAE	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense X Circuit Low	P0BB0	Sets when cell voltage is detected below threshold	Cell Voltage X	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense X Circuit High	P0BB1	Sets when cell voltage is detected above threshold	Cell Voltage X	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense Y Circuit	P0BB3	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense Y Circuit Low	P0BB5	Sets when cell voltage is detected below threshold	Cell Voltage Y	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense Y Circuit High	P0BB6	Sets when cell voltage is detected above threshold	Cell Voltage Y	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense Z Circuit	P0BB8	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense Z Circuit Low	P0BBA	Sets when cell voltage is detected below threshold	Cell Voltage Z	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense Z Circuit High	P0BBB	Sets when cell voltage is detected above threshold	Cell Voltage Z	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Temperature Sensor E Circuit Low	P0BC4	Sets when Temperature Sensor 5 falls below a threshold	Temperature Sensor 5	> 87.5C (ADC Count < 135)	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True True	1.4 seconds in a 2 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Temperature Sensor E Circuit High	P0BC5	Sets when Temperature Sensor 5 falls above a threshold	Temperature Sensor 5	< -40C (ADC Count > 4008)	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True True	1.4 seconds in a 2 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Temperature Sensor F Circuit Low	P0C35	Sets when Temperature Sensor 6 falls below a threshold	Temperature Sensor 6	> 87.5C (ADC Count < 135)	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True True	1.4 seconds in a 2 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Temperature Sensor F Circuit High	P0C36	Sets when Temperature Sensor 6 falls above a threshold	Temperature Sensor 6	< -40C (ADC Count > 4008)	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True True	1.4 seconds in a 2 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Pack Coolant Temperature Sensor Circuit Low	P0C44	Sets when Inlet Coolant Temp Sensor falls below a Threshold	Inlet Temp	>= 87.9C (ADC Count <= 133)	Diagnostic Enable	True	1.75 seconds in a 2.5 seconds window	Type B, 2 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM System Voltage	>= 9V		
			DTC Pass	Inlet Temp < 87.9C (ADC Count > 133)			2.5 Seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Pack Coolant Temperature Sensor Circuit High	P0C45	Sets when Inlet Coolant Temp Sensor goes above a Threshold	Inlet Temp	< -40C (ADC Count > 3890)	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	True True >= 9V	1.75 seconds in a 2.5 seconds window	Type B, 2 Trips
			DTC Pass	Inlet Temp >= -40C (ADC Count <= 3890)			2.5 Seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Random Accessoryes s Memory (RAM)	P1A05	RAM Read Write function Failed	RAM Read not Equal to RAM Written	1	Diagnostic Enable	True	At power up	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM Initalization Status Extended	Initializing		
					VITM System Voltage	>= 9V		
			DTC Pass	1			At power up	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Read Only Memory (ROM)	P1A06	Flash ROM Checksum method	Flash ROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable	True	At power up	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM Initalization Status Extended	Initializing		
					VITM System Voltage	>= 9V		
			DTC Pass	1			At power up	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module 5 Volt Reference Circuit	P1A07	Sets when 5V VITM reference voltage is out of range	5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	5V Reference Value < 2.8V or 5V Reference Value > 3.2V	Diagnostic Enable	True	600 ms in a 1 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM System Voltage	>= 9V		
			DTC Pass	2.8V <= 5V Reference Value <= 3.2V			1 Second	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module System Voltage Low	P1A0C	If 12V System Voltage is below Threshold	12V System Voltage	< 9.0V	Diagnostic Enable	True	5 seconds in a 6 seconds window	Type C, No SVS
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
			DTC Pass	12V System Voltage >= 9.0V			6 Seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module System Voltage High	P1A0D	If 12V System Voltage is above Threshold	12V System Voltage DTC Pass	>18.5V 12V System Voltage >= 18.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True True	5 seconds in a 6 seconds window 6 Seconds	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Ignition Switch Run/ Start Position Circuit Low	P1A5E	If RunCrank input state is below Threshold and RunCrank Received Serial Data State = Active	RunCrank Hardwire Input and Serial Data signal	RunCrank Input < 5V	Diagnostic Enable	True	5 seconds in a 6 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM System Voltage	>= 9V		
					No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H	U185B		
					HPC2 Run Crank Terminal Status	TRUE		
			DTC Pass	RunCrank Input >= 5V			6 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Ignition Switch Run/ Start Position Circuit High	P1A5F	If RunCrank input state is above Threshold and RunCrank Received Serial Data State = Inactive	RunCrank Hardwire Input and Serial Data signal	RunCrank Input >= 5V	Diagnostic Enable	True	5 seconds in a 6 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM System Voltage	>= 9V		
					No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H	U185B		
					HPC2 Run Crank Terminal Status	FALSE		
			DTC Pass	RunCrank Input < 5V			6 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Ignition Switch Accessory Position Circuit Low	P1A60	If Acessory input state is below Threshold and received serial data Propulsion System Active state = True and Accessory Diagnostic Delay is Expired	Accessory Hardwire Input	Accessory Input < 5V	Diagnostic Enable	True	0.1 seconds (8 * 0.0125)	Type B, 2 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTC for Battery Energy Control Module Lost Communication With with HCP (TPIM) on Bus A (HS GMLAN Bus)	U1885		
					VITM System Voltage	>= 9V		
					Propulsion System Active	True		
			DTC Pass	Accessory Input >= 5V			0.1 seconds (8 * 0.0125)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Hybrid Battery Voltage Isolation Sensor Circuit	P1AE6	Sets when Isolation Ckt components detected open/short	Active Isolation Circuit	If K <= 0.985 or K >= 1.015	Diagnostic Enable	True	30s	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VICM Isolation Start Request	True		
					VITM System Voltage	> 9V		
					No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H	U185B		
			DTC Pass	0.985 < K < 1.015 (diagnose open sw and/or open/short in circuit resistors) Or {}{abs(AD1 – AD2) < 30mV} or {abs(BD1 – BD2) < 30mV} (diagnose shorted sw)			30s	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AA Circuit Low	P1B17	Sets when cell voltage is detected below threshold	Cell Voltage AA	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
					No Active DTCs associated with Open Sense Line	P0B3B, P0B40, P0B45, P0B4A, P0B4F, P0B54, P0B59, P0B5E, P0B63, P0B68, P0B6D, P0B72, P0B77, P0B7C, P0B81, P0B86, P0B8B, P0B90, P0B95, P0B9A, P0B9F, P0BA4, P0BA9, P0BAE, P0BB3, P0BB8, P1B28, P1B29, P1B2A, P1B2B, P1B2C, P1B2D, P1E4C, P1E4D, P1E4E, P1E4F, P1E50, P1E51, P1E52, P1E53, P1E54, P1E55, P1E56, P1E57, P1E58, P1E59, P1E5A, P1E5B, P1E5C, P1E5D, P1E5E, P1E5F, P1E60, P1E61, P1E62, P1E63, P1E64, P1E65, P1E66, P1E67, P1E68, P1E69, P1E6A, P1E6B, P1E6C, P1E6D P1E6E, P1E6F, P1E70, P1E71, P1E72, P1E73, P1E74, P1E75, P1E76, P1E77, P1E78, P1E79, P1E7A, P1E7B, P1E7C, P1E7D, P1E7E, P1E7F, P1E80, P1E81, P1E82, P1E83, P1E84, P1E86,		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P1E87, P1E88, P1E89, P1E8A		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	P1E92, P1E98, P1E9E, P1EA4, P1FC9, P1FCA, P1FCB, P1FCC, P1FCD, P1FCE, P3036, P3041		
					No Active DTCs associated with Slave Internal Performance	P1E8E, P1E94, P1E9A, P1EA0, P1FBD, P1FBE, P1FBF, P1FC0, P1FC1, P1FC2, P3034, P303F		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AA Circuit High	P1B18	Sets when cell voltage is detected above threshold	Cell Voltage AA	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AB Circuit Low	P1B1A	Sets when cell voltage is detected below threshold	Cell Voltage AB	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AB Circuit High	P1B1B	Sets when cell voltage is detected above threshold	Cell Voltage AB	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AC Circuit Low	P1B1D	Sets when cell voltage is detected below threshold	Cell Voltage AC	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AC Circuit High	P1B1E	Sets when cell voltage is detected above threshold	Cell Voltage AC	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AD Circuit Low	P1B20	Sets when cell voltage is detected below threshold	Cell Voltage AD	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AD Circuit High	P1B21	Sets when cell voltage is detected above threshold	Cell Voltage AD	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AE Circuit Low	P1B23	Sets when cell voltage is detected below threshold	Cell Voltage AE	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AE Circuit High	P1B24	Sets when cell voltage is detected above threshold	Cell Voltage AE	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AF Circuit Low	P1B26	Sets when cell voltage is detected below threshold	Cell Voltage AF	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AF Circuit High	P1B27	Sets when cell voltage is detected above threshold	Cell Voltage AF	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AA Circuit	P1B28	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AB Circuit	P1B29	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AC Circuit	P1B2A	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AD Circuit	P1B2B	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AE Circuit	P1B2C	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AF Circuit	P1B2D	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on		Diagnostic Enable	True	0.8 seconds out of a 1.6 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
			Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on	Case 1: Cell V_On Gate < 36mV	No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
			Case 2: General Sense Line |1st Cell V – 2nd Cell V|	Case 2: |1st Cell V – 2nd Cell V| >= 1.3V	No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
			Case 3: Common Power Line |1st Cell V – 2nd Cell V|	Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V				
			Case 4: Common Ground Line |1st Cell V – 2nd Cell V|	Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V	2nd Protection Self Test Diagnostic	Not Running		
			Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on	Case 5 : Cell V_On Gate < 36mV	No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		
			Case 6: Splice Line Splice Cap Voltage	Case 6: Splice Cap Voltage > 0.1V				
			Case 7: BusBar Splice Splice Cap Voltage	Case 7: Splice Cap Voltage > 0.5V				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AG Circuit Low	P1B46	Sets when cell voltage is detected below threshold	Cell Voltage AG	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AG Circuit High	P1B47	Sets when cell voltage is detected above threshold	Cell Voltage AG	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AH Circuit Low	P1B49	Sets when cell voltage is detected below threshold	Cell Voltage AH	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AH Circuit High	P1B4A	Sets when cell voltage is detected above threshold	Cell Voltage AH	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AI Circuit Low	P1B4C	Sets when cell voltage is detected below threshold	Cell Voltage AI	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AI Circuit High	P1B4D	Sets when cell voltage is detected above threshold	Cell Voltage AI	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AJ Circuit Low	P1B4F	Sets when cell voltage is detected below threshold	Cell Voltage AJ	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AJ Circuit High	P1B50	Sets when cell voltage is detected above threshold	Cell Voltage AJ	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AK Circuit Low	P1B52	Sets when cell voltage is detected below threshold	Cell Voltage AK	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AK Circuit High	P1B53	Sets when cell voltage is detected above threshold	Cell Voltage AK	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AL Circuit Low	P1B55	Sets when cell voltage is detected below threshold	Cell Voltage AL	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AL Circuit High	P1B56	Sets when cell voltage is detected above threshold	Cell Voltage AL	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AM Circuit Low	P1B58	Sets when cell voltage is detected below threshold	Cell Voltage AM	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AM Circuit High	P1B59	Sets when cell voltage is detected above threshold	Cell Voltage AM	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AN Circuit Low	P1B5B	Sets when cell voltage is detected below threshold	Cell Voltage AN	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AN Circuit High	P1B5C	Sets when cell voltage is detected above threshold	Cell Voltage AN	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AO Circuit Low	P1B5E	Sets when cell voltage is detected below threshold	Cell Voltage AO	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AO Circuit High	P1B5F	Sets when cell voltage is detected above threshold	Cell Voltage AO	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AP Circuit Low	P1B61	Sets when cell voltage is detected below threshold	Cell Voltage AP	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AP Circuit High	P1B62	Sets when cell voltage is detected above threshold	Cell Voltage AP	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AQ Circuit Low	P1B64	Sets when cell voltage is detected below threshold	Cell Voltage AQ	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AQ Circuit High	P1B65	Sets when cell voltage is detected above threshold	Cell Voltage AQ	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AR Circuit Low	P1B67	Sets when cell voltage is detected below threshold	Cell Voltage AR	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AR Circuit High	P1B68	Sets when cell voltage is detected above threshold	Cell Voltage AR	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AS Circuit Low	P1B6A	Sets when cell voltage is detected below threshold	Cell Voltage AS	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AS Circuit High	P1B6B	Sets when cell voltage is detected above threshold	Cell Voltage AS	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AT Circuit Low	P1B6D	Sets when cell voltage is detected below threshold	Cell Voltage AT	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AT Circuit High	P1B6E	Sets when cell voltage is detected above threshold	Cell Voltage AT	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AU Circuit Low	P1B70	Sets when cell voltage is detected below threshold	Cell Voltage AU	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AU Circuit High	P1B71	Sets when cell voltage is detected above threshold	Cell Voltage AU	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AV Circuit Low	P1B73	Sets when cell voltage is detected below threshold	Cell Voltage AV	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AV Circuit High	P1B74	Sets when cell voltage is detected above threshold	Cell Voltage AV	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AW Circuit Low	P1B76	Sets when cell voltage is detected below threshold	Cell Voltage AW	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AW Circuit High	P1B77	Sets when cell voltage is detected above threshold	Cell Voltage AW	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AX Circuit Low	P1B79	Sets when cell voltage is detected below threshold	Cell Voltage AX	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AX Circuit High	P1B7A	Sets when cell voltage is detected above threshold	Cell Voltage AX	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AY Circuit Low	P1B7C	Sets when cell voltage is detected below threshold	Cell Voltage AY	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AY Circuit High	P1B7D	Sets when cell voltage is detected above threshold	Cell Voltage AY	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AZ Circuit Low	P1B7F	Sets when cell voltage is detected below threshold	Cell Voltage AZ	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AZ Circuit High	P1B80	Sets when cell voltage is detected above threshold	Cell Voltage AZ	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BA Circuit Low	P1B82	Sets when cell voltage is detected below threshold	Cell Voltage BA	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BA Circuit High	P1B83	Sets when cell voltage is detected above threshold	Cell Voltage BA	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BB Circuit Low	P1B85	Sets when cell voltage is detected below threshold	Cell Voltage BB	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BB Circuit High	P1B86	Sets when cell voltage is detected above threshold	Cell Voltage BB	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BC Circuit Low	P1B88	Sets when cell voltage is detected below threshold	Cell Voltage BC	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BC Circuit High	P1B89	Sets when cell voltage is detected above threshold	Cell Voltage BC	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BD Circuit Low	P1B8B	Sets when cell voltage is detected below threshold	Cell Voltage BD	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BD Circuit High	P1B8C	Sets when cell voltage is detected above threshold	Cell Voltage BD	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BE Circuit Low	P1B8E	Sets when cell voltage is detected below threshold	Cell Voltage BE	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BE Circuit High	P1B8F	Sets when cell voltage is detected above threshold	Cell Voltage BE	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BF Circuit Low	P1B91	Sets when cell voltage is detected below threshold	Cell Voltage BF	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BF Circuit High	P1B92	Sets when cell voltage is detected above threshold	Cell Voltage BF	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BG Circuit Low	P1B94	Sets when cell voltage is detected below threshold	Cell Voltage BG	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BG Circuit High	P1B95	Sets when cell voltage is detected above threshold	Cell Voltage BG	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BH Circuit Low	P1B97	Sets when cell voltage is detected below threshold	Cell Voltage BH	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BH Circuit High	P1B98	Sets when cell voltage is detected above threshold	Cell Voltage BH	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BI Circuit Low	P1B9A	Sets when cell voltage is detected below threshold	Cell Voltage BI	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BI Circuit High	P1B9B	Sets when cell voltage is detected above threshold	Cell Voltage BI	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BJ Circuit Low	P1B9D	Sets when cell voltage is detected below threshold	Cell Voltage BJ	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BJ Circuit High	P1B9E	Sets when cell voltage is detected above threshold	Cell Voltage BJ	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BK Circuit Low	P1BA0	Sets when cell voltage is detected below threshold	Cell Voltage BK	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BK Circuit High	P1BA1	Sets when cell voltage is detected above threshold	Cell Voltage BK	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BL Circuit Low	P1BA3	Sets when cell voltage is detected below threshold	Cell Voltage BL	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BL Circuit High	P1BA4	Sets when cell voltage is detected above threshold	Cell Voltage BL	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BM Circuit Low	P1BA6	Sets when cell voltage is detected below threshold	Cell Voltage BM	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BM Circuit High	P1BA7	Sets when cell voltage is detected above threshold	Cell Voltage BM	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BN Circuit Low	P1BA9	Sets when cell voltage is detected below threshold	Cell Voltage BN	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BN Circuit High	P1BAA	Sets when cell voltage is detected above threshold	Cell Voltage BN	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BO Circuit Low	P1BAC	Sets when cell voltage is detected below threshold	Cell Voltage BO	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BO Circuit High	P1BAD	Sets when cell voltage is detected above threshold	Cell Voltage BO	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BP Circuit Low	P1BAF	Sets when cell voltage is detected below threshold	Cell Voltage BP	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BP Circuit High	P1BB0	Sets when cell voltage is detected above threshold	Cell Voltage BP	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BQ Circuit Low	P1BB2	Sets when cell voltage is detected below threshold	Cell Voltage BQ	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BQ Circuit High	P1BB3	Sets when cell voltage is detected above threshold	Cell Voltage BQ	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BR Circuit Low	P1BB5	Sets when cell voltage is detected below threshold	Cell Voltage BR	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BR Circuit High	P1BB6	Sets when cell voltage is detected above threshold	Cell Voltage BR	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BS Circuit Low	P1BB8	Sets when cell voltage is detected below threshold	Cell Voltage BS	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BS Circuit High	P1BB9	Sets when cell voltage is detected above threshold	Cell Voltage BS	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BT Circuit Low	P1BBB	Sets when cell voltage is detected below threshold	Cell Voltage BT	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BT Circuit High	P1BBC	Sets when cell voltage is detected above threshold	Cell Voltage BT	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BU Circuit Low	P1BBE	Sets when cell voltage is detected below threshold	Cell Voltage BU	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BU Circuit High	P1BBF	Sets when cell voltage is detected above threshold	Cell Voltage BU	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BV Circuit Low	P1BC1	Sets when cell voltage is detected below threshold	Cell Voltage BV	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BV Circuit High	P1BC2	Sets when cell voltage is detected above threshold	Cell Voltage BV	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BW Circuit Low	P1BC4	Sets when cell voltage is detected below threshold	Cell Voltage BW	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BW Circuit High	P1BC5	Sets when cell voltage is detected above threshold	Cell Voltage BW	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BX Circuit Low	P1BC7	Sets when cell voltage is detected below threshold	Cell Voltage BX	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BX Circuit High	P1BC8	Sets when cell voltage is detected above threshold	Cell Voltage BX	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BY Circuit Low	P1BCA	Sets when cell voltage is detected below threshold	Cell Voltage BY	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BY Circuit High	P1BCB	Sets when cell voltage is detected above threshold	Cell Voltage BY	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BZ Circuit Low	P1BCD	Sets when cell voltage is detected below threshold	Cell Voltage BZ	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BZ Circuit High	P1BCE	Sets when cell voltage is detected above threshold	Cell Voltage BZ	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CA Circuit Low	P1BD0	Sets when cell voltage is detected below threshold	Cell Voltage CA	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CA Circuit High	P1BD1	Sets when cell voltage is detected above threshold	Cell Voltage CA	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CB Circuit Low	P1BD3	Sets when cell voltage is detected below threshold	Cell Voltage CB	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CB Circuit High	P1BD4	Sets when cell voltage is detected above threshold	Cell Voltage CB	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CC Circuit Low	P1BD6	Sets when cell voltage is detected below threshold	Cell Voltage CC	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CC Circuit High	P1BD7	Sets when cell voltage is detected above threshold	Cell Voltage CC	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CD Circuit Low	P1BD9	Sets when cell voltage is detected below threshold	Cell Voltage CD	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CD Circuit High	P1BDA	Sets when cell voltage is detected above threshold	Cell Voltage CD	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CE Circuit Low	P1BDC	Sets when cell voltage is detected below threshold	Cell Voltage CE	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CE Circuit High	P1BDD	Sets when cell voltage is detected above threshold	Cell Voltage CE	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CF Circuit Low	P1BDF	Sets when cell voltage is detected below threshold	Cell Voltage CF	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CF Circuit High	P1BE0	Sets when cell voltage is detected above threshold	Cell Voltage CF	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CG Circuit Low	P1BE2	Sets when cell voltage is detected below threshold	Cell Voltage CF	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CG Circuit High	P1BE3	Sets when cell voltage is detected above threshold	Cell Voltage CG	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CH Circuit Low	P1BE5	Sets when cell voltage is detected below threshold	Cell Voltage CH	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CH Circuit High	P1BE6	Sets when cell voltage is detected above threshold	Cell Voltage CH	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CI Circuit Low	P1BE8	Sets when cell voltage is detected below threshold	Cell Voltage CI	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CI Circuit High	P1BE9	Sets when cell voltage is detected above threshold	Cell Voltage CI	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CJ Circuit Low	P1BEB	Sets when cell voltage is detected below threshold	Cell Voltage CJ	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CJ Circuit High	P1BEC	Sets when cell voltage is detected above threshold	Cell Voltage CJ	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CK Circuit Low	P1BEE	Sets when cell voltage is detected below threshold	Cell Voltage CK	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CK Circuit High	P1BEF	Sets when cell voltage is detected above threshold	Cell Voltage CK	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CL Circuit Low	P1BF1	Sets when cell voltage is detected below threshold	Cell Voltage CL	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CL Circuit High	P1BF2	Sets when cell voltage is detected above threshold	Cell Voltage CL	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CM Circuit Low	P1BF4	Sets when cell voltage is detected below threshold	Cell Voltage CM	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CM Circuit High	P1BF5	Sets when cell voltage is detected above threshold	Cell Voltage CM	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CN Circuit Low	P1BF7	Sets when cell voltage is detected below threshold	Cell Voltage CN	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CN Circuit High	P1BF8	Sets when cell voltage is detected above threshold	Cell Voltage CN	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CO Circuit Low	P1BFA	Sets when cell voltage is detected below threshold	Cell Voltage CO	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CO Circuit High	P1BFB	Sets when cell voltage is detected above threshold	Cell Voltage CO	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CP Circuit Low	P1BFD	Sets when cell voltage is detected below threshold	Cell Voltage CP	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CP Circuit High	P1BFE	Sets when cell voltage is detected above threshold	Cell Voltage CP	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CQ Circuit Low	P1E02	Sets when cell voltage is detected below threshold	Cell Voltage CQ	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CQ Circuit High	P1E03	Sets when cell voltage is detected above threshold	Cell Voltage CQ	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CR Circuit Low	P1E05	Sets when cell voltage is detected below threshold	Cell Voltage CR	<= 0.2V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CR Circuit High	P1E06	Sets when cell voltage is detected above threshold	Cell Voltage CR	>= 4.8V	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					2nd Protection Self Test Diagnostic	Not Running		
					No Active DTCs associated with Slave Cell Balancing Fault	Slave Cell Balancing Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AG Circuit	P1E4C	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AH Circuit	P1E4D	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AI Circuit	P1E4E	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AJ Circuit	P1E4F	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AK Circuit	P1E50	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AL Circuit	P1E51	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AM Circuit	P1E52	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AN Circuit	P1E53	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AO Circuit	P1E54	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AP Circuit	P1E55	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AQ Circuit	P1E56	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AR Circuit	P1E57	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AS Circuit	P1E58	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AT Circuit	P1E59	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AU Circuit	P1E5A	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AV Circuit	P1E5B	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AW Circuit	P1E5C	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AX Circuit	P1E5D	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AY Circuit	P1E5E	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense AZ Circuit	P1E5F	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BA Circuit	P1E60	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BB Circuit	P1E61	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BC Circuit	P1E62	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BD Circuit	P1E63	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BE Circuit	P1E64	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BF Circuit	P1E65	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BG Circuit	P1E66	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BH Circuit	P1E67	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BI Circuit	P1E68	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BJ Circuit	P1E69	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BK Circuit	P1E6A	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BL Circuit	P1E6B	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BM Circuit	P1E6C	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BN Circuit	P1E6D	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BO Circuit	P1E6E	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BP Circuit	P1E6F	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BQ Circuit	P1E70	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BR Circuit	P1E71	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BS Circuit	P1E72	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BT Circuit	P1E73	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BU Circuit	P1E74	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BV Circuit	P1E75	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BW Circuit	P1E76	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BX Circuit	P1E77	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BY Circuit	P1E78	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense BZ Circuit	P1E79	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CA Circuit	P1E7A	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CB Circuit	P1E7B	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CC Circuit	P1E7C	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CD Circuit	P1E7D	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CE Circuit	P1E7E	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CF Circuit	P1E7F	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CG Circuit	P1E80	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CH Circuit	P1E81	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CI Circuit	P1E82	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CJ Circuit	P1E83	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CK Circuit	P1E84	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CL Circuit	P1E85	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CM Circuit	P1E86	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CN Circuit	P1E87	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CO Circuit	P1E88	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CP Circuit	P1E89	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Voltage Sense CQ Circuit	P1E8A	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| or Cell V_gate on Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on Case 2: General Sense Line |1st Cell V – 2nd Cell V| Case 3: Common Power Line |1st Cell V – 2nd Cell V| Case 4: Common Ground Line |1st Cell V – 2nd Cell V| Case 5: Single Ground Line Affected Cell Voltage when Cell Balance Gate is on Case 6: Splice Line Splice Cap Voltage Case 7: BusBar Splice Splice Cap Voltage	Case 1: Cell V_On Gate < 36mV Case 2: |1st Cell V – 2nd Cell V| >= 1.3V Case 3 : |1st Cell V – 2nd Cell V| >= 1.3V Case 4 : |1st Cell V – 2nd Cell V| >= 1.3V Case 5 : Cell V_On Gate < 36mV Case 6: Splice Cap Voltage > 0.1V Case 7: Splice Cap Voltage > 0.5V	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Cell Balancing Fault No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Open Sense Line Fault Not Running Slave Cell Balancing Fault Slave Internal Performance Fault	0.8 seconds out of a 1.6 second window	Type A, 1 Trips

<table>
<tr><th>Component/ System</th><th>Fault Code</th><th>Monitor Strategy Description</th><th>Malfunction Criteria</th><th>Threshold Value</th><th>Secondary Parameters</th><th>Enable Conditions</th><th>Time Required</th><th>MIL Illum.</th></tr>
<tr><td>Hybrid Battery Voltage Sense CR Circuit</td><td>P1E8B</td><td>Sets when cell voltage is detected open</td><td>|1st Cell V – 2nd Cell V| or Cell V_gate on

Case 1: Single Power Line - Positive side Affected Cell Voltage when Cell Balance Gate is on

Case 2: General Sense Line
|1st Cell V – 2nd Cell V|

Case 3: Common Power Line
|1st Cell V – 2nd Cell V|

Case 4: Common Ground Line
|1st Cell V – 2nd Cell V|

Case 5: Single Ground Line
Affected Cell Voltage when Cell Balance Gate is on

Case 6: Splice Line
Splice Cap Voltage

Case 7: BusBar Splice
Splice Cap Voltage</td><td>Case 1:
Cell V_On Gate < 36mV

Case 2:
|1st Cell V – 2nd Cell V| >= 1.3V

Case 3 :
|1st Cell V – 2nd Cell V| >= 1.3V

Case 4 :
|1st Cell V – 2nd Cell V| >= 1.3V

Case 5 :
Cell V_On Gate < 36mV

Case 6:
Splice Cap Voltage > 0.1V

Case 7:
Splice Cap Voltage > 0.5V</td><td>Diagnostic Enable

Run/Crank, Accessory/ Run or HVEM EB Comm Enable

No Active DTCs associated with Slave Loss of Comm

No Active DTCs associated with Open Sense Line

2nd Protection Self Test Diagnostic

No Active DTCs associated with Slave Cell Balancing Fault

No Active DTCs associated with Slave Internal Performance</td><td>True

True

Slave Loss of Comm Fault

Open Sense Line Fault

Not Running

Slave Cell Balancing Fault

Slave Internal Performance Fault</td><td>0.8 seconds out of a 1.6 second window</td><td>Type A, 1 Trips</td></tr>
</table>

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module A Performance	P1E8E	Slave A fails for any of the following reasons: - Illegal Address Detect Reset - Illegal Opcode or Detect Reset - Watchdog Timer Reset - Loss of Clock Reset - Low Voltage Detect Reset - SPI Bus Malfunction (Read Value from Register Not Equal to Written Value)	If Watchdog resets controller OR Wrong value Read DTC Pass	1 All should pass	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	True True >= 9V	Instantaneous - all reasons other than SPI bus 500us - SPI Bus 500 us in 200ms window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module A RAM	P1E8F	RAM Read Write function Failed	RAM Read not Equal to RAM Written	1	Diagnostic Enable	True	At power up	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power up	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module A ROM	P1E90	ROM Checksum Method	ROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable	True	At power down	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module A KAM	P1E91	Using Checksum method	EEPROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable	True	At power down	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module A Cell Balancing Circuit	P1E92	Cell Balance switch output	Cell Balance switch is below threshold	Slaves in VTSM: 4.0V < Cell Voltage < 5.0V Threshold = 66mV 3.5V < Cell Voltage < 4.0V Threshold = 41mV 3.0V < Cell Voltage < 3.5V Threshold = 22mV Slaves in VITM: 3.8V < Cell Voltage < 5.0V Threshold = 44mV 3.0V < Cell Voltage < 3.8V Threshold = 23mV	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Internal Performance	True True U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624 Not Running P1E8E, P1E94, P1E9A, P1EA0, P1FBD, P1FBE, P1FBF, P1FC0, P1FC1, P1FC2, P3037, P3042	14 seconds in a 20 seconds window	Type A, 1 Trips
			DTC Pass	Threshold is above values specified for Cell Voltage specified			20 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module A Reference Voltage	P1E93	Sets when 5V Slave reference voltage is out of range	5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	5V Reference Value < 2.8V or 5V Reference Value > 3.2V	Diagnostic Enable	True	1.4 seconds in a 2.0 seconds window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
					2nd Protection Self Test Diagnostic	Not Running		
			DTC Pass	2.8V <= 5V Reference Value <= 3.2V			2.0 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module B Performance	P1E94	Slave A fails for any of the following reasons: - Illegal Address Detect Reset - Illegal Opcode or Detect Reset - Watchdog Timer Reset - Loss of Clock Reset - Low Voltage Detect Reset - SPI Bus Malfunction (Read Value from Register Not Equal to Written Value)	If Watchdog resets controller OR Wrong value Read DTC Pass	1 All should pass	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	True True >= 9V	Instantaneous - all reasons other than SPI bus 500us - SPI Bus 500 us in 200ms window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module B RAM	P1E95	RAM Read Write function Failed	RAM Read not Equal to RAM Written	1	Diagnostic Enable	True	At power up	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power up	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module B ROM	P1E96	ROM Checksum Method	ROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm	True Transitions: TRUE to FALSE (During VTSM A Power down) U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624	At power down	Type A, 1 Trips
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module B KAM	P1E97	Using Checksum method	EEPROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm	True Transitions: TRUE to FALSE (During VTSM A Power down) U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624	At power down	Type A, 1 Trips
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module B Cell Balancing Circuit	P1E98	Cell Balance switch output	Cell Balance switch is below threshold	Slaves in VTSM: 4.0V < Cell Voltage < 5.0V Threshold = 66mV 3.5V < Cell Voltage < 4.0V Threshold = 41mV 3.0V < Cell Voltage < 3.5V Threshold = 22mV Slaves in VITM: 3.8V < Cell Voltage < 5.0V Threshold = 44mV 3.0V < Cell Voltage < 3.8V Threshold = 23mV	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Internal Performance	True True U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624 Not Running P1E8E, P1E94, P1E9A, P1EA0, P1FBD, P1FBE, P1FBF, P1FC0, P1FC1, P1FC2, P3037, P3042	14 seconds in a 20 seconds window	Type A, 1 Trips
			DTC Pass	Threshold is above values specified for Cell Voltage specified			20 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module B Reference Voltage	P1E99	Sets when 5V Slave reference voltage is out of range	5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	5V Reference Value < 2.8V or 5V Reference Value > 3.2V	Diagnostic Enable	True	1.4 seconds in a 2.0 seconds window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
					2nd Protection Self Test Diagnostic	Not Running		
			DTC Pass	2.8V <= 5V Reference Value <= 3.2V			2.0 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module C Performance	P1E9A	Slave A fails for any of the following reasons: - Illegal Address Detect Reset - Illegal Opcode or Detect Reset - Watchdog Timer Reset - Loss of Clock Reset - Low Voltage Detect Reset - SPI Bus Malfunction (Read Value from Register Not Equal to Written Value)	If Watchdog resets controller OR Wrong value Read DTC Pass	1 All should pass	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	True True >= 9V	Instantaneous - all reasons other than SPI bus 500us - SPI Bus 500 us in 200ms window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module C RAM	P1E9B	RAM Read Write function Failed	RAM Read not Equal to RAM Written	1	Diagnostic Enable	True	At power up	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power up	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module C ROM	P1E9C	ROM Checksum Method	ROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm	True Transitions: TRUE to FALSE (During VTSM A Power down) U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624	At power down	Type A, 1 Trips
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module C KAM	P1E9D	Using Checksum method	EEPROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm	True Transitions: TRUE to FALSE (During VTSM A Power down) U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624	At power down	Type A, 1 Trips
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module C Cell Balancing Circuit	P1E9E	Cell Balance switch output	Cell Balance switch is below threshold	Slaves in VTSM: 4.0V < Cell Voltage < 5.0V Threshold = 66mV 3.5V < Cell Voltage < 4.0V Threshold = 41mV 3.0V < Cell Voltage < 3.5V Threshold = 22mV Slaves in VITM: 3.8V < Cell Voltage < 5.0V Threshold = 44mV 3.0V < Cell Voltage < 3.8V Threshold = 23mV	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Internal Performance	True True U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624 Not Running P1E8E, P1E94, P1E9A, P1EA0, P1FBD, P1FBE, P1FBF, P1FC0, P1FC1, P1FC2, P3037, P3042	14 seconds in a 20 seconds window	Type A, 1 Trips
			DTC Pass	Threshold is above values specified for Cell Voltage specified			20 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module C Reference Voltage	P1E9F	Sets when 5V Slave reference voltage is out of range	5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	5V Reference Value < 2.8V or 5V Reference Value > 3.2V	Diagnostic Enable	True	1.4 seconds in a 2.0 seconds window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
					2nd Protection Self Test Diagnostic	Not Running		
			DTC Pass	2.8V <= 5V Reference Value <= 3.2V			2.0 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module D Performance	P1EA0	Slave A fails for any of the following reasons: - Illegal Address Detect Reset - Illegal Opcode or Detect Reset - Watchdog Timer Reset - Loss of Clock Reset - Low Voltage Detect Reset - SPI Bus Malfunction (Read Value from Register Not Equal to Written Value)	If Watchdog resets controller OR Wrong value Read DTC Pass	1 All should pass	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	True True >= 9V	Instantaneous - all reasons other than SPI bus 500us - SPI Bus 500 us in 200ms window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module D RAM	P1EA1	RAM Read Write function Failed	RAM Read not Equal to RAM Written	1	Diagnostic Enable	True	At power up	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power up	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module D ROM	P1EA2	ROM Checksum Method	ROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable	True	At power down	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module D KAM	P1EA3	Using Checksum method	EEPROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm	True Transitions: TRUE to FALSE (During VTSM A Power down) U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624	At power down	Type A, 1 Trips
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery Interface Control Module D Cell Balancing Circuit	P1EA4	Cell Balance switch output	Cell Balance switch is below threshold	Slaves in VTSM: 4.0V < Cell Voltage < 5.0V Threshold = 66mV 3.5V < Cell Voltage < 4.0V Threshold = 41mV 3.0V < Cell Voltage < 3.5V Threshold = 22mV Slaves in VITM: 3.8V < Cell Voltage < 5.0V Threshold = 44mV 3.0V < Cell Voltage < 3.8V Threshold = 23mV	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Internal Performance	True True U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624 Not Running P1E8E, P1E94, P1E9A, P1EA0, P1FBD, P1FBE, P1FBF, P1FC0, P1FC1, P1FC2, P3037, P3042	14 seconds in a 20 seconds window	Type A, 1 Trips
			DTC Pass	Threshold is above values specified for Cell Voltage specified			20 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module D Reference Voltage	P1EA5	Sets when 5V Slave reference voltage is out of range	5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	5V Reference Value < 2.8V or 5V Reference Value > 3.2V	Diagnostic Enable	True	1.4 seconds in a 2.0 seconds window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
					2nd Protection Self Test Diagnostic	Not Running		
			DTC Pass	2.8V <= 5V Reference Value <= 3.2V			2.0 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module Software Incompatible	P1EB1	VITM Software version and Software version of ALL Slave modules are compatible	If any software version incompatibility is detected	1	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage No Active DTCs associated with Slave Loss of Comm	True True >= 9V Slave Loss of Comm Fault	At power up - 0.200 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module 1 Not Programmed	P1EB2	If Slave did not Program correctly	Wrong or No response from Slave indicating error in Programming	1	After Programming session Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	 True True >= 9V	As soon as Programming session ends	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module 2 Not Programmed	P1EB3	If Slave did not Program correctly	Wrong or No response from Slave indicating error in Programming	1	After Programming session		As soon as Programming session ends	Type A, 1 Trips
					Diagnostic Enable	True		
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM System Voltage	>= 9V		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module 3 Not Programmed	P1EB4	If Slave did not Program correctly	Wrong or No response from Slave indicating error in Programming	1	After Programming session		As soon as Programming session ends	Type A, 1 Trips
					Diagnostic Enable	True		
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM System Voltage	>= 9V		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module 4 Not Programmed	P1EB5	If Slave did not Program correctly	Wrong or No response from Slave indicating error in Programming	1	After Programming session		As soon as Programming session ends	Type A, 1 Trips
					Diagnostic Enable	True		
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM System Voltage	>= 9V		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Pack Current Sensor A Exceeded Learning Limit	P1EBA	If Pack Current Coarse Offset is out of range	|Pack Current Coarse Offset|	> 8A	Diagnostic Enable	True	At power up - 185 ms	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					High Voltage Contactor Status	Open		
					Charger Contactor Status	Open		
					VITM System Voltage	>= 9V		
					VITM Initalization Status Extended	Initializing		
					No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H	U185B		
			DTC Pass	|Pack Current Coarse Offset| <= 8A			At power up - 185 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Pack Current Sensor B Exceeded Learning Limit	P1EBB	If Pack Current Fine Offset is out of range	Pack Current Fine Offset	|Pack Current Fine Offset| > 2.5A	Diagnostic Enable	True	At power up - 185 ms	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					High Voltage Contactor Status	Open		
					Charger Contactor Status	Open		
					VITM System Voltage	>= 9V		
					VITM Initalization Status Extended	Initializing		
					No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H	U185B		
			DTC Pass	|Pack Current Fine Offset| <= 2.5A			At power up - 185 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module High Voltage Energy Management Communication Bus Enable Circuit Low	P1EC1	If High Voltage Energy Management (HVEM) Wakeup input state is below Threshold and HVEM Received Serial Data State = Active	HVEM Hardwire Input and Serial Data signal	HVEM Input < 5V	Diagnostic Enable	True	7 seconds in a 10 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM System Voltage	>= 9V		
					No Active DTC for Battery Energy Control Module System Voltage Low	P1A0C		
					No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus A (HS)	U2602		
			DTC Pass	HVEM Input >= 5V			10 Seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module A Processor Performance	P1F06	Compare Slave Reported Value with Expected Value in VITM	Reported Key Value by Slave is not correct	5	Diagnostic Enable	True	1 second in a 1.4 second window	Type A, 1 Trips
					Seed and Key Algorithm Calibration	True		
					Run/Crank, Accessory or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					2nd Protection Self Test Diagnostic	Not Running		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module B Processor Performance	P1F07	Compare Slave Reported Value with Expected Value in VITM	Reported Key Value by Slave is not correct	5	Diagnostic Enable	True	1 second in a 1.4 second window	Type A, 1 Trips
					Seed and Key Algorithm Calibration	True		
					Run/Crank, Accessory or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					2nd Protection Self Test Diagnostic	Not Running		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module C Processor Performance	P1F08	Compare Slave Reported Value with Expected Value in VITM	Reported Key Value by Slave is not correct	5	Diagnostic Enable	True	1 second in a 1.4 second window	Type A, 1 Trips
					Seed and Key Algorithm Calibration	True		
					Run/Crank, Accessory or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					2nd Protection Self Test Diagnostic	Not Running		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module D Processor Performance	P1F09	Compare Slave Reported Value with Expected Value in VITM	Reported Key Value by Slave is not correct	5	Diagnostic Enable	True	1 second in a 1.4 second window	Type A, 1 Trips
					Seed and Key Algorithm Calibration	True		
					Run/Crank, Accessory or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					2nd Protection Self Test Diagnostic	Not Running		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module E Not Programmed	P1FA6	If Slave did not Program correctly	Wrong or No response from Slave indicating error in Programming	1	After Programming session Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	 True True >= 9V	As soon as Programming session ends	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module F Not Programmed	P1FA7	If Slave did not Program correctly	Wrong or No response from Slave indicating error in Programming	1	After Programming session		As soon as Programming session ends	Type A, 1 Trips
					Diagnostic Enable	True		
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM System Voltage	>= 9V		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module G Not Programmed	P1FA8	If Slave did not Program correctly	Wrong or No response from Slave indicating error in Programming	1	After Programming session Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	 True True >= 9V	As soon as Programming session ends	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module H Not Programmed	P1FA9	If Slave did not Program correctly	Wrong or No response from Slave indicating error in Programming	1	After Programming session Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	 True True >= 9V	As soon as Programming session ends	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module I Not Programmed	P1FAA	If Slave did not Program correctly	Wrong or No response from Slave indicating error in Programming	1	After Programming session		As soon as Programming session ends	Type A, 1 Trips
					Diagnostic Enable	True		
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM System Voltage	>= 9V		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module J Not Programmed	P1FAB	If Slave did not Program correctly	Wrong or No response from Slave indicating error in Programming	1	After Programming session Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	 True True >= 9V	As soon as Programming session ends	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module E ROM	P1FAC	ROM Checksum Method	ROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable	True	At power down	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module G ROM	P1FAD	ROM Checksum Method	ROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable	True	At power down	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module H ROM	P1FAE	ROM Checksum Method	ROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable	True	At power down	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module I ROM	P1FAF	ROM Checksum Method	ROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable	True	At power down	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module J ROM	P1FB0	ROM Checksum Method	ROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm	True Transitions: TRUE to FALSE (During VTSM A Power down) U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624	At power down	Type A, 1 Trips
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module E RAM	P1FB1	RAM Read Write function Failed	RAM Read not Equal to RAM Written	1	Diagnostic Enable	True	At power up	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power up	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module F RAM	P1FB2	RAM Read Write function Failed	RAM Read not Equal to RAM Written	1	Diagnostic Enable	True	At power up	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power up	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module G RAM	P1FB3	RAM Read Write function Failed	RAM Read not Equal to RAM Written	1	Diagnostic Enable	True	At power up	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power up	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module H RAM	P1FB4	RAM Read Write function Failed	RAM Read not Equal to RAM Written	1	Diagnostic Enable	True	At power up	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power up	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module I RAM	P1FB5	RAM Read Write function Failed	RAM Read not Equal to RAM Written DTC Pass	1 1	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm	True Transitions: TRUE to FALSE (During VTSM A Power down) U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624	At power up At power up	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module J RAM	P1FB6	RAM Read Write function Failed	RAM Read not Equal to RAM Written	1	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm	True Transitions: TRUE to FALSE (During VTSM A Power down) U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624	At power up	Type A, 1 Trips
			DTC Pass	1			At power up	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module E KAM	P1FB7	Using Checksum method	EEPROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable	True	At power down	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module F KAM	P1FB8	Using Checksum method	EEPROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable	True	At power down	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module G KAM	P1FB9	Using Checksum method	EEPROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable	True	At power down	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module H KAM	P1FBA	Using Checksum method	EEPROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable	True	At power down	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module I KAM	P1FBB	Using Checksum method	EEPROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable	True	At power down	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module J KAM	P1FBC	Using Checksum method	EEPROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable	True	At power down	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module E Performance	P1FBD	Slave A fails for any of the following reasons: - Illegal Address Detect Reset - Illegal Opcode or Detect Reset - Watchdog Timer Reset - Loss of Clock Reset - Low Voltage Detect Reset - SPI Bus Malfunction (Read Value from Register Not Equal to Written Value)	If Watchdog resets controller OR Wrong value Read DTC Pass	1 All should pass	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	True True >= 9V	Instantaneous - all reasons other than SPI bus 500us - SPI Bus 500 us in 200ms window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module F Performance	P1FBE	Slave A fails for any of the following reasons: - Illegal Address Detect Reset - Illegal Opcode or Detect Reset - Watchdog Timer Reset - Loss of Clock Reset - Low Voltage Detect Reset - SPI Bus Malfunction (Read Value from Register Not Equal to Written Value)	If Watchdog resets controller OR Wrong value Read DTC Pass	1 All should pass	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	True True >= 9V	Instantaneous - all reasons other than SPI bus 500us - SPI Bus 500 us in 200ms window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module G Performance	P1FBF	Slave A fails for any of the following reasons: - Illegal Address Detect Reset - Illegal Opcode or Detect Reset - Watchdog Timer Reset - Loss of Clock Reset - Low Voltage Detect Reset - SPI Bus Malfunction (Read Value from Register Not Equal to Written Value)	If Watchdog resets controller OR Wrong value Read DTC Pass	1 All should pass	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	True True >= 9V	Instantaneous - all reasons other than SPI bus 500us - SPI Bus 500 us in 200ms window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module H Performance	P1FC0	Slave A fails for any of the following reasons: - Illegal Address Detect Reset - Illegal Opcode or Detect Reset - Watchdog Timer Reset - Loss of Clock Reset - Low Voltage Detect Reset - SPI Bus Malfunction (Read Value from Register Not Equal to Written Value)	If Watchdog resets controller OR Wrong value Read DTC Pass	1 All should pass	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	True True >= 9V	Instantaneous - all reasons other than SPI bus 500us - SPI Bus 500 us in 200ms window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module I Performance	P1FC1	Slave A fails for any of the following reasons: - Illegal Address Detect Reset - Illegal Opcode or Detect Reset - Watchdog Timer Reset - Loss of Clock Reset - Low Voltage Detect Reset - SPI Bus Malfunction (Read Value from Register Not Equal to Written Value)	If Watchdog resets controller OR Wrong value Read DTC Pass	1 All should pass	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	True True >= 9V	Instantaneous - all reasons other than SPI bus 500us - SPI Bus 500 us in 200ms window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module J Performance	P1FC2	Slave A fails for any of the following reasons: - Illegal Address Detect Reset - Illegal Opcode or Detect Reset - Watchdog Timer Reset - Loss of Clock Reset - Low Voltage Detect Reset - SPI Bus Malfunction (Read Value from Register Not Equal to Written Value)	If Watchdog resets controller OR Wrong value Read DTC Pass	1 All should pass	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	True True >= 9V	Instantaneous - all reasons other than SPI bus 500us - SPI Bus 500 us in 200ms window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module E Reference Voltage	P1FC3	Sets when 5V Slave reference voltage is out of range	5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	5V Reference Value < 2.8V or 5V Reference Value > 3.2V	Diagnostic Enable	True	1.4 seconds in a 2.0 seconds window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
					2nd Protection Self Test Diagnostic	Not Running		
			DTC Pass	2.8V <= 5V Reference Value <= 3.2V			2.0 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module F Reference Voltage	P1FC4	Sets when 5V Slave reference voltage is out of range	5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	5V Reference Value < 2.8V or 5V Reference Value > 3.2V	Diagnostic Enable	True	1.4 seconds in a 2.0 seconds window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
					2nd Protection Self Test Diagnostic	Not Running		
			DTC Pass	2.8V <= 5V Reference Value <= 3.2V			2.0 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module G Reference Voltage	P1FC5	Sets when 5V Slave reference voltage is out of range	5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	5V Reference Value < 2.8V or 5V Reference Value > 3.2V	Diagnostic Enable	True	1.4 seconds in a 2.0 seconds window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
					2nd Protection Self Test Diagnostic	Not Running		
			DTC Pass	2.8V <= 5V Reference Value <= 3.2V			2.0 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module H Reference Voltage	P1FC6	Sets when 5V Slave reference voltage is out of range	5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	5V Reference Value < 2.8V or 5V Reference Value > 3.2V	Diagnostic Enable	True	1.4 seconds in a 2.0 seconds window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
					2nd Protection Self Test Diagnostic	Not Running		
			DTC Pass	2.8V <= 5V Reference Value <= 3.2V			2.0 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module I Reference Voltage	P1FC7	Sets when 5V Slave reference voltage is out of range	5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	5V Reference Value < 2.8V or 5V Reference Value > 3.2V	Diagnostic Enable	True	1.4 seconds in a 2.0 seconds window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
					2nd Protection Self Test Diagnostic	Not Running		
			DTC Pass	2.8V <= 5V Reference Value <= 3.2V			2.0 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module J Reference Voltage	P1FC8	Sets when 5V Slave reference voltage is out of range	5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	5V Reference Value < 2.8V or 5V Reference Value > 3.2V	Diagnostic Enable	True	1.4 seconds in a 2.0 seconds window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
					2nd Protection Self Test Diagnostic	Not Running		
			DTC Pass	2.8V <= 5V Reference Value <= 3.2V			2.0 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module E Cell Balancing Circuit	P1FC9	Cell Balance switch output	Cell Balance switch is below threshold	Slaves in VTSM: 4.0V < Cell Voltage < 5.0V Threshold = 66mV 3.5V < Cell Voltage < 4.0V Threshold = 41mV 3.0V < Cell Voltage < 3.5V Threshold = 22mV Slaves in VITM: 3.8V < Cell Voltage < 5.0V Threshold = 44mV 3.0V < Cell Voltage < 3.8V Threshold = 23mV	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Internal Performance	True True U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624 Not Running P1E8E, P1E94, P1E9A, P1EA0, P1FBD, P1FBE, P1FBF, P1FC0, P1FC1, P1FC2, P3037, P3042	14 seconds in a 20 seconds window	Type A, 1 Trips
			DTC Pass	Threshold is above values specified for Cell Voltage specified			20 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module F Cell Balancing Circuit	P1FCA	Cell Balance switch output	Cell Balance switch is below threshold	Slaves in VTSM: 4.0V < Cell Voltage < 5.0V Threshold = 66mV 3.5V < Cell Voltage < 4.0V Threshold = 41mV 3.0V < Cell Voltage < 3.5V Threshold = 22mV Slaves in VITM: 3.8V < Cell Voltage < 5.0V Threshold = 44mV 3.0V < Cell Voltage < 3.8V Threshold = 23mV	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Internal Performance	True True U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624 Not Running P1E8E, P1E94, P1E9A, P1EA0, P1FBD, P1FBE, P1FBF, P1FC0, P1FC1, P1FC2, P3037, P3042	14 seconds in a 20 seconds window	Type A, 1 Trips
			DTC Pass	Threshold is above values specified for Cell Voltage specified			20 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module G Cell Balancing Circuit	P1FCB	Cell Balance switch output	Cell Balance switch is below threshold	Slaves in VTSM: 4.0V < Cell Voltage < 5.0V Threshold = 66mV 3.5V < Cell Voltage < 4.0V Threshold = 41mV 3.0V < Cell Voltage < 3.5V Threshold = 22mV Slaves in VITM: 3.8V < Cell Voltage < 5.0V Threshold = 44mV 3.0V < Cell Voltage < 3.8V Threshold = 23mV	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Internal Performance	True True U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624 Not Running P1E8E, P1E94, P1E9A, P1EA0, P1FBD, P1FBE, P1FBF, P1FC0, P1FC1, P1FC2, P3037, P3042	14 seconds in a 20 seconds window	Type A, 1 Trips
			DTC Pass	Threshold is above values specified for Cell Voltage specified			20 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module H Cell Balancing Circuit	P1FCC	Cell Balance switch output	Cell Balance switch is below threshold	Slaves in VTSM: 4.0V < Cell Voltage < 5.0V Threshold = 66mV 3.5V < Cell Voltage < 4.0V Threshold = 41mV 3.0V < Cell Voltage < 3.5V Threshold = 22mV Slaves in VITM: 3.8V < Cell Voltage < 5.0V Threshold = 44mV 3.0V < Cell Voltage < 3.8V Threshold = 23mV	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Internal Performance	True True U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624 Not Running P1E8E, P1E94, P1E9A, P1EA0, P1FBD, P1FBE, P1FBF, P1FC0, P1FC1, P1FC2, P3037, P3042	14 seconds in a 20 seconds window	Type A, 1 Trips
			DTC Pass	Threshold is above values specified for Cell Voltage specified			20 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module I Cell Balancing Circuit	P1FCD	Cell Balance switch output	Cell Balance switch is below threshold	Slaves in VTSM: 4.0V < Cell Voltage < 5.0V Threshold = 66mV 3.5V < Cell Voltage < 4.0V Threshold = 41mV 3.0V < Cell Voltage < 3.5V Threshold = 22mV Slaves in VITM: 3.8V < Cell Voltage < 5.0V Threshold = 44mV 3.0V < Cell Voltage < 3.8V Threshold = 23mV	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Internal Performance	True True U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624 Not Running P1E8E, P1E94, P1E9A, P1EA0, P1FBD, P1FBE, P1FBF, P1FC0, P1FC1, P1FC2, P3037, P3042	14 seconds in a 20 seconds window	Type A, 1 Trips
			DTC Pass	Threshold is above values specified for Cell Voltage specified			20 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module J Cell Balancing Circuit	P1FCE	Cell Balance switch output	Cell Balance switch is below threshold	Slaves in VTSM: 4.0V < Cell Voltage < 5.0V Threshold = 66mV 3.5V < Cell Voltage < 4.0V Threshold = 41mV 3.0V < Cell Voltage < 3.5V Threshold = 22mV Slaves in VITM: 3.8V < Cell Voltage < 5.0V Threshold = 44mV 3.0V < Cell Voltage < 3.8V Threshold = 23mV	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Internal Performance	True True U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624 Not Running P1E8E, P1E94, P1E9A, P1EA0, P1FBD, P1FBE, P1FBF, P1FC0, P1FC1, P1FC2, P3037, P3042	14 seconds in a 20 seconds window	Type A, 1 Trips
			DTC Pass	Threshold is above values specified for Cell Voltage specified			20 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module E Processor Performance	P1FCF	Compare Slave Reported Value with Expected Value in VITM	Reported Key Value by Slave is not correct	5	Diagnostic Enable	True	1 second in a 1.4 second window	Type A, 1 Trips
					Seed and Key Algorithm Calibration	True		
					Run/Crank, Accessory or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					2nd Protection Self Test Diagnostic	Not Running		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module F Processor Performance	P1FD0	Compare Slave Reported Value with Expected Value in VITM	Reported Key Value by Slave is not correct	5	Diagnostic Enable Seed and Key Algorithm Calibration Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm 2nd Protection Self Test Diagnostic	True True True Slave Loss of Comm Fault Not Running	1 second in a 1.4 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module G Processor Performance	P1FD1	Compare Slave Reported Value with Expected Value in VITM	Reported Key Value by Slave is not correct	5	Diagnostic Enable	True	1 second in a 1.4 second window	Type A, 1 Trips
					Seed and Key Algorithm Calibration	True		
					Run/Crank, Accessory or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					2nd Protection Self Test Diagnostic	Not Running		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module H Processor Performance	P1FD2	Compare Slave Reported Value with Expected Value in VITM	Reported Key Value by Slave is not correct	5	Diagnostic Enable	True	1 second in a 1.4 second window	Type A, 1 Trips
					Seed and Key Algorithm Calibration	True		
					Run/Crank, Accessory or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					2nd Protection Self Test Diagnostic	Not Running		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module I Processor Performance	P1FD3	Compare Slave Reported Value with Expected Value in VITM	Reported Key Value by Slave is not correct	5	Diagnostic Enable Seed and Key Algorithm Calibration Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm 2nd Protection Self Test Diagnostic	True True True Slave Loss of Comm Fault Not Running	1 second in a 1.4 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module J Processor Performance	P1FD4	Compare Slave Reported Value with Expected Value in VITM	Reported Key Value by Slave is not correct	5	Diagnostic Enable	True	1 second in a 1.4 second window	Type A, 1 Trips
					Seed and Key Algorithm Calibration	True		
					Run/Crank, Accessory or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					2nd Protection Self Test Diagnostic	Not Running		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module A Voltage Sensor Circuit Low	P1FD5	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	< 1.5V (ADC Count < 123)	Diagnostic Enable Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Slave Internal Performance Fault	1.4 second in a 2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module B Voltage Sensor Circuit Low	P1FD6	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	< 1.5V (ADC Count < 123)	Diagnostic Enable Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Slave Internal Performance Fault	1.4 second in a 2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module C Voltage Sensor Circuit Low	P1FD7	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	< 1.5V (ADC Count < 123)	Diagnostic Enable Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Slave Internal Performance Fault	1.4 second in a 2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module D Voltage Sensor Circuit Low	P1FD8	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	< 1.5V (ADC Count < 123)	Diagnostic Enable Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Slave Internal Performance Fault	1.4 second in a 2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module E Voltage Sensor Circuit Low	P1FD9	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	< 1.5V (ADC Count < 123)	Diagnostic Enable Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Slave Internal Performance Fault	1.4 second in a 2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module F Voltage Sensor Circuit Low	P1FDA	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	< 1.5V (ADC Count < 123)	Diagnostic Enable Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Slave Internal Performance Fault	1.4 second in a 2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module G Voltage Sensor Circuit Low	P1FDB	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	< 1.5V (ADC Count < 123)	Diagnostic Enable Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Slave Internal Performance Fault	1.4 second in a 2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module H Voltage Sensor Circuit Low	P1FDC	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	< 1.5V (ADC Count < 123)	Diagnostic Enable Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Slave Internal Performance Fault	1.4 second in a 2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module I Voltage Sensor Circuit Low	P1FDD	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	< 1.5V (ADC Count < 123)	Diagnostic Enable Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Slave Internal Performance Fault	1.4 second in a 2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module J Voltage Sensor Circuit Low	P1FDE	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	< 1.5V (ADC Count < 123)	Diagnostic Enable Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Slave Internal Performance Fault	1.4 second in a 2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module A Voltage Sensor Circuit High	P1FDF	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	> 48.5V (ADC Count > 3972)	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module B Voltage Sensor Circuit High	P1FE0	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	> 48.5V (ADC Count > 3972)	Diagnostic Enable Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Slave Internal Performance Fault	1.4 second in a 2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module C Voltage Sensor Circuit High	P1FE1	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	> 48.5V (ADC Count > 3972)	Diagnostic Enable Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Slave Internal Performance Fault	1.4 second in a 2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module D Voltage Sensor Circuit High	P1FE2	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	> 48.5V (ADC Count > 3972)	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module E Voltage Sensor Circuit High	P1FE3	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	> 48.5V (ADC Count > 3972)	Diagnostic Enable Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Slave Internal Performance Fault	1.4 second in a 2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module F Voltage Sensor Circuit High	P1FE4	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	> 48.5V (ADC Count > 3972)	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module G Voltage Sensor Circuit High	P1FE5	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	> 48.5V (ADC Count > 3972)	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module H Voltage Sensor Circuit High	P1FE6	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	> 48.5V (ADC Count > 3972)	Diagnostic Enable Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Slave Internal Performance Fault	1.4 second in a 2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module I Voltage Sensor Circuit High	P1FE7	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	> 48.5V (ADC Count > 3972)	Diagnostic Enable Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Slave Internal Performance Fault	1.4 second in a 2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module J Voltage Sensor Circuit High	P1FE8	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	> 48.5V (ADC Count > 3972)	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module A Voltage Sensor Circuit Range/ Performance	P1FE9	Compares Slave Module Voltage to sum of Cells measured by Slave	abs(Slave Module Voltage - Slave sum of Cell Voltages)	6-cell Slave Module: > 512mV (ADC Count > 422) 7-cell Slave Module: > 557mV (ADC Count > 445) 8-cell Slave Module: > 636mV (ADC Count > 521) 9-cell Slave Module: > 660mV (ADC Count > 540)	Diagnostic Enable No Active DTCs associated with Cell Voltage Ckt Low Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line No Active DTCs associated with Cell Voltage Ckt High No Active DTCs associated with Slave Internal Performance	True Cell Voltage Ckt Low True Slave Loss of Comm Fault Open Sense Line Fault Cell Voltage Ckt High Slave Internal Performance Fault	3 seconds in a 4 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module B Voltage Sensor Circuit Range/ Performance	P1FEA	Compares Slave Module Voltage to sum of Cells measured by Slave	abs(Slave Module Voltage - Slave sum of Cell Voltages)	6-cell Slave Module: > 512mV (ADC Count > 422) 7-cell Slave Module: > 557mV (ADC Count > 445) 8-cell Slave Module: > 636mV (ADC Count > 521) 9-cell Slave Module: > 660mV (ADC Count > 540)	Diagnostic Enable No Active DTCs associated with Cell Voltage Ckt Low Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line No Active DTCs associated with Cell Voltage Ckt High No Active DTCs associated with Slave Internal Performance	True Cell Voltage Ckt Low True Slave Loss of Comm Fault Open Sense Line Fault Cell Voltage Ckt High Slave Internal Performance Fault	3 seconds in a 4 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module C Voltage Sensor Circuit Range/ Performance	P1FEB	Compares Slave Module Voltage to sum of Cells measured by Slave	abs(Slave Module Voltage - Slave sum of Cell Voltages)	6-cell Slave Module: > 512mV (ADC Count > 422) 7-cell Slave Module: > 557mV (ADC Count > 445) 8-cell Slave Module: > 636mV (ADC Count > 521) 9-cell Slave Module: > 660mV (ADC Count > 540)	Diagnostic Enable No Active DTCs associated with Cell Voltage Ckt Low Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line No Active DTCs associated with Cell Voltage Ckt High No Active DTCs associated with Slave Internal Performance	True Cell Voltage Ckt Low True Slave Loss of Comm Fault Open Sense Line Fault Cell Voltage Ckt High Slave Internal Performance Fault	3 seconds in a 4 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module D Voltage Sensor Circuit Range/ Performance	P1FEC	Compares Slave Module Voltage to sum of Cells measured by Slave	abs(Slave Module Voltage - Slave sum of Cell Voltages)	6-cell Slave Module: > 512mV (ADC Count > 422) 7-cell Slave Module: > 557mV (ADC Count > 445) 8-cell Slave Module: > 636mV (ADC Count > 521) 9-cell Slave Module: > 660mV (ADC Count > 540)	Diagnostic Enable No Active DTCs associated with Cell Voltage Ckt Low Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line No Active DTCs associated with Cell Voltage Ckt High No Active DTCs associated with Slave Internal Performance	True Cell Voltage Ckt Low True Slave Loss of Comm Fault Open Sense Line Fault Cell Voltage Ckt High Slave Internal Performance Fault	3 seconds in a 4 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module E Voltage Sensor Circuit Range/ Performance	P1FED	Compares Slave Module Voltage to sum of Cells measured by Slave	abs(Slave Module Voltage - Slave sum of Cell Voltages)	6-cell Slave Module: > 512mV (ADC Count > 422) 7-cell Slave Module: > 557mV (ADC Count > 445) 8-cell Slave Module: > 636mV (ADC Count > 521) 9-cell Slave Module: > 660mV (ADC Count > 540)	Diagnostic Enable	True	3 seconds in a 4 second window	Type A, 1 Trips
					No Active DTCs associated with Cell Voltage Ckt Low	Cell Voltage Ckt Low		
					Run/Crank, Accessory or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					No Active DTCs associated with Cell Voltage Ckt High	Cell Voltage Ckt High		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module F Voltage Sensor Circuit Range/ Performance	P1FEE	Compares Slave Module Voltage to sum of Cells measured by Slave	abs(Slave Module Voltage - Slave sum of Cell Voltages)	6-cell Slave Module: > 512mV (ADC Count > 422) 7-cell Slave Module: > 557mV (ADC Count > 445) 8-cell Slave Module: > 636mV (ADC Count > 521) 9-cell Slave Module: > 660mV (ADC Count > 540)	Diagnostic Enable No Active DTCs associated with Cell Voltage Ckt Low Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line No Active DTCs associated with Cell Voltage Ckt High No Active DTCs associated with Slave Internal Performance	True Cell Voltage Ckt Low True Slave Loss of Comm Fault Open Sense Line Fault Cell Voltage Ckt High Slave Internal Performance Fault	3 seconds in a 4 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module G Voltage Sensor Circuit Range/ Performance	P1FEF	Compares Slave Module Voltage to sum of Cells measured by Slave	abs(Slave Module Voltage - Slave sum of Cell Voltages)	6-cell Slave Module: > 512mV (ADC Count > 422) 7-cell Slave Module: > 557mV (ADC Count > 445) 8-cell Slave Module: > 636mV (ADC Count > 521) 9-cell Slave Module: > 660mV (ADC Count > 540)	Diagnostic Enable No Active DTCs associated with Cell Voltage Ckt Low Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line No Active DTCs associated with Cell Voltage Ckt High No Active DTCs associated with Slave Internal Performance	True Cell Voltage Ckt Low True Slave Loss of Comm Fault Open Sense Line Fault Cell Voltage Ckt High Slave Internal Performance Fault	3 seconds in a 4 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module H Voltage Sensor Circuit Range/ Performance	P1FF0	Compares Slave Module Voltage to sum of Cells measured by Slave	abs(Slave Module Voltage - Slave sum of Cell Voltages)	6-cell Slave Module: > 512mV (ADC Count > 422) 7-cell Slave Module: > 557mV (ADC Count > 445) 8-cell Slave Module: > 636mV (ADC Count > 521) 9-cell Slave Module: > 660mV (ADC Count > 540)	Diagnostic Enable	True	3 seconds in a 4 second window	Type A, 1 Trips
					No Active DTCs associated with Cell Voltage Ckt Low	Cell Voltage Ckt Low		
					Run/Crank, Accessory or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Open Sense Line	Open Sense Line Fault		
					No Active DTCs associated with Cell Voltage Ckt High	Cell Voltage Ckt High		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module I Voltage Sensor Circuit Range/ Performance	P1FF1	Compares Slave Module Voltage to sum of Cells measured by Slave	abs(Slave Module Voltage - Slave sum of Cell Voltages)	6-cell Slave Module: > 512mV (ADC Count > 422) 7-cell Slave Module: > 557mV (ADC Count > 445) 8-cell Slave Module: > 636mV (ADC Count > 521) 9-cell Slave Module: > 660mV (ADC Count > 540)	Diagnostic Enable No Active DTCs associated with Cell Voltage Ckt Low Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line No Active DTCs associated with Cell Voltage Ckt High No Active DTCs associated with Slave Internal Performance	True Cell Voltage Ckt Low True Slave Loss of Comm Fault Open Sense Line Fault Cell Voltage Ckt High Slave Internal Performance Fault	3 seconds in a 4 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module J Voltage Sensor Circuit Range/ Performance	P1FF2	Compares Slave Module Voltage to sum of Cells measured by Slave	abs(Slave Module Voltage - Slave sum of Cell Voltages)	6-cell Slave Module: > 512mV (ADC Count > 422) 7-cell Slave Module: > 557mV (ADC Count > 445) 8-cell Slave Module: > 636mV (ADC Count > 521) 9-cell Slave Module: > 660mV (ADC Count > 540)	Diagnostic Enable No Active DTCs associated with Cell Voltage Ckt Low Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line No Active DTCs associated with Cell Voltage Ckt High No Active DTCs associated with Slave Internal Performance	True Cell Voltage Ckt Low True Slave Loss of Comm Fault Open Sense Line Fault Cell Voltage Ckt High Slave Internal Performance Fault	3 seconds in a 4 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module F ROM	P1FF3	ROM Checksum Method	ROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable	True	At power down	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module K Not Programmed	P3030	If Slave did not Program correctly	Wrong or No response from Slave indicating error in Programming	1	After Programming session Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	 True True >= 9V	As soon as Programming session ends	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module K ROM	P3031	ROM Checksum Method	ROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable	True	At power down	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module K RAM	P3032	RAM Read Write function Failed	RAM Read not Equal to RAM Written	1	Diagnostic Enable	True	At power up	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power up	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module K KAM	P3033	Using Checksum method	EEPROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable	True	At power down	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module K Performance	P3034	Slave A fails for any of the following reasons: - Illegal Address Detect Reset - Illegal Opcode or Detect Reset - Watchdog Timer Reset - Loss of Clock Reset - Low Voltage Detect Reset - SPI Bus Malfunction (Read Value from Register Not Equal to Written Value)	If Watchdog resets controller OR Wrong value Read DTC Pass	1 All should pass	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	True True >= 9V	Instantaneous - all reasons other than SPI bus 500us - SPI Bus 500 us in 200ms window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module K Reference Voltage	P3035	Sets when 5V Slave reference voltage is out of range	5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	5V Reference Value < 2.8V or 5V Reference Value > 3.2V	Diagnostic Enable	True	1.4 seconds in a 2.0 seconds window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
					2nd Protection Self Test Diagnostic	Not Running		
			DTC Pass	2.8V <= 5V Reference Value <= 3.2V			2.0 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module K Cell Balancing Circuit	P3036	Cell Balance switch output	Cell Balance switch is below threshold	Slaves in VTSM: 4.0V < Cell Voltage < 5.0V Threshold = 66mV 3.5V < Cell Voltage < 4.0V Threshold = 41mV 3.0V < Cell Voltage < 3.5V Threshold = 22mV Slaves in VITM: 3.8V < Cell Voltage < 5.0V Threshold = 44mV 3.0V < Cell Voltage < 3.8V Threshold = 23mV	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Internal Performance	True True U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624 Not Running P1E8E, P1E94, P1E9A, P1EA0, P1FBD, P1FBE, P1FBF, P1FC0, P1FC1, P1FC2, P3037, P3042	14 seconds in a 20 seconds window	Type A, 1 Trips
			DTC Pass	Threshold is above values specified for Cell Voltage specified			20 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module K Processor Performance	P3037	Compare Slave Reported Value with Expected Value in VITM	Reported Key Value by Slave is not correct	5	Diagnostic Enable	True	1 second in a 1.4 second window	Type A, 1 Trips
					Seed and Key Algorithm Calibration	True		
					Run/Crank, Accessory or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					2nd Protection Self Test Diagnostic	Not Running		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module K Voltage Sensor Circuit Low	P3038	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	< 1.5V (ADC Count < 123)	Diagnostic Enable Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Slave Internal Performance Fault	1.4 second in a 2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module K Voltage Sensor Circuit High	P3039	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	> 48.5V (ADC Count > 3972)	Diagnostic Enable	True	1.4 second in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					No Active DTCs associated with Slave Internal Performance	Slave Internal Performance Fault		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module K Voltage Sensor Circuit Range/ Performance	P303A	Compares Slave Module Voltage to sum of Cells measured by Slave	abs(Slave Module Voltage - Slave sum of Cell Voltages)	6-cell Slave Module: > 512mV (ADC Count > 422) 7-cell Slave Module: > 557mV (ADC Count > 445) 8-cell Slave Module: > 636mV (ADC Count > 521) 9-cell Slave Module: > 660mV (ADC Count > 540)	Diagnostic Enable No Active DTCs associated with Cell Voltage Ckt Low Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line No Active DTCs associated with Cell Voltage Ckt High No Active DTCs associated with Slave Internal Performance	True Cell Voltage Ckt Low True Slave Loss of Comm Fault Open Sense Line Fault Cell Voltage Ckt High Slave Internal Performance Fault	3 seconds in a 4 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module L Not Programmed	P303B	If Slave did not Program correctly	Wrong or No response from Slave indicating error in Programming	1	After Programming session		As soon as Programming session ends	Type A, 1 Trips
					Diagnostic Enable	True		
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM System Voltage	>= 9V		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module L ROM	P303C	ROM Checksum Method	ROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm	True Transitions: TRUE to FALSE (During VTSM A Power down) U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624	At power down	Type A, 1 Trips
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module L RAM	P303D	RAM Read Write function Failed	RAM Read not Equal to RAM Written	1	Diagnostic Enable	True	At power up	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	Transitions: TRUE to FALSE (During VTSM A Power down)		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
			DTC Pass	1			At power up	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module L KAM	P303E	Using Checksum method	EEPROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm	True Transitions: TRUE to FALSE (During VTSM A Power down) U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624	At power down	Type A, 1 Trips
			DTC Pass	1			At power down	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module L Performance	P303F	Slave A fails for any of the following reasons: - Illegal Address Detect Reset - Illegal Opcode or Detect Reset - Watchdog Timer Reset - Loss of Clock Reset - Low Voltage Detect Reset - SPI Bus Malfunction (Read Value from Register Not Equal to Written Value)	If Watchdog resets controller OR Wrong value Read DTC Pass	1 All should pass	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	True True >= 9V	Instantaneous - all reasons other than SPI bus 500us - SPI Bus 500 us in 200ms window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module L Reference Voltage	P3040	Sets when 5V Slave reference voltage is out of range	5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	5V Reference Value < 2.8V or 5V Reference Value > 3.2V	Diagnostic Enable	True	1.4 seconds in a 2.0 seconds window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624		
					2nd Protection Self Test Diagnostic	Not Running		
			DTC Pass	2.8V <= 5V Reference Value <= 3.2V			2.0 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module L Cell Balancing Circuit	P3041	Cell Balance switch output	Cell Balance switch is below threshold	Slaves in VTSM: 4.0V < Cell Voltage < 5.0V Threshold = 66mV 3.5V < Cell Voltage < 4.0V Threshold = 41mV 3.0V < Cell Voltage < 3.5V Threshold = 22mV Slaves in VITM: 3.8V < Cell Voltage < 5.0V Threshold = 44mV 3.0V < Cell Voltage < 3.8V Threshold = 23mV	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm 2nd Protection Self Test Diagnostic No Active DTCs associated with Slave Internal Performance	True True U2603, U2604, U2605, U2606, U2617, U2618, U2619, U2620, U2621, U2622, U2623, U2624 Not Running P1E8E, P1E94, P1E9A, P1EA0, P1FBD, P1FBE, P1FBF, P1FC0, P1FC1, P1FC2, P3037, P3042	14 seconds in a 20 seconds window	Type A, 1 Trips
			DTC Pass	Threshold is above values specified for Cell Voltage specified			20 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module L Processor Performance	P3042	Compare Slave Reported Value with Expected Value in VITM	Reported Key Value by Slave is not correct	5	Diagnostic Enable	True	1 second in a 1.4 second window	Type A, 1 Trips
					Seed and Key Algorithm Calibration	True		
					Run/Crank, Accessory or HVEM EB Comm Enable	True		
					No Active DTCs associated with Slave Loss of Comm	Slave Loss of Comm Fault		
					2nd Protection Self Test Diagnostic	Not Running		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module L Voltage Sensor Circuit Low	P3043	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	< 1.5V (ADC Count < 123)	Diagnostic Enable Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Slave Internal Performance Fault	1.4 second in a 2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module L Voltage Sensor Circuit High	P3044	Sets when Module Voltage Sensor falls below a Threshold	Module Voltage	> 48.5V (ADC Count > 3972)	Diagnostic Enable Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Slave Internal Performance	True True Slave Loss of Comm Fault Slave Internal Performance Fault	1.4 second in a 2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV Battery Interface Control Module L Voltage Sensor Circuit Range/ Performance	P3045	Compares Slave Module Voltage to sum of Cells measured by Slave	abs(Slave Module Voltage - Slave sum of Cell Voltages)	6-cell Slave Module: > 512mV (ADC Count > 422) 7-cell Slave Module: > 557mV (ADC Count > 445) 8-cell Slave Module: > 636mV (ADC Count > 521) 9-cell Slave Module: > 660mV (ADC Count > 540)	Diagnostic Enable No Active DTCs associated with Cell Voltage Ckt Low Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with Slave Loss of Comm No Active DTCs associated with Open Sense Line No Active DTCs associated with Cell Voltage Ckt High No Active DTCs associated with Slave Internal Performance	True Cell Voltage Ckt Low True Slave Loss of Comm Fault Open Sense Line Fault Cell Voltage Ckt High Slave Internal Performance Fault	3 seconds in a 4 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Communication Bus H Off	U1806	If Bus Off is Detected	Transmit Error Counter (TEC)	TEC > 255	Diagnostic Enable Run/Crank or Accessory/ Run VITM System Voltage	True True >= 9V	1.4 seconds in a 2 seconds window	Type B, 2 Trips
			DTC Pass	TEC < 255			2 Seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Communication Bus A Off	U180B	If Bus Off is Detected	Transmit Error Counter (TEC)	TEC > 255	Diagnostic Enable	True	1.4 seconds in a 2 seconds window	Type B, 2 Trips
					Run/Crank or Accessory/ Run	True		
					VITM System Voltage	>= 9V		
			DTC Pass	TEC < 255			2 Seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Lost Communication with Hybrid Powertrain Control Module B on Bus H	U185B	If message $20A OR $20E OR $304 are not Received by VITM	Loss of Supervision with VICM module on Charger CAN bus	# of consecutive $20A message not received > 5 OR # of consecutive $20E message not received > 4 OR # of consecutive $304 message not received >4	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable VITM System Voltage	True True >= 9V	700 ms in a 1 second window	Type B, 2 Trips
			DTC Pass	1			1 Second	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Lost Communication With Communication Gateway Module	U1862	If message $3CF is not Received by VITM	Loss of Supervision with CGM module on HS GMLAN bus	# of consecutive $3CF message not received > 10	Diagnostic Enable Run/Crank or Accessory/ Run VITM System Voltage Flashing Programming Session (Other Modules or itself) Mode $28 Executed on HS Bus	TRUE TRUE >= 9V Completed FALSE	1.4 seconds in a 2 second window Frequency- 100 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Lost Communication With Hybrid Powertrain Control Module	U1885	If message $1DF is not Received by VITM	Loss of Supervision with HCP module on HS GMLAN bus	# of consecutive $1DF message not received > 10	Diagnostic Enable	True	1.75 seconds in a 2 second window	Type B, 2 Trips
					Run/Crank or Accessory/ Run	True		
					VITM System Voltage	>= 9V		
					Flashing Programming Session (Other Modules or itself)	Completed		
					Mode $28 Executed on HS Bus	False		
			DTC Pass	1			2 Seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Lost Communication With Engine Control Module (ECM)	U1886	If message $4C1 is not received by VITM	Loss of Supervision with ECM module on HS GMLAN bus	# of consecutive $4C1 message not received > 10	Diagnostic Enable Run/Crank or Accessory/ Run VITM System Voltage Flashing Programming Session(Other Modules or itself) Mode $28 Executed on HS Bus	True True >= 9V Completed False	3.5 seconds in a 5 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Dedicated Bus 1 Off	U2401	If Bus Off is Detected	Transmit Error Counter (TEC)	TEC > 255	Diagnostic Enable	True	1.4 seconds in a 2 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					VITM System Voltage	>= 9V		
			DTC Pass	TEC < 255			2 Seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on HS	U2602	If message $236 is not Received by VITM	Loss of Supervision with VICM module on HS GMLAN bus	# of consecutive $236 message not received > 3	Diagnostic Enable	True	2.8 seconds in a 4 second window	Type B, 2 Trips
					Run/Crank or Accessory/ Run	True		
					VITM System Voltage	>= 9V		
					Flashing Programming Session (Other Modules or itself)	Completed		
					Mode $28 Executed on HS Bus	False		
			DTC Pass	1			4 Seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module 1	U2603	If associated message from Slave is not received	Loss of Supervision with Slave A on Private CAN bus DTC Pass	# of consecutive serial data message from Slave A not received > 7 1	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable 2nd Protection Self Test Diagnostic VITM System Voltage	True True Not Running >= 9V	2.8 seconds in a 4 second window 4 Seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module 2	U2604	If associated message from Slave is not received	Loss of Supervision with Slave A on Private CAN bus	# of consecutive serial data message from Slave A not received > 7	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable 2nd Protection Self Test Diagnostic VITM System Voltage	True True Not Running >= 9V	2.8 seconds in a 4 second window	Type A, 1 Trips
			DTC Pass	1			4 Seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module 3	U2605	If associated message from Slave is not received	Loss of Supervision with Slave A on Private CAN bus DTC Pass	# of consecutive serial data message from Slave A not received > 7 1	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable 2nd Protection Self Test Diagnostic VITM System Voltage	True True Not Running >= 9V	2.8 seconds in a 4 second window 4 Seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module 4	U2606	If associated message from Slave is not received	Loss of Supervision with Slave A on Private CAN bus	# of consecutive serial data message from Slave A not received > 7	Diagnostic Enable	True	2.8 seconds in a 4 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					2nd Protection Self Test Diagnostic	Not Running		
					VITM System Voltage	>= 9V		
			DTC Pass	1			4 Seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module E	U2617	If associated message from Slave is not received	Loss of Supervision with Slave A on Private CAN bus	# of consecutive serial data message from Slave A not received > 7	Diagnostic Enable	True	2.8 seconds in a 4 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					2nd Protection Self Test Diagnostic	Not Running		
					VITM System Voltage	>= 9V		
			DTC Pass	1			4 Seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module F	U2618	If associated message from Slave is not received	Loss of Supervision with Slave A on Private CAN bus	# of consecutive serial data message from Slave A not received > 7	Diagnostic Enable	True	2.8 seconds in a 4 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					2nd Protection Self Test Diagnostic	Not Running		
					VITM System Voltage	>= 9V		
			DTC Pass	1			4 Seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module G	U2619	If associated message from Slave is not received	Loss of Supervision with Slave A on Private CAN bus	# of consecutive serial data message from Slave A not received > 7	Diagnostic Enable	True	2.8 seconds in a 4 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					2nd Protection Self Test Diagnostic	Not Running		
					VITM System Voltage	>= 9V		
			DTC Pass	1			4 Seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module H	U2620	If associated message from Slave is not received	Loss of Supervision with Slave A on Private CAN bus	# of consecutive serial data message from Slave A not received > 7	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable 2nd Protection Self Test Diagnostic VITM System Voltage	True True Not Running >= 9V	2.8 seconds in a 4 second window	Type A, 1 Trips
			DTC Pass	1			4 Seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module I	U2621	If associated message from Slave is not received	Loss of Supervision with Slave A on Private CAN bus DTC Pass	# of consecutive serial data message from Slave A not received > 7 1	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable 2nd Protection Self Test Diagnostic VITM System Voltage	True True Not Running >= 9V	2.8 seconds in a 4 second window 4 Seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module J	U2622	If associated message from Slave is not received	Loss of Supervision with Slave A on Private CAN bus DTC Pass	# of consecutive serial data message from Slave A not received > 7 1	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable 2nd Protection Self Test Diagnostic VITM System Voltage	True True Not Running >= 9V	2.8 seconds in a 4 second window 4 Seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module K	U2623	If associated message from Slave is not received	Loss of Supervision with Slave A on Private CAN bus	# of consecutive serial data message from Slave A not received > 7	Diagnostic Enable	True	2.8 seconds in a 4 second window	Type A, 1 Trips
					Run/Crank, Accessory/ Run or HVEM EB Comm Enable	True		
					2nd Protection Self Test Diagnostic	Not Running		
					VITM System Voltage	>= 9V		
			DTC Pass	1			4 Seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Energy Control Module Lost Communication with Hybrid/EV Battery Interface Control Module L	U2624	If associated message from Slave is not received	Loss of Supervision with Slave A on Private CAN bus DTC Pass	# of consecutive serial data message from Slave A not received > 7 1	Diagnostic Enable Run/Crank, Accessory/ Run or HVEM EB Comm Enable 2nd Protection Self Test Diagnostic VITM System Voltage	True True Not Running >= 9V	2.8 seconds in a 4 second window 4 Seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
System Voltage Performance	P0561	This diagnostic detects a difference in voltage between the 12V input and the Ignition Run/ Crank Voltage. The fault sets when the host controller detects the difference is above the indicated threshold for the indicated time.	Difference between 12V Battery Voltage Input and Ignition Run/Crank Voltage	> 3.00 Volts	Enable Calibration is True Diagnostic System Code Clear Requested Diagnostic System Reset Complete Battery input is present Ignition Run/Crank Voltage 12V Starter Engaged	= 1.00 (1 is Enabled) = False = True = 1.00 (1 is Available) > 6.0 Volts = False	4 seconds out of a 5 seconds window	Type C, No SVS "Emission Neutral Diagnostic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
System Voltage Low	P0562	This diagnostic detects low voltage in the vehicle's 12 volt system. The fault sets when the HMCP detects supply voltage below the indicated threshold for the indicated time.	Ignition Voltage	≤ 10.00 Volts	Enable Calibration is True 12V Starter Engaged Ignition Run/Crank Voltage Engine Speed	= 1.00 (1 is Enabled) = False > 6.0 Volts ≥ 0.00 RPM	5 seconds out of a 6 seconds window	Type C, No SVS "Emission Neutral Diagnostic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
System Voltage High	P0563	This diagnostic detects high voltage in the vehicle's 12 volt system. The fault sets when the host controller detects supply voltage above the indicated threshold for the indicated time.	Ignition Voltage	≥ 16.00 Volts	Enable Calibration is True Ignition Run/Crank Voltage	= 1.00 (1 is Enabled) > 6.0 Volts	5 seconds out of a 6 seconds window	Type C, No SVS "Emission Neutral Diagnostic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid System Performance	P0AB9	This diagnostic indicates an autostart or autostop attempt has failed or an engine stall has occured.	Delta Engine Sensed Torque	≤ 0.00 Nm	Engine State Low Fuel Condition Engine Positiong Fault (CAM or Crank) DTC's not Fault Active Number of engine start re-try attempts	= Auto-starting = FALSE = FALSE = P16E0 = 2.00	3.00 Start Attempts	Type A, 1 Trips
			Engine Stopping State Engine Stopping State Engine Stopping State	= Preparing for Stop OR = Disabling Fuel OR = Ramping Down	Engine State Low Fuel Condition Engine Positiong Fault (CAM or Crank) DTC's not Fault Active	= Auto-stopping = FALSE = FALSE = P16E0	Diagnostic will set in 15.00 s (runs at 12.5 ms)	
			Engine Speed	< 300.00 RPM	Engine State Low Fuel Condition Engine Positiong Fault (CAM or Crank) DTC's not Fault Active Wheel Slip State	= Engine Running = FALSE = FALSE = P16E0 = No Wheel Slip	25.00 RPM * seconds (integrated value) (runs at 12.5ms) (i.e. if RPM is 25.00 below the 300.00 RPM threshold for 1 second, the diagnostic will set, diagnostic will proportionally set faster as RPM dips further below the 300.00 RPM	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							threshold)	
			Engine Speed	< 800.00 AND > 300.00	Engine State Low Fuel Condition Engine Positiong Fault (CAM or Crank) DTC's not Fault Active Wheel Slip State	= Engine Running = FALSE = FALSE = P16E0 = No Wheel Slip	If the fail conditons are met for 0.50 s	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Supply Voltage Circuit 2 Low Voltage	P150D	This diagnostic detects low supply voltage for the circuit 2 path for motor control. If the supply voltage circuit 2 path is below the indicated threshold for the indicated time the DTC is set.	12 volt battery supply circuit 2	< 8.00 Volts	Enable Calibration is True Diagnostic System Code Clear Requested Diagnostic System Reset Complete	= 1.00 (1 is Enabled) = False = True	2 seconds out of a 2.5 seconds window	Type C, No SVS "Emission Neutral Diagnostic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Supply Voltage Circuit 1 Low Voltage	P150E	This diagnostic detects low supply voltage for the circuit 1 path for motor control. If the supply voltage circuit 1 path is below the indicated threshold for the indicated time the DTC is set.	12 volt battery supply circuit 1	< 8.00 Volts	Enable Calibration is True Diagnostic System Code Clear Requested Diagnostic System Reset Complete	= 1.00 (1 is Enabled) = False = True	2 seconds out of a 2.5 seconds window	Type C, No SVS "Emission Neutral Diagnostic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Performance - No Torque Detected	P16E0	This diagnostic indicates that the engine's reported torque does not match the sensed engine torque.	Reported Engine Torque - Sensed Engine Torque	> 50.00 Nm	All Secondary Parameters Listed below must be meet for 2.00 seconds		3.5 seconds out of a 4 seconds window	Type A, 1 Trips
					Engine Actual Torque Fault	= FALSE		
					DTC's not Fault Active	= U0100		
					Engine Start Stop State	= Engine Running		
					Engine Torque Command Immediate	≥ 50.00 Nm		
					Engine Sensed Torque	> 0.00 Nm		
					Low Fuel Condition	= FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Switch Run/ Start Position Circuit Low	P2534	Detects a run crank relay open circuit	Runk Crank Line Voltage	≤ 2.0 Volts	Enable Calibration is True	= 1 (1 is Enabled)	2.5 seconds out of a 5 seconds window	Type A, 1 Trips
					CAN Communication	Enabled		
					ECM Run Crank Active CAN Data	Available and Active		
					Diagnostic System Code Clear Requested	= False		
					Diagnostic System Reset Complete	= True		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Switch Run/ Start Position Circuit High	P2535	Detects a run crank relay short to power	Runk Crank Line Voltage	> 6.0 V	Enable Calibration is True CAN Communication ECM Run Crank Active CAN Data Diagnostic System Code Clear Requested Diagnostic System Reset Complete	= 1 (1 is True) Enabled Available and False = False = True	2.5 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Switch Accessory Position Circuit Low	P2537	Detects an accessory position circuit open	Accessory	False	P2537	Not Test Failed This Key On and Not Test Passed This Key On	0.20 seconds	Type B, 2 Trips
					Propulsion System	Active		
					Propulsion System Active Time	> 0.50 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP) Sensor A Circuit	P0335	Diagnostic will fail if a crank sensor pulse was not received (from the ECM's replicated crank signal) during a period of time; if crank sensor pulses are received, the diagnostic will pass.	No crankshaft pulses received.	Crank Sync State= No Activity for >= 1.40 s	HWIO based crank decode status	= NOT Disable-Crank	Continuous at every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP) Sensor A Performance	P0336	1. Fail counts will occur if the engine goes out of synchronization repeatedly over a period of time and will pass if the engine stays in synchronization. 2. Diagnostic will fail if synchronization gap is not found in a specified period of time and will pass if the synchronization gap is found.	Time in which 15.00 crank re-synchronizations occur	Crank Sync State transitions to Activity Detected X times in < 10.00 seconds (without seeing "crank in sync")	HWIO based crank decode status	= NOT Disable-Crank	Continuous every 250 msec	Type B, 2 Trips
			No crankshaft synchronization gap found	Crank Sync State = Activity Detected for >= 1.40 s	HWIO based crank decode status	= NOT Disable-Crank	Continuous every 12.5 msec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Idle Air Control (IAC) System - RPM Too Low	P0506	This DTC sets when the idle speed is lower than the targeted idle speed	Idle Speed	Fail Criteria: Filtered input speed error (desired - actual), is greater than the fail threshold of 91 RPM. Filter coefficient for engine speed = 0.003	No Active DTCs:	Motor A speed faults: P0A3F, P1B03, P0A40, P0C52, P0C53, P0C5C, P0C5D	1 loop execution at 100 ms rate	Type B, 2 Trips
					No Active DTCs:	Motor B speed faults: P0A45, P1B04, P0A46, P0C57, P0C58, P0C61, P0C62		
					No Active DTCs:	Vehicle Speed/TOS sensor faults: P0722, P077B, P215C		
					Accelerator pedal position	Not Defaulted & <= 1.00 %		
					Engine State	Running (not starting or stopping states)		
					Vehicle Speed	<= 2 kph		
					Engine Coolant	>= 60.00 Deg C		
					Commanded RPM Delta	< 50 RPM		
					Idle Conditons Present	>= 10.00 seconds		
				Pass Criteria: Filtered input speed error (desired - actual), is less than fail threshold 81 . Filter coefficient for engine speed = 0.003			Pass condition met for 10.00 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Idle Air Control (IAC) System - RPM Too High	P0507	This DTC sets when the idle speed is higher than the targeted idle speed	Idle Speed	Fail Criteria: Filtered input speed error (desired - actual), is less than the fail threshold of -182 RPM. Filter coefficient for engine speed = 0.003 Pass Criteria: Filtered input speed error (desired - actual), is greater than fail threshold -172 . Filter coefficient for engine speed = 0.003	No Active DTCs: No Active DTCs: No Active DTCs: Accelerator pedal position Engine State Vehicle Speed Engine Coolant Commanded RPM Delta Idle Conditons Present	Motor A speed faults: P0A3F, P1B03, P0A40, P0C52, P0C53, P0C5C, P0C5D Motor B speed faults: P0A45, P1B04, P0A46, P0C57, P0C58, P0C61, P0C62 Vehicle Speed/TOS sensor faults: P0722, P077B, P215C Not Defaulted & <= 1.00 % Running (not starting or stopping states) <= 2 kph >= 60.00 Deg C < 25 RPM >= 10.00 seconds	1 loop execution at 100 ms rate Pass condition met for 10.00 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Read Only Memory (ROM)	P0601	This Diagnostic tests ROM (flash) memory in the THCP micro-controller. The test checks that ROM has not changed since it was flashed in the plant. The bytes of ROM in different areas (code, calibration, HW configuration, etc.) are summed and compared to a checksum for that area. The checksum is created when the software is built and does not change over time. The DTC sets when the checksum comparison does not match for the indicated number of times.	Calculated Checksum of the Boot ROM	≠ Expected Checksum	Controller Status ROM Checksum in Progress (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= On ≠ True = False = True	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5.00 failures	Type A, 1 Trips
			2nd Processor State of Health ROM fault latched	= TRUE	Controller Status ROM Checksum in Progress (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= On ≠ True = False = True	Runs continuously in the background	
			Calculated Checksum of Torque Security Related Calibrations	≠ Expected Checksum	Controller Status (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete) = Disable Calibration is False = Enable Calibration is True	= On = False = True = 0 (0 is Enabled) = 1 (1 is Enabled)	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 2 failures	
			ECC Fault detected in Flash memory	= TRUE	Controller Status Power Up Reset AND HWIO BINVDM ECC State AND HWIO ROM Fault Enable Calibration is true	= On = False = False = True = 1 (1 is Enabled)	Greater than 5 failures at controller initialization Runs once at initialization	
			ROM fault Active AND 2nd SOH ROM Fault	≠ True ≠ True	(Diagnostic System Code Clear Requested AND	= False = True	Runs in the Background	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Latched AND Main SOH ROM Fault Latched	≠ True	Diagnostic System Reset Complete)			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Not Programmed	P0602	This Diagnostic checks that the THCP micro-controller has a valid calibration flashed into it. The controller manufacturer flashes a calibration with a particular calibration set to 1. At the vehicle plant the controller is reflashed with a valid calibration that also changes the particular calibration set to 0. The DTC sets when the diagnostic checks that particular calibration and it has a nonzero value.	No Start Calibration is True	= 0 (1 is for No Start Condition)	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Runs once at controller initialization and every 1 second there after	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Long Term Memory Reset	P0603	This Diagnostic tests the NonVolatile Memory (NVM) in the THCP micro-controller for changes since the last write at power down. The bytes of various NVM sections are summed and compared to checksums for each section that were stored at the last powerdown. The DTC sets when the checksum comparisons do not match.	Static NVM Checksum at power-up	≠ Checksum at power-down	Ignition Status Enable Calibration is True	= Run or Crank = 1 (1 is Enabled)	1 failure Runs once at controller initialization	Type A, 1 Trips
			Preserved NVM Checksum at power-up	≠ Checksum at power-down	Ignition Status Enable Calibration is True	= Run or Crank = 1 (1 is Enabled)	1 failure Runs once at controller initialization	
			Power Up Reset BINVDM NVM Checksum at power-up	= False ≠ Checksum at power-down	Ignition Status Enable Calibration is True	= Run or Crank = 1 (1 is Enabled)	Runs once at controller initialization 3 out of 5 controller initializations for Failure	
			Dynamic NVM checksum at power-up AND Shutdown Finished	≠ Checksum at power-down = TRUE	Ignition Status Enable Calibration is True	= Run or Crank = 1 (1 is Enabled)	1 failure Runs once at controller initialization	
			Static NVM Error Dynamic NVM Error BINVDM ECC Error	= False = False = False	Enable Calibration is True	= 1 (1 is Enabled)	Runs once at controller initialization	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Random Access Memory (RAM)	P0604	This Diagnostic tests the RAM in the THCP micro-controller. The diagnostic checks that RAM has not changed unexpectedly. Pattern checks are done at initialization where different patterns are written and then read back. The DTC sets if the patterns do not match. Continuous checks are done while the controller is executing code that store the same variables in multiple locations. When those variables are read, a check is done to be sure both locations still match. A DTC sets if the locations do not match for the indicated time.	Secure redundant "Y" variable	≠ Primary "V" variable for greater than 125 ms	Current Time Execution - Time of Last DualStore Error	> 25 ms	Executes in Background loop	Type A, 1 Trips
			HWIO detects an illegal write to Write Protected RAM	= TRUE	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Executes in Background loop 1 count to fail	
			2nd Processor State of Health RAM Fault Latched	= TRUE	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Executes in Background loop every 1000ms	
			Checksum of PreservedNVM_Region for Main Processor State of Health and 2nd Processor State Of Health	≠ Expected checksum value	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Runs once at Initialization	
			HWIO detects fault in System RAM	= TRUE	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Runs once at Initialization 3 count to fail	
			HWIO detects fault in Cache RAM	= TRUE	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Runs once at Initialization 3 count to fail	
			HWIO detects fault in eTPU RAM (Timer Processing Unit)	= TRUE	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Runs once at Initialization 3 count to fail	
			Main SOH RAM Fault Latched AND SPI Fault Latched	= 0 = False	(Diagnostic System Code Clear Requested AND Diagnostic System Reset	= False = True	Executes in Background loop every 1000ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AND System RAM Fault Count AND Cache RAM Fault Count AND eTPU RAM Fault Count	 = 0 = 0 = 0	Complete) Time Since Last Duel Store Error	 > 1,000 ms		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Internal Performance	P0606	This Diagnostic tests all the internal processor subsystems for faults which suggest that the integrity of the processor can not be trusted. Fail Case 1, 2, 3: These diagnostics are built into the hardware of the THCP microprocessor by the chip manufacturer. These diagnostics check the ALU and Configuration registers to ensure there have been no changes. The DTC sets if these registers have changed since the software flash at the vehicle plant. An additional built in diagnostic checks whether the top of the stack memory has changed from initialization at power up. The DTC sets if this section of memory has been detected to have changed for the	HWIO detects Fault in ALU Test Indicates that the Processor detected an ALU fault in the processor "MainALU_Flt"	= 2 faults in a key cycle	Enabled Calibration is True (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete) AND Run Crank Ingnition Low Voltage AND Run Crank Low Voltage Crank	= 1.00 (1 is Enabled) = False = True = False = False	Runs continuously in 12.5ms loop	Type A, 1 Trips
			HWIO detects Fault in Configuration Registry Test Indicates that the Processor detected a Configuration Register fault in the processor "MainCfgRegFlt"	= 2 faults in a key cycle	Enable Calibration is True (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete) AND Run Crank Ingnition Low Voltage AND Run Crank Low Voltage Crank	= 1 (1 is Enabled) = False = True = False = False	Runs continuously in 12.5ms loop	
			HWIO detects Fault in the Stack Limit Test Indicates that the CPU Stack memory exceeded the limit "MainStackFlt"	= 2 faults since power up	Enable Calibration is True (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= 1 (1 is Enabled) = False = True	Runs Continuously in 100ms loop	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		indicated amount of time. Fail Case 4: This diagnostic checks the analog to digital converter (ADC) in the THCP microprocessor. If the accuracy of the ADC read of a test voltage is greater than the indicated threshold for the indicated amount of time then the DTC sets. Fail Case 5: This diagnostic checks the circuitry that transfers data from Flash memory to RAM. When the data transfer is made at startup and periodically there after a set of bytes are included that can be checked. The DTC sets if these bytes in RAM are not equal to the Flash memory. Fail Case 6, 7: This diagnostic corresponds to the Program Sequence Watch (PSW), which ensures that a task is being executed properly. Functions	Voltage difference between expected circuit voltage and actual test circuit voltage Indicates that the Processor detected a problem with the Analog to Digital convertor test circuit "MainADC_Flt"	> 9 V	Enable Calibration is True AND Run/Crank Voltage (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= 1 (1 is Enabled) >= 7 V = False = True	0.15 seconds out of a 0.2 seconds window OR A2D Converter Test Error >= 0.20 seconds	
			HWIO detects Fault in Transfer Test from Flash to RAM OR HWIO detects Fault in the Memory Data From Flash Indicates that the Processor detected a problem in the data transfer from Flash memory to RAM memory "DMA_XferTest"	= TRUE = TRUE	Enable Calibration is True (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= 0 (1 is Enabled) = False = True	50ms Execution Rate after controller initialization	
			Program Sequence Watch Fault on a CPU Indicates that the Processor detected that a program was ran out of sequence according to the Program Sequence Watch "MainSequenceFlt"	seed sequence ≠ expected sequence	Program Sequence Watch Enabled (KaPISD_b_ProgSeqWatchEnbl[x])	= TRUE	0.15 seconds out of a 0.2 seconds window	
			Program Sequence Watch Seed time Since Seed Change Indiucates that the Processor detected that a program seed was not sending for the Program Sequence Watch "MainSequenceFlt"	> 200.00 ms	Program Sequence Watch Enabled	1.00 (1 = enabled)	Executes in a 50ms loop after controller initialization	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		requiring support place calls to the PSW at critical locations, and the PSW updates a signature value, eventually performing a math operation on this value and a calibrated value from an array, which should revert the signature back to its initial value, if each function was called in the proper order. This test will fail and the fault will mature if the program was run out of order or if there is a problem with the PSW. Fail Case 8: These fail cases rely on a seed and key interaction where one micro-controller sends a seed and a second controller runs a predefined set of calculations and responds with a key. The first controller sends a seed and checks that the received key matches its lookup table value for that seed and that it was received in time. The second controller checks that the correct seed value has been received and that it is in	Key Value or New Key Update Time Indicates that the secondary processor recieved incorrect key values for the associated seed values that it sent to the main processor "2ndRxIncorrectKeys" OR that the key was not recieved in	NOT = expected key value OR > 0.15 ms	Missing Motor Duty Cycle Enabled	1.00 (1 = enabled)	6E-06 seconds out of a 6.4E-06 seconds window	
			MissingMotorDutyCycle Task 0	Fail to execute	Missing Motor Duty Cycle Enabled	1.00 (1 = enabled)	6E-06 seconds out of a 6.4E-06 seconds window	
			First ROM Test Complete AND Processor Performance System Run Time Met AND Processor Integrity Fault Lower AND Processor Integrity Fault Upper	= True = 1 (1 is Enabled) after Controller Initialization = No Fault = No Fault	End of Test in Progress AND Diagnostic End of Trip in Progress AND Inhibit Path Test State	= True = False = Test Aborted OR Test Completed	Executes at the end of every trip	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		time. The DTC sets when there is a mismatch of seed or key values or the expected key or seed value is out of order or if the key or seed value has not been received in the indicated time. Fail Case 9: The Missing Motor Duty Cycle is checking the execution for Task (0) to ensure that the task is executing correctly						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Performance	P0607	This Diagnostic tests all the internal processor subsystems for faults which suggest that the integrity of the processor can not be trusted. Fail Case 1: In case of many faults the THCP microprocessor along with the other microprocessors need to take remedial action to directly take the vehicle to a safe state. This fail case tests at powerdown that the microprocessors can take those remedial actions effectively. Potential failures can include memory, software, processor and Arithmatic Logic Unit (ALU) faults. The diagnostic runs by setting different controller inputs and the outputs are checked in each case across all of the microprocessors . The DTC sets when the outputs are not as expected for the indicated number of tests.	Inhibit Path Test Failed Indicates that the Processor is not demonstrating the ability to inhibit the system (take remedial action) during the Inhibit Path Test "2ndFailsToTakeRmdlActn "	>= 3 Failures	HV Batt contactor Staus Available Invertor State HV Batt Voltage HV Contactors 12V Batt Voltage Vehicle Speed Motor Faults Motor Speed SRAR Shutdowns SPI Fault RunCrank Active Ram or ROM fault Seed received in wrong order fault Seed/Key Timeout Powermode Off time	= TRUE = Off >= 80.00 V = Closed > 9.50 V < 1.00 kph = FALSE (None active) <= 20.00 rpm = FALSE = FALSE (No active P0606) = FALSE = FALSE (No active P0601, P0604) = FALSE (No active P0606) = FALSE < 5.00 sec	Executes in a 12.5ms loop Detects in 3 key cycles	Type A, 1 Trips
			HWIO detects Fault that the Processor detected a problem with the Flash ECC (error correction code) test circuit "FlashECC_CktTest"	= TRUE	Enable Calibration is True AND Power-Up Reset	= 1 (1 is Enabled) = TRUE	Executes once at every power up reset 3.00 failed cycles out of 10.00 cycles (turns on MIL) 5.00 failed cycles out of 10.00 cycles (shutdown vehicle)	
			HWIO detects Fault that the Processor detected a problem with the RAM ECC (error correction code) test circuit	= TRUE	Enable Calibration is True AND Power-Up Reset	= 1 (1 is Enabled) = TRUE	Executes once at every power up reset 3.00 failed	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Fail Case 2, 3: These diagnostics use microprocessor internal circuitry to detect if there are faults in the RAM or Flash memory. The checks occur at power up and will set the DTC if there are the indicated number of failures in each diagnostic.	"RAM_ECC_CktTest"				cycles out of 10.00 cycles (turns on MIL) 5.00 failed cycles out of 10.00 cycles (shutdown vehicle)	
			First ROM Test Complete AND Processor Performance System Run Time Met AND Processor Integrity Fault Lower AND Processor Integrity Fault Upper	= True = 1 (1 is Enabled) after Controller Initialization = No Fault = No Fault	End of Test in Progress AND Diagnostic End of Trip in Progress AND Inhibit Path Test State	= True = False = Test Aborted OR Test Completed	Executes at the end of every trip	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Monitoring Processor Performance	P060A	This Diagnostic tests all the monitoring processor subsystems for faults which suggest that the integrity of the processor can not be trusted. Fail Case 1, 2, 3, 4, 5: The microprocessors in the TPIM ECU monitor that each of the others is executing code correctly and in a timely manner. These fail cases rely on a seed and key interaction where one micro-controller sends a seed and a second controller runs a predefined set of calculations and responds with a key. The first controller sends a seed and checks that the received key matches its lookup table value for that seed and that is was received in time. The second controller checks that the correct seed value has been received and that is in time. The DTC sets when there is a mismatch of seed or key values or the expected key or seed value is out of order or if the key or seed value	Key Value Indicates that the Processor received incorrect key values or the key is not received in time for the associated seed values that it sent out to the secondary processor "2ndRxIncorrectKeys"	≠ expected key value	Number Of Main Processors to monitor IPT status SPI Fault Run/Crank Voltage	> 0 = Not Running = FALSE (No active P0606) >= 9.50 V	Executes in a 12.5ms loop Detects in 150ms or two consecutive faulty keys	Type A, 1 Trips
			New Seed Update Time Indicates that the Processor did not receive a key value from the secondary processor during the expected time frame "MainDtctdSdKeyTimeout "	> 1.00 sec	Number Of Mains Processors to monitor AND SPI Faults AND Seed/Key Init delay timer AND Run/Crank Voltage OR 12V Battery Voltage	> 0 = FALSE (No active P0606) >= 1.00 s >= 9.50 V > 11 V	Executes in a 12.5ms loop Detects in 1 second	
			Seed sequence Indicates that the Processor received incorrect key values in the incorrect order from the secondary processor "MainDtctdSdRxWrongOrdr"	≠ expected order	Number Of Mains Processors to monitor AND SPI Faults AND Run/Crank Voltage OR 12V Battery Voltage	> 0 = FALSE (No active P0606) >= 9.50 V > 11 V	0.15 seconds out of a 0.2 seconds window Executes in a 12.5ms loop	
			Seed time Since Seed Change Indicates that the Processor detected that a Seed was not sending for the Program Sequence Watch "MainSequenceFlt"	> 200.00 ms	Program Sequence Watch Enabled (KaPISD_b_ProgSeqWatchEnbl[x])	= TRUE	Executes in a 50ms loop after controller initialization	
			First ROM Test Complete AND Processor Performance System Run Time Met AND	= True = 1 (1 is Enabled) after Controller Initialization	End of Test in Progress AND Diagnostic End of Trip in Progress AND	= True = False = Test Aborted OR Test	Executes at the end of every trip	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		has not been received in the indicated time.	Processor Integrity Fault Lower AND Processor Integrity Fault Upper	= No Fault = No Fault	Inhibit Path Test State	Completed		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Torque Performance	P061A	This Diagnostic tests if the regenerative braking function is producing too much torque. Potential failures can include memory, software, processor and ALU faults. If the total output torque, including regenerative torque, is greater than the regenerative braking request plus the maximum output torque allowed or the output torque is greater than the regenerative braking request plus the actual output torque request plus the indicated threshold then the DTC is set.	Calculated Output Torque (To)	> Upper limit of Output Torque (ToMax) plus Regen Torque Request OR > Regen Torque Request plus Output Torque Request plus 363.00 Nm threshold	Ignition Run Crank Security Voltage OR Ignition Run/Crank Voltage AND Enable Calibration is True	>= 9.50 V >= 11.00 V = 0 (0 is Enabled)	0.1875 seconds out of a 0.2 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Torque Calculation Performance	P061B	Fail Case 1: This Diagnostic tests the calculation of output torque. Potential failures can include memory, software, processor and ALU faults. The primary calculated output torque value is compared to the secondary calculated output torque and if that difference is greater than the indicated threshold for the indicated time the fault is set. The DTC is also set if the regenerative braking minus the indicated calibration is greater than the indicated threshold for greater than the indicated time. Fail Case 2 This diagnostic tests the calculation of output torque. Potential failures can include memory, software, processor and ALU faults. The fault is set if the calculated output torque value is greater than the driver's calculated torque request plus the indicated calibration.	Difference between Immediate Axle Torque command primary and secondary OR Regen Brake Torque Output command minus 0.00 Nm	> 378.00 Nm >= 342.00 Nm	Run/Crank Voltage OR Ignition Run/Crank Voltage Enable Calibration is True	>= 9.50 V >= 11.00 V = 0 (0 is Enabled)	0.1875 seconds out of a 0.2 seconds window	Type A, 1 Trips
			Calculated Output Torque (To)	> Max of Drivers Output Torque Request plus 363.00 Nm OR 363.00 Nm	Run/Crank Voltage OR Ignition Run/Crank Voltage Enable Calibration is True	>= 9.50 V >= 11.00 V = 0 (0 is Enabled)	0.1875 seconds out of a 0.2 seconds window	
			Calculated Output Torque (To)	< Min of Drivers Output Torque Request minus 363.00 Nm OR - 363.00 Nm	Run/Crank Voltage OR Ignition Run/Crank Voltage Enable Calibration is True	>= 9.50 V >= 11.00 V = 0 (0 is Enabled)	0.1875 seconds out of a 0.2 seconds window	
			[Trans Range State AND Output Torque Command AND Shaped Torque for Sign Diff test] OR [Trans Range State AND Output Torque Command AND Shaped Torque for Sign Diff test]	= Drive <= -363.00 Nm >= 0Nm = Reverse >= 363.00 Nm <= 0Nm	Run/Crank Voltage OR Ignition Run/Crank Voltage Transient Torque Condition AND (Computed TOS OR ((Computed TOS AND Vehicle Direction Error) OR Vehicle speed rationality)) Enable Calibration is True	>= 9.50 V >= 11.00 V = FALSE <= 236.00 rpm > 135.00 rpm = TRUE = TRUE = 0 (0 is Enabled)	0.1875 seconds out of a 0.2 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		The DTC is set if the fault is present for longer than the indicated time. Fail Case 3: This diagnostic tests the calculation of output torque. Potential failures can include memory, software, processor and ALU faults. The fault is set if the calculated output torque value is less than the driver's calculated torque request minus the indicated calibration. The DTC is set if the fault is present for longer than the indicated time. Fail Case 4: This diagnostic tests the calculation of output torque request. Potential failures can include memory, software, processor and ALU faults. The fault is set if the calculated output torque request is less than the indicated threshold and the transmission is in Drive. The fault is also set if the calculated output torque request is	Motor A torque command	> ShortTerm motor A capacity plus 126.00 Nm OR < ShortTerm motor A capacity minus 126.00 Nm	Run/Crank Voltage OR Ignition Run/Crank Voltage Enable Calibration is True	>= 9.50 V >= 11.00 V = 0 (0 is Enabled)	0.1875 seconds out of a 0.2 seconds window	
			Motor B torque command	> ShortTerm motor B capacity plus 118.00 Nm OR < ShortTerm motor B capacity minus 118.00 Nm	Run/Crank Voltage OR Ignition Run/Crank Voltage Enable Calibration is True	>= 9.50 V >= 11.00 V = 0 (0 is Enabled)	0.1875 seconds out of a 0.2 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		greater than the indicated threshold and the transmission is in Reverse. The DTC is set if the fault is present for longer than the indicated time. Fail Case 5: This diagnostic tests the calculation of motor A torque request. Potential failures can include memory, software, processor and ALU faults. The fault is set if the calculated motor A torque request is greater than the short term motor A capacity plus the indicated threshold. The fault is also set if the calculated motor A torque is less than the motor A capacity minus the indicated threshold. The DTC is set if either fault is present for longer than the indicated time. Fail Case 6: This diagnostic tests the calculation of motor B torque request. Potential failures can include memory, software, processor and ALU faults. The fault is set if the						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		calculated motor B torque request is greater than the short term motor B capacity plus the indicated threshold. The fault is also set if the calculated motor B torque is less than the motor B capacity minus the indicated threshold. The DTC is set if either fault is present for longer than the indicated time.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Long Term Memory Performance	P062F	This Diagnostic tests specific areas of nonvolatile memory (NVM). The fault sets If the last write to nonvolatile memory was not successful or if the checksum of static NVM does not agree with the latest summation of that memory area. The NVM write and records the success or not of that write at key off and the success value is read at initiialization.	HWIO reports next write to NVM will not succeed OR HWIO reports the assembly calibration integrity check has failed	= True = True	Enable Calibration is True Controller Status	= 1 (1 is Enabled) = Initialization	Runs once at controller initialization	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
HSD1 Actuator Supply Circuit Voltage Low	P0658	This diagnostic reports when a high side driver 1 circuit low fault is detected by the current supply driver and is reported via HWIO.	HWIO circuitry detects if an electrical circuit low is present or not. HSD 1 Short to Ground Fault Status	=TRUE	Enable Calibration is True HSD 1	= 1 (1 is Enabled) = On	0.13125 seconds out of a 0.15625 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
HSD1 Actuator Supply Circuit Voltage High	P0659	This diagnostic reports when a high side driver 1 circuit high fault is detected by the current supply driver and is reported via HWIO.	HWIO circuitry detects if an electrical circuit high is present or not. HSD 1 Short to Power Fault Status	 =TRUE	Enable Calibration is True	= 1 (1 is Enabled)	0.00625 seconds (1 Loop)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Torque Managment System - Forced Engine Shutdown	P06AF	This THCP Diagnostic checks that the ECM is processing code correctly. The ECM has a main and a secondary processor. As long as the main ECM processor responds to the secondary ECM processor correctly then the correct pattern is sent via CAN message to the THCP. When the ECM does not have correct interaction between its two microprocessors then an incorrect pattern is sent to the THCP and the THCP sets the DTC.	Received pattern from the ECM OR Received malfunction pattern	≠ expected pattern (F, 5, B, D, A, 6, 3, 0) >= 2.00 counts	Run/Crank Voltage OR Ignition Run/Crank Voltage Run Crank Active Time	>= 9.50 V >= 11.00 V >= 0.50 seconds	0.075 seconds out of a 0.15 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Sensor Power Supply C Circuit Low	P06E7	This diagnostic monitors the IGBT power supply circuit voltage. The sensed voltage is compared against a threshold. If the sensed voltage is below the failure threshold for sufficient time, the diagnostic will fail.	Scaled 15V IGBT Supply Voltage	< 12.00 V	Wakeup Signal	ON	0.4 seconds out of a 0.5 seconds window (x of y) OR Continuous Fail Time > 0.30 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Sensor Power Supply C Circuit High	P06E8	This diagnostic monitors the IGBT power supply circuit voltage. The sensed voltage is compared against a threshold. If the sensed voltage is above the failure threshold for sufficient time, the diagnostic will fail.	Scaled 15V IGBT Supply Voltage	> 22.00 V	Wakeup SIgnal	ON	0.4 seconds out of a 0.5 seconds window (x of y) OR Continuous Fail Time > 0.30 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Fluid Temperature (TFT) Sensor Performance	P0711	Monitors the performance of Transmission Fluid Temperature (TFT) circuit by comparing the temperature calculated from the resistance vs temp table to an estimated cold soak average temperature or verifying that the temperature calculated from the resistance vs temp table has not latched at a value after a period of time.	Transmission Fluid Temperature Sensor compared to a Cold Soak Average Temperature	≥ (See supporting tables for failure threshold value) **Cold Soak Rationality**	Rationality Enable Calibration is True Time after init controller Cold Soak Enable Calibration is True Cold Soak Average Temperature Message Cold Soak Average Temperature P0712, P0713, U179A, U0293 TFT temperature	= 1 (1 is Enabled) ≥ 3.00 seconds = 0 (1 is Enabled) = Use Data ≥ -40.00 C NOT Fault Active -40.00 ≤ X ≤ 130.00 C	One diagnostic loop once all enable criteria have been met	Type A, 1 Trips
			Continuous Check for Transmission Fluid Temperature Stuck in Range Transmission Oil Temperature Raw - Previous Transmission Oil Temperature	 ≤ 0.00 C	Rationality Enable Calibration is True Time after init controller Continuous Rationality Enable Calibration is True Engine Speed Vehicle Speed Transmission Oil Temperature Raw	= 1 (1 is Enabled) ≥ 3.00 seconds = 1 (1 is Enabled) 0.00 ≤ X ≤ 7,500.00 RPM for 5.00 seconds ≤ 124.27 MPH for 5.00 seconds -40.00 ≤ X ≤ 130.00 C	≥ 300.00 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Fluid Temperature (TFT) Sensor Circuit Low Voltage	P0712	Monitors the Transmission Fluid Temperature (TFT) sensor circuit resistance and reports a low voltage condition if the sensed resistance is below a threshold.	Transmission Fluid Temperature (TFT) circuit resistance	≤ 68.60 ohms (Corresponds to 149 C which is above the operating range of the transmission)	Enable Calibration is True 12V Battery Voltage Ignition Run/Crank Voltage	= 1 (1 is Enabled) > 9.00 for 0.10 seconds > 9.00 for 0.10 seconds	2 seconds out of a 3 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Fluid Temperature (TFT) Sensor Circuit High Voltage	P0713	Monitors the Transmission Fluid Temperature (TFT) sensor circuit resistance and reports a high voltage condition if the sensed resistance is above a threshold.	Transmission Fluid Temperature (TFT) circuit resistance	≥ 83,641.00 ohms (Corresponds to a temperature below -50 C, which is below the operating range of the transmission)	Enable Calibration is True 12V Battery Voltage Ignition Run/Crank Voltage	= 1 (1 is Enabled) > 9.00 for 0.10 seconds > 9.00 for 0.10 seconds	2 seconds out of a 3 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Output Speed (TOS) Sensor Wrong Direction	P0721	The DTC monitors when the TOS direction converted from the TOS sensor output pulse amplitude does not fall within the valid ranges for "Forward" or "Reverse" for a calibrated period of time.	TOS Raw Direction	TOS Direction Raw is not Forward or Reverse	Enable Calibration is True TOS Sample Period TOS Sensor Type	= 1 (1 is Enabled) ≠ 0 = CeTOSR_e_Directional	3.00 Seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Output Speed Sensor Circuit - Direction Error	P077B	The DTC monitors when the TOS direction converted rom the TOS sensor output pulse amplitude does not match the TOS direction calculated from the motor A and motor B resolver directions for a calibrated period of time.	Transmission Output Speed Direction Raw	≠ transmission output speed direction calculated from motor A and motor B resolver directions	Enable Calibration is True P0721, P077C, P077D, P215C Hybrid Motor Speed based Estimated Output Speed is Valid Transmission Output Speed and Motor Output Speed Difference Motor Estimated Transmission Output Speed	= 1 (1 is Enabled) NOT Fault Active Calculated based on Stable Speed Equation ≤ 50.00 RPM ≥ 50.00 RPM	0.35 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Output Speed Sensor Circuit Low	P077C	This DTC monitors the transmission output speed sensor signal and reports when the signal voltage is below a calibrated threshold.	Transmission Output Speed Sensor Voltage	< 0.36 Volts	Enable Calibration is True P077D Ignition Run/Crank Voltage 12V Battery Voltage	= 1 (1 is Enabled) NOT Fault Active ≥ 6.00 V for 0.00 seconds >= 9.00 for 0.00 seconds	0.36 Seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Output Speed Sensor Circuit High	P077D	This DTC monitors the transmission output speed sensor signal and reports when the signal voltage is above a calibrated threshold.	Transmission Output Speed Sensor Voltage	> 4.25 Volts	Enable Calibration is True P077C Ignition Run/Crank Voltage 12V Battery Voltage	= 1 (1 is Enabled) NOT Fault Active ≥ 6.00 V for 0.00 seconds >= 9.00 V for 0.00 seconds	0.36 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Clutch 1 Slip	P079A	Monitors clutch 1 slip by comparing the slip speed across the clutch to a slip threshold or comparing the calculated slip energy to an energy threshold.	Clutch 1 Slip Speed	>= 190.00 RPM	Line Pressure Estimate Clutch Torque Estimate Clutch Status Motor Speeds Wheel Slip Shutdown Command	>= 190.00 kPa > 74.00 Nm =Locked = not faulted =0 =0	Fail Condition met for 0.60 seconds out of 0.80 seconds Retry Count: 0.00	Type A, 1 Trips
			Clutch 1 Energy	>= 8,003.30 J	Line Pressure Estimate Clutch Torque Estimate Clutch Status Motor Speeds Wheel Slip Shutdown Command	>= 190.00 kPa > 74.00 Nm =Locked = not faulted =0 =0	Instantly once Clutch 1 Energy >= 8,003.30 J Retry Count: 0.00	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Clutch 2 Slip	P079B	Monitors clutch 2 slip by comparing the slip speed across the clutch to a slip threshold or comparing the calculated slip energy to an energy threshold.	Clutch 2 Slip Speed	>= 100.00 RPM	Line Pressure Estimate Clutch Torque Estimate Clutch Status Motor Speeds Wheel Slip Shutdown Command	>= 190.00 kPa > 15.00 Nm =Locked = not faulted =0 =0	Fail Condition met for 2.50 seconds out of 3.33 seconds Retry Count: 0.00	Type A, 1 Trips
			Clutch 2 Energy	>= 5,851.40 J	Line Pressure Estimate Clutch Torque Estimate Clutch Status Motor Speeds Wheel Slip Shutdown Command	>= 190.00 kPa > 15.00 Nm =Locked = not faulted =0 =0	Instantly once Clutch 1 Energy >= 5,851.40 J Retry Count: 0.00	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Clutch 3 Slip	P079C	Monitors clutch 3 slip by comparing slip speed across the clutch to a slip threshold.	Clutch 3 Slip Speed	>= 100.00 RPM	Line Pressure Estimate Clutch Status Motor Speeds Wheel Slip Shutdown Command	>= 190.00 kPa =Locked = not faulted =0 =0	Fail Condition met for 1.00 seconds out of 1.25 seconds Retry Count: 0.00	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Clutch 1 Stuck On	P07A3	Detects if clutch 1 is stuck on by comparing actual clutch 1 slip speed to a desired slip profile or by detecting that slip across the clutch is not above a threshold when slip is expected.	C1 Offgoing Slip Expected	=1	Motor Speed Clutch 1 State	= not faulted = offgoing	Fail condition met for 0.50 seconds out of 0.75 seconds. Retry Count: 0.00	Type A, 1 Trips
			C1 Slip Speed C1 Profiled Slip Speed	=< **Clutch1FailSlipSpeed** (See supporting table) >= **Clutch1ProfiledSlipSpdThd** (See supporting table)	Clutch Status Shutdown command Motor Speed	=Released =0 =not faulted	Fail condition met for 0.50 seconds out of 0.75 seconds. Retry Count: 0.00	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Clutch 2 Stuck On	P07A5	Detects if clutch 2 is stuck on by comparing actual clutch 2 slip speed to a desired slip profile or by detecting that slip across the clutch is not above a threshold when slip is expected.	C2 Offgoing Slip Expected	=1	Motor Speed Clutch 2 State	= not faulted =off going	Fail condition met for 0.50 seconds out of 0.75 seconds. Retry Count: 0.00	Type A, 1 Trips
			C2 Slip Speed C2 Profiled Slip Speed	=< **Clutch2FailSlipSpeed** (See supporting table) >= **Clutch2ProfiledSlipSpeedThd** (See supporting table)	Clutch Status Shutdown command Motor Speed	=Released =0 = not faulted	Fail condition met for 0.50 seconds out of 0.75 seconds. Retry Count: 0.00	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Clutch 3 (Diode) Stuck	P07A7	Detects if clutch 3 is stuck on by comparing actual clutch 3 slip speed to a desired slip profile.	C3 Slip Speed C3 Profiled Slip Speed	=< **Clutch3FailSlipSpeed** (See supporting table) >= **Clutch3ProfiledSlipSpeedThd** (See supporting table)	Clutch Status Shutdown command Motor Speeds	=Released =0 =not faulted	Fail condition met for 0.38 seconds out of 0.50 seconds. Retry Count: 0.00	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid A Control Circuit Open	P0960	This DTC sets when the PCSA control circuit has been detected to be open	HWIO circuitry detects if an electrical circuit open is present or not. PCS A Circuit Open Fault Status	=TRUE	Battery Voltage Ignition voltage Engine Speed Vehicle Speed PropSysActive	>=9.00 V and <=16.00V > = 11 Volts && <= 16 Volts >= 0 RPM && <= 7500 RPM for >= 5 seconds <= 200 mph for >= 5 seconds =1	Fail condition met for 0.30 seconds in a 0.40 second window.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid A Control Circuit Low Voltage	P0962	This DTC sets when the PCSA control circuit has been detected to be shorted to ground	HWIO circuitry detects if an electrical circuit low is present or not.		Battery Voltage	>=9.00 V and <=16.00 V	Fail condition met for 0.30 seconds in a 0.40 second window.	Type A, 1 Trips
					Ignition voltage	> = 11 Volts && <= 16 Volts		
			PCS A Circuit Low Fault Status	=TRUE				
					Engine Speed	>= 0 RPM && <= 7500 RPM for >= 5 seconds		
					Vehicle Speed	<= 200 mph for >= 5 seconds		
					PropSysActive	=1		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid A Control Circuit High Voltage	P0963	This DTC sets when PCS1 has been detected to be shorted to power	HWIO circuitry detects if an electrical circuit high is present or not. PCS A Circuit High Fault Status	 =TRUE	Battery Voltage Ignition voltage Engine Speed Vehicle Speed PropSysActive	>=9.00 V and <=16.00 V > = 11 Volts && <= 16 Volts >= 0 RPM && <= 7500 RPM for >= 5 seconds <= 200 mph for >= 5 seconds =1	Fail condition met for 0.30 seconds in a 0.40 second window.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid B Control Circuit Open	P0964	This DTC sets when the PCSB control circuit has been detected to be open	HWIO circuitry detects if an electrical circuit open is present or not PCS B Open Circuit Fault Status	HWIO circuitry detects if an electrical circuit open is present or not. =TRUE	Battery Voltage Ignition voltage Engine Speed Vehicle Speed PropSysActive	>= 9.00 V and <= 16.00 V > = 11 Volts && <= 16 Volts >= 0 RPM && <= 7500 RPM for >= 5 seconds <= 200 mph for >= 5 seconds =1	Fail condition met for 0.30 seconds in a 0.40 second window.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid B Control Circuit Low Voltage	P0966	This DTC sets when the PCSB control circuit has been detected to be shorted to ground	HWIO circuitry detects if an electrical circuit low is present or not PCS B Circuit Low Fault Status	=TRUE	Battery Voltage Ignition voltage Engine Speed Vehicle Speed PropSysActive	>= 9.00 V and <= 16.00 V > = 11 Volts && <= 16 Volts >= 0 RPM && <= 7500 RPM for >= 5 seconds <= 200 mph for >= 5 seconds =1	Fail condition met for 0.075 seconds in a 0.10 second window.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid B Control Circuit High Voltage	P0967	This DTC sets when PCSb has been detected to be shorted to power or open circuited	HWIO circuitry detects if an electrical circuit high is present or not. PCS A Circuit High Fault Status	=TRUE	Battery Voltage Ignition voltage Engine Speed Vehicle Speed PropSysActive	>= 9.00 V and <= 16.00 V > = 11 Volts && <= 16 Volts >= 0 RPM && <= 7500 RPM for >= 5 seconds <= 200 mph for >= 5 seconds =1	Fail condition met for 0.30 seconds in a 0.40 second window.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid C Control Circuit Open	P0968	This DTC sets when the PCSC control circuit has been detected to be open circuit	HWIO circuitry detects if an electrical circuit open is present or not.		Battery Voltage	>= 9.00 V and <= 16.00 V	Fail condition met for 0.30 seconds in a 0.40 second window.	Type A, 1 Trips
			PCS C Open Circuit Fault Status	=TRUE	Ignition voltage	> = 11 Volts && <= 16 Volts		
					Engine Speed	>= 0 RPM && <= 7500 RPM for >= 5 seconds		
					Vehicle Speed	<= 200 mph for >= 5 seconds		
					PropSysActive	=1		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid C Control Circuit Low Voltage	P0970	This DTC sets when the PCSC control circuit has been detected to be shorted to ground	HWIO circuitry detects if an electrical circuit low is present or not.		Battery Voltage	>= 9.00 V and <= 16.00 V	Fail condition met for 0.03 seconds in a 0.04 second window.	Type A, 1 Trips
					Ignition voltage	> = 11 Volts && <= 16 Volts		
			PCS C Circuit Low Fault Status	=TRUE				
					Engine Speed	>= 0 RPM && <= 7500 RPM for >= 5 seconds		
					Vehicle Speed	<= 200 mph for >= 5 seconds		
					PropSysActive	=1		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid C Control Circuit High Voltage	P0971	This DTC sets when PCSC has been detected to be shorted to power or open circuited.	HWIO circuitry detects if an electrical circuit high is present or not. PCS C Circuit High Fault Status	=TRUE	Battery Voltage Ignition voltage Engine Speed Vehicle Speed PropSysActive	>= 9.00 V and <= 16.00 V > = 11 Volts && <= 16 Volts >= 0 RPM && <= 7500 RPM for >= 5 seconds <= 200 mph for >= 5 seconds =1	Fail condition met for 0.30 seconds in a 0.40 second window.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Phase U Current Low	P0B01	This diagnostic monitors the sensed current on the "U" phase of the electric motor for an open circuit. When the phase angle of the stator current vector nears its peak, the absolute value of the current is then compared against a threshold. If the sensed current is below the failure threshold for sufficient time, the diagnostic will fail.	Peak Phase Axis Current on the U Phase	< 1.00 Amps	Drive State Delay Timer Inverter State Inverter Power Stage Inverter Voltage Rotor Position Squared Current Comanded	RUN > 10.00 ms ≠Active Discharge Normal PWM > 50.00 V -30 deg < Phase Axis < +30 deg > 15.00 Amps^2	0.08 seconds out of a 0.6 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Phase V Current Low	P0B04	This diagnostic monitors the sensed current on the "V" phase of the electric motor for an open circuit. When the phase angle of the stator current vector nears its peak, the absolute value of the current is then compared against a threshold. If the sensed current is below the failure threshold for sufficient time, the diagnostic will fail.	Peak Phase Axis Current on the V Phase	< 1.00 Amps	Drive State Delay Timer Inverter State Inverter Power Stage Inverter Voltage Rotor Position Squared Current Comanded	Run > 10.00 ms ≠Active Discharge Normal PWM > 50.00 V -30 deg < Phase Axis < +30 deg > 15.00 Amps^2	0.08 seconds out of a 0.6 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Phase W Current Low	P0B07	This diagnostic monitors the sensed current on the "W" phase of the electric motor for an open circuit. When the phase angle of the stator current vector nears its peak, the absolute value of the current is then compared against a threshold. If the sensed current is below the failure threshold for sufficient time, the diagnostic will fail.	Peak Phase Axis Current on the W Phase	< 1.00 Amps	Drive State Delay Timer Inverter State Inverter Power Stage Inverter Voltage Rotor Position Squared Current Comanded	RUN > 10.00 ms ≠Active Discharge Normal PWM > 50.00 V -30 deg < Phase Axis < +30 deg > 15.00 Amps^2	0.08 seconds out of a 0.6 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Motor Current High	P0C28	This diagnostic monitors the sensed current on all three phases of the electric motor. The absolute value of the highest current phase value is then compared against a threshold. If the value is above the failure threshold for sufficient time, the diagnostic will fail. This diagnostic implements the use of 2 different fail timers, one fast and one slow. The fast timer has a very short sample window so that the diagnostic will detect a sudden fault, the slower timer has a longer sample window to allow the diagnostic to detect an intermittent fault.	U, V, or W Phase Current Sensor	> 35.00 Amps	Wakeup Signal	On	0.0104 seconds out of a 0.104 seconds window (x of Y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Battery System Discharge Time Too Long	P0C76	Monitors the high voltage bus after contactors open to ensure sufficient drop in voltage occurs	High voltage inverter rationalized voltage after discharge	> 200 volts	Enable calibration is True High voltage main contactor status IF discharge during charging is Not Allowed THEN High voltage charging contactor status	= 1 (1 is Enabled) = OPEN = 0 (0 is Not Allowed) = OPEN	3.5 seconds Diagnostic must run 2 times before failure is reported	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Regenerative Braking Control Switch A Circuit/Open	P152A	Checks to see if the regen on demand switch is active for an expected amount of time while the IMS is in an expected range. Fail case 1 and fail case 2 must be met to trip this DTC.Regenerative Braking Control Switch A Stuck ON	IMS Position Tap Switch Position	= **TapDwnSwch2_Fail1 Rng** =Tap Down	P152A enable calibration Crank Diagnostic enable criteria met P152D Regen on Demand Switch available	= 1.00 (1 is enabled) = True NOT Fault active (FA) AND NOT Test Failed This Key On (TFTKO) = 1.00 (1 is available)	Malfunction criteria met for 600.00 seconds	Type C, No SVS "Emission Neutral Diagnostic - Type C"
			IMS Position Tap Switch Position	= **TapDwnSwch2_Fail2 Rng** =Tap Up	P152A enable calibration Crank Diagnostic enable criteria met P152D Regen on Demand Switch available	= 1.00 (1 is enabled) = True NOT Fault active (FA) AND NOT Test Failed This Key On (TFTKO) = 1.00 (1 is available)	Malfunction criteria met for 600.00 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Regenerative Braking Control Switch Signal Message Counter Incorrect	P152C	This diagnostic monitors the signal from the body control module (BCM) to the THCP microprocessor for the regenerative braking switch. Potential failures include the BCM transceiver, the transmission line, the THCP transceiver and the processing in both microprocessors. If the BCM does not increment a counter with each message or fails to send the message in time the fault is set in the THCP.	Tap Up Tap Down Switch Alive Rolling Count Error	> 3 Errors	Enable Calibration is True Enable Calibration is True	= 1 (1 is Enabled) = 1 (1 is Enabled)	10 ms out of 10 ms window	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Regenerative Braking Control Switch A and B Circuit	P152D	This DTC reports when the regen on demand switch position is invalid after an expected period of time.	Regen On Demand Switch position	= Invalid (NOT reported as "TapDwn" or "TapOff")	P152D Enable calibration Regen on Demand Switch available Crank Diagnostic Enable criteria met	= 1.00 (1 is enabled) = 1.00 (1 is available) = True	Malfunction criteria met for 60.00 seconds	Type C, No SVS "Emission Neutral Diagnostic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Alive Rolling Count/ Protection Value Fault - Engine Actual Torque Steady State	P15F0	This diagnostic monitors the signal from the engine control module (ECM) to the THCP microprocessor with the engine torque data. Potential failures include the ECM transceiver, the transmission line, the THCP transceiver and the processing in both microprocessors. If the ECM does not increment an Alive Rolling Count (ARC) with each message or fails to send the message in time or fails to calculate the checksum correctly the fault is set in the THCP.	Current ARC value OR Primary signal value	≠ Previous ARC value plus 1 (0-3) ≠ Protection Value	Propulsion System Active Run/Crank Active time AND Run/Crank Voltage OR Ignition Run/Crank Voltage	= TRUE >= 0.50 secomds >= 9.50 V >= 11.00 V	0.125 seconds out of a 0.2 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Alive Rolling Count/ Protection Value Fault - Commanded Axle Torque Predicted	P15F1	This diagnostic monitors the signal from the engine control module (ECM) to the THCP microprocessor with commanded engine torque data. Potential failures include the ECM transceiver, the transmission line, the THCP transceiver and the processing in both microprocessors. If the ECM does not increment a counter with each message or fails to send the message in time or fails to calculate the checksum correctly the fault is set in the THCP.	Current ARC value OR Primary signal value	≠ Previous ARC value plus 1 (0-3) ≠ Protection Value	Run/Crank Active time AND (Run/Crank Voltage OR Ignition Run/Crank Voltage	>= 0.50 secomds >= 9.50 V >= 11.00 V	0.125 seconds out of a 0.2 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Alive Rolling Count/ Protection Value Fault - Contactor Status Signal Circuit	P15FC	This diagnostic monitors the signal from the VICM/BSM (HPCM2) to the THCP microprocessor with contactor status information. Potential failures include the VICM/BSM transceiver, the transmission line, the THCP transceiver and the processing in both microprocessors. If the VICM/BSM does not increment a counter with each message or fails to send the message in time or fails to calculate the checksum correctly the fault is set in the THCP.	Current ARC value OR Primary signal value	≠ Previous ARC value plus 1 (0,1,2,3,0,1,2...) ≠ Protection Value	Ignition Status	= Run or Crank	0.45 seconds out of a 0.5 seconds window Executes every time PE GMLAN msg $1D8 is received	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 2	P16E9	This diagnostic checks that the SPI communication between the THCP and MCP2 is working correctly. Potential failures could be in the microprocessors SPI handling, the transmission line or the microprocessors ability to execute code. The DTC sets if the messages are missing, the counter is not updated, or the SPI handler detects an incorrect checksum.	CRC (Cyclic Redundant Checksum) error on receive Number of missing messages OR Alive Rolling Count (ARC) incremented from previous value (0-3)	=True ≠ True	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete) OR CAN communication Disabled OR Run Crank In Range Voltage AND Run Crank In Range Security Voltage AND 12V Battery Voltage	= False = True = False > 11.00 V >= 9.50 V > 11.00 V	0.175 seconds out of a 0.2 seconds window	Type A, 1 Trips
			HWIO Received Errors AND Receiving Data in Progress	≠ 0 ≠ True	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete) OR CAN communication Disabled OR Run Crank In Range Voltage AND Run Crank In Range Security Voltage AND 12V Battery Voltage	= False = True = False > 11.00 V >= 9.50 V > 11.00 V	0.175 seconds out of a 0.2 seconds window	
			Number of Missing Received Messages	> 4 messages	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	0.175 seconds out of a 0.2 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					OR			
					CAN communication Disabled	= False		
					OR			
					Run Crank In Range Voltage	> 11.00 V		
					AND			
					Run Crank In Range Security Voltage	>= 9.50 V		
					AND			
					12V Battery Voltage	> 11.00 V		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 1	P16F0	This diagnostic checks that the SPI communication between the THCP and MCP1 is working correctly. Potential failures could be in the microprocessors SPI handling, the transmission line or the microprocessors ability to execute code. The DTC sets if the messages are missing, the counter is not updated, or the SPI handler detects an incorrect checksum in the time indicated.	CRC error on receive Number of missing messages OR Alive Rolling Count (ARC) incremented from previous value (0-3)	=True ≠ True	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete) OR CAN communication Disabled OR Run Crank In Range Voltage AND Run Crank In Range Security Voltage AND 12V Battery Voltage	= False = True = False > 11.00 V >= 9.50 V > 11.00 V	0.175 seconds out of a 0.2 seconds window	Type A, 1 Trips
			HWIO Received Errors AND Receiving Data in Progress	≠ 0 ≠ True	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete) OR CAN communication Disabled OR Run Crank In Range Voltage AND Run Crank In Range Security Voltage AND 12V Battery Voltage	= False = True = False > 11.00 V >= 9.50 V > 11.00 V	0.175 seconds out of a 0.2 seconds window	
			Number of Missing Received Messages	> 4 messages	(Diagnostic System Code Clear Requested AND Diagnostic System Reset	= False = True	0.175 seconds out of a 0.2 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Complete) OR CAN communication Disabled OR Run Crank In Range Voltage AND Run Crank In Range Security Voltage AND 12V Battery Voltage	 = False > 11.00 V >= 9.50 V > 11.00 V		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Redundant Memory Performance	P16F3	This diagnostic detects RAM faults in real time for those variables that are determined to be safety critical. The DTC sets when the called variable is called and compared to its redundant variable and does not match. There are fail cases for secure vehicle speed, transmission output sensor to wheel speed sensor conversion factor, and the engine torque value.	Rate Limited Secure Vehicle Speed (Re)	≠ Dual Stored Rate Limited Secure Vehicle Speed (Ve)	Run Crank Voltage Enable Calibration is True	>= 11.00 V = 1 (1 is Enabled)	0.125 seconds out of a 0.2 seconds window	Type A, 1 Trips
			TOS to Wheel Speed Conversion Factor TOS to Wheel Speed Conversion Factor	>= 1.10 (High & Neu) OR <= 0.10 (High & Neu) >= 1.10 (4WD Low) OR <= 0.10 (4WD Low)	Run Crank Voltage	>= 11.00 V	0.125 seconds out of a 0.2 seconds window	
			Engine Actual Torque Steady State WOM (Ve)	≠ Dual Stored Engine Actual Torque Steady State WOM (We)	Run Crank Voltage	>= 11.00 V	0.125 seconds out of a 0.2 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Transmission Range Control Performance	P16F4	Detects transmission range errors by comparing the Direction IMS switches with the Range IMS information from the THCP.	Valid Range IMS transmission position	≠ Valid Direction IMS transmission position	Run/Crank Voltage	>= 9.50 Volts	150.00 ms out of a 200.00 ms window Executes in a 25ms loop	Type A, 1 Trips
		DTC Fail case 1: Positive transmission ranges that do not match DTC Fail case 2: Error corrected Direction IMS does not match	Valid Range IMS transmission position	≠ Error corrected Direction IMS transmission position	Run/Crank Voltage	>= 9.50 Volts	150.00 ms out of a 200.00 ms window Executes in a 25ms loop	
		DTC Fail case 3: Range IMS is between valid transmission positions and Direction IMS is error corrected	Range IMS indicates a transitional state AND Direction IMS has an error corrected transmision position		Run/Crank Voltage	>= 9.50 Volts	150.00 ms out of a 200.00 ms window Executes in a 25ms loop	
		DTC Fail case 4: Range IMS is invalid and Direction IMS is error corrected DTC Fail case 5: Range IMS is between valid transmission positions and Direction IMS is invalid	Range IMS is invalid due to a fault or problem with THCP, AND the Direction IMS has an error corrected transmission position		Run/Crank Voltage	>= 9.50 Volts	150.00 ms out of a 200.00 ms window Executes in a 25ms loop	
		DTC Fail case 6: Range IMS and Direction IMS are both invalid	Range IMS indicates a transitional state AND Direction IMS is invalid due to a fault or problem with the THCP		Run/Crank Voltage	>= 9.50 Volts	150.00 ms out of a 200.00 ms window Executes in a 25ms loop	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Range IMS is invalid due to a fault or problem with the THCP, AND the Direction IMS is invalid due to a fault or a problem with the THCP		Run/Crank Voltage	>= 9.50 Volts	150.00 ms out of a 200.00 ms window Executes in a 25ms loop	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Commanded Range State	P16F6	This diagnostic verifies the calculation of the Transmission Range State. Potential failure modes could be the calculation of range state, range state transitions or the calculation of input torque does not match the range state. The DTC sets if there are mismatches in system equations, or the transmission range state being executed is invalid, or the transmission range state has performed an invalid transition or the input torque can not be rationalized with the range state.	The current Transmission Range State being used is detected to be an invalid value within the current Transmission range State Group		(Run/Crank Voltage OR Ignition Voltage) Enable range equation check is True Enable state machine rationality check is True Enable clutch control rationality check is True	>= 11.00 V >= 9.50 V = 1 (1 is Enabled) = 1 (1 is Enabled) = 1 (1 is Enabled)	0.2 seconds out of a 0.2125 seconds window	Type A, 1 Trips
			The current Transmission Range State Group being used by the system is an invalid value		(Run/Crank Voltage OR Ignition Voltage) Enable range equation check is True Enable state machine rationality check is True Enable clutch control rationality check is True	>= 11.00 V >= 9.50 Volts = 1 (1 is Enabled) = 1 (1 is Enabled) = 1 (1 is Enabled)	0.2 seconds out of a 0.2125 seconds window	
			The current Transmission Range State has changed, and the change in value is not one of the supported transitions from the previous Transmission Range State		(Run/Crank Voltage OR Ignition Voltage) Enable range equation check is True Enable state machine rationality check is True Enable clutch control rationality check is True	>= 11.00 V >= 9.50 V = 1 (1 is Enabled) = 1 (1 is Enabled) = 1 (1 is Enabled)	0.2 seconds out of a 0.2125 seconds window	
			The Range Equation can not be rationalized against the current Transmission Range State		(Run/Crank Voltage OR Ignition Voltage) Enable range equation check is True	>= 11.00 V >= 9.50 V = 1 (1 is Enabled)	0.2 seconds out of a 0.2125 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Enable state machine rationality check is True Enable clutch control rationality check is True	= 1 □1 is Enabled□ = 1 □1 is Enabled□		
			The Tor□ue Determination State can not be rationali□ed against the current Transmission Range State		□Run/Crank Voltage □R Ignition Voltage□ Enable range e□uation check is True Enable state machine rationality check is True Enable clutch control rationality check is True	>= 11.00 V >= 9.50 V = 1 □1 is Enabled□ = 1 □1 is Enabled□ = 1 □1 is Enabled□	0.2 seconds out of a 0.2125 seconds window	
			The Input Tor□ue □ptimi□ation State can not be rationali□ed against the current Transmission Range State		□Run/Crank Voltage □R Ignition Voltage□ Enable range e□uation check is True Enable state machine rationality check is True Enable clutch control rationality check is True	>= 11.00 V >= 9.50 V = 1 □1 is Enabled□ = 1 □1 is Enabled□ = 1 □1 is Enabled□	0.2 seconds out of a 0.2125 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Pressure Control Solenoid Command Incorrect	P16F7	This diagnostic detects whether the solenoids driving the clutches are in the correct states. If a pressure solenoid is commanded off and the electronic feedback indicates it is in the "on" state the DTC sets in the indicated time. If the pressure solenoid is commanded on and the electronic feedback indicates the solenoid is "off" the DTC sets in the indicated time.	Clutch commanded off OR Clutch commanded on	= Clutch State On = Clutch State Off	Direct control of Solenoids AND Direct control of clutches AND Hydralic default state AND (Run Crank Voltage OR Ignition Voltage)	= Inactive = Inactive = False >= 11.00 V >= 9.50 V	0.1375 seconds out of a 0.2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Clutch 1 Slip Adapt	P179C	Detects an excessive amount of clutch slip adapt from slip intervention	Max clutch 1 capacity reserve adapt	= 1	Enable Calibration is True Hydraulic System	= 1 (1 is Enabled) = Enabled	10.00 cycles of max clutch capacity reserve adapt being observed	Type B, 2 Trips
			Slip intervention requested without holding the adapt	= 1	Enable Calibration is True Hydraulic System	= 1 (1 is Enabled) = Enabled	65,535.00 cycles of slip intervention without holding the adapt being observed	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Clutch 2 Slip Adapt	P179D	Detects an excessive amount of clutch slip adapt from slip intervention	Max clutch 2 capacity reserve adapt	= 1	Enable Calibration is True Hydraulic System	= 1 (1 is Enabled) = Enabled	10.00 cycles of max clutch capacity reserve adapt being observed	Type B, 2 Trips
			Slip intervention requested without holding the adapt	= 1	Enable Calibration is True Hydraulic System	= 1 (1 is Enabled) = Enabled	65,535.00 cycles of slip intervention without holding the adapt being observed	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch P Circuit High Voltage	P1824	This DTC Monitors if the IMS P Circuit is Shorted to a high voltage	IMS P Voltage	> 2.49	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts = 1 (1 is Enabled)	Fail condition met for 1.75 seconds in a 2.00 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch A Circuit Low Voltage	P182A	This DTC Monitors if the IMS A Circuit is Shorted to a Low Voltage	IMS A Voltage	<= 0.66	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts =1 1 (1 is Enabled)	Fail condition met for 1.75 seconds in a 2.00 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch B Circuit Low Voltage	P182B	This DTC Monitors if the IMS B Circuit is Shorted to a Low Voltage	IMS B Voltage	<= 0.66	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts = 1 (1 is Enabled)	Fail condition met for 1.75 seconds in a 2.00 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch B Circuit High Voltage	P182C	This DTC Monitors if the IMS B Circuit is Shorted to a high voltage	IMS B Voltage	> 2.49	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts = 1 (1 is Enabled)	Fail condition met for 1.75 seconds in a 2.00 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch P Circuit Low Voltage	P182D	This DTC Monitors if the IMS P Circuit is Shorted to a Low Voltage	IMS P Voltage	<= 0.66	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts = 1 (1 is Enabled)	Fail condition met for 1.75 seconds in a 2.00 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch Invalid Range	P182E	This DTC Monitors if the IMS is Reporting an invalid range, meaning that the position of the IMS cannot be determined from the states of the individual IMS bits.	Converted Directional IMS	= Illegal	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts = 1 (1 is Enabled)	Fail condition met for 2.70 seconds in a 3.13 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch C Circuit High Voltage	P182F	This DTC Monitors if the IMS C Circuit is Shorted to a high voltage	IMS C Voltage	> 2.49	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts = 1 (1 is Enabled)	Fail condition met for 1.75 seconds in a 2.00 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch A Circuit High Voltage	P1838	This DTC Monitors if the IMS A Circuit is Shorted to a high voltage	IMS A Voltage	> 2.49	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts = 1 (1 is Enabled)	Fail condition met for 1.75 seconds in a 2.00 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch C Circuit Low Voltage	P1839	This DTC Monitors if the IMS C Circuit is Shorted to a Low Voltage	IMS C Voltage	<= 0.66	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts = 1 (1 is Enabled)	Fail condition met for 1.75 seconds in a 2.00 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch S Circuit Low Voltage	P1840	This DTC Monitors if the IMS S Circuit is Shorted to a Low Voltage	IMS S Voltage	<= 0.66	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts = 1 (1 is Enabled)	Fail condition met for 1.75 seconds in a 2.00 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch S Circuit High Voltage	P1841	This DTC Monitors if the IMS S Circuit is Shorted to a high voltage	IMS S Voltage	> 2.49	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts = 1 (1 is Enabled)	Fail condition met for 1.75 seconds in a 2.00 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch A Circuit Short	P18B5	This DTC reports if the monitored an IMS A Circuit voltage is between the max voltage for the valid low range and the min voltage for the valid high range.	IMS A Voltage	> 1.02 Volts and < 1.62 Volts	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts = 1 (1 is Enabled)	Fail condition met for 1.75 seconds in a 2.00 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch B Circuit Short	P18B6	This DTC reports if the monitored an IMS B Circuit voltage is between the max voltage for the valid low range and the min voltage for the valid high range.	IMS A Voltage	> 1.02 Volts and < 1.62 Volts	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts = 1 (1 is Enabled)	Fail condition met for 1.75 seconds in a 2.00 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch C Circuit Short	P18B7	This DTC reports if the monitored an IMS C Circuit voltage is between the max voltage for the valid low range and the min voltage for the valid high range.	IMS A Voltage	> 1.02 Volts and < 1.62 Volts	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts = 1 (1 is Enabled)	Fail condition met for 1.75 seconds in a 2.00 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch P Circuit Short	P18B8	This DTC reports an IMS P Circuit short if the monitored voltage is between the max voltage for the valid low range and the min voltage for the valid high range.	IMS P Voltage	> 1.02 Volts and < 1.62 Volts	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts = 1 (1 is Enabled)	Fail condition met for 1.75 seconds in a 2.00 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch S Circuit Short	P18B9	This DTC reports if the monitored an IMS S Circuit voltage is between the max voltage for the valid low range and the min voltage for the valid high range.	IMS S Voltage	> 1.02 Volts and < 1.62 Volts	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts = 1 (1 is Enabled)	Fail condition met for 1.75 seconds in a 2.00 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch A Stuck Off	P18BA	This DTC Monitors if the IMS A Circuit is Stuck Off, meaning that the circuit is in the valid low state when it is expected to be in the valid high state.	Converted Directional IMS Directional IMS A	Transitional 30 IMS A has not been observed valid Low	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts = 1 (1 is enabled)	Fail condition met for 2.70 seconds in a 3.13 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch C Stuck Off	P18BC	This DTC Monitors if the IMS C Circuit is Stuck Off, meaning that the circuit is in the valid low state when it is expected to be in the valid high state.	Converted Directional IMS Directional IMS C	Transitional 27 IMS C has not been observed valid Low	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts = 1 (1 is enabled)	Fail condition met for 2.70 seconds in a 3.13 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch A Stuck On	P18BF	This DTC Monitors if the IMS A Circuit is Stuck On, meaning that the circuit is in the valid high state when it is expected to be in the valid low state.	Converted Directional IMS AND Directional IMS A	Transitional 17 IMS A has not been observed in the valid High state	Ignition Voltage Run/Crank Voltage Enable Calibration is True Converted Directional IMS AND Directional IMS A	>= 9.0 volts > 6.00 volts = 1 (1 is Enabled) =Transitional 2 Has not been observed High in park for 1.50 seconds	Fail condition met for 2.70 seconds in a 3.13 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch B Stuck On	P18C0	This DTC Monitors if the IMS B Circuit is Stuck On, meaning that the circuit is in the valid high state when it is expected to be in the valid low state.	Converted Directional IMS AND Directional IMS B	Drive IMS B has not been observed High	Ignition Voltage Run/Crank Voltage Enable Calibration is True Converted Directional IMS AND Directional IMS B	>= 9.0 volts > 6.00 volts = 1 (1 is Enabled) Drive Has not been observed High in Park for 1.50 seconds.	Fail condition met for 2.70 seconds in a 3.13 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch P Stuck On	P18C2	This DTC Monitors if the IMS P Circuit is Stuck On, meaning that the circuit is in the valid high state when it is expected to be in the valid low state.	Converted Directional IMS AND Directional IMS P	Transitional 24 IMS P as not been observed High	Ignition Voltage Run/Crank Voltage Enable Calibration is True	>= 9.0 volts > 6.00 volts = 1 (1 is Enabled)	Fail condition met for 2.70 seconds in a 3.13 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Mode Switch S Stuck On	P18C3	This DTC Monitors if the IMS S Circuit is Stuck On, meaning that the circuit is in the valid high state when it is expected to be in the valid low state.	Converted Directional IMS AND Directional IMS S	LowManual IMS S has not been observed High	Ignition Voltage Run/Crank Voltage Converted Directional IMS Enable Calibration is True AND Directional IMS S	>= 9.0 volts > 6.00 volts =Park = 1 (1 is Enabled) has not been observed High in park for 1.50 seconds	Fail condition met for 2.70 seconds in a 3.13 second window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Alive Rolling Count/ Protection Value Fault - Regenerative Braking Torque Request Circuit	P1B15	This diagnostic monitors the signal from the electronic brake control module (EBCM) to the THCP microprocessor with the regenerative braking torque request data. Potential failures include the EBCM transceiver, the transmission line, the THCP transceiver and the processing of the signal in both microprocessors. If the EBCM does not increment a counter with each message or fails to send the message in timetime or fails to calculate the checksum correctly the fault is set in the THCP. Detect the ARC (Alive Rolling Count) or Protection Value fault by checking the ARC counter and verifying the Protection Value of the Regenerative Braking Torque Request Circuit	Current ARC value OR Primary signal value	≠ Previous ARC value plus 1 (0-3) ≠ Protection Value	Run/Crank Active time AND Run/Crank Voltage OR Ignition Run/Crank Voltage	>= 0.50 seconds >= 9.50 Volts >= 11.00 V	0.1875 seconds out of a 0.25 seconds window Executes every time CE GMLAN msg $235 is received	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensing Performance	P1E1B	This diagnostic verifies that the high voltage bus positive and negative leg sensors are neither inappropriately high nor low. It compares the sensed battery pack voltage against the high voltage positive and negative leg. If the absolute value of the difference between the sensed battery voltage and the high voltage positive and negative leg sensors is greater than the failure threshold for a sufficient time, the diagnostic will fail.	ABS(Total High Voltage Measured By the Battery Pack - High Voltage Measured from Positve to Ground - High Voltage Measured from Negative to Ground)	>= 50.00 V	No Active DTCs: Controller Initialization Contactors	P1AE8, P1AE9, P1B0B, P1B0C Complete Closed	0.175 seconds out of a 0.2 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensor 1 Circuit Low	P1E1C	This diagnostic monitors the high voltage bus positive leg sensor voltage which is out of range low. The sensed voltage is compared against a threshold. If the sensed voltage is below the failure threshold for sufficient time, the diagnostic will fail	Pos mid-pack voltage	< 20.00 Volts	Controller Initialization Run Crank Active Contactors	Complete True Closed	0.7375 seconds out of a 1.05 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensor 1 Circuit High	P1E1D	This diagnostic monitors the high voltage bus positive leg sensor voltage which is out of range high. The sensed voltage is subtracted from the total voltage. This delta is then compared against a threshold. If the delta is above the failure threshold for sufficient time, the diagnostic will fail.	High Voltage Positive to Ground Reading - Total High Voltage Reading from High Voltage Battery	> 40.00 Volts	Controller Initialization Run/Crank Active Contactors	Complete True Closed	0.525 seconds out of a 1.05 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit Low	P1E1E	This diagnostic monitors the high voltage bus negative leg sensor voltage which is out of range low. The sensed voltage is compared against a threshold. If the sensed voltage is below the failure threshold for sufficient time, the diagnostic will fail.	Negative mid-pack voltage	< 20.00 Volts	Controller Initialization Run/Crank Active Contactors	Complete True Closed	0.7375 seconds out of a 1.05 seconds window (x o y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit High	P1E1F	This diagnostic monitors the high voltage bus negative leg sensor voltage which is out of range high. The sensed voltage is subtracted from the total voltage. This delta is then compared against a threshold. If the delta is above the failure threshold for sufficient time, the diagnostic will fail.	High Voltage Positive to Ground Reading - Total High Voltage Reading from High Voltage Battery	> 40.00 Volts	Controller Initialization Run/Crank Active Contactors	Complete True Closed	0.525 seconds out of a 1.05 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage System Isolation Fault	P1E22	This diagnostic monitors the high voltage bus for possible shorts to chassis. The high voltage positive leg is compared to the high voltage negative leg via a ratio. If the ratio falls outside of a specific window for sufficient time, the diagnostic will fail.	Isolation Ratio (Neg mid-pack voltage / Pos mid-pack voltage)	> 4.53 OR < 0.21	No Active DTCs: Controller Initialization	P1AE8, P1AE9, P1AEC Complete	2.5 seconds out of a 5 seconds window (x of y)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Control Module Calculated Motor Position Performance	P1E29	This diagnostic monitors the auxiliary fluid pump for a loss of control. The calculated motor speed achieved is compared to a threshold. If the achieved speed is lower than the fail threshold for sufficient time, the diagnostic will fail.	Motor Speed Achieved	< -500.00 rpm	Wakeup Signal	ON	5.00 Retries Allowed after failure conditions met for 0.0006 seconds out of a 0.002 seconds window	Type A, 1 Trips
			Rotor Speed (Electrical Radians Per Second)	> 62.80 Rad/S	Wakeup Signal	ON	5.00 Retries Allowed after failure conditions met for 0.0006 seconds out of a 0.002 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Motor Phase U Current Sensor Circuit Low	P1E2A	This diagnostic monitors for the "U" phase current sensor voltage which is out of range low. After the sensor output voltage is converted, the sensed current is compared against a threshold. If the sensed current is below the failure threshold for sufficient time, the diagnostic will fail.	U Phase current sensor output at highside	< -50.00 Amps	Wakeup Signal Run Flag	On = 1.00	0.1 seconds out of a 0.15 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Motor Phase U Current Sensor Circuit High	P1E2B	This diagnostic monitors for the "U" phase current sensor voltage which is out of range high. After the sensor output voltage is converted, the sensed current is compared against a threshold. If the sensed current is above the failure threshold for sufficient time, the diagnostic will fail.	U phase current sensor output at highside	> 50.00 amps	Wakeup Signal Run Flag	On = 1.00	0.1 seconds out of a 0.15 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Motor Phase U Current Sensor Circuit Range/ Performance	P1E2C	This diagnostic monitors the offset that is learned by the phase “U” current sensor on the high voltage electric motor. In order to ensure accurate current measurement an offset is calculated when there is no current going through the motor. The offset learn process is conducted on every key crank, the learned offset is then compared against a threshold, if the offset value is larger than the fail threshold the diagnostic will fail.	U phase current sensor offset learn value	> 2.00 amps	Wakeup Signal Delay Timer Motor Fauts Inverter Faults	On 0.40 Sec None None	Fail conditions met 0.40 sec after enable conditions met	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Motor Phase V Current Sensor Circuit Low	P1E2D	This diagnostic monitors for the "V" phase current sensor voltage which is out of range low. After the sensor output voltage is converted, the sensed current is compared against a threshold. If the sensed current is below the failure threshold for sufficient time, the diagnostic will fail.	U phase current sensor output at highside	< -50.00 amps	Wakeup Signal Run Flag	On = 1.00	0.1 seconds out of a 0.15 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Motor Phase V Current Sensor Circuit High	P1E2E	This diagnostic monitors for the "V" phase current sensor voltage which is out of range high. After the sensor output voltage is converted, the sensed current is compared against a threshold. If the sensed current is above the failure threshold for sufficient time, the diagnostic will fail.	V phase Current Sensor output highside	> 50.00	Wakeup Signal Run Flag	On = 1.00	0.1 seconds out of a 0.15 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Motor Phase V Current Sensor Circuit Range/ Performance	P1E2F	This diagnostic monitors the offset that is learned by the phase "V" current sensor on the high voltage electric motor. In order to ensure accurate current measurement an offset is calculated when there is no current going through the motor. The offset learn process is conducted on every key crank, the learned offset is then compared against a threshold, if the offset value is larger than the fail threshold the diagnostic will fail.	U phase current sensor offset learn value	> 2.00 amps	Wakeup Signal Delay Timer Motor Faults Inverter Faults	On 0.40 Sec None None	Fail conditions met 0.40 sec after enable conditions met	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Motor Inverter Temperature Sensor Circuit High	P1E34	This diagnostic monitor for inverter phase "U" temperature sensor voltage which is out of range high. The temperature sensor this diagnostic is monitoring is a negative temperature coefficient thermistor with a pull up resistor on the sensing board, meaning a high temperature of sensor short to ground will result in a low sensed voltage. After conversion the sensed temperature is compared against a threshold. If the sensed temperature is below the failure threshold for sufficient time, the diagnostic will fail.	PIM Temperature Sensor A	< -50.00 degrees C	Sensor Exists Wakeup Signal Inverter Warmup Time at or above inverter warmup torque	= 1.00 ON ≥ 600.00 s ≥ABS(1.00)Nm	6.25 seconds out of a 8.75 seconds window (x of y)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Motor Inverter Termperature Sensor Circuit Low	P1E35	This diagnostic monitor for inverter phase "U" temperature sensor voltage which is out of range low. The temperature sensor this diagnostic is monitoring is a negative temperature coefficient thermistor with a pull up resistor on the sensing board, meaning a high temperature of sensor short to ground will result in a low sensed voltage. After conversion the sensed temperature is compared against a threshold. If the sensed temperature is above the failure threshold for sufficient time, the diagnostic will fail.	PIM Temperature Sensor A	> 159.00 degrees C	Sensor Exists WakeUp Signal	= 1.00 On	6.25 seconds out of a 8.75 seconds window (x of y)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Motor Inverter Temperature Sensor Circuit Range/ Performance	P1E36	This diagnostic verifies that the high voltage electric motor inverter phase "U" temperature sensor is neither inappropriately high nor low. This diagnostic compares the temperature reading from the sensor to a calculated average temperature of the vehicle. This average temperature is only calculated on key up after the vehicle has been off for a certain amount of time. The absolute value of the sensed temperature minus the calculated average temperature is then compared against a threshold. If the calculated delta between the sensed temperature and the calculated average temperature is above the fail threshold the diagnostic will fail.	ABS(Inverter A Temp- Cold Soak Average Temp)	> 20.00 degrees C	Vehicle off time Cold Start Average Temperature No Active Power Inverter Temp Out Of Range Faults: Delay timer after controller initialization	≥ 9.17 hours > -20.00 °C P0AF0 and P0AEF > 5.13 second	1.25 seconds out of a 1.75 seconds window (x of y)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Motor Inverter Over Temperature	P1E37	This diagnostic monitors the inverter phase "U" temperature for an in-range high temperature condition. The sensed temperature is compared against a threshold. If the sensed temperature is above the failure threshold for a sufficient time, the diagnostic will fail.	PIM Phase U Temperature	> 122.00 degrees C	PIM Phase U Temperature	TEMP NORMAL	1.5 seconds out of a 2 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Motor Power Supply Circuit/Open	P1E38	This diagnostic monitors the status of the IGBTs. The IGBT module will continuously monitor the supply circuit voltage. When the supply circuit drops below a threshold voltage the module then report out a status of being in a Bias fault. If the Bias fault status is present for sufficient time, the diagnostic will fail.	Phase A, B, or C Power Supply	Failed (Status Fault Bit)	Inverter State	Initialization Complete	0.168 seconds out of a 0.2 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmissioni Fluid Pump Motor Inverter Performance	P1E39	This diagnostic monitors the status of the IGBTs. The IGBT module will continually monitor the IGBTs for a short between the upper and lower phase. The module will then report out a status of being in a DeSat fault. If the DeSat fault status is present for sufficient time, the diagnostic will fail.	Phase A, B, or C High or Low Side IGBT	DSatFltPending (Status Fault Bit)	Wakeup Signal	ON	0.01 seconds out of a 1 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Redundant Drive Motor A Speed Sensing Circuit	P1E4A	This diagnostic is a check of the motor A speed detection circuitry. When the difference between the THCP's motor A speed from the resolver circuit and the MCPA's motor speed from the emulated encoder circuit are greater than the indicated threshold for longer than the timer threshold, the DTC is set.	Difference between Resolver based Motor Speed and Emulated Encoder based Motor Speed	> 400.00 rpm	Enable Calibration is True AND (Run/Crank Voltage OR Ignition Run/Crank Voltage) AND SPI Receive Fault Active	= 1 (1 is Enabled) >= 9.50 Volts >= 11.00 V = FALSE	3.3375 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Redundant Drive Motor B Speed Sensing Circuit	P1E4B	This diagnostic is a check of the motor B speed detection circuitry. When the difference between the THCP's motor B speed from the resolver circuit and the MCPB's motor speed from the emulated encoder circuit are greater than the indicated threshold for longer than the timer threshold, the DTC is set.	Difference between Resolver based Motor Speed and Emulated Encoder based Motor Speed	> 400.00 rpm	Enable Calibration is True AND (Run/Crank Voltage OR Ignition Run/Crank Voltage) AND SPI Receive Fault Active	= 1 (1 is Enabled) >= 9.50 Volts >= 11.00 V = FALSE	3.3375 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Motor Inverter Temperature Sensor Circuit Erratic	P1F00	This diagnostic monitors the inverter phase "U" temperature sensor voltage which could be intermittently high, low, or open. A rolling average of sensed temperature readings calculated over a set amount of time is compared against a threshold that has been calculated based on the stator current. If the calculated rolling average is above the calculated fail threshold for sufficient time the, the diagnostic will fail.	A rolling average of temperature readings calculated over 0.38 s this calculation is known as a string length. Temperature readings are taken every .025s.	> an estimated string length calculated based on stator current.	Start-Up Delay	> 0.13 s	1.25 seconds out of a 1.875 seconds window (x of y)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV System Discharge Switch Circuit Performance	P1F63	Voltage drop over a given time is monitored to ensure discharge circuit is performing as expected.	High voltage rationalized inverter voltage delta during discharge switch commanded on time	< 20 volts = 0.1 seconds	Enable calibration is True High voltage inverter rationalized voltage before discharge High voltage inverter rationalized voltage after discharge completes Motor Speeds High voltage main contactor status IF discharge during charging is Not Allowed THEN High voltage charging contactor status	= 1 (1 is Enabled) > 330 Volts < 200 Volts < 200 RPM = OPEN = 0 (0 is Not Allowed) = OPEN	1 Failure	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV System Discharge Switch Circuit Low	P1F64	Monitors the high voltage discharge switch for a circuit low fault	Active discharge circuit open status	HWIO determines if the active discharge resistor is failed open. =TRUE	Enable calibration is True AND Run Crank Voltage	= 1 (1 is Enabled) In Range (10.00 - 16.00 volts)	0.125 seconds out of a 0.15 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid/EV System Discharge Switch Circuit High	P1F65	Monitors the high voltage discharge switch for a circuit high fault	Active discharge circuit high status	HWIO determines if the active discharge resistor is failed high. =TRUE	Enable calibration is True	= 1 (1 is Enabled)	0.125 seconds out of a 0.15 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Vehicle Speed Output Shaft Speed Correlation	P215B	The DTC Monitors if the Difference between the Transmission Output Speed, Output Speed Calculated from the Wheel Speed Sensors, and Output Speed Calculated from the Motor Speeds. The DTC sets if 2 of the 3 vehicle speed sources do not match.	Transmission Output Speed and Output Speed Calculated from the Wheel Speed Sensors and Output Speed Calculated from the Motor Speeds difference	> 12.42 mph	Vehicle speed diagnostic is enabled Number of Secured Vehicle Speed Sources	= 1 (1 = Enabled) CeVSPR_e_ThreeSrcSysTOS_WhlMtr	0.15 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Output Shaft Speed (OSS) - Wheel Speed Correlation	P215C	The DTC calculates the difference between the output shaft speed measured from the transmission output speed sensor (TOSS) and the output shaft speed calculated from the average of the wheel speed sensors then reports if they differ from each other by a threshold for a calibrated period of time. There is a different set of enable conditions when the TOS calculated from wheel speeds and TOS calculated from motor speeds are above or below a threshold.	Difference between Transmission Output Speed and the Calculated Average of Output Speed from the Motors and Wheel Speed Sensors	≥ 50.00 RPM	Enable Calibration is True	= 1 (1 is Enabled)	0.23 seconds	Type B, 2 Trips
					OBD Wheel Speed Sensors	True		
					Driven Wheel Estimated Vehicle Speed Fault	False		
					Propulsion System Active	True		
					TOS calculated from Wheel Speeds	≥ 200.00 RPM		
					TOS calculated from Motor Speeds	≥ 200.00 RPM		
			Difference between Transmission Output Speed and the Calculated Average of Output Speed from the Motors and Wheel Speed Sensors	≥ 60.00 RPM	Enable Calibration is True	= 1 (1 is Enabled)	0.23 seconds	
					OBD Wheel Speed Sensors	True		
					Driven Wheel Estimated Vehicle Speed Fault	False		
					Propulsion System Active	True		
					TOS calculated from Wheel Speeds	≤ 200.00 RPM		
					TOS calculated from Motor Speeds	≤ 200.00 RPM		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
HSD2 Actuator Supply Circuit Voltage Low	P2670	This diagnostic reports when a high side driver 2 circuit low fault is detected by the current supply driver and is reported via HWIO.	HWIO circuitry detects if an electrical circuit low is present or not. HSD 2 Short to Ground Fault Status	=TRUE	Enable Calibration is True HSD 2	= 1 (1 is Enabled) = On	0.13125 seconds out of a 0.15625 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
HSD2 Actuator Supply Circuit Voltage High	P2671	This diagnostic reports when a high side driver 2 circuit high fault is detected by the current supply driver and is reported via HWIO.	HWIO circuitry detects if an electrical circuit high is present or not. HSD 2 Short to Power Fault Status	=TRUE	Enable Calibration is True	= 1 (1 is Enabled)	0.00625 seconds (1 Loop)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid D Control Circuit Open	P2718	This DTC sets when the PCSD control circuit has been detected to be open circuit	HWIO circuitry detects if an electrical circuit open is present or not. PCS D Open Circuit Fault Status	=TRUE	Battery Voltage Ignition voltage Engine Speed Vehicle Speed PropSysActive	>= 9.00 V and <= 16.00 V > = 11 Volts && <= 16 Volts >= 0 RPM && <= 7500 RPM for >= 5 seconds <= 200 mph for >= 5 seconds =1	Fail condition met for 0.30 seconds in a 0.40 second window.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid D Control Circuit Low Voltage	P2720	This DTC sets when the PCSD control circuit has been detected to be open circuit or shorted to power	HWIO circuitry detects if an electrical circuit low is present or not.		Battery Voltage	>= 9.00 V and <= 16.00 V	Fail condition met for 0.30 seconds in a 0.40 second window.	Type A, 1 Trips
					Ignition voltage	> = 11 Volts && <= 16 Volts		
			PCS D Circuit Low Fault Status	=TRUE				
					Engine Speed	>= 0 RPM && <= 7500 RPM for >= 5 seconds		
					Vehicle Speed	<= 200 mph for >= 5 seconds		
					PropSysActive	=1		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid D Control Circuit High Voltage	P2721	This DTC sets when PCSD has been detected to be shorted to battery	HWIO circuitry detects if an electrical circuit high is present or not. PCS D Circuit High Fault Status	 =TRUE	Battery Voltage Ignition voltage Engine Speed Vehicle Speed PropSysActive	>= 9.00 V and <= 16.00 V > = 11 Volts && <= 16 Volts >= 0 RPM && <= 7500 RPM for >= 5 seconds <= 200 mph for >= 5 seconds =1	Fail condition met for 0.30 seconds in a 0.40 second window.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid E Control Circuit Open	P2727	This DTC sets when the PCSE control circuit has been detected to be open circuit	HWIO circuitry detects if an electrical circuit open is present or not.		Battery Voltage	>= 9.00 V and <= 16.00 V	Fail condition met for 0.30 seconds in a 0.40 second window.	Type A, 1 Trips
					Ignition voltage	> = 11 Volts && <= 16 Volts		
			PCS E Open Circuit Fault Status	=TRUE				
					Engine Speed	>= 0 RPM && <= 7500 RPM for >= 5 seconds		
					Vehicle Speed	<= 200 mph for >= 5 seconds		
					PropSysActive	=1		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid E Control Circuit Low Voltage	P2729	This DTC sets when the PCSE control circuit has been detected to be open circuit or shorted to ground	HWIO circuitry detects if an electrical circuit low is present or not.		Battery Voltage	>= 9.00 V and <= 16.00 V	Fail condition met for 0.30 seconds in a 0.40 second window.	Type A, 1 Trips
					Ignition voltage	> = 11 Volts && <= 16 Volts		
			PCS E Circuit Low Fault Status	=TRUE				
					Engine Speed	>= 0 RPM && <= 7500 RPM for >= 5 seconds		
					Vehicle Speed	<= 200 mph for >= 5 seconds		
					PropSysActive	=1		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid E Control Circuit High Voltage	P2730	This DTC sets when PCS5 has been detected to be shorted to power	HWIO circuitry detects if an electrical circuit high is present or not. PCS E Circuit High Fault Status	=TRUE	Battery Voltage Ignition voltage Engine Speed Vehicle Speed PropSysActive	>= 9.00 V and <= 16.00 V > = 11 Volts && <= 16 Volts >= 0 RPM && <= 7500 RPM for >= 5 seconds <= 200 mph for >= 5 seconds =1	Fail condition met for 0.30 seconds in a 0.40 second window.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Performance	P2797	This diagnostic monitors the aux pump performance based on aux pump filtered desired speed and actual speed values.	Difference between desired and actual aux pump speed AND Aux Pump Motor Estimated Temperature	See supporting tables for P2797 failure threshold **P2797 Pump Performance Speed Delta Threshold** < 165C	Aux Pump Speed Command Run/Crank Voltage	>= 5.00 RPM for 1.00 s > 6.00 volts	Fail Condition met for 3.00 seconds in a 3.75 second window	Type A, 1 Trips
			Difference between desired and actual aux pump speed AND Aux Pump Motor Estimated Temperature	See supporting tables for P2797 failure threshold **P2797 Pump Performance Speed Delta Threshold Case 2** > 165C	Aux Pump Speed Command Run/Crank Voltage	>= 5.00 RPM for 1.00 s > 6.00 volts	Fail Condition met for 2.00 seconds in a 2.50 second window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DID 76 Calibration Incorrect	P27A7	Detects if the solenoid calibration is incorrect	Solenoid not programmed	=1			Instantly	Type A, 1 Trips
			Solenoid programming falut(stored solenoid type and class configuration calibrations do not match)	=1			Instantly	
			Checksum Mismatch	=1			Instantly	
			Access Decreasing Fault	=1			Instantly	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Drive Motor Control Performance	P3260	This diagnostic checks that the engine speed and motor torque go below thresholds when the driver shifts to neutral. When the driver shifts to neutral and the vehicle speed is below the shown threshold the vehicle should turn off the engine and reduce the motor torque to near zero Nm. When shifted to neutral, if the engine speed does not fall below the threshold or motor torque is not removed in the shown time then the DTC is set. A second fail case is checked after the above conditions are correct the engine speed and motor torque values are continuously monitored to be sure they stay in range, otherwise the DTC is set.	((Motor A torque AND Ignore Motor A torque) OR (Motor B torque AND Ignore Motor B torque) OR (Engine speed AND Ignore Engine speed))	< 0.000001 Nm = 0 (0 = use Motor A Torque) < 0.000001 Nm = 0 (0 = use Motor B Torque) < 200.00 RPM = 1 (0 = use Engine speed)	Vehicle speed AND No motor neutral diagnostic enabled AND Gear position Debounce timer	< 5.00 kph = 1 (1 = Enabled) = CeHSER_e_G2_RngEqn (Neutral) > 375.00 msec	Timer from shift to neutral to all conditions being met > 33.00 seconds	Type A, 1 Trips
			((Motor A torque AND I gnore Motor A torque) OR (Motor B torque AND Ignore Motor B torque) OR (Engine speed AND	>= 4.00 Nm = 0 (0 = use Motor A Torque) >= 4.00 Nm = 0 (0 = use Motor B Torque) >= 200.00 RPM	Case 1 test passed AND Gear position	= CeHSER_e_G2_RngEqn (Neutral)	X of Y > 30 * 0.0125 = 0.1875 msec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Ignore Engine speed))	= 1 (0 = use Engine speed)				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication on Bus A Off	U0073	This diagnostic detects that BUS A is off or is non-operational. If the host controller can not transmit on bus A in the indicated time the DTC is set.	Bus off failures exceeds before the sample time of is reached	4 counts (equivalent to 0.05 seconds) 0.81 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: Enable Calibration is True Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for CAN hardware is bus OFF for	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 9.50 = run = 1 (1 is Enabled) = Active > 9.50 > 3.00 seconds > 0.1625 seconds	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication on Bus B Off	U0074	This diagnostic detects that BUS B is off or is non-operational. If the host controller can not transmit on BUS B in the indicated time the DTC is set.	Bus off failures exceeds before the sample time is reached	4 counts (equivalent to 0.05 seconds)	General Enable Criteria:		0.05 seconds out of 0.81 seconds	Type A, 1 Trips
					U0074	Not Active on Current Key Cycle		
					Normal CAN transmission on Bus B	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			
					Ignition voltage	>= 9.50		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					Enable Calibration is True	= 1 (1 is Enabled)		
					Ignition Accessory Line and	= Active		
					Battery Voltage	> 9.50		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for	> 3.00 seconds		
					CAN hardware is bus OFF for	> 0.1625 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication on Bus E Off	U0077	This diagnostic detects that BUS E is off or is non-operational. If the host controller can not transmit on BUS E in the indicated time the DTC is set.	Bus off failures exceeds before the sample time is reached	4 counts (equivalent to 0.05 seconds)	General Enable Criteria:		0.05 seconds out of 0.81 seconds	Type A, 1 Trips
					U0077	Not Active on Current Key Cycle		
					Normal CAN transmission on Bus E	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			
					Ignition voltage	>= 9.50		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					Enable Calibration is True	= 1 (1 is Enabled)		
					Ignition Accessory Line and	= Active		
					Battery Voltage	> 9.50		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met	> 3.00 seconds		
					CAN hardware is bus OFF for	> 0.1625 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on with ECM/PCM A	U0100	This diagnostic detects that the engine control module (ECM) has stopped sending messages on Bus A. If ECM message traffic is not received on Bus A by the host controller in the indicated time the DTC is set.	Message is not received from controller for		General Enable Criteria:		See Threshold Value Diagnostic runs in 12.5 ms loop	Type A, 1 Trips
					U0073	Not Active on Current Key Cycle		
			Message $0AA	≥ 0.50 seconds				
			Message $0C9	≥ 10.00 seconds	Normal CAN transmission on Bus A	Enabled		
			Message $1A3	≥ 10.00 seconds	Device Control	Not Active		
			Message $1AA	≥ 10.00 seconds	High Voltage Virtual Network Management	Not Active		
			Message $1C5	≥ 10.00 seconds	Ignition Voltage Criteria:			
			Message $287	≥ 10.00 seconds	Ignition voltage	>= 9.50		
			Message $3DC	≥ 10.00 seconds				
			Message $3E9	≥ 10.00 seconds	Power Mode	= run		
			Message $3FB	≥ 10.00 seconds	Off Cycle Enable Criteria:			
			Message $4A3	≥ 10.00 seconds	Enable Calibration is True	= 1 (1 indicates enabled)		
			Message $4C1	≥ 10.00 seconds				
			Message $4C7	≥ 10.00 seconds	Ignition Accessory Line and	= Active		
					Battery Voltage			
			Message $4F1	≥ 10.00 seconds		> 9.50		
			Message $589	≥ 10.00 seconds	General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for	> 3.0000 seconds		
					Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	> 0.4000 seconds		
					U0100	Not Active on Current Key		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					ECM	Cycle is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Brake System Control Module	U0129	This diagnostic detects that the brake system control module has stopped sending messages. If brake system control module message traffic is not received by the host controller in the indicated time the DTC is set.	Message is not received from controller for Message $0C1 Message $0C5 Message $0D1 Message $0F1 Message $1E9 Message $4E9	 ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: Enable Calibration is True Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for U0129	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 9.50 = run = 1 (1 indicates enabled) = Active > 9.50 > 3.0000 seconds > 0.4000 seconds Not Active on Current Key Cycle	See Threshold Value Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Brake System Control Module	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Gateway A	U0146	This diagnostic detects that the gateway A has stopped sending messages. If gateway A message traffic is not received by the host controller in the indicated time the DTC is set.	Message is not received from controller for Message $3CF	 ≥ 10 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: Enable Calibration is True Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for U0100	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 9.50 = run = 1 (1 indicates enabled) = Active > 9.50 > 3.0000 seconds > 0.4000 seconds Not Active on Current Key Cycle	See Threshold Value Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Gateway module	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Hybrid Powertrain Control Module B	U179A	This diagnostic detects that Hybrid Powertrain Control Module B has stopped sending messages. If Hybrid Powertrain Control Module B message traffic is not received by the host controller in the indicated time the DTC is set.	Message is not received from controller for		General Enable Criteria:		See Threshold Value Diagnostic runs in 12.5 ms loop	Type A, 1 Trips
					U0073	Not Active on Current Key Cycle		
			Message $3DD	≥ 10.00 seconds				
					Normal CAN transmission on Bus A	Enabled		
			Message $4CB	≥ 10.00 seconds				
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			
					Ignition voltage	>= 9.50		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					Enable Calibration is True	= 1 (1 indicates enabled)		
					Ignition Accessory Line and	= Active		
					Battery Voltage	> 9.50		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for	> 3.0000 seconds		
					Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	> 0.4000 seconds		
					U179A	Not Active on Current Key Cycle		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					HPCM_B	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with ECM/PCM A on Bus B	U1818	This diagnostic detects that the engine control module (ECM) has stopped sending messages on Bus B. If ECM message traffic is not received on Bus B by the host controller in the indicated time the DTC is set.	Message is not received from controller for Message $091 Message $0A5 Message $184 Message $187 Message $18C Message $18D Message $1C2 Message $283 Message $383 Message $489	 ≥ 10.00 seconds ≥ 10.00 seconds ≥ 0.50 seconds ≥ 0.50 seconds ≥ 10.00 seconds ≥ 10.00 seconds ≥ 10.00 seconds ≥ 10.00 seconds ≥ 10.00 seconds ≥ 10.00 seconds	General Enable Criteria: U0074 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: Enable Calibration is True Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for U1818	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 9.50 = run = 1 (1 indicates enabled) = Active > 9.50 > 3.0000 seconds > 0.4000 seconds Not Active on Current Key	See Threshold Value Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					ECM	Cycle is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Hybrid Powertrain Control Module B on Bus B	U182D	This diagnostic detects that the Hybrid Powertrain Control Module B has stopped sending messages on Bus B. If Hybrid Powertrain Control Module B message traffic is not received on Bus B by the host controller in the indicated time the DTC is set.	Message is not received from controller for		General Enable Criteria:		See Threshold Value Diagnostic runs in 12.5 ms loop	Type A, 1 Trips
					U0074	Not Active on Current Key Cycle		
			Message $1D8	≥ 0.5 seconds	Normal CAN transmission on Bus B	Enabled		
			Message $3C5	≥ 10.0 seconds				
					Device Control	Not Active		
			Message $3D5	≥ 10.0 seconds				
					High Voltage Virtual Network Management	Not Active		
			Message $3D7	≥ 10.0 seconds				
			Message $3DA	≥ 10.0 seconds	Ignition Voltage Criteria:			
			Message $3DB	≥ 10.0 seconds	Ignition voltage	>= 9.50		
			Message $3DF	≥ 10.0 seconds	Power Mode	= run		
					Off Cycle Enable Criteria:			
					Enable Calibration is True	= 1 (1 indicates enabled)		
					Ignition Accessory Line and	= Active		
					Battery Voltage	> 9.50		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for	> 3.0000 seconds		
					Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	> 0.4000 seconds		
					U182D			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Hybrid Powertrain Control Module B (VICM)	Not Active on Current Key Cycle is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Brake System Control Module on Bus E	U1833	This diagnostic detects that the Brake System Control Module has stopped sending messages on Bus E. If Brake System Control Module message traffic is not received on Bus E by the host controller in the indicated time the DTC is set.	Message is not received from controller for Message $0C1 Rdnt Message $0C5 Rdnt Message $235	 ≥ 10.00 seconds ≥ 10.00 seconds ≥ 0.50 seconds	General Enable Criteria: U0077 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: Enable Calibration is True Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for U1833	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 9.50 = run = 1 (1 indicates enabled) = Active > 9.50 > 3.0000 seconds > 0.4000 seconds Not Active on Current Key Cycle	See Threshold Value Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Brake System Control Module	is present on the bus		

Initial Supporting table - Clutch1FailSlipSpeed

Description:

y/x	-50	-30	-24	-17	4	40
1	20	20	20	20	30	30

Initial Supporting table - Clutch1ProfiledSlipSpdThd

Description:

y/x	-50	-30	-24	-17	4	40
1	250	250	250	250	175	120

Initial Supporting table - Clutch2FailSlipSpeed

Description:

y/x	-50	-30	-24	-17	4	40
1	20	20	20	20	30	30

Initial Supporting table - Clutch2ProfiledSlipSpeedThd

Description:

y/x	-50	-30	-24	-17	4	40
1	350	350	350	350	350	250

Initial Supporting table - Clutch3FailSlipSpeed

Description:

y/x	-50	-30	-24	-17	4	40
1	20	20	20	20	20	20

Initial Supporting table - Clutch3ProfiledSlipSpeedThd

Description:

y/x	-50	-30	-24	-17	4	40
1	200	200	200	200	200	200

Initial Supporting table - Cold Soak Rationality

Description: Transmission Temp Difference from Cold Soak Average Temperature Based on Transmission Fluid Temperature

y/x	1	2	3	4	5
1	-40	-20	0	20	60
2	15	10	10	10	10

Initial Supporting table - P2797 Pump Performance Speed Delta Threshold

Description:

y/x	-40	-25	0	15	40	125
1	24	90	205	235	500	500

Initial Supporting table - P2797 Pump Performance Speed Delta Threshold Case 2

Description:

y/x	-40	-25	0	15	40	125
1	1,000	900	800	700	600	500

Initial Supporting table - TapDwnSwch2_Fail1Rng

Description:

TapDwnSwch2_Fail1Rng - Part 1

y/x	CeTRGR_e_Drive1	CeTRGR_e_Drive2	CeTRGR_e_Drive3	CeTRGR_e_Drive4	CeTRGR_e_Drive5
1	0	0	0	1	0

TapDwnSwch2_Fail1Rng - Part 2

y/x	CeTRGR_e_Drive6	CeTRGR_e_Drive7	CeTRGR_e_Drive8	CeTRGR_e_Drive9	CeTRGR_e_Drive10
1	1	0	0	0	0

TapDwnSwch2_Fail1Rng - Part 3

y/x	CeTRGR_e_Neutral	CeTRGR_e_Reverse	CeTRGR_e_Park		
1	0	0	0		

Initial Supporting table - TapDwnSwch2_Fail2Rng

Description:

TapDwnSwch2_Fail2Rng - Part 1

y/x	CeTRGR_e_Drive1	CeTRGR_e_Drive2	CeTRGR_e_Drive3	CeTRGR_e_Drive4	CeTRGR_e_Drive5
1	0	0	0	1	0

TapDwnSwch2_Fail2Rng - Part 2

y/x	CeTRGR_e_Drive6	CeTRGR_e_Drive7	CeTRGR_e_Drive8	CeTRGR_e_Drive9	CeTRGR_e_Drive10
1	1	0	0	0	0

TapDwnSwch2_Fail2Rng - Part 3

y/x	CeTRGR_e_Neutral	CeTRGR_e_Reverse	CeTRGR_e_Park		
1	0	0	0		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Sensor Power Supply A Circuit Low	P06B1	This diagnostic monitors the IGBT power supply circuit voltage. The sensed voltage is compared against a threshold. If the sensed voltage is below the failure threshold for sufficient time, the diagnostic will fail.	Scaled 15V IGBT Supply Voltage	< 12.00 V	Wakeup Signal	ON	0.4 seconds out of a 0.5 seconds window (x of y) OR Continuous Fail Time > 0.30 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Sensor Power Supply A Circuit High	P06B2	This diagnostic monitors the IGBT power supply circuit voltage. The sensed voltage is compared against a threshold. If the sensed voltage is above the failure threshold for sufficient time, the diagnostic will fail.	Scaled 15V IGBT Supply Voltage	> 22.00 V	Wakeup SIgnal	ON	0.4 seconds out of a 0.5 seconds window (x of y) OR Continuous Fail Time > 0.30 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Position Sensor Circuit	P0A3F	This diagnostic monitors the output from the resolver circuit on the high voltage motor. The circuit observes the error between the sin and cos signals produced by the operation of the resolver. If the error is below a threshold voltage the circuit will output a status signal indicating a loss of signal. If the loss of signal status is present for a threshold amount of time, the diagnostic will fail.	Amplitude of Sin or Cos Signal	<2.3V	Wakeup Signal Resolver Initialization Delay Once Resolver has indicated a fault, a Retry timer is initiated. Retry Timer must be	ON 1.00 s > 0.05 s	Failure Conditions Met for 0.20 to 0.80 seconds out of a 2.00 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Position Sensor Circuit Range/ Performance	P0A40	This diagnostic monitors the output from the resolver circuit on the high voltage motor. The circuit observes the error between the sin and cos signals produced by the operation of the resolver. If the error is above a threshold voltage, the circuit will output a status signal indicating the degradation of signal. If the degradation of signal status is present for a threshold amount of time, the diagnostic will fail.	Sin or Cos Signal	>4.0V	Wakeup Signal Resolver Initialization Delay Once Resolver has indicated a fault, a Retry timer is initiated. Retry Timer must be	ON 1.00 s > 0.05 s	Failure Conditions Met for 0.20 to 0.80 seconds out of a 2.00 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Phase U Current Low	P0A5E	This diagnostic monitors the sensed current on the "U" phase of the electric motor for an open circuit. When the phase angle of the stator current vector nears its peak, the absolute value of the current is then compared against a threshold. If the sensed current is below the failure threshold for sufficient time, the diagnostic will fail.	ABS(Peak Phase Axis Current on the U phase)	< 9.00 Amps	Drive State Delay Timer Inverter State Inverter Power Stage Inverter Voltage Rotor Position Squared Current Comanded	RUN > 10.00 ms ≠ Active Discharge Normal PWM > 50.00 V -30 deg < Phase Axis < +30 deg > 4,900.00 Amps^2	0.4 seconds out of a 0.6 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Phase V Current Low	P0A61	This diagnostic monitors the sensed current on the "V" phase of the electric motor for an open circuit. When the phase angle of the stator current vector nears its peak, the absolute value of the current is then compared against a threshold. If the sensed current is below the failure threshold for sufficient time, the diagnostic will fail.	Peak Phase Axis Current on the V phase	< 9.00 Amps	Drive State Delay Timer Inverter State Inverter Power Stage Inverter Voltage Rotor Position Squared Current Comanded	Run > 10.00 ms ≠ Active Discharge Normal PWM > 50.00 V -30 deg < Phase Axis < +30 deg > 4,900.00 Amps^2	0.4 seconds out of a 0.6 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Phase W Current Low	P0A64	This diagnostic monitors the sensed current on the "W" phase of the electric motor for an open circuit. When the phase angle of the stator current vector nears its peak, the absolute value of the current is then compared against a threshold. If the sensed current is below the failure threshold for sufficient time, the diagnostic will fail.	Peak Phase Axis Current on the W phase	< 9.00 Amps	Drive State Delay Timer Inverter State Inverter Power State Inverter Voltage Rotor Position Squared Current Comanded	Run > 10.00 ms ≠Active Discharge Normal PWM > 50.00 V -30 deg < Phase Axis < +30 deg > 4,900.00 Amps^2	0.4 seconds out of a 0.6 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Inverter Performance	P0A78	This diagnostic monitors the status of the IGBTs. The IGBT module will continually monitor the IGBTs for a short between the upper and lower phase. The module will then report out a status of being in a DeSat fault. If the DeSat fault status is present for sufficient time, the diagnostic will fail.	Phase A, B, or C High or Low Side IGBT	DSatFltPending (Status Fault Bit)	Wakeup Signal	ON	0.002 seconds out of a 1 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Inverter Temperature Sensor A Circuit Range/ Performance	P0AEE	This diagnostic verifies that the high voltage electric motor inverter phase "U" temperature sensor is neither inappropriately high nor low. This diagnostic compares the temperature reading from the sensor to a calculated average temperature of the vehicle. This average temperature is only calculated on key up after the vehicle has been off for a certain amount of time. The absolute value of the sensed temperature minus the calculated average temperature is then compared against a threshold. If the calculated delta between the sensed temperature and the calculated average temperature is above the fail threshold the diagnostic will fail.	ABS(Inverter Phase U Temp- Cold Soak Average Temp)	> 20.00 degrees C	Vehicle off soak timer met Cold Start Average Temperature No Active Power Inverter Temp Out Of Range Faults: Time after controller intialization	= TRUE > -20.00 C P0AF0 and P0AEF > 5.13 seconds	1.25 seconds out of a 1.75 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Inverter Temperature Sensor A Circuit Low	P0AEF	This diagnostic monitor for inverter phase U temperature sensor voltage which is out of range low. The temperature sensor this diagnostic is monitoring is a negative temperature coefficient thermistor with a pull up resistor on the sensing board, meaning a high temperature of sensor short to ground will result in a low sensed voltage. After conversion the sensed temperature is compared against a threshold. If the sensed temperature is above the failure threshold for sufficient time, the diagnostic will fail.	Inverter Phase U Temperature Sensor	> 159.00 degrees C	Sensor Exists WakeUp Signal	= 1.00 On	6.25 seconds out of a 8.75 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Inverter Temperature Sensor A Circuit High	P0AF0	This diagnostic monitor for inverter phase U temperature sensor voltage which is out of range high. The temperature sensor this diagnostic is monitoring is a negative temperature coefficient thermistor with a pull up resistor on the sensing board, meaning a high temperature of sensor short to ground will result in a low sensed voltage. After conversion the sensed temperature is compared against a threshold. If the sensed temperature is below the failure threshold for sufficient time, the diagnostic will fail.	Inverter Phase U Temperature Sensor	< -50.00 degrees C	Sensor Exists Wakeup Signal Inverter Warmup Time at or above inverter warmup torque	= 1.00 ON >= 90.00 s >=ABS(20.00)Nm	6.25 seconds out of a 8.75 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Inverter Temperature Sensor C Circuit Range/ Performance	P0BD2	This diagnostic verifies that the motor inverter phase V temperature sensor is neither inappropriately high nor low. This diagnostic compares the temperature reading from the sensor to a calculated average temperature of the vehicle. This average temperature is only calculated after a specified amount of time. The absolute value of the sensed temperature minus the calculated average temperature is then compared against a threshold. If the calculated delta between the sensed temperature and the calculated average temperature is above the fail threshold the diagnostic will fail.	ABS(Inverter Phase V Temp- Cold Soak Average Temp)	> 20.00 degrees C	Vehicle off soak timer met Cold Start Average Temperature No Active Power Inverter Temp Out Of Range Faults: Time after controller intialization	= TRUE > -20.00 C P0BD3 and P0BD4 > 5.13 seconds	1.25 seconds out of a 1.75 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Inverter Temperature Sensor C Circuit Low	P0BD3	This diagnostic monitor for inverter phase V temperature sensor voltage which is out of range low. The temperature sensor this diagnostic is monitoring is a negative temperature coefficient thermistor with a pull up resistor on the sensing board, meaning a high temperature of sensor short to ground will result in a low sensed voltage. After conversion the sensed temperature is compared against a threshold. If the sensed temperature is above the failure threshold for sufficient time, the diagnostic will fail.	Inverter Phase V Temperature Sensor	> 159.00 degrees C	Sesor Exists WakeUp Signal	= 1.00 ON	6.25 seconds out of a 8.75 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Inverter Temperature Sensor C Circuit High	P0BD4	This diagnostic monitor for inverter phase V temperature sensor voltage which is out of range high. The temperature sensor this diagnostic is monitoring is a negative temperature coefficient thermistor with a pull up resistor on the sensing board, meaning a high temperature of sensor short to ground will result in a low sensed voltage. After conversion the sensed temperature is compared against a threshold. If the sensed temperature is below the failure threshold for sufficient time, the diagnostic will fail.	Inverter Phase V Temperature Sensor	< -50.00 degrees C	Sensor Exists Wakeup Signal Inverter Warmup Time at or above inverter warmup torque	= 1.00 ON >= 90.00 s >=ABS(20.00)Nm	6.25 seconds out of a 8.75 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Inverter Temperature Sensor E Circuit Range/ Performance	P0BDC	This diagnostic verifies that the high voltage electric motor inverter phase "W" temperature sensor is neither inappropriately high nor low. This diagnostic compares the temperature reading from the sensor to a calculated average temperature of the vehicle. This average temperature is only calculated on key up after the vehicle has been off for a certain amount of time. The absolute value of the sensed temperature minus the calculated average temperature is then compared against a threshold. If the calculated delta between the sensed temperature and the calculated average temperature is above the fail threshold the diagnostic will fail.	ABS(Inverter Phase W Temp- Cold Soak Average Temp)	> 20.00 degrees C	Vehicle off soak timer met Cold Start Average Temperature No Active Power Inverter Temp Out Of Range Faults: Time after controller intialization	= TRUE > -20.00 C P0BDD and P0BDE > 5.13 seconds	1.25 seconds out of a 1.75 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Inverter Temperature Sensor E Circuit Low	P0BDD	This diagnostic monitor for inverter phase W temperature sensor voltage which is out of range low. The temperature sensor this diagnostic is monitoring is a negative temperature coefficient thermistor with a pull up resistor on the sensing board, meaning a high temperature of sensor short to ground will result in a low sensed voltage. After conversion the sensed temperature is compared against a threshold. If the sensed temperature is above the failure threshold for sufficient time, the diagnostic will fail.	Inverter Phase W Temperature Sensor	> 159.00 degrees C	Sesor Exists WakeUp Signal	= 1.00 ON	6.25 seconds out of a 8.75 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Inverter Temperature Sensor E Circuit High	P0BDE	This diagnostic monitor for inverter phase W temperature sensor voltage which is out of range high. The temperature sensor this diagnostic is monitoring is a negative temperature coefficient thermistor with a pull up resistor on the sensing board, meaning a high temperature of sensor short to ground will result in a low sensed voltage. After conversion the sensed temperature is compared against a threshold. If the sensed temperature is below the failure threshold for sufficient time, the diagnostic will fail.	Inverter Phase W Temperature Sensor	< -50.00 degrees C	Sensor Exists Wakeup Signal Inverter Warmup Time at or above inverter warmup torque	= 1.00 ON >= 90.00 s >=ABS(20.00)Nm	6.25 seconds out of a 8.75 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Phase U Current Sensor Offset Out-of Range	P0BE6	This diagnostic monitors the offset that is learned by the phase “U” current sensor on the high voltage electric motor. In order to ensure accurate current measurement an offset is calculated when there is no current going through the motor. The offset learn process is conducted on every key crank, the learned offset is then compared against a threshold, if the offset value is larger than the fail threshold the diagnostic will fail.	U phase offset current learn value	> 35.00 amps	Wakeup Signal Delay Timer Motor Faults Inverter Faults	On 0.40 Sec None None	Fail conditions met 0.40 sec after enable conditions met	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Phase U Current Sensor Circuit Low	P0BE7	This diagnostic monitors for the "U" phase current sensor voltage which is out of range low. After the sensor output voltage is converted, the sensed current is compared against a threshold. If the sensed current is below the failure threshold for sufficient time, the diagnostic will fail.	U phase current sensor output at highside	< -700.00 amps	Wakeup Signal Run Flag	On = 1.00	0.1 seconds out of a 0.15 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Phase U Current Sensor Circuit High	P0BE8	This diagnostic monitors for the "U" phase current sensor voltage which is out of range high. After the sensor output voltage is converted, the sensed current is compared against a threshold. If the sensed current is above the failure threshold for sufficient time, the diagnostic will fail.	U phase current sensor output highside	> 700.00 amps	Wakeup Signal Enable Flag	On = 1.00	0.1 seconds out of a 0.15 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Phase V Current Sensor Offset Out-of Range	P0BEA	This diagnostic monitors the offset that is learned by the phase "V" current sensor on the high voltage electric motor. In order to ensure accurate current measurement an offset is calculated when there is no current going through the motor. The offset learn process is conducted on every key crank, the learned offset is then compared against a threshold, if the offset value is larger than the fail threshold the diagnostic will fail.	V phase current sensor offset learn value	> 35.00 amps	Wakeup Signal Delay Timer Motor Faults Inverter Faults	On 0.40 Sec None None	Fai conditions met 0.40 Sec after enable conditions met	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Phase V Current Sensor Circuit Low	P0BEB	This diagnostic monitors for the "V" phase current sensor voltage which is out of range low. After the sensor output voltage is converted, the sensed current is compared against a threshold. If the sensed current is below the failure threshold for sufficient time, the diagnostic will fail.	V phase current sensor output at highside	< -700.00 amps	Wakeup Signal Run Flag	On = 1.00	0.1 seconds out of a 0.15 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Phase V Current Sensor Circuit High	P0BEC	This diagnostic monitors for the "V" phase current sensor voltage which is out of range high. After the sensor output voltage is converted, the sensed current is compared against a threshold. If the sensed current is above the failure threshold for sufficient time, the diagnostic will fail.	V phase current Sensor output at highside	> 700.00 amps	Wakeup Signal Run Flag	On = 1.00	0.1 seconds out of a 0.15 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Phase W Current Sensor Offset Out-of Range	P0BEE	This diagnostic monitors the offset that is learned by the phase “W” current sensor on the high voltage electric motor. In order to ensure accurate current measurement an offset is calculated when there is no current going through the motor. The offset learn process is conducted on every key crank, the learned offset is then compared against a threshold, if the offset value is larger than the fail threshold the diagnostic will fail.	W phase current sensor offset learn value	> 35.00 amps	Wakeup Signal Delay Timer Motor Faults Inverter Faults	On 0.40 Sec None None	Fail condidtions met 0.40 sec after enable conditoins met	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Phase W Current Sensor Circuit Low	P0BEF	This diagnostic monitors for the "W" phase current sensor voltage which is out of range low. After the sensor output voltage is converted, the sensed current is compared against a threshold. If the sensed current is below the failure threshold for sufficient time, the diagnostic will fail.	W phase current sensor output at highside	< -700.00 amps	Wakeup Signal Run Flag	On = 1.00	0.1 seconds out of a 0.15 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Phase W Current Sensor Circuit High	P0BF0	This diagnostic monitors for the "W" phase current sensor voltage which is out of range high. After the sensor output voltage is converted, the sensed current is compared against a threshold. If the sensed current is above the failure threshold for sufficient time, the diagnostic will fail.	W phase current sensor output at high side	> 700.00 amps	Wakeup Signal Run Flag	On = 1.00	0.1 seconds out of a 0.15 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Phase U-V-W Correlation	P0BFD	This diagnostic monitors the U, V, and W phase currents for balance. The absolute value of the sum of the phase values is compared against a threshold. If the sum is above the failure threshold for sufficient time, the diagnostic will fail.	Sum of U-V-W phase currents	≥ 110.00 amps	Wakeup Signal Run Flag	On = 1.00	0.0032 seconds out of a 0.0038 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Phase U-V-W Current Sensor Overcurrent	P0C01	This diagnostic monitors the sensed current on all three phases of the electric motor. The absolute value of the highest current phase value is then compared against a threshold. If the value is above the failure threshold for sufficient time, the diagnostic will fail. This diagnostic implements the use of 2 different fail timers, one fast and one slow. The fast timer has a very short sample window so that the diagnostic will detect a sudden fault, the slower timer has a longer sample window to allow the diagnostic to detect an intermittent fault.	U, V, or W Phase Current Sensor	> 600.00 amps	Wakeup Signal	On	0.0104 seconds out of a 0.104 seconds window (x of y) OR 0.00416 seconds out of a 0.06656 seconds window (x of y)	Type A, 1 Trips
			D Axis current less than calculated threshold determined by stator temperature listed in supporting table unless the motor temperature reading is faulted, then D Axis current threshold is determined by a default value	D-Axis Current<- 600.00 amps (faulted motor temp value) **P0C01 D-Axis Current Thresholds** (See supporting tables for expected threshold values for non-faulted motor temperature readings)	Wakeup Signal	On	0.0104 seconds out of a 0.104 seconds window (x of y) OR 0.00416 seconds out of a 0.06656 seconds window (x of y)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Inverter Power Supply Circuit/Open	P0C0B	This diagnostic monitors the status of the IGBTs. The IGBT module will continuously monitor the supply circuit voltage. When the supply circuit drops below a threshold voltage the module then report out a status of being in a Bias fault. If the Bias fault status is present for sufficient time, the diagnostic will fail.	Phase A, B, or C Power Supply	Failed (Status Fault Bit)	Inverter State	Initialization Complete	0.168 seconds out of a 0.2 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Inverter Phase U Over Temperature	P0C11	This diagnostic monitors the inverter phase U temperature for an in-range high temperature condition. The sensed temperature is compared against a threshold. If the sensed temperature is above the failure threshold for a sufficient time, the diagnostic will fail.	Inverter Phase U Temperature	> 128.00 degrees C	PIM Phase U Temperature	TEMP NORMAL	1.5 seconds out of a 2 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Inverter Phase V Over Temperature	P0C12	This diagnostic monitors the inverter phase V temperature for an in-range high temperature condition. The sensed temperature is compared against a threshold. If the sensed temperature is above the failure threshold for a sufficient time, the diagnostic will fail.	Inverter Phase V Temperature	> 128.00 degrees C	PIM Phase V Temperature	TEMP Normal	1.5 seconds out of a 2 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Inverter Phase W Over Temperature	P0C13	This diagnostic monitors the inverter phase W temperature for an in-range high temperature condition. The sensed temperature is compared against a threshold. If the sensed temperature is above the failure threshold for a sufficient time, the diagnostic will fail.	Inverter Phase W Temperature	> 128.00 degrees C	PIM Phase W Temperature	TEMP NORMAL	1.5 seconds out of a 2 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Position Sensor Not Learned	P0C17	This diagnostic monitors the initial offset that is learned by the resolver circuit. The diagnostic runs only when there is no previously stored value for the resolver offset. The diagnostic fails when during the learn process either the motor speed is higher than a threshold, the total high voltage bus is below a threshold voltage, the peak to peak current on the motor falls below a threshold, or the learn process takes longer than a threshold time.	Initial Offset Learn Could Not Complete Because: ABS(Motor Speed)	> 50.00 rpm	Key Off	TRUE	0.30 s Learn Time	Type A, 1 Trips
			Initial Offset Learn Could Not Complete Because: Filtered DC	< 200.00 V	Key Off	TRUE	0.30 s Learn Time	
			Initial Offset Learn Could Not Complete Because: ALL phase Current	< 15.00 A	Key Off	TRUE	0.30 s Learn Time	
			Initial Offset Learn Could Not Complete Because: Learn Timer	> 1.40 s	Key Off	TRUE	0.30 s Learn Time	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Position Exceeded Learning Limit	P0C4E	This diagnostic monitors the offset that is learned by the resolver circuit. The diagnostic runs on every key off cycle after the offset learn has completed. Once the offset value has been determined it is compared to a threshold. If the value of the offset is above the fail threshold, the diagnostic will fail. Another way the diagnostic can fail is once the offset learn has completed and the offset value determined, it is then compared against the previously stored offset value. If the absolute value of the difference between the previous offset value and the current offset value is above the failure threshold the diagnostic will fail.	Offset Learn Completes AND ABS(Offset Correction Angle)	> 30.00 degrees	Key Off Offset Learn Status	TRUE Complete	5.00 key off cycles of out of offset angle being out of range	Type A, 1 Trips
			Offset Learn Completes AND ABS(Offset Correction Angle - prevoiusly stored value)	> 10.00 degrees	Key Off Offset Learn Status	TRUE Complete	5.00 key off cycles of out of offset angle being out of range	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Position Sensor Circuit A Low	P0C52	This diagnostic monitors the output voltage from the high voltage motor resolver circuit which is out of range low. The sensed voltage is compared against a threshold. If the sensed voltage is below the failure threshold for sufficient time, the diagnostic will fail.	Resolver S13 Circuit Reference Voltage	< 0.10 V	Wakeup Signal	ON	0.25 seconds out of a 0.375 seconds window (x of y)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Position Sensor Circuit A High	P0C53	This diagnostic monitors the output voltage from the high voltage motor resolver circuit which is out of range high. The sensed voltage is compared against a threshold. If the sensed voltage is above the failure threshold for sufficient time, the diagnostic will fail.	Resolver S13 Circuit Reference Voltage	> 4.90 V	Wakeup Signal	ON	0.25 seconds out of a 0.375 seconds window (x of y)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Position Sensor Circuit B Low	P0C5C	This diagnostic monitors the output voltage from the high voltage motor resolver circuit which is out of range low. The sensed voltage is compared against a threshold. If the sensed voltage is below the failure threshold for sufficient time, the diagnostic will fail.	Resolver S24 Circuit Reference Voltage	< 0.10 V	Wakeup Signal	ON	0.25 seconds out of a 0.375 seconds window (x of y)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Position Sensor Circuit B High	P0C5D	This diagnostic monitors the output voltage from the high voltage motor resolver circuit which is out of range high. The sensed voltage is compared against a threshold. If the sensed voltage is above the failure threshold for sufficient time, the diagnostic will fail.	Resolver S24 Circuit Reference Voltage	> 4.90 V	Wakeup Signal	ON	0.25 seconds out of a 0.375 seconds window (x of y)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Inverter Phase U Temperature Sensor Erratic	P190A	This diagnostic monitors the inverter phase U temperature sensor voltage which could be intermittently high, low, or open. A rolling average of sensed temperature readings calculated over a set amount of time is compared against a threshold that has been calculated based on the stator current. If the calculated rolling average is above the calculated fail threshold for sufficient time the, the diagnostic will fail.	A rolling average of temperature readings calculated over 0.38 s this calculation is known as a string length. Temperature readings are taken every .025s.	> an estimated string length calculated based on stator current.	Start-Up Delay	> 0.13 s	1.25 seconds out of a 1.875 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Inverter Phase V Temperature Sensor Erratic	P190B	This diagnostic monitors the inverter phase V temperature sensor voltage which could be intermittently high, low, or open. A rolling average of sensed temperature readings calculated over a set amount of time is compared against a threshold that has been calculated based on the stator current. If the calculated rolling average is above the calculated fail threshold for sufficient time the, the diagnostic will fail.	A rolling average of temperature readings calculated over 0.38 s this calculation is known as a string length. Temperature readings are taken every .025s.	> an estimated string length calculated based on stator current.	Start-Up Delay	> 0.13 s	1.25 seconds out of a 1.875 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Inverter Phase W Temperature Sensor Erratic	P190C	This diagnostic monitors the inverter phase W temperature sensor voltage which could be intermittently high, low, or open. A rolling average of sensed temperature readings calculated over a set amount of time is compared against a threshold that has been calculated based on the stator current. If the calculated rolling average is above the calculated fail threshold for sufficient time the, the diagnostic will fail.	A rolling average of temperature readings calculated over 0.38 s this calculation is known as a string length. Temperature readings are taken every .025s.	> an estimated string length calculated based on stator current.	Start-Up Delay	> 0.13 s	1.25 seconds out of a 1.875 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Control Module System Voltage Low	P1ADE	This diagnostic detects low voltage in the vehicle's 12 volt system. The fault sets when the host controller detects supply voltage below the indicated threshold for the indicated time.	Ignition Voltage	≤ 10.00 Volts	Enable Calibration is True AND 12V Starter Engaged AND Ignition Run/Crank Voltage AND Engine Speed (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= 1 (1 is Enabled) = False > 6.0 Volts ≥ 0.00 RPM = False = True	5 seconds out of a 6 seconds window	Type C, No SVS "Emission Neutral Diagnos-tic - Type

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Control Module System Voltage High	P1ADF	This diagnostic detects high voltage in the vehicle's 12 volt system. The fault sets when the host controller detects supply voltage above the indicated threshold for the indicated time.	Ignition Voltage	≥ 16.00 Volts	Enable Calibration is True AND Ignition Run/Crank Voltage (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= 1.00 (1 is Enabled) > 6.0 Volts = False = True	5 seconds out of a 6 seconds window	Type C, No SVS "Emission Neutral Diagnos-tic - Type

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Hybrid Battery System Voltage High	P1AEE	This diagnostic monitors the total high voltage system voltage which is too high for the hardware. The sensed voltage is compared against a threshold. If the sensed voltage is above the failure threshold for sufficient time, the diagnostic will fail.	High Voltage Sensor Voltage OR High Voltage Hardware Flag	> 450.00 Volts = True	Controller Initialization	Complete	0.01 seconds out of a 0.2 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Control Module Hybrid Battery Voltage System Isolation Fault	P1AF0	This diagnostic monitors the high voltage bus for possible shorts to chassis. The high voltage positive leg is compared to the high voltage negative leg via a ratio. If the ratio falls outside of a specific window for sufficient time, the diagnostic will fail.	Isolation Ratio (Neg mid-pack voltage / Pos mid-pack voltage)	> 4.53 OR < 0.21	No Active DTCs: Controller Initialization	P1AE8, P1AE9, P1AEC Complete	2.5 seconds out of a 5 seconds window (x of y)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 1 Circuit Low	P1AF4	This diagnostic monitors the high voltage bus positive leg sensor voltage which is out of range low. The sensed voltage is compared against a threshold. If the sensed voltage is below the failure threshold for sufficient time, the diagnostic will fail.	Positive mid-pack voltage	< 20.00 Volts	Controller Initialization Run Crank Active Contactors	Complete True Closed	0.7375 seconds out of a 1.05 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 1 Circuit High	P1AF5	This diagnostic monitors the high voltage bus positive leg sensor voltage which is out of range high. The sensed voltage is subtracted from the total voltage. This delta is then compared against a threshold. If the delta is above the failure threshold for sufficient time, the diagnostic will fail.	Positive mid-pack voltage - High Voltage sensor voltage	> 40.00 Volts	Controller Initialization Run/Crank Active Contactors	Complete True Closed	0.525 seconds out of a 1.05 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Position Sensor Circuit Loss of Tracking	P1B03	This diagnostic monitors the output from the resolver circuit on the high voltage motor. The circuit is continually calculating the position of the rotor in degrees. When the error between each sampling of position is greater than 5 degrees the circuit will output a status signal indicating a loss of tracking. If the loss of tracking status is present for a threshold amount of time, the diagnostic will fail.	Internal Tracking Error	>5 Degrees	Wakeup Signal Resolver Initialization Delay Once Resolver has indicated a fault, a Retry timer is initiated. Retry Timer must be	ON 1.00 > 0.05 s	Failure Conditions Met for 0.20 to 0.80 seconds out of a 2.00 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit Low	P1B0B	This diagnostic monitors the high voltage bus negative leg sensor voltage which is out of range low. The sensed voltage is compared against a threshold. If the sensed voltage is below the failure threshold for sufficient time, the diagnostic will fail	Negative mid-pack voltage	< 20.00 Volts	Controller Initialization Run/Crank Active Contactors	Complete True Closed	0.7375 seconds out of a 1.05 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit High	P1B0C	This diagnostic monitors the high voltage bus negative leg sensor voltage which is out of range high. The sensed voltage is subtracted from the total voltage. This delta is then compared against a threshold. If the delta is above the failure threshold for sufficient time, the diagnostic will fail.	High Voltage Negative to Ground Reading - Total High Voltage Reading from High Voltage Battery	> 40.00 Volts	Controller Initialization Run/Crank Active Contactors	Complete True Closed	0.525 seconds out of a 1.05 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Position Sensor Circuit Overspeed	P1B0D	This diagnostic monitors the output speed of the high voltage motor. The absolute value of the sensed speed of the motor is compared against a threshold. If the sensed speed is above the fail threshold for sufficient time, the diagnostic will fail.	ABS(Motor Speed)	> 12,700.00 rpm	Wakeup Signal	On	0.13 seconds out of a 2.5 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Position Sensor Learn Incorrect	P1B0F	This diagnostic monitors the offset that is learned by the resolver circuit. The diagnostic runs on every key off cycle while the offset learn process is in progress. The offset learn process can fail when during the learn process either the motor speed is higher than a threshold, the total high voltage bus is below a threshold voltage, the peak to peak current on the motor falls below a threshold, or the learn process takes longer than a threshold time. If the learn process fails for any one of the afore mentioned reasons a counter is increased and compared against a threshold. If the counter exceeds the threshold the diagnostic will fail.	Offset Learn Could Not Complete Because: ABS(Motor Speed) Consecutive Key Cycles where the offset learn is unable to complete	 > 50.00 rpm > 106.00 cycles	Key Off	TRUE	106.00 consecutive key cyles with a 0.30 s Learn Time	Type C, No SVS
			Initial Offset Learn Could Not Complete Because: Filtered DC Consecutive Key Cycles where the offset learn is unable to complete	 < 200.00 V > 106.00 cycles	Key Off	TRUE	106.00 consecutive key cyles with a 0.30 s Learn Time	
			Initial Offset Learn Could Not Complete Because: ALL phase Current Consecutive Key Cycles where the offset learn is unable to complete	 < 15.00 A > 106.00 cycles	Key Off	TRUE	106.00 consecutive key cyles with a 0.30 s Learn Time	
			Initial Offset Learn Could Not Complete Because: Learn Timer Consecutive Key Cycles where the offset learn is unable to complete	 > 1.40 s > 106.00 cycles	Key Off	TRUE	106.00 consecutive key cyles with a 0.30 s Learn Time	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensing Performance	P1B41	This diagnostic verifies that the high voltage bus positive and negative leg sensors are neither inappropriately high nor low. It compares the sensed battery pack voltage against the high voltage positive and negative leg. If the absolute value of the difference between the sensed battery voltage and the high voltage positive and negative leg sensors is greater than the failure threshold for a sufficient time, the diagnostic will fail.	ABS(Total High Voltage Measured By the Battery Pack - High Voltage Measured from Positve to Ground - High Voltage Measured from Negative to Ground)	≥ 50.00 V	No Active DTCs:	P1AE8, P1AE9, P1B0B, P1B0C	0.175 seconds out of a 0.2 seconds window (x of y)	Type A, 1 Trips
					Controller Initialization	Complete		
					Contactors	Closed		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Control Module A Lost Communication With Hybrid Powertrain Control Module B on Bus B	U182E	This diagnostic detects that the Hybrid Powertrain Control Module B has stopped sending messages on Bus B. If Hybrid Powertrain Control Module B message traffic is not received on Bus B by the MCPA controller in the indicated time the DTC is set.	Message is not received from controller for Message $1D8 Message $3C5 Message $3D7	 ≥ 0.5 seconds ≥ 0.5 seconds ≥ 0.5 seconds	General Enable Criteria: U0074 Normal CAN transmission on Bus B Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl and Ignition Accessory Line and Battery Voltage and General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 9.50 = run = 1 (1 indicates enabled) = Active > 11.00 > 0.4000 seconds	See Threshold Value Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					U182E	Not Active on Current Key Cycle		
					Hybrid Powertrain Control Module B (VICM)	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Control Module A Lost Communication With Hybrid Powertrain Control Module	U1845	This diagnostic detects that the Hybrid Powertrain Control Module has stopped sending messages on Bus A. If Hybrid Powertrain Control Module message traffic is not received on Bus A by the MCPA controller in the indicated time the DTC is set.	Message is not received from controller for Message $1A45	 ≥ 10.00 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 9.50 = run = 1 (1 indicates enabled) = Active > 11.00 > 0.4000 seconds	See Threshold Value Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					U0293 Hybrid Powertrain Control Module	Not Active on Current Key Cycle is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Control Module Lost Communication With Engine Control Module (ECM)/ Powertrain Control Module (PCM)	U1876	This diagnostic detects that the Engine Control Module (ECM/PCM) has stopped sending messages. If ECM/ PCM message traffic is not received by the MCPA controller in the indicated time the DTC is set.	Message is not received from controller for Message $0C9 Message $1A3 Message $4C1 Message $4C7 Message $4F1	 ≥ 10.00 seconds ≥ 10.00 seconds ≥ 10.00 seconds ≥ 10.00 seconds ≥ 10.00 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 9.50 = run = 1 (1 indicates enabled) = Active > 11.00	See Threshold Value Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					not active for	> 0.4000 seconds		
					U0293	Not Active on Current Key Cycle		
					Hybrid Powertrain Control Module	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Control Module Performance	P0A1B	This diagnostic is set on the HCP when MCP2 sets a P0606 (i.e. when it detects a primary fault on itself). Fail Case 1, 2, 3: These diagnostics are built into the hardware of the HMCP microprocessor by the chip manufacturer. These diagnostics check the ALU and Configuration registers to ensure there have been no changes. The DTC sets if these registers have changed since the software flash at the vehicle plant. An additional built in diagnostic checks whether the top of the stack memory has changed from initialization at power up. The DTC sets if this section of memory has been detected to have changed for the indicated amount of time.	HWIO detects Fault in ALU Test Indicates that the Processor detected an ALU fault in the processor "MainALU_Flt"	= 2 faults in a key cycle	Enabled Calibration is True (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete) AND Run Crank Ingnition Low Voltage AND Run Crank Low Voltage Crank	= 1.00 (1 is Enabled) = False = True = False = False	Runs continuously in 12.5ms loop	Type A, 1 Trips
			HWIO detects Fault in Configuration Registry test Indicates that the Processor detected a Configuration Register fault in the processor "MainCfgRegFlt"	= 2 faults in a key cycle	Enable Calibration is True (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete) AND Run Crank Ignition Low Voltage AND Run Crank Low Voltage Crank	= 1.00 (1 is Enabled) = False = True = False = False	Runs continuously in 12.5ms loop	
			HWIO detects Fault in the Stack Limit Test Indicates that the CPU Stack memory exceeded the limit "MainStackFlt"	= 2.00 faults since power up	Enable Calibration is True (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= 1.00 (1 is Enabled) = False = True	Runs continuously in 100ms loop	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Fail Case 4: This diagnostic checks the analog to digital converter (ADC) in the HMCP microprocessor. If the accuracy of the ADC read of a test voltage is greater than the indicated threshold for the indicated amount of time then the DTC sets. Fail Case 5: This diagnostic checks the circuitry that transfers data from Flash memory to RAM. When the data transfer is made at startup and periodically there after a set of bytes are included that can be checked. The DTC sets if these bytes in RAM are not equal to the Flash memory. Fail Case 6, 7: This diagnostic corresponds to the Program Sequence Watch (PSW), which ensures that a task is being executed properly. Functions requiring support place calls to the PSW at critical locations, and the PSW updates a signature value, eventually performing a	Voltage difference between expected circuit voltage and actual test circuit voltage Indicates that the Processor detected a problem with the Analog to Digital converter test circuit "MainADC_Flt"	> 16.00 V	Enable Calibration is True AND Run/Crank Voltage (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= 1.00 (1 is Enabled) >= <KePISD_U_RunCrankEnbl, value, 2, Calibration> V = False = True	OR A2D Converter Test Error >= 0.20 seconds	
			HWIO detects Faul in Transfer Test from Flash to RAM OR HWIO detects Fault in the Memory Data From Flash Indicates that the Processor detected a problem in the data transfer from Flash memory to RAM memory "DMA_XferTest"	= TRUE = TRUE	Enable Calibration is True (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= 0.00 (1 is Enabled) = False = True	50ms Execution Rate after controller initialization	
			Program Sequence Watch fault on a CPU Indicates that the Processor detected that a program was run out of sequence according to the Program Sequence Watch "MainSequenceFlt"	seed sequence ≠ expected sequence	Program Sequence Watch Enabled 1.00	= TRUE		
			Program Sequence Watch Seed time since Seed Change Indicates that the Processor detected that a program seed was not sending for the program sequence Watch "MainSequenceFlt"	> 200.00 ms	Program Sequence Watch Enabled 1.00	= TRUE	Executes in a 50ms loop after controller initialization	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		math operation on this value and a calibrated value from an array, which should revert the signature back to its initial value, if each function was called in the proper order. This test will fail and the fault will mature if the program was run out of order or if there is a problem with the PSW.						
			Key Value OR New Key Update Time Indicates that the secondary processor received incorrect key values for the associated seed values that it sent to the main processor "2ndRxIncorrectKeys" OR that a key timed out	≠ expected key value > 0.15 sec	Number of Main Processors to monitor IPT status SPI Fault Run/Crank voltage	> 0 = Not Running = FALSE (no active P0606) 9.50 V		
		Fail Case 8: These fail cases rely on a seed and key interaction where one micro-controller sends a seed and a second controller runs a predefined set of calculations and responds with a key. The first controller sends a seed and checks that the received key matches its lookup table value for that seed and that it was received in time. The second controller checks that the correct seed value has been received and that it is in time. The DTC sets when there is a mismatch of seed or key values or the expected key or seed value is out of order or if the key or seed value	Missing Motor Duty Cycle Task 0	Fail to execute	Missing Motor Duty Cycle Enabled	1.00 (1 = enabled)	2E-06 seconds out of a 3.2E-06 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		has not been received in the indicated time. Fail Case 9: The Missing Motor Duty Cycle is checking the execution for Task (0) to ensure that the task is executing correctly						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Torque Delivered Performance	P0C19	This diagnostic is a plausibility check that the motor torque is following the commanded torque. Potential failure modes include the motor's ability to produce torque and the torque calculation path in the microprocessor. When the difference between commanded motor torque and actual motor torque is greater than the indicated threshold for longer than the timer threshold, the DTC is set.	Absolute value of (Commanded torque - Torque Command Slewed)	> 132.00 Nm	DTCs not Fault Active Motor Drive State ID ((DTCs not Fault Active) OR (Voltage Hazard Active AND Motor Temperature Fault Active))	P1AF5 or P1B0C or P1B41 or P0A3F or P0A40 or P1B03 or P16EB = Run P0BFD = True = False	0.1875 seconds out of a 0.2 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Control Module Monitoring Processor Performance	P1369	This diagnostic is set on the HCP when MCP2 sets a P060A (i.e. when it detects a primary fault on its monitoring processor, the HCP). Fail Case 1, 2, 3 The microprocessors in the TPIM ECU monitor that each of the others is executing code correctly and in a timely manner. These fail cases rely on a seed and key interaction where one micro-controller sends a seed and a second controller runs a predefined set of calculations and responds with a key. The first controller sends a seed and checks that the received key matches its lookup table value for that seed and that it was received in time. The second controller checks that the correct seed value has been received and that it is in time. The DTC sets when there is a mismatch of seed or key values or the expected key or seed value is out of order or if the key or seed value	Key Value OR New Key Update Time Indicates that the Processor received incorrect key values for the associated seed values that it sent out to the secondary processor "2ndRxIncorrectKeys"	≠ expected key value > 0.15	Number of Main Processors to monitor IPT status SPI Fault Run/Crank Voltage	> 0 = Not Running = FALSE (no active P0606) >= 9.50 V	Executes in a 12.5 ms loop Detects in 150ms or two consecutive faulty keys	Type A, 1 Trips
			New Seed update time Indicates that the processor did not receive a seed value from the secondary processor during the expected time frame "MainDtctdSdKeyTimeout "	> 1.00	Number of Main Processors to monitor AND SPI Faults AND Seed/Key init delay timer AND Run/crank voltage OR 12V battery voltage	> 0 = FALSE (no active P0606) >= 1.00 s >= 9.50 V > 11.00 V	Executes in a 12.5ms loop Detects in 1 second	
			Seed sequence Indicates that the processor received key values in the incorrect order from the secondary processor "MainDtctdSdRxWrongOrdr"	≠ expected order	Number of Main Processors to monitor AND SPI Faults AND Run/Crank Voltage OR 12V Battery Voltage	> 0 = FALSE (no active P0606) >= 9.50 V > 11.00 V	0.15 seconds out of a 0.2 seconds window Executes in a 12.5ms loop	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		has not been received in the indicated time.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Control Module Processor Performance	P136B	This diagnostic is set on the HCP when MCP sets a P0607 (i.e. when it detects a latent fault on itself). Fail Case 1: In case of many faults the HMCP microprocessor along with the other microprocessors need to take remedial action to directly take the vehicle to a safe state. This fail case tests at powerdown that the microprocessors can take those remedial actions effectively. Potential failures can include memory, software, processor and Arithmetic Logic Unit (ALU) faults. The diagnostic runs by setting different controller inputs and the outputs are checked in each case across all of the microprocessors . The DTC sets when the outputs are not as expected for the indicated number of tests. Fail Case 2, 3: These diagnostics use microprocessor internal	Inhibit Path Test Failed Indicates that the Processor is not demonstrating the ability to inhibit the system (take remedial action) during the Inhibit Path Test "2ndFailsToTakeRmdlActn "	>= 3.00 Failures	HV Batt contactor status available Inverter state HV Batt Voltage HV contactors 12V batt voltage Vehicle speed Motor faults Motor speed SRAR Shutdowns SPI Fault RunCrank Active Ram or ROM fault Seed received in wrong order fault Seed/key timeout Powermode off time Frequency	= TRUE = Off >= 80.00 V = Closed > 9.50 V < 1.00 kph = FALSE (none active) <= 20.00 rpm =FALSE =FALSE (No active P0606) =FALSE =FALSE (No active P0601, P0604) = FALSE (No active P0606) = FALSE < 5.00 s = CeIPTR_e_RunKeyOffOnly	Executes in a 12.5ms loop Detects in 3 key cycles	Type A, 1 Trips
			HWIO detects fault that the processor detected a problem with the Flash ECC (error correction code) test circuit "FlashECC_CktTest"	= TRUE	Enable calibration is True AND Power-up reset	= 1.00 (1 is Enabled) = TRUE	Executes once every power up reset 3.00 failed cycles out of 10.00 cycles (turns on MIL) 5.00 failed cycles out of 10.00 cycles (shutdown vehicle)	
			HWIO detects fault that the processor detected a	= TRUE	Enable Calibration is True AND	= 1.00 (1 is Enabled)	Executes once every power up	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		circuitry to detect if there are faults in the RAM or Flash memory. The checks occur at power up and will set the DTC if there are the indicated number of failures in each diagnostic.	problem with the RAM ECC (error correction code) test circuit "RAM_ECC_CktTest"		Power-up reset	= TRUE	reset 3.00 failed cycles out of 10.00 cycles (turns on MIL) 5.00 failed cycles out of 10.00 cycles (shutdown vehicle)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 1	P16F0	This diagnostic checks that the SPI communication between the Transmission & Hybrid Control Processor (HMCP) and MCP is working correctly. Potential failures could be in the microprocessor's SPI handling, the transmission line or the microprocessors ability to execute code. The DTC sets if the messages are missing, the counter is not updated, or the SPI handler detects an incorrect checksum in the time indicated.	CRC error on receive Number of missing messages OR Alive Rolling Count (ARC) incremented from previous value (0-3)	=True ≠ True	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete) OR CAN communication Disabled OR Run Crank In Range Voltage AND Run Crank In Range Security Voltage AND 12V Battery Voltage	= False = True = False > 11.00 V >= 9.50 V > 11.00 V	0.175 seconds out of a 0.2 seconds window	Type A, 1 Trips
			HWIO Received Errors AND Receiving Data in Progress	≠ 0 ≠ True	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete) OR CAN communication Disabled OR Run Crank In Range Voltage AND Run Crank In Range Security Voltage AND 12V Battery Voltage	= False = True = False > 11.00 V >= 9.50 V > 11.00 V	0.175 seconds out of a 0.2 seconds window	
			Number of Missing Received Messages	> 4 messages	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	0.175 seconds out of a 0.2 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					OR CAN communication Disabled OR Run Crank In Range Voltage AND Run Crank In Range Security Voltage AND 12V Battery Voltage	 = False > 11.00 V >= 9.50 V > 11.00 V		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Control Module Not Programmed	P1A4F	This Diagnostic checks that the MCP micro-controller has a valid calibration flashed into it. The controller manufacturer flashes a calibration with a configuration ID. At the vehicle plant the controller is reflashed with a valid configuration ID. The DTC sets when the diagnostic checks the configuration ID and it does not match the correct ID.	MCP Processor Configuration ID	≠ CeMCGR_i_MCP1	None	NA	0.125 seconds out of a 0.2 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Control Module Random Access Memory (RAM)	P1A50	This Diagnostic tests the RAM in the MCP micro-controller. The diagnostic checks that RAM has not changed unexpectedly. Pattern checks are done at intiialization where different patterns are written and then read back. The DTC sets if the patterns do not match. Continuous checks are done while the controller is executing code that store the same variables in multiple locations. When those variables are read, a check is done to be sure both locations still match. A DTC sets if the locations do not match for the indicated time.	Secure "Y" variable	≠ Primary "V" variable for greater than 125 ms	Current Time Execution - Time of Last DualStore Error	> 25 ms	Executes in Background loop	Type A, 1 Trips
			HWIO detects an illegal write to Write Protected RAM	= TRUE	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Executes in Background loop 0 counts to fail	
			2nd Processor State of Health RAM Fault Latched	= TRUE	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Executes in Background loop every 1000ms	
			Checksum of PreservedNVM_Region for Main Processor State of Health and 2nd Processor State Of Health	≠ Expected checksum value	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Runs once at Initialization	
			HWIO detects fault in System RAM	= TRUE	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Runs once at Initialization 3 count to fail	
			HWIO detects fault in Cache RAM	= TRUE	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Runs once at Initialization 3 count to fail	
			HWIO detects fault in eTPU RAM	= TRUE	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Runs once at Initialization 3 count to fail	
			Main SOH RAM Fault Latched AND	= 0	(Diagnostic System Code Clear Requested AND Diagnostic System Reset	= False = True	Executes in Background loop every 1000ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			SPI Fault Latched AND System RAM Fault Count AND Cache RAM Fault Count AND eTPU RAM Fault Count	= False = 0 = 0 = 0	Complete) Time Since Last Duel Store Error	> 1,000 ms		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Control Module Read Only Memory (ROM)	P1A51	This Diagnostic tests ROM (flash) memory in the MCP micro-controller. The test checks that ROM has not changed since it was flashed in the plant. The bytes of ROM in different areas (code, calibration, HW configuration, etc.) are summed and compared to a checksum for that area. The DTC sets when the checksum comparison does not match for the indicated number of times.	Calculated Checksum of the Boot ROM	≠ Expected Checksum	Controller Status ROM Checksum in Progress (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= On ≠ True = False = True	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5.00 failures	Type A, 1 Trips
			2nd Processor State of Health ROM fault latched	= TRUE	Controller Status ROM Checksum in Progress (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= On ≠ True = False = True	Runs continuously in the background	
			Calculated Checksum of Torque Security Related Calibrations	≠ Expected Checksum	Controller Status (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete) = Enable Calibration is True = Enable Calibration is True	= On = False = True = 0 (0 is Enabled) = 1 (1 is Enabled)	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 2 failures	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			ECC Fault detected in Flash memory	= TRUE	Controller Status Power Up Reset AND HWIO BINVDM ECC State AND HWIO ROM Fault Enable Calibration is true	= On = False = False = True = 1 (1 is Enabled)	Greater than 5 failures at controller initialization Runs once at initialization	
			ROM fault Active AND 2nd SOH ROM Fault Latched AND Main SOH ROM Fault Latched	≠ True ≠ True ≠ True	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Runs in the Background	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Control Module Long Term Memory Performance	P1ADC	This Diagnostic tests specific areas of nonvolatile memory (NVM). The fault sets If the last write to nonvolatile memory was not successful or if the checksum of static NVM does not agree with the latest summation of that memory area. The DTC sets if the fault is set in the indicated time.	HWIO reports next write to NVM will not succeed OR HWIO reports the assembly calibration integrity check has failed	= True = True	Enable Calibration is True Controller Status	= 1 (1 is Enabled) = Initialization	Runs once at controller initialization	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Control Module Torque Calculation Performance	P1E0A	Fail Case 1, 5: This Diagnostic tests the calculation of output torque. Potential failures can include memory, software, processor and ALU faults. The primary calculated output torque value is compared to the secondary calculated output torque and if that difference is greater than the indicated threshold for the indicated time the fault is set. Fail Case 2 This diagnostic tests the calculation of output motor torque. Potential failures can include memory, software, processor and ALU faults. The fault is set if the differnece in calculated output motor torque and the secondary output motor torque is greater than the indicated calibration. The DTC is set if the fault is present for longer than the indicated time.	Absolute difference between Torque Achieved in primary and secondary path is greater than the threshold value	> 132.00 Nm	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	Type A, 1 Trips
			Absolute difference between Torque Commmanded in primary and secondary path is greater than the threshold value Abs(Primary - Secondary) OR Absolute difference between Mtr Minimum Short Term Torque Commmanded in primary and secondary path is greater than the threshold value Abs(Primary - Secondary) OR Absolute difference between Mtr Maximum Short Term Torque Commmanded in primary and secondary path is greater than the threshold value Abs(Primary - Secondary)	> 132.00 Nm > 132.00 Nm > 132.00 Nm	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Fail Case 3, 4: This diagnostic tests the electronic current delivery circuits. The fault is set if the difference in current delivered between the primary and secondary paths is greater than the shown threshold. The DTC is set if the fault is present for longer than the indicated time. Fail Case 6: This diagnostic tests the calculation of the back emf torque in the primary and secondary paths. Potential failures can include memory, software, processor and ALU faults. The fault is set if the calculated back emf torque in the primary path is different from the secondary calculation path by more than the threshold given. The DTC is set if the fault is present for longer than the indicated time. Fail Case 7, 8, 9: This diagnostic compares different calculations of Usd and Usq in a primary and a secondary path.	Difference between Issd in primary and secondary path is greater than the threshold value	> 50.00 Amps	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	
			Absolute difference between Issq in primary and secondary path is greater than the threshold value	> 50.00 Amps	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	
			Absolute difference between IssCmnd Torque in primary and secondary path is greater than the threshold value	> 132.00 Nm	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	
			Absolute difference between Back emf Torque in primary and secondary path is greater than the threshold value	> 0.015 Nm	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	
			Absolute difference between Usd Limited in primary and secondary	> 0.40 V (for Usd)	DriveStateID TorqCalcPerf Flt Active	= Run = TRUE	0.1875 seconds out of a 0.2 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Potential failures can include memory, software, processor and ALU faults. The fault is set if the calculated differences are greater than the indicated thresholds. The DTC is set if either fault is present for longer than the indicated time.	path is greater than the threshold value OR Absolute difference between Usq Limited in primary and secondary path is greater than the threshold value	> 0.40 V (for Usd)	OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	 = FALSE ≠ 0 = TRUE		
		Fail Case 10: This diagnostic tests the primary and secondary input power paths for motor A. Potential failures can include the power input circuits, microprocessor memory, software and calibration, processor and ALU faults. The fault is set if the difference between primary and secondary input power are greater than the indicated threshold. The DTC is set if the fault is present for longer than the indicated time.	UsdLmt Squared plus UsqLmt Squared OR DutyQ Squared plus DutyD Squared AND Duty Squared minus UsLmt Squared OR Perf Squared Duty Squared minus UsLmt Squared OR Perf Squared	> 0.70 > 0.70 > 0.30 > 1.00 > 0.10 > 0.15	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	
			Absolute difference of the Mod Index Square Calcluation for Usd and Usq for Volt Hz mode in primary and seconday paths	> 0.40 V	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	
		Fail Case 11: This diagnostic tests the primary and secondary input voltage paths for motor A. Potential failures can include the power input circuits,	Difference between Power Input in primary and secondary path is greater than or equal to the threshold value	>= 40,000.00 Watts	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter	= Run = TRUE = FALSE ≠ 0	0.1875 seconds out of a 0.2 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		microprocessor memory, software and calibration, processor and ALU faults. The fault is set if the difference between primary and secondary voltage are greater than the indicated threshold. The DTC is set if the fault is present for longer than the indicated time. Fail Case 12: This diagnostic tests the primary and secondary reactive power paths for motor A. Potential failures can include the reactive power input circuits, microprocessor memory, software and calibration, processor and ALU faults. The fault is set if the difference between primary and secondary reactive power is greater than the indicated threshold. The DTC is set if the fault is present for longer than the indicated time. Fail Case 13: This diagnostic tests the primary and secondary resolver motor speed for motor			OR TrqMntr Fault	= TRUE		
			Difference between Vdc Adapt in primary and secondary path is greater than or equal to the threshold value	>= 0.07 Volts	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	
			Difference between Reactive Power (Qest) in the primary and secondary path is greater than or equal to the threshold value	>= 43,755.40 Watts	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	
			Calculated resolver Mtr Speed difference in the primary and secondary path is greater than the threshold value OR Calculated resolver Mtr Speed difference in the primary and secondary path is greater than the threshold value To Pass: Calculated resolver Mtr Speed AND Calculated Mtr Speed in	> 6,000.00 rpm > 510.00 radians/sec < 4,000.00 rpm <= 146.00 rad	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		A. The diagnostic tests the resolver circuits. The fault is set if the difference between primary and secondary motor speed is greater than the indicated threshold. The DTC is set if the fault is present for longer than the indicated time.	radians/sec					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor A Control Module Long Term Memory Reset	P1EB6	This Diagnostic tests the NonVolatile Memory (NVM) in the MCP micro-controller for changes since the last write at power down. The bytes of various NVM sections are summed and compared to checksums for each section that were stored at the last powerdown. The DTC sets when the checksum comparisons do not match.	Static NVM Checksum at power-up	≠ Checksum at power-down	Ignition Status Enable Calibration is True	= Run or Crank = 1 (1 is Enabled)	1 failure Runs once at controller initialization	Type A, 1 Trips
			Preserved NVM Checksum at power-up	≠ Checksum at power-down	Ignition Status Enable Calibration is True	= Run or Crank = 1 (1 is Enabled)	1 failure Runs once at controller initialization	
			Power Up Reset BINVDM NVM Checksum at power-up	= False ≠ Checksum at power-down	Ignition Status Enable Calibration is True	= Run or Crank = 1 (1 is Enabled)	Runs once at controller initialization 3 out of 5 controller initilizations for Failure	
			Dynamic NVM checksum at power-up AND Shutdown Finished	≠ Checksum at power-down = TRUE	Ignition Status Enable Calibration is True	= Run or Crank = 1 (1 is Enabled)	1 failure Runs once at controller initialization	
			Static NVM Error Dynamic NVM Error BINVDM ECC Error	= False = False = False	Enable Calibration is True	= 1 (1 is Enabled)	Runs once at controller initialization	

Initial Supporting table - P0C01 D-Axis Current Thresholds

Description: X-Axis is stator temperature, Y-Axis is current threshold for the D-Axis current

y/x	0	50	100	110	120	130	140	150	160	170
1	-485	-485	-485	-485	-485	-485	-485	-485	-485	-485

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Control Module Performance	P0A1C	This diagnostic is set on the HCP when MCP2 sets a P0606 (i.e. when it detects a primary fault on itself). Fail Case 1, 2, 3: These diagnostics are built into the hardware of the HMCP microprocessor by the chip manufacturer. These diagnostics check the ALU and Configuration registers to ensure there have been no changes. The DTC sets if these registers have changed since the software flash at the vehicle plant. An additional built in diagnostic checks whether the top of the stack memory has changed from initialization at power up. The DTC sets if this section of memory has been detected to have changed for the indicated amount of time.	HWIO detects Fault in ALU Test Indicates that the Processor detected an ALU fault in the processor "MainALU_Flt"	= 2 faults in a key cycle	Enabled Calibration is True (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete) AND Run Crank Ingnition Low Voltage AND Run Crank Low Voltage Crank	= 1.00 (1 is Enabled) = False = True = False = False	Runs continuously in 12.5ms loop	Type A, 1 Trips
			HWIO detects Fault in Configuration Registry test Indicates that the Processor detected a Configuration Register fault in the processor "MainCfgRegFlt"	= 2 faults in a key cycle	Enable Calibration is True (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete) AND Run Crank Ignition Low Voltage AND Run Crank Low Voltage Crank	= 1.00 (1 is Enabled) = False = True = False = False	Runs continuously in 12.5ms loop	
			HWIO detects Fault in the Stack Limit Test Indicates that the CPU Stack memory exceeded the limit "MainStackFlt"	= 2.00 faults since power up	Enable Calibration is True (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= 1.00 (1 is Enabled) = False = True	Runs continuously in 100ms loop	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Fail Case 4: This diagnostic checks the analog to digital converter (ADC) in the HMCP microprocessor. If the accuracy of the ADC read of a test voltage is greater than the indicated threshold for the indicated amount of time then the DTC sets. Fail Case 5: This diagnostic checks the circuitry that transfers data from Flash memory to RAM. When the data transfer is made at startup and periodically there after a set of bytes are included that can be checked. The DTC sets if these bytes in RAM are not equal to the Flash memory. Fail Case 6, 7: This diagnostic corresponds to the Program Sequence Watch (PSW), which ensures that a task is being executed properly. Functions requiring support place calls to the PSW at critical locations, and the PSW updates a signature value, eventually performing a	Voltage difference between expected circuit voltage and actual test circuit voltage Indicates that the Processor detected a problem with the Analog to Digital converter test circuit "MainADC_Flt"	> 16.00 V	Enable Calibration is True AND Run/Crank Voltage (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= 1.00 (1 is Enabled) >= <KePISD_U_RunCrankEnbl, value, 2, Calibration> V = False = True	OR A2D Converter Test Error >= 0.20 seconds	
			HWIO detects Faul in Transfer Test from Flash to RAM OR HWIO detects Fault in the Memory Data From Flash Indicates that the Processor detected a problem in the data transfer from Flash memory to RAM memory "DMA_XferTest"	= TRUE = TRUE	Enable Calibration is True (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= 0.00 (1 is Enabled) = False = True	50ms Execution Rate after controller initialization	
			Program Sequence Watch fault on a CPU Indicates that the Processor detected that a program was run out of sequence according to the Program Sequence Watch "MainSequenceFlt"	seed sequence ≠ expected sequence	Program Sequence Watch Enabled 1.00	= TRUE		
			Program Sequence Watch Seed time since Seed Change Indicates that the Processor detected that a program seed was not sending for the program sequence Watch "MainSequenceFlt"	> 200.00 ms	Program Sequence Watch Enabled 1.00	= TRUE	Executes in a 50ms loop after controller initialization	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		math operation on this value and a calibrated value from an array, which should revert the signature back to its initial value, if each function was called in the proper order. This test will fail and the fault will mature if the program was run out of order or if there is a problem with the PSW. Fail Case 8: These fail cases rely on a seed and key interaction where one micro-controller sends a seed and a second controller runs a predefined set of calculations and responds with a key. The first controller sends a seed and checks that the received key matches its lookup table value for that seed and that it was received in time. The second controller checks that the correct seed value has been received and that it is in time. The DTC sets when there is a mismatch of seed or key values or the expected key or seed value is out of order or if the key or seed value						
			Key Value OR New Key Update Time Indicates that the secondary processor received incorrect key values for the associated seed values that it sent to the main processor "2ndRxIncorrectKeys" OR that a key timed out	≠ expected key value > 0.15 sec	Number of Main Processors to monitor IPT status SPI Fault Run/Crank voltage	> 0 = Not Running = FALSE (no active P0606) 9.50 V		
			Missing Motor Duty Cycle Task 0	Fail to execute	Missing Motor Duty Cycle Enabled	1.00 (1 = enabled)	2E-06 seconds out of a 3.2E-06 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		has not been received in the indicated time. Fail Case 9: The Missing Motor Duty Cycle is checking the execution for Task (0) to ensure that the task is executing correctly						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Position Sensor Circuit	P0A45	This diagnostic monitors the output from the resolver circuit on the high voltage motor. The circuit observes the error between the sin and cos signals produced by the operation of the resolver. If the error is below a threshold voltage the circuit will output a status signal indicating a loss of signal. If the loss of signal status is present for a threshold amount of time, the diagnostic will fail.	Amplitude of Sin or Cos Signal	<2.3V	Wakeup Signal Resolver Initialization Delay Once Resolver has indicated a fault, a Retry timer is initiated. Retry Timer must be	ON 1.00 s > 0.05 s	Failure Conditions Met for 0.20 to 0.80 seconds out of a 2.00 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Position Sensor Circuit Range/ Performance	P0A46	This diagnostic monitors the output from the resolver circuit on the high voltage motor. The circuit observes the error between the sin and cos signals produced by the operation of the resolver. If the error is above a threshold voltage, the circuit will output a status signal indicating the degradation of signal. If the degradation of signal status is present for a threshold amount of time, the diagnostic will fail.	Sin or Cos Signal	>4.0V	Wakeup Signal Resolver Initialization Delay Once Resolver has indicated a fault, a Retry timer is initiated. Retry Timer must be	ON 1.00 s > 0.05 s	Failure Conditions Met for 0.20 to 0.80 seconds out of a 2.00 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Inverter Temperature Sensor B Circuit Range/ Performance	P0AF3	This diagnostic verifies that the high voltage electric motor inverter phase "U" temperature sensor is neither inappropriately high nor low. This diagnostic compares the temperature reading from the sensor to a calculated average temperature of the vehicle. This average temperature is only calculated on key up after the vehicle has been off for a certain amount of time. The absolute value of the sensed temperature minus the calculated average temperature is then compared against a threshold. If the calculated delta between the sensed temperature and the calculated average temperature is above the fail threshold the diagnostic will fail.	ABS(Inverter A Temp-Cold Soak Average Temp)	> 20.00 degrees C	Vehicle off soak timer met Cold Start Average Temperature No Active Power Inverter Temp Out Of Range Faults: Time after controller intialization	= TRUE > -20.00 C P0AF4 and P0AF5 > 5.13 seconds	1.25 seconds out of a 1.75 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Inverter Temperature Sensor B Circuit Low	P0AF4	This diagnostic monitor for inverter phase U temperature sensor voltage which is out of range low. The temperature sensor this diagnostic is monitoring is a negative temperature coefficient thermistor with a pull up resistor on the sensing board, meaning a high temperature of sensor short to ground will result in a low sensed voltage. After conversion the sensed temperature is compared against a threshold. If the sensed temperature is above the failure threshold for sufficient time, the diagnostic will fail.	Inverter Phase U Temperature Sensor	> 159.00 degrees C	Sesor Exists WakeUp Signal	= 1.00 On	6.25 seconds out of a 8.75 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Inverter Temperature Sensor B Circuit High	P0AF5	This diagnostic monitor for inverter phase U temperature sensor voltage which is out of range high. The temperature sensor this diagnostic is monitoring is a negative temperature coefficient thermistor with a pull up resistor on the sensing board, meaning a high temperature of sensor short to ground will result in a low sensed voltage. After conversion the sensed temperature is compared against a threshold. If the sensed temperature is below the failure threshold for sufficient time, the diagnostic will fail.	PIM Temperature Sensor A Inverter Phase U Temperature Sensor	< -50.00 degrees C	Sensor Exists Wakeup Signal Inverter Warmup Time at or above inverter warmup torque	= 1.00 ON >= 90.00 s >=ABS(20.00)Nm	6.25 seconds out of a 8.75 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Inverter Temperature Sensor D Circuit Range/ Performance	P0BD7	This diagnostic verifies that the motor inverter phase V temperature sensor is neither inappropriately high nor low. This diagnostic compares the temperature reading from the sensor to a calculated average temperature of the vehicle. This average temperature is only calculated after a specified amount of time. The absolute value of the sensed temperature minus the calculated average temperature is then compared against a threshold. If the calculated delta between the sensed temperature and the calculated average temperature is above the fail threshold the diagnostic will fail.	ABS(Inverter Phase V Temp- Cold Soak Average Temp)	> 20.00 degrees C	Vehicle off soak timer met Cold Start Average Temperature No Active Power Inverter Temp Out Of Range Faults: Time after controller intialization	= TRUE > -20.00 C P0BD8 and P0BD9 > 5.13 seconds	1.25 seconds out of a 1.75 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Inverter Temperature Sensor D Circuit Low	P0BD8	This diagnostic monitor for inverter phase V temperature sensor voltage which is out of range low. The temperature sensor this diagnostic is monitoring is a negative temperature coefficient thermistor with a pull up resistor on the sensing board, meaning a high temperature of sensor short to ground will result in a low sensed voltage. After conversion the sensed temperature is compared against a threshold. If the sensed temperature is above the failure threshold for sufficient time, the diagnostic will fail.	Inverter Phase V Temperature Sensor	> 159.00 degrees C	Sesor Exists WakeUp Signal	= 1.00 ON	6.25 seconds out of a 8.75 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Inverter Temperature Sensor D Circuit High	P0BD9	This diagnostic monitor for inverter phase V temperature sensor voltage which is out of range high. The temperature sensor this diagnostic is monitoring is a negative temperature coefficient thermistor with a pull up resistor on the sensing board, meaning a high temperature of sensor short to ground will result in a low sensed voltage. After conversion the sensed temperature is compared against a threshold. If the sensed temperature is below the failure threshold for sufficient time, the diagnostic will fail.	Inverter Phase V Temperature Sensor	< -50.00 degrees C	Sensor Exists Wakeup Signal Inverter Warmup Time at or above inverter warmup torque	= 1.00 ON >= 90.00 s >=ABS(20.00)Nm	6.25 seconds out of a 8.75 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Inverter Temperature Sensor F Circuit Range/ Performance	P0BE1	This diagnostic verifies that the high voltage electric motor inverter phase "W" temperature sensor is neither inappropriately high nor low. This diagnostic compares the temperature reading from the sensor to a calculated average temperature of the vehicle. This average temperature is only calculated on key up after the vehicle has been off for a certain amount of time. The absolute value of the sensed temperature minus the calculated average temperature is then compared against a threshold. If the calculated delta between the sensed temperature and the calculated average temperature is above the fail threshold the diagnostic will fail.	ABS(Inverter Phase W Temp- Cold Soak Average Temp)	> 20.00 degrees C	Vehicle off soak timer met Cold Start Average Temperature No Active Power Inverter Temp Out Of Range Faults: Time after controller intialization	= TRUE > -20.00 C P0BE2 and P0BE3 > 5.13 seconds	1.25 seconds out of a 1.75 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Inverter Temperature Sensor F Circuit Low	P0BE2	This diagnostic monitor for inverter phase W temperature sensor voltage which is out of range low. The temperature sensor this diagnostic is monitoring is a negative temperature coefficient thermistor with a pull up resistor on the sensing board, meaning a high temperature of sensor short to ground will result in a low sensed voltage. After conversion the sensed temperature is compared against a threshold. If the sensed temperature is above the failure threshold for sufficient time, the diagnostic will fail.	Inverter Phase W Temperature Sensor	> 159.00 degrees C	Sesor Exists WakeUp Signal	= 1.00 ON	6.25 seconds out of a 8.75 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Inverter Temperature Sensor F Circuit High	P0BE3	This diagnostic monitor for inverter phase W temperature sensor voltage which is out of range high. The temperature sensor this diagnostic is monitoring is a negative temperature coefficient thermistor with a pull up resistor on the sensing board, meaning a high temperature of sensor short to ground will result in a low sensed voltage. After conversion the sensed temperature is compared against a threshold. If the sensed temperature is below the failure threshold for sufficient time, the diagnostic will fail.	Inverter Phase W Temperature Sensor	< -50.00 degrees C	Sensor Exists Wakeup Signal Inverter Warmup Time at or above inverter warmup torque	= 1.00 ON >= 90.00 s >=ABS(20.00)Nm	6.25 seconds out of a 8.75 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Inverter Phase U Over Temperature	P0C14	This diagnostic monitors the inverter phase U temperature for an in-range high temperature condition. The sensed temperature is compared against a threshold. If the sensed temperature is above the failure threshold for a sufficient time, the diagnostic will fail.	Inverter Phase U Temperature	> 131.00 degrees C	PIM Phase U Temperature	TEMP NORMAL	1.5 seconds out of a 2 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Inverter Phase V Over Temperature	P0C15	This diagnostic monitors the inverter phase V temperature for an in-range high temperature condition. The sensed temperature is compared against a threshold. If the sensed temperature is above the failure threshold for a sufficient time, the diagnostic will fail.	PIM Phase V Temperature	> 131.00 degrees C	PIM Phase V Temperature	TEMP Normal	1.5 seconds out of a 2 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Inverter Phase W Over Temperature	P0C16	This diagnostic monitors the inverter phase W temperature for an in-range high temperature condition. The sensed temperature is compared against a threshold. If the sensed temperature is above the failure threshold for a sufficient time, the diagnostic will fail.	PIM Phase W Temperature	> 131.00 degrees C	PIM Phase W Temperature	TEMP NORMAL	1.5 seconds out of a 2 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Position Sensor Not Learned	P0C18	This diagnostic monitors the initial offset that is learned by the resolver circuit. The diagnostic runs only when there is no previously stored value for the resolver offset. The diagnostic fails when during the learn process either the motor speed is higher than a threshold, the total high voltage bus is below a threshold voltage, the peak to peak current on the motor falls below a threshold, or the learn process takes longer than a threshold time.	Initial Offset Learn Could Not Complete Because: ABS(Motor Speed)	> 50.00 rpm	Key Off	TRUE	0.30 s Learn Time	Type A, 1 Trips
			Initial Offset Learn Could Not Complete Because: Filtered DC	< 200.00 V	Key Off	TRUE	0.30 s Learn Time	
			Initial Offset Learn Could Not Complete Because: ALL phase Current	< 30.00 A	Key Off	TRUE	0.30 s Learn Time	
			Initial Offset Learn Could Not Complete Because: Learn Timer	> 1.40 s	Key Off	TRUE	0.30 s Learn Time	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Torque Delivered Performance	P0C1A	This diagnostic is a plausibility check that the motor torque is following the commanded torque. Potential failure modes include the motor's ability to produce torque and the torque calculation path in the microprocessor. When the difference between commanded motor torque and actual motor torque is greater than the indicated threshold for longer than the timer threshold, the DTC is set.	Absolute value of (Commanded torque - Torque Command Slewed)	> 123.00 Nm	DTCs not Fault Active Motor Drive State ID ((DTCs not Fault Active) OR (Voltage Hazard Active AND Motor Temperature Fault Active))	P1AF5 or P1B0C or P1B41 or P0A3F or P0A40 or P1B03 or P16EB = Run P0BFD = True = False	0.1875 seconds out of a 0.2 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Position Exceeded Learning Limit	P0C4F	This diagnostic monitors the offset that is learned by the resolver circuit. The diagnostic runs on every key off cycle after the offset learn has completed. Once the offset value has been determined it is compared to a threshold. If the value of the offset is above the fail threshold, the diagnostic will fail. Another way the diagnostic can fail is once the offset learn has completed and the offset value determined, it is then compared against the previously stored offset value. If the absolute value of the difference between the previous offset value and the current offset value is above the failure threshold the diagnostic will fail.	Offset Learn Completes AND ABS(Offset Correction Angle)	> 30.00 degrees	Key Off Offset Learn Status	TRUE Complete	5.00 key off cycles of out of offset angle being out of range	Type A, 1 Trips
			Offset Learn Completes AND ABS(Offset Correction Angle - prevoiusly stored value)	> 10.00 degrees	Key Off Offset Learn Status	TRUE Complete	5.00 key off cycles of out of offset angle being out of range	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Position Sensor Circuit A Low	P0C57	This diagnostic monitors the output voltage from the high voltage motor resolver circuit which is out of range low. The sensed voltage is compared against a threshold. If the sensed voltage is below the failure threshold for sufficient time, the diagnostic will fail.	Resolver S13 Circuit Reference Voltage	< 0.10 V	Wakeup Signal	ON	0.25 seconds out of a 0.375 seconds window (x of y)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Position Sensor Circuit A High	P0C58	This diagnostic monitors the output voltage from the high voltage motor resolver circuit which is out of range high. The sensed voltage is compared against a threshold. If the sensed voltage is above the failure threshold for sufficient time, the diagnostic will fail.	Resolver S13 Circuit Reference Voltage	> 4.90 V	Wakeup Signal	ON	0.25 seconds out of a 0.375 seconds window (x of y)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Position Sensor Circuit B Low	P0C61	This diagnostic monitors the output voltage from the high voltage motor resolver circuit which is out of range low. The sensed voltage is compared against a threshold. If the sensed voltage is below the failure threshold for sufficient time, the diagnostic will fail.	Resolver S24 Circuit Reference Voltage	< 0.10 V	Wakeup Signal	ON	0.25 seconds out of a 0.375 seconds window (x of y)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Position Sensor Circuit B High	P0C62	This diagnostic monitors the output voltage from the high voltage motor resolver circuit which is out of range high. The sensed voltage is compared against a threshold. If the sensed voltage is above the failure threshold for sufficient time, the diagnostic will fail.	Reslover S24 Circuit Reference Voltage	> 4.90 V	Wakeup Signal	ON	0.25 seconds out of a 0.375 seconds window (x of y)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Control Module Monitoring Processor Performance	P136A	This diagnostic is set on the HCP when MCP2 sets a P060A (i.e. when it detects a primary fault on its monitoring processor, the HCP). Fail Case 1, 2, 3 The microprocessors in the TPIM ECU monitor that each of the others is executing code correctly and in a timely manner. These fail cases rely on a seed and key interaction where one micro-controller sends a seed and a second controller runs a predefined set of calculations and responds with a key. The first controller sends a seed and checks that the received key matches its lookup table value for that seed and that it was received in time. The second controller checks that the correct seed value has been received and that it is in time. The DTC sets when there is a mismatch of seed or key values or the expected key or seed value is out of order or if the key or seed value	Key Value OR New Key Update Time Indicates that the Processor received incorrect key values for the associated seed values that it sent out to the secondary processor "2ndRxIncorrectKeys"	≠ expected key value > 0.15	Number of Main Processors to monitor IPT status SPI Fault Run/Crank Voltage	> 0 = Not Running = FALSE (no active P0606) >= 9.50 V	Executes in a 12.5 ms loop Detects in 150ms or two consecutive faulty keys	Type A, 1 Trips
			New Seed update time Indicates that the processor did not receive a seed value from the secondary processor during the expected time frame "MainDtctdSdKeyTimeout "	> 1.00	Number of Main Processors to monitor AND SPI Faults AND Seed/Key init delay timer AND Run/crank voltage OR 12V battery voltage	> 0 = FALSE (no active P0606) >= 1.00 s >= 9.50 V > 11.00 V	Executes in a 12.5ms loop Detects in 1 second	
			Seed sequence Indicates that the processor received key values in the incorrect order from the secondary processor "MainDtctdSdRxWrongOrdr"	≠ expected order	Number of Main Processors to monitor AND SPI Faults AND Run/Crank Voltage OR 12V Battery Voltage	> 0 = FALSE (no active P0606) >= 9.50 V > 11.00 V	0.15 seconds out of a 0.2 seconds window Executes in a 12.5ms loop	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		has not been received in the indicated time.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Control Module Processor Performance	P136C	This diagnostic is set on the HCP when MCP2 sets a P0607 (i.e. when it detects a latent fault on itself). Fail Case 1: In case of many faults the HMCP microprocessor along with the other microprocessors need to take remedial action to directly take the vehicle to a safe state. This fail case tests at powerdown that the microprocessors can take those remedial actions effectively. Potential failures can include memory, software, processor and Arithmetic Logic Unit (ALU) faults. The diagnostic runs by setting different controller inputs and the outputs are checked in each case across all of the microprocessors . The DTC sets when the outputs are not as expected for the indicated number of tests. Fail Case 2, 3: These diagnostics use microprocessor internal	Inhibit Path Test Failed Indicates that the Processor is not demonstrating the ability to inhibit the system (take remedial action) during the Inhibit Path Test "2ndFailsToTakeRmdlActn"	>= 3.00 Failures	HV Batt contactor status available Inverter state HV Batt Voltage HV contactors 12V batt voltage Vehicle speed Motor faults Motor speed SRAR Shutdowns SPI Fault RunCrank Active Ram or ROM fault Seed received in wrong order fault Seed/key timeout Powermode off time Frequency	= TRUE = Off >= 80.00 V = Closed > 9.50 V < 1.00 kph = FALSE (none active) <= 20.00 rpm =FALSE =FALSE (No active P0606) =FALSE =FALSE (No active P0601, P0604) = FALSE (No active P0606) = FALSE < 5.00 s = CeIPTR_e_RunKeyOffOnly	Executes in a 12.5ms loop Detects in 3 key cycles	Type A, 1 Trips
			HWIO detects fault that the processor detected a problem with the Flash ECC (error correction code) test circuit "FlashECC_CktTest"	= TRUE	Enable calibration is True AND Power-up reset	= 1.00 (1 is Enabled) = TRUE	Executes once every power up reset 3.00 failed cycles out of 10.00 cycles (turns on MIL) 5.00 failed cycles out of 10.00 cycles (shutdown vehicle)	
			HWIO detects fault that the processor detected a	= TRUE	Enable Calibration is True AND	= 1.00 (1 is Enabled)	Executes once every power up	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		circuitry to detect if there are faults in the RAM or Flash memory. The checks occur at power up and will set the DTC if there are the indicated number of failures in each diagnostic.	problem with the RAM ECC (error correction code) test circuit "RAM_ECC_CktTest"		Power-up reset	= TRUE	reset 3.00 failed cycles out of 10.00 cycles (turns on MIL) 5.00 failed cycles out of 10.00 cycles (shutdown vehicle)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 2	P16E9	This diagnostic checks that the SPI communication between the Transmission & Hybrid Control Processor (HMCP) and MCP is working correctly. Potential failures could be in the microprocessor's SPI handling, the transmission line or the microprocessors ability to execute code. The DTC sets if the messages are missing, the counter is not updated, or the SPI handler detects an incorrect checksum in the time indicated.	CRC error on receive Number of missing messages OR Alive Rolling Count (ARC) incremented from previous value (0-3)	=True ≠ True	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete) OR CAN communication Disabled OR Run Crank In Range Voltage AND Run Crank In Range Security Voltage AND 12V Battery Voltage	= False = True = False > 11.00 V >= 9.50 V > 11.00 V	0.175 seconds out of a 0.2 seconds window	Type A, 1 Trips
			HWIO Received Errors AND Receiving Data in Progress	≠ 0 ≠ True	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete) OR CAN communication Disabled OR Run Crank In Range Voltage AND Run Crank In Range Security Voltage AND 12V Battery Voltage	= False = True = False > 11.00 V >= 9.50 V > 11.00 V	0.175 seconds out of a 0.2 seconds window	
			Number of Missing Received Messages	> 4 messages	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	0.175 seconds out of a 0.2 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					OR CAN communication Disabled OR Run Crank In Range Voltage AND Run Crank In Range Security Voltage AND 12V Battery Voltage	 = False > 11.00 V >= 9.50 V > 11.00 V		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Inverter Phase U Temperature Sensor Erratic	P190D	This diagnostic monitors the inverter phase U temperature sensor voltage which could be intermittently high, low, or open. A rolling average of sensed temperature readings calculated over a set amount of time is compared against a threshold that has been calculated based on the stator current. If the calculated rolling average is above the calculated fail threshold for sufficient time the, the diagnostic will fail.	A rolling average of temperature readings calculated over 0.38 s this calculation is known as a string length. Temperature readings are taken every .025s.	> an estimated string length calculated based on stator current.	Start-Up Delay	> 0.13 s	1.25 seconds out of a 1.875 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Inverter Phase V Temperature Sensor Erratic	P190E	This diagnostic monitors the inverter phase V temperature sensor voltage which could be intermittently high, low, or open. A rolling average of sensed temperature readings calculated over a set amount of time is compared against a threshold that has been calculated based on the stator current. If the calculated rolling average is above the calculated fail threshold for sufficient time the, the diagnostic will fail.	A rolling average of temperature readings calculated over 0.38 s this calculation is known as a string length. Temperature readings are taken every .025s.	> an estimated string length calculated based on stator current.	Start-Up Delay	> 0.13 s	1.25 seconds out of a 1.875 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Inverter Phase W Temperature Sensor Erratic	P190F	This diagnostic monitors the inverter phase W temperature sensor voltage which could be intermittently high, low, or open. A rolling average of sensed temperature readings calculated over a set amount of time is compared against a threshold that has been calculated based on the stator current. If the calculated rolling average is above the calculated fail threshold for sufficient time the, the diagnostic will fail.	A rolling average of temperature readings calculated over 0.38 s this calculation is known as a string length. Temperature readings are taken every .025s.	> an estimated string length calculated based on stator current.	Start-Up Delay	> 0.13 s	1.25 seconds out of a 1.875 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Control Module Random Access Memory (RAM)	P1A53	This Diagnostic tests the RAM in the MCP micro-controller. The diagnostic checks that RAM has not changed unexpectedly. Pattern checks are done at intiialization where different patterns are written and then read back. The DTC sets if the patterns do not match. Continuous checks are done while the controller is executing code that store the same variables in multiple locations. When those variables are read, a check is done to be sure both locations still match. A DTC sets if the locations do not match for the indicated time.	Secure "Y" variable	≠ Primary "V" variable for greater than 125 ms	Current Time Execution - Time of Last DualStore Error	> 25 ms	Executes in Background loop	Type A, 1 Trips
			HWIO detects an illegal write to Write Protected RAM	= TRUE	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Executes in Background loop 0 counts to fail	
			2nd Processor State of Health RAM Fault Latched	= TRUE	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Executes in Background loop every 1000ms	
			Checksum of PreservedNVM_Region for Main Processor State of Health and 2nd Processor State Of Health	≠ Expected checksum value	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Runs once at Initialization	
			HWIO detects fault in System RAM	= TRUE	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Runs once at Initialization 3 count to fail	
			HWIO detects fault in Cache RAM	= TRUE	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Runs once at Initialization 3 count to fail	
			HWIO detects fault in eTPU RAM	= TRUE	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Runs once at Initialization 3 count to fail	
			Main SOH RAM Fault Latched AND	= 0	(Diagnostic System Code Clear Requested AND Diagnostic System Reset	= False = True	Executes in Background loop every 1000ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Complete)			
			SPI Fault Latched	= False	Time Since Last Duel Store Error	> 1,000 ms		
			AND					
			System RAM Fault Count	= 0				
			AND					
			Cache RAM Fault Count	= 0				
			AND					
			eTPU RAM Fault Count	= 0				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Control Module Read Only Memory (ROM)	P1A54	This Diagnostic tests ROM (flash) memory in the MCP micro-controller. The test checks that ROM has not changed since it was flashed in the plant. The bytes of ROM in different areas (code, calibration, HW configuration, etc.) are summed and compared to a checksum for that area. The DTC sets when the checksum comparison does not match for the indicated number of times.	Calculated Checksum of the Boot ROM	≠ Expected Checksum	Controller Status ROM Checksum in Progress (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= On ≠ True = False = True	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5.00 failures	Type A, 1 Trips
			2nd Processor State of Health ROM fault latched	= TRUE	Controller Status ROM Checksum in Progress (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= On ≠ True = False = True	Runs continuously in the background	
			Calculated Checksum of Torque Security Related Calibrations	≠ Expected Checksum	Controller Status (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete) = Enable Calibration is True = Enable Calibration is True	= On = False = True = 0 (0 is Enabled) = 1 (1 is Enabled)	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 2 failures	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			ECC Fault detected in Flash memory	= TRUE	Controller Status Power Up Reset AND HWIO BINVDM ECC State AND HWIO ROM Fault Enable Calibration is true	= On = False = False = True = 1 (1 is Enabled)	Greater than 5 failures at controller initialization Runs once at initialization	
			ROM fault Active AND 2nd SOH ROM Fault Latched AND Main SOH ROM Fault Latched	≠ True ≠ True ≠ True	(Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= False = True	Runs in the Background	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Control Module Long Term Memory Performance	P1ADD	This Diagnostic tests specific areas of nonvolatile memory (NVM). The fault sets If the last write to nonvolatile memory was not successful or if the checksum of static NVM does not agree with the latest summation of that memory area. The DTC sets if the fault is set in the indicated time.	HWIO reports next write to NVM will not succeed OR HWIO reports the assembly calibration integrity check has failed	= True = True	Enable Calibration is True Controller Status	= 1 (1 is Enabled) = Initialization	Runs once at controller initialization	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Control Module System Voltage Low	P1AE0	This diagnostic detects low voltage in the vehicle's 12 volt system. The fault sets when the THCP detects supply voltage below the indicated threshold for the indicated time.	Ignition Voltage	≤ 10.00 Volts	Enable Calibration is True AND 12V Starter Engaged AND Ignition Run/Crank Voltage AND Engine Speed (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= 1.00 (1 is Enabled) = False > 6.0 Volts ≥ 0.00 RPM = False = True	5 seconds out of a 6 seconds window	Type C, No SVS "Emission Neutral Diagnos- tic - Type

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Control Module System Voltage High	P1AE1	This diagnostic detects high voltage in the vehicle's 12 volt system. The fault sets when the THCP detects supply voltage above the indicated threshold for the indicated time.	Ignition Voltage	≥ 16.00 Volts	Enable Calibration is True AND Ignition Run/Crank Voltage (Diagnostic System Code Clear Requested AND Diagnostic System Reset Complete)	= 1.00 (1 is Enabled) > 6.0 Volts = False = True	5 seconds out of a 6 seconds window	Type C, No SVS "Emission Neutral Diagnos- tic - Type

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Hybrid Battery System Voltage High	P1AEF	This diagnostic monitors the total high voltage system voltage which is too high for the hardware. The sensed voltage is compared against a threshold. If the sensed voltage is above the failure threshold for sufficient time, the diagnostic will fail.	High Voltage Sensor Voltage OR High Voltage Hardware Flag	> 450.00 Volts = True	Controller Initialization	Complete	0.01 seconds out of a 0.2 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Control Module Hybrid Battery Voltage System Isolation Fault	P1AF2	This diagnostic monitors the high voltage bus for possible shorts to chassis. The high voltage positive leg is compared to the high voltage negative leg via a ratio. If the ratio falls outside of a specific window for sufficient time, the diagnostic will fail.	Isolation Ratio (Neg mid-pack voltage / Pos mid-pack voltage)	> 4.53 OR < 0.21	No Active DTCs: Controller Initialization	P1AE8, P1AE9, P1AEC Complete	2.5 seconds out of a 5 seconds window (x of y)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Control Module Hybrid Battery Voltage Isolation Sensor 1 Circuit Low	P1AF6	This diagnostic monitors the high voltage bus positive leg sensor voltage which is out of range low. The sensed voltage is compared against a threshold. If the sensed voltage is below the failure threshold for sufficient time, the diagnostic will fail.	Positive mid-pack voltage	< 20.00 Volts	Controller Initialization	Complete	0.7375 seconds out of a 1.05 seconds window (x of y)	Type A, 1 Trips
					Run Crank Active	True		
					Contactors	Closed		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Control Module Hybrid Battery Voltage Isolation Sensor 1 Circuit High	P1AF7	This diagnostic monitors the high voltage bus positive leg sensor voltage which is out of range high. The sensed voltage is subtracted from the total voltage. This delta is then compared against a threshold. If the delta is above the failure threshold for sufficient time, the diagnostic will fail.	Pos mid-pack voltage - High Voltage sensor voltage	> 40.00 Volts	Controller Initialization Run/Crank Active Contactors	Complete True Closed	0.525 seconds out of a 1.05 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Position Sensor Circuit Loss of Tracking	P1B04	This diagnostic monitors the output from the resolver circuit on the high voltage motor. The circuit is continually calculating the position of the rotor in degrees. When the error between each sampling of position is greater than 5 degrees the circuit will output a status signal indicating a loss of tracking. If the loss of tracking status is present for a threshold amount of time, the diagnostic will fail.	Internal Tracking Error	>5 Degrees	Wakeup Signal Resolver Initialization Delay Once Resolver has indicated a fault, a Retry timer is initiated. Retry Timer must be	ON 1.00 > 0.05 s	Failure Conditions Met for 0.20 to 0.80 seconds out of a 2.00 second window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Position Sensor Circuit Overspeed	P1B0E	This diagnostic monitors the output speed of the high voltage motor. The absolute value of the sensed speed of the motor is compared against a threshold. If the sensed speed is above the fail threshold for sufficient time, the diagnostic will fail.	ABS(Motor Speed)	> 12,700.00 rpm	Wakeup Signal	On	0.13 seconds out of a 2.5 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Position Sensor Learn Incorrect	P1B10	This diagnostic monitors the offset that is learned by the resolver circuit. The diagnostic runs on every key off cycle while the offset learn process is in progress. The offset learn process can fail when during the learn process either the motor speed is higher than a threshold, the total high voltage bus is below a threshold voltage, the peak to peak current on the motor falls below a threshold, or the learn process takes longer than a threshold time. If the learn process fails for any one of the afore mentioned reasons a counter is increased and compared against a threshold. If the counter exceeds the threshold the diagnostic will fail.	Offset Learn Could Not Complete Because: ABS(Motor Speed) Consecutive Key Cycles where the offset learn is unable to complete	 > 50.00 rpm > 106.00 cycles	Key Off	TRUE	106.00 consecutive key cyles with a 0.30 s Learn Time	Type C, No SVS
			Initial Offset Learn Could Not Complete Because: Filtered DC Consecutive Key Cycles where the offset learn is unable to complete	 < 200.00 V > 106.00 cycles	Key Off	TRUE	106.00 consecutive key cyles with a 0.30 s Learn Time	
			Initial Offset Learn Could Not Complete Because: ALL phase Current Consecutive Key Cycles where the offset learn is unable to complete	 < 30.00 A > 106.00 cycles	Key Off	TRUE	106.00 consecutive key cyles with a 0.30 s Learn Time	
			Initial Offset Learn Could Not Complete Because: Learn Timer Consecutive Key Cycles where the offset learn is unable to complete	 > 1.40 s > 106.00 cycles	Key Off	TRUE	106.00 consecutive key cyles with a 0.30 s Learn Time	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Control Module Hybrid Battery Voltage Isolation Sensing Performance	P1B42	This diagnostic verifies that the high voltage bus positive and negative leg sensors are neither inappropriately high nor low. It compares the sensed battery pack voltage against the high voltage positive and negative leg. If the absolute value of the difference between the sensed battery voltage and the high voltage positive and negative leg sensors is greater than the failure threshold for a sufficient time, the diagnostic will fail.	ABS(Total High Voltage Measured By the Battery Pack - High Voltage Measured from Positve to Ground - High Voltage Measured from Negative to Ground)	>= 50.00 V	No Active DTCs:	P1AE8, P1AE9, P1B0B, P1B0C	0.175 seconds out of a 0.2 seconds window (x of y)	Type A, 1 Trips
					Controller Initialization	Complete		
					Contactors	Closed		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit Low	P1B43	This diagnostic monitors the high voltage bus negative leg sensor voltage which is out of range low. The sensed voltage is compared against a threshold. If the sensed voltage is below the failure threshold for sufficient time, the diagnostic will fail	Negative mid-pack voltage	< 20.00 Volts	Controller Initialization Run/Crank Active Contactors	Complete True Closed	0.7375 seconds out of a 1.05 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit High	P1B44	This diagnostic monitors the high voltage bus negative leg sensor voltage which is out of range high. The sensed voltage is subtracted from the total voltage. This delta is then compared against a threshold. If the delta is above the failure threshold for sufficient time, the diagnostic will fail.	High Voltage Negative to Ground Reading - Total High Voltage Reading from High Voltage Battery	> 40.00 Volts	Controller Initialization Run/Crank Active Contactors	Complete True Closed	0.525 seconds out of a 1.05 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Control Module Torque Calculation Performance	P1E0B	Fail Case 1, 5: This Diagnostic tests the calculation of output torque. Potential failures can include memory, software, processor and ALU faults. The primary calculated output torque value is compared to the secondary calculated output torque and if that difference is greater than the indicated threshold for the indicated time the fault is set. Fail Case 2 This diagnostic tests the calculation of output motor torque. Potential failures can include memory, software, processor and ALU faults. The fault is set if the differnece in calculated output motor torque and the secondary output motor torque is greater than the indicated calibration. The DTC is set if the fault is present for longer than the indicated time.	Absolute difference between Torque Achieved in primary and secondary path is greater than the threshold value	> 123.00 Nm	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	Type A, 1 Trips
			Absolute difference between Torque Commmanded in primary and secondary path is greater than the threshold value Abs(Primary - Secondary) OR Absolute difference between Mtr Minimum Short Term Torque Commmanded in primary and secondary path is greater than the threshold value Abs(Primary - Secondary) OR Absolute difference between Mtr Maximum Short Term Torque Commmanded in primary and secondary path is greater than the threshold value Abs(Primary - Secondary)	> 123.00 Nm > 123.00 Nm > 123.00 Nm	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Fail Case 3, 4: This diagnostic tests the electronic current delivery circuits. The fault is set if the difference in current delivered between the primary and secondary paths is greater than the shown threshold. The DTC is set if the fault is present for longer than the indicated time. Fail Case 6: This diagnostic tests the calculation of the back emf torque in the primary and secondary paths. Potential failures can include memory, software, processor and ALU faults. The fault is set if the calculated back emf torque in the primary path is different from the secondary calculation path by more than the threshold given. The DTC is set if the fault is present for longer than the indicated time. Fail Case 7, 8, 9: This diagnostic compares different calculations of Usd and Usq in a primary and a secondary path.	Difference between Issd in primary and secondary path is greater than the threshold value	> 50.00 Amps	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	
			Absolute difference between Issq in primary and secondary path is greater than the threshold value	> 50.00 Amps	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	
			Absolute difference between IssCmnd Torque in primary and secondary path is greater than the threshold value	> 123.00 Nm	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	
			Absolute difference between Back emf Torque in primary and secondary path is greater than the threshold value	> 0.015 Nm	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	
			Absolute difference between Usd Limited in primary and secondary	> 0.40 V (for Usd)	DriveStateID TorqCalcPerf Flt Active	= Run = TRUE	0.1875 seconds out of a 0.2 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Potential failures can include memory, software, processor and ALU faults. The fault is set if the calculated differences are greater than the indicated thresholds. The DTC is set if either fault is present for longer than the indicated time. Fail Case 10: This diagnostic tests the primary and secondary input power paths for motor A. Potential failures can include the power input circuits, microprocessor memory, software and calibration, processor and ALU faults. The fault is set if the difference between primary and secondary input power are greater than the indicated threshold. The DTC is set if the fault is present for longer than the indicated time. Fail Case 11: This diagnostic tests the primary and secondary input voltage paths for motor A. Potential failures can include the power input circuits,	path is greater than the threshold value OR Absolute difference between Usq Limited in primary and secondary path is greater than the threshold value	> 0.40 V (for Usd)	OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= FALSE ≠ 0 = TRUE		
			UsdLmt Squared plus UsqLmt Squared OR DutyQ Squared plus DutyD Squared AND Duty Squared minus UsLmt Squared OR Perf Squared Duty Squared minus UsLmt Squared OR Perf Squared	> 0.70 > 0.70 > 0.30 > 1.00 > 0.10 > 0.15	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	
			Absolute difference of the Mod Index Square Calcluation for Usd and Usq for Volt Hz mode in primary and seconday paths	> 0.40 V	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	
			Difference between Power Input in primary and secondary path is greater than or equal to the threshold value	>= 40,000.00 Watts	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter	= Run = TRUE = FALSE ≠ 0	0.1875 seconds out of a 0.2 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		microprocessor memory, software and calibration, processor			OR TrqMntr Fault	 = TRUE		
		and ALU faults. The fault is set if the difference between primary and secondary voltage are greater than the indicated threshold. The DTC is set if the fault is present for longer than the indicated time.	Difference between Vdc Adapt in primary and secondary path is greater than or equal to the threshold value	>= 0.07 Volts	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	
		Fail Case 12: This diagnostic tests the primary and secondary reactive power paths for motor A. Potential failures can include the reactive power input circuits,	Difference between Reactive Power (Qest) in the primary and secondary path is greater than or equal to the threshold value	>= 43,755.40 Watts	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	
		microprocessor memory, software and calibration, processor and ALU faults. The fault is set if the difference between primary and secondary reactive power is greater than the indicated threshold. The DTC is set if the fault is present for longer than the indicated time. Fail Case 13: This diagnostic tests the primary and secondary resolver motor speed for motor	Calculated resolver Mtr Speed difference in the primary and secondary path is greater than the threshold value OR Calculated resolver Mtr Speed difference in the primary and secondary path is greater than the threshold value To Pass: Calculated resolver Mtr Speed AND Calculated Mtr Speed in	> 6,000.00 rpm > 510.00 radians/sec < 4,000.00 rpm <= 146.00 rad	DriveStateID TorqCalcPerf Flt Active OR TorqCalcPerf TPTKO OR TorqCalcPerf Flt counter OR TrqMntr Fault	= Run = TRUE = FALSE ≠ 0 = TRUE	0.1875 seconds out of a 0.2 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		A. The diagnostic tests the resolver circuits. The fault is set if the difference between primary and secondary motor speed is greater than the indicated threshold. The DTC is set if the fault is present for longer than the indicated time.	radians/sec					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Control Module Long Term Memory Reset	P1EB7	This Diagnostic tests the NonVolatile Memory (NVM) in the MCP micro-controller for changes since the last write at power down. The bytes of various NVM sections are summed and compared to checksums for each section that were stored at the last powerdown. The DTC sets when the checksum comparisons do not match.	Static NVM Checksum at power-up	≠ Checksum at power-down	Ignition Status Enable Calibration is True	= Run or Crank = 1 (1 is Enabled)	1 failure Runs once at controller initialization	Type A, 1 Trips
			Preserved NVM Checksum at power-up	≠ Checksum at power-down	Ignition Status Enable Calibration is True	= Run or Crank = 1 (1 is Enabled)	1 failure Runs once at controller initialization	
			Power Up Reset BINVDM NVM Checksum at power-up	= False ≠ Checksum at power-down	Ignition Status Enable Calibration is True	= Run or Crank = 1 (1 is Enabled)	Runs once at controller initialization 3 out of 5 controller initilizations for Failure	
			Dynamic NVM checksum at power-up AND Shutdown Finished	≠ Checksum at power-down = TRUE	Ignition Status Enable Calibration is True	= Run or Crank = 1 (1 is Enabled)	1 failure Runs once at controller initialization	
			Static NVM Error Dynamic NVM Error BINVDM ECC Error	= False = False = False	Enable Calibration is True	= 1 (1 is Enabled)	Runs once at controller initialization	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Control Module B Lost Communication With Hybrid Powertrain Control Module B on Bus B	U182F	This diagnostic detects that the Hybrid Powertrain Control Module B has stopped sending messages on Bus B. If Hybrid Powertrain Control Module B message traffic is not received on Bus B by the MCPB controller in the indicated time the DTC is set.	Message is not received from controller for Message $1D8 Message $3C5 Message $3D7	 ≥ 0.5 seconds ≥ 0.5 seconds ≥ 0.5 seconds	General Enable Criteria: U0074 Normal CAN transmission on Bus B Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycle DiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 9.50 = run = 1 (1 indicates enabled) = Active > 11.00 > 0.4000 seconds	See Threshold Value Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					U182F	Not Active on Current Key Cycle		
					Hybrid Powertrain Control Module B (VICM)	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor Control Module B Lost Communication With Hybrid Powertrain Control Module	U1846	This diagnostic detects that the Hybrid Powertrain Control Module has stopped sending messages on Bus A. If Hybrid Powertrain Control Module message traffic is not received on Bus A by the MCPb controller in the indicated time the DTC is set.	Message is not received from controller for Message $1A5	 ≥ 10.00 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 9.50 = run = 1 (1 indicates enabled) = Active > 11.00	See Threshold Value Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					not active for	> 0.4000 seconds		
					U1846	Not Active on Current Key Cycle		
					Hybrid Powertrain Control Module	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Control Module Lost Communication With Engine Control Module (ECM)/ Powertrain Control Module (PCM)	U1879	This diagnostic detects that the Engine Control Module (ECM/PCM) has stopped sending messages. If ECM/ PCM message traffic is not received by the MCPB controller in the indicated time the DTC is set.	Message is not received from controller for Message $0C9 Message $1A3 Message $4C1 Message $4C7 Message $4F1	 ≥ 10.00 seconds ≥ 10.00 seconds ≥ 10.00 seconds ≥ 10.00 seconds ≥ 10.00 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 9.50 = run = 1 (1 indicates enabled) = Active > 11.00 > 0.4000 seconds	See Threshold Value Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					U1879	Not Active on Current Key Cycle		
					Hybrid Powertrain Control Module	is present on the bus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Sensor Power Supply B Circuit Low	P06B4	This diagnostic monitors the IGBT power supply circuit voltage. The sensed voltage is compared against a threshold. If the sensed voltage is below the failure threshold for sufficient time, the diagnostic will fail.	Scaled 15V IGBT Supply Voltage	< 12.00 V	Wakeup Signal	ON	0.4 seconds out of a 0.5 seconds window (x of y) OR Continuous Fail Time > 0.30 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Sensor Power Supply B Circuit High	P06B5	This diagnostic monitors the IGBT power supply circuit voltage. The sensed voltage is compared against a threshold. If the sensed voltage is above the failure threshold for sufficient time, the diagnostic will fail.	Scaled 15V IGBT Supply Voltage	> 22.00 V	Wakeup SIgnal	ON	0.4 seconds out of a 0.5 seconds window (x of y) OR Continuous Fail Time > 0.30 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Phase U Current Low	P0A67	This diagnostic monitors the sensed current on the "U" phase of the electric motor for an open circuit. When the phase angle of the stator current vector nears its peak, the absolute value of the current is then compared against a threshold. If the sensed current is below the failure threshold for sufficient time, the diagnostic will fail.	Peak Phase Axis Current on the U phase	< 9.00 Amps	Drive State Delay Timer Inverter State Inverter Power Stage Inverter Voltage Rotor Position Squared Current Comanded	RUN > 10.00 ms ≠ Active Discharge Normal PWM > 50.00 V -30 deg < Phase Axis < +30 deg > 4,900.00 Amps^2	0.4 seconds out of a 0.6 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Phase V Current Low	P0A6A	This diagnostic monitors the sensed current on the "V" phase of the electric motor for an open circuit. When the phase angle of the stator current vector nears its peak, the absolute value of the current is then compared against a threshold. If the sensed current is below the failure threshold for sufficient time, the diagnostic will fail.	Peak Phase Axis Current on the V phase	< 9.00 Amps	Drive State Delay Timer Inverter State Inverter Power Stage Inverter Voltage Rotor Position Squared Current Comanded	Run > 10.00 ms ≠ Active Discharge Normal PWM > 50.00 V -30 deg < Phase Axis < +30 deg > 4,900.00 Amps^2	0.4 seconds out of a 0.6 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Phase W Current Low	P0A6D	This diagnostic monitors the sensed current on the "W" phase of the electric motor for an open circuit. When the phase angle of the stator current vector nears its peak, the absolute value of the current is then compared against a threshold. If the sensed current is below the failure threshold for sufficient time, the diagnostic will fail.	Peak Phase Axis Current on the W phase	< 9.00 Amps	Drive State Delay Timer Inverter State Inverter Power State Inverter Voltage Rotor Position Squared Current Comanded	Run > 10.00 ms ≠Active Discharge Normal PWM > 50.00 V -30 deg < Phase Axis < +30 deg > 4,900.00 Amps^2	0.4 seconds out of a 0.6 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Inverter Performance	P0A79	This diagnostic monitors the status of the IGBTs. The IGBT module will continually monitor the IGBTs for a short between the upper and lower phase. The module will then report out a status of being in a DeSat fault. If the DeSat fault status is present for sufficient time, the diagnostic will fail.	Phase A, B, or C High or Low Side IGBT	DSatFltPending (Status Fault Bit)	Wakeup Signal	ON	0.002 seconds out of a 1 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Phase U Current Sensor Offset Out-of Range	P0BF2	This diagnostic monitors the offset that is learned by the phase "U" current sensor on the high voltage electric motor. In order to ensure accurate current measurement an offset is calculated when there is no current going through the motor. The offset learn process is conducted on every key crank, the learned offset is then compared against a threshold, if the offset value is larger than the fail threshold the diagnostic will fail.	U phase offset current learn value	> 35.00 amps	Wakeup Signal Delay Timer Motor Faults Inverter Faults	On 0.40 Sec None None	Fail conditions met 0.40 sec after enable conditions met	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Phase U Current Sensor Circuit Low	P0BF3	This diagnostic monitors for the "U" phase current sensor voltage which is out of range low. After the sensor output voltage is converted, the sensed current is compared against a threshold. If the sensed current is below the failure threshold for sufficient time, the diagnostic will fail.	U phase current sensor output at highside	< -700.00 amps	Wakeup Signal Run Flag	On = 1.00	0.1 seconds out of a 0.15 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Phase U Current Sensor Circuit High	P0BF4	This diagnostic monitors for the "U" phase current sensor voltage which is out of range high. After the sensor output voltage is converted, the sensed current is compared against a threshold. If the sensed temperature is above the failure threshold for sufficient time, the diagnostic will fail.	U phase current sensor output highside	> 700.00 amps	Wakeup Signal Enable Flag	On = 1.00	0.1 seconds out of a 0.15 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Phase V Current Sensor Offset Out-of Range	P0BF6	This diagnostic monitors the offset that is learned by the phase “V” current sensor on the high voltage electric motor. In order to ensure accurate current measurement an offset is calculated when there is no current going through the motor. The offset learn process is conducted on every key crank, the learned offset is then compared against a threshold, if the offset value is larger than the fail threshold the diagnostic will fail.	V phase current sensor offset learn value	> 35.00 amps	Wakeup Signal Delay Timer Motor Faults Inverter Faults	On 0.40 Sec None None	Fai conditions met 0.40 Sec after enable conditions met	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Phase V Current Sensor Circuit Low	P0BF7	This diagnostic monitors for the "V" phase current sensor voltage which is out of range low. After the sensor output voltage is converted, the sensed current is compared against a threshold. If the sensed temperature is below the failure threshold for sufficient time, the diagnostic will fail.	V phase current sensor output at highside	< -700.00 amps	Wakeup Signal Run Flag	On = 1.00	0.1 seconds out of a 0.15 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Phase V Current Sensor Circuit High	P0BF8	This diagnostic monitors for the "V" phase current sensor voltage which is out of range high. After the sensor output voltage is converted, the sensed current is compared against a threshold. If the sensed temperature is above the failure threshold for sufficient time, the diagnostic will fail.	V phase current Sensor output at highside	> 700.00	Wakeup Signal Run Flag	On = 1.00	0.1 seconds out of a 0.15 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Phase W Current Sensor Offset Out-of Range	P0BFA	This diagnostic monitors the offset that is learned by the phase “W” current sensor on the high voltage electric motor. In order to ensure accurate current measurement an offset is calculated when there is no current going through the motor. The offset learn process is conducted on every key crank, the learned offset is then compared against a threshold, if the offset value is larger than the fail threshold the diagnostic will fail.	W phase current sensor offset learn value	> 35.00 amps	Wakeup Signal Delay Timer Motor Faults Inverter Faults	On 0.40 Sec None None	Fail condidtions met 0.40 sec after enable conditoins met	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Phase W Current Sensor Circuit Low	P0BFB	This diagnostic monitors for the "W" phase current sensor voltage which is out of range low. After the sensor output voltage is converted, the sensed current is compared against a threshold. If the sensed temperature is below the failure threshold for sufficient time, the diagnostic will fail.	W phase current sensor output at highside	< -700.00 amps	Wakeup Signal Run Flag	On = 1.00	0.1 seconds out of a 0.15 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Phase W Current Sensor Circuit High	P0BFC	This diagnostic monitors for the "W" phase current sensor voltage which is out of range high. After the sensor output voltage is converted, the sensed current is compared against a threshold. If the sensed temperature is above the failure threshold for sufficient time, the diagnostic will fail.	W phase current sensor output at high side	> 700.00	Wakeup Signal Run Flag	On = 1.00	0.1 seconds out of a 0.15 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Phase U-V-W Correlation	P0BFE	This diagnostic monitors the U, V, and W phase currents for balance. The absolute value of the sum of the phase values is compared against a threshold. If the sum is above the failure threshold for sufficient time, the diagnostic will fail.	Sum of U-V-W phase currents	≥ 110.00 amps	Wakeup Signal Run Flag	On = 1.00	0.0032 seconds out of a 0.0038 seconds window (x of y)	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor "B" Phase U-V-W Current Sensor Overcurrent	P0C04	This diagnostic monitors the sensed current on all three phases of the electric motor. The absolute value of the highest current phase value is then compared against a threshold. If the value is above the failure threshold for sufficient time, the diagnostic will fail. This diagnostic implements the use of 2 different fail timers, one fast and one slow. The fast timer has a very short sample window so that the diagnostic will detect a sudden fault, the slower timer has a longer sample window to allow the diagnostic to detect an intermittent fault.	U, V, or W Phase Current Sensor	> 600.00 amps	Wakeup Signal	On	0.0104 seconds out of a 0.104 seconds window (x of y) OR 0.00416 seconds out of a 0.09984 seconds window (x of y)	Type A, 1 Trips
			D Axis current less than calculated threshold determined by stator temperature listed in supporting table unless the motor temperature reading is faulted, then D Axis current threshold is determined by a default value	D-Axis Current<- 600.00 amps (faulted motor temp value) **P0C04 D-Axis Current Thresholds** (See supporting tables for expected threshold values for non-faulted motor temperature readings)	Wakeup Signal	On	0.0104 seconds out of a 0.104 seconds window (x of y) OR 0.00416 seconds out of a 0.09984 seconds window (x of y)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Drive Motor B Inverter Power Supply Circuit/Open	P0C0E	This diagnostic monitors the status of the IGBTs. The IGBT module will continuously monitor the supply circuit voltage. When the supply circuit drops below a threshold voltage the module then report out a status of being in a Bias fault. If the Bias fault status is present for sufficient time, the diagnostic will fail.	Phase A, B, or C Power Supply	Failed (Status Fault Bit)	Inverter State	Initialization Complete	0.168 seconds out of a 0.2 seconds window (x of y)	Type A, 1 Trips

Initial Supporting table - P0C04 D-Axis Current Thresholds

Description: X-Axis is stator temperature, Y-Axis is current threshold for the D-Axis current

y/x	100	140	150	160	170	180	190	200	210	220
1	-804	-676	-565	-517	-517	-517	-517	-517	-517	-517

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
ABS Front Hydraulic Circuit Leak Detected	C05B0	This monitoring chekcs if the front brake circuit has a leak by comparing the wheels dynamics with the vehicle deceleration.1. A fault is set if wheels dynamics do not match the vehicle deceleration.	The wheels dynamics are not matching the vehicle deceleration	= True	Ignition key AND Antilock brake system OR EBD Braking	= On = Active = Active	1 [Sec]	Type A, 1 Trip
		This monitoring checks for a brake circuit failure at the front axle. A fault is set if the master cylinder pressure is higher than the rear axle pressure.	Pressure of Master cylinder	> Pressure of rear axle	Ignition key AND Pressure at front axle Maintain the brake pedal at a constant force	= On > 5000 Kpa = 3 Sec	0.2 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition On and apply brake pedal with a pressure at front axle higher than 5000 kpa. Maintain the brake pedal with a constant force for 3 seconds and release.					
ABS Pump Motor Calibration Not Learned	C05AE	This monitoring strategy checks if there is a 0V calibration at Sigma Delta Modulator (SDM).The motor measuring units through a SDM require a 0V calibration. The measured SDM 0V calibration values are compared. A fault is set if the measured voltages are outside of a calibrated range.	Raw generator voltage Ugen OR Raw generator voltage Ugen AND Raw voltage drops at hydraulic pump motor relay URdsON OR Raw voltage drops at hydraulic pump motor relay URdsON	< 14 V > 23.8 V < 13 V > 18 V	Ignition key AND System voltage AND Hydraulic pump motor	= On > 6.9 V = Off	3 [Sec]	Type A, 1 Trip
		This monitoring verifies the supply voltage of the return flow pump. A supply undervoltage fault is set if the voltage of the pump motor shunt resistor is below a calibrated threshold or if the voltage of the Motor relay drain voltage is above a calibrated range, which is depending on the system voltage.	Voltage of motor shunt resistor OR Motor relay drain voltage OR Motor relay drain voltage	< 7.5 V > 3 V < 1.5 V	Ignition key AND System voltage AND Hydraulic pump motor	= On > 6.9 V = Off	2 [Sec]	Type A, 1 Trip
		DTC Pass	Accelerate vehicle to at least 18.6 mph and hold the speed for at least 20s					
ABS Pump Motor Control Circuit High	C052D	This monitoring strategy checks if there is a motor interruption or a motor relay short-circuit failure outside a motor actuation. The state of the pump motor is monitored. A fault is set if the motor voltage exceeds a calibrated threshold.	Hydraulic pump motor supply voltage	> 12 V	Hydraulic pump motor	= Off	1 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 30sec without braking.					
ABS Pump Motor Performance	C052B	This monitoring strategy checks if the return pump is weak due to a heavy load. A fault is set if the calculated generator voltage is over a calibrated threshold and the measured generator voltage is below the same threshold.	Calculated generator voltage AND Measured generator voltage	> 0.6 V < 0.6 V	System voltage AND Hydraulic pump motor AND Electronic Brake Control Unit state	> 6.9 V = On = Started with hardware reset	0.48 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks the functionality of the hydraulic pump motor path. A fault is set if the voltage drop over the motor relay stays below a calibrated threshold when the motor relay (MR) is switched on.	Voltage drops at hydraulic pump motor relay AND Motor relay switched on	< 2 V = True	System voltage AND Vehicle speed AND Hydraulic pump motor	> 6.9 V > 9.32 mph = Off	5 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the hydraulic pump motor can be actuated and if the generated motor voltage is visible to the microcontroller. The pump motor is actuated, and both the analog and digital feedback voltage signals are monitored. A fault is set if the analog or digital pump motor voltage is below a calibrated threshold.	Analog pump motor voltage OR Digital pump motor voltage	< 1.7 V < 1.7 V	Ignition key	= On	5 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the motor voltage is incorrect. The Motor Voltage Comparison Test triggers a predetermined number of measurements in normal mode to give the motor voltage comparison monitor the chance to detect failures. To do this, it switches the motor voltage to UBMR (Battery Motor Relay) voltage and compares the analog UBMR voltage read in by the Analog Digital Converter (ADC) with the digital UBMR voltage calculated by the Application Specific Integrated Circuit (ASIC) while the hydraulic pump is not active. A fault is set if the deviation between the UBMR voltage read by the ADC (analog) and the UBMR voltage calculated by the ASIC (digital) exceeds a calibrated threshold.	Motor relay supply line voltage read by ADC (analog) / Motor relay supply line voltage calculated by ASIC (digital)	> 0.25	Ignition key AND Hydraulic pump motor	= On = On	2 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 30sec without braking. Accelerate vehicle to at least 37.3 mph and hold the speed for at least 7s					
ABS Pump Motor Supply Circuit	C052F	This monitoring strategy checks if an interruption of the motor relay voltage supply line has occured. This can be caused by a defective fuse, a bad or broken car wire harness, or even by very deep undervoltage at the motor relay voltage supply line. A fault is set if the supply line voltage (UBMR) drops below a calibrated threshold.	Motor relay supply voltage	< 1.955 V	Ignition key	= On	0.1 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
ABS Pump Motor Supply Voltage "A" Circuit Low	C055B	This monitoring strategy checks if there is a possible inline resistor or undervoltage situation in the motor relay supplier. This is a check to ensure that the Application Specific Integrated Circuit (ASIC) register bit is set whenever there is an MRDSupplyFailure and is not reset throughout the ignition cycle, even if the voltage is recovered. A fault is set if during return flow pump actuation, the motor relay battery voltage drops below a calibrated threshold.	Motor relay voltage / internal supply voltage	< 0.4	Hydraulic pump motor AND Ignition key AND Vehicle speed	= On = On > 23.6 mph	0.01 [Sec]	Special Type C
		This monitoring strategy checks if there are failures on the motor supply line (for example: interruptions of UBMR). An Application Specific Integrated Circuit (ASIC) compares the voltage at UBMR with an internal dependent threshold provided by the hardware. A fault is set if the motor relay supply voltage is below a calibrated threshold.	Motor relay voltage / internal supply voltage	< 0.4	Ignition key	= On	0.2 [Sec]	Special Type C
		DTC Pass	Drive off, accelerate up to 37.2 mph and maintain this speed for at least 5 Sec					
ABS Rear Hydraulic Circuit Leak Detected	C05B1	This monitoring strategy checks if there is a leakage on the rear axle brake circuit. The monitor detects the variation of the rear axle pressure value during hold phases. A fault is set if the rear axle pressure decreases by more than a calibrated amount.	Calculated leakage on rear axle from the pressure variation	> 0.3 ml/Sec	System voltage Rear axle target presssure Pump motor running Vehicle speed For a cumulative duration of braking situations	> 9.6 V > 4500 kPa = False = 0 mph > 300 Sec	1[Sec]	Type A, 1 Trip
		This monitoring checks for a brake circuit failure at the rear axle. A fault is set if the master cylinder pressure is lower than the rear axle pressure.	Pressure of Master cylinder	< Pressure of rear axle	Ignition key AND Pressure at front axle Maintain the brake pedal at a constant force	= On > 5000 KPa = 3 Sec	0.2 [Sec]	Type A, 1 Trip
		DTC Pass	Turn on ignition. Constant brake pedal application during standstill for at least 3 sec. Check that the brake lights are illuminated or pressure at master cylinder > 500kpa. Release the brake pedal. Wait 5s. Constant brake pedal application during standstill for at least 3 sec. Check that the brake lights are illuminated or pressure at master cylinder > 500kpa. Release the brake pedal.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Brake Assist Information 1 Message Counter Incorrect	C1284	This monitoring strategy checks whether the message is still alive or not. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). With each newly sent message a counter is incremented within the sending ECU. the counter value is enclosed within the message. The receiving control unit checks whether counters have been incremented. A fault is set if the counter value is not incremented.	Message 0x214 on Bus E counter halted	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.1 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the message checksum is correct. The network driver sends and receives all network messages. It also checks if the messages are correct (length, checksum, alive-counter, reception timeout). With each newly sent message a checksum is calculated within the sending ECU. The value of the checksum is enclosed within the message. The receiving control unit calculates the checksum again and compares it with the sent one. A fault is set if the received checksum is different from the calculated checksum.	Checksum of 0x214 on Bus E not correct	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.1 [Sec]	Type A, 1 Trip
Brake Assist Information 2 Message Counter Incorrect	C1285	This monitoring strategy checks whether the message is still alive or not. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). With each newly sent message a counter is incremented within the sending ECU. the counter value is enclosed within the message. The receiving control unit checks whether counters have been incremented. A fault is set if the counter value is not incremented.	Message 0x219 on Bus E counter halted	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.1 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the message checksum is correct. The network driver sends and receives all network messages. It also checks if the messages are correct (length, checksum, alive-counter, reception timeout). With each newly sent message a checksum is calculated within the sending ECU. The value of the checksum is enclosed within the message. The receiving control unit calculates the checksum again and compares it with the sent one. A fault is set if the received checksum is different from the calculated checksum.	Checksum of 0x219 on Bus E not correct	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.1 [Sec]	Type A, 1 Trip
Brake Blending System Performance	C05AD	This monitoring tests if the actual pressure in the boost piston is much higher than the target pressure. The cause of this fault could be an erroneously high pressure sensor value. A fault is set if the actual pressure is much higher than the target pressure in the by-wire circuit	Actual pressure	> 4000 KPa	Ignition key	= On	0,5 - 1 [Sec]	Type A, 1 Trip
		This monitoring tests if the actual pressure in the boost piston is much higher than the target pressure. The cause of this fault could be an erroneously high pressure sensor value. A fault is set if the actual pressure is much higher than the target pressure in the master cylinder.	Actual pressure	> 4000 KPa	Ignition key	= On	0,5 - 1 [Sec]	Type A, 1 Trip
		This monitoring checks if the actual pressure in the boost piston is much lower than the target pressure. The cause of this fault could be an erroneously low pressure sensor value, no pressure ot too low pressure in the accumulator, a defective pump, air in the hydraulic circuit, or a leakage in the hydraulic circuit. A fault is set if the actual pressure is much lower than the target pressure in the by-wire circuit	Actual pressure	< 1500 KPa	Ignition key	= On	0,5 - 1 [Sec]	Type A, 1 Trip
		This monitoring checks if the actual pressure in the boost piston is much lower than the target pressure. The cause of this fault could be an erroneously low pressure sensor value, no pressure ot too low pressure in the accumulator, a defective pump, air in the hydraulic circuit, or a leakage in the hydraulic circuit. A fault is set if the actual pressure is much lower than the target pressure in the master cylinder.	Actual pressure	< 1500 KPa	Ignition key	= On	0,5 - 1 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		DTC Pass	Turn on ignition, 1. Wait 5seconds, 2. Drive up to 24.8 mph, 3. Realize a comfortable braking (about 3000 kpa at the rear axle), 4. Hold for 2 seconds and release smooth the brake pedal, 5. Wait 2seconds. Then repeat step 2 to 5 once again.					
Brake Master Cylinder Pressure Sensor 1 Circuit High Voltage	C0572	This monitoring checks if there is a short circuit between the supply voltage line and the pressure sensor signal line by comparing the signal line with the supply voltage line. Normally, the signal line maximum voltage should be lower than the supply voltage. A fault is set, if there is no difference in voltage between the signal line and the supply line.	Signal line voltage / Supply line voltage AND Signal line voltage / Supply line voltage	> 0.95 < 1.05	Ignition key	= On	0.1 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Brake Master Cylinder Pressure Sensor 1 Circuit Low Voltage	C0571	This monitoring checks if there is a short circuit between the ground and the pressure sensor signal line by comparing the signal line voltage with the ground. Normally, the signal line has a minimum voltage that is higher than the ground. A fault is set if there is no difference in voltage between the signal line and the ground.	Signal line voltage / Ground voltage AND Signal line voltage / Ground voltage	> 0.95 < 1.05	Ignition key	= On	0.1 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Brake Master Cylinder Pressure Sensor 1 Circuit Performance	C0574	This monitoring strategy checks if the offset compensation of the pressure sensor is out of range. The zero-point of the pressure sensor signal is adjusted to compensate for any signal drifts. The offset compensation is only performed when the brake pedal is not applied (corresponding to the pressure sensor zero point). A fault is set if the offset is outside a calibrated range.	Measured pressure OR Measured pressure	> 1500 KPa < -1500 KPa	System voltage AND Brake pedal is pushed AND Acceleration pedal is pushed AND Hydraulic pump motor And Vehicle speed	> 6.9 V = False = True = Off > 4.48 mph	Immediately	Type A, 1 Trip
		DTC Pass	Drive off, accelerate up to 37.2 mph and maintain this speed for at least 5s					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Brake Pressure Sensor "A" Missing Calibration	C0560	This monitoring strategy checks if the pressure sensor at the master cylinder is functioning as expected. A fault is set if the master cylinder pressure sensor test pulse voltage exceeds a calibrated threshold or if it falls below another calibrated threshold.	Master cylinder pressure sensor test pulse voltage OR Master cylinder pressure sensor test pulse voltage	> 110 % < 90 %	Vehicle acceleration AND Actual pressure of Master Cylinder AND Traction Control System AND Vehicle speed AND Anti-Lock Braking System intervention AND Vehicle Dynamics Control AND Hydraulic pump motor	= False < 150 KPa = Off < 9.32 mph = Off = Off = Off	Immediately	Type A, 1 Trip
		DTC Pass	Drive with more than 6.2 mph for more than 60 Sec. without pressing brake pedal and no					
Brake Pressure Sensor "B" Missing Calibration	C059B	This monitoring strategy checks if the rear left pressure sensor is functioning as expected. A fault is set if the master cylinder pressure sensor test pulse voltage exceeds a calibrated threshold. A fault is also set if the test pulse voltage falls below a calibrated threshold.	Rear left pressure sensor testpulse voltage OR Rear left pressure sensor testpulse voltage	> 110 % < 90 %	System Software Offset compensation of pressure sensor completed AND Actual pressure of Master Cylinder AND Traction Control System AND Anti-Lock Braking System intervention AND Vehicle Dynamics Control AND Hydraulic pump motor AND Brake light switch AND Last test pulse AND Vehicle speed OR Throttle control is pushed	= At least once < 150 kPa = Off = Off = Off = Off = Off > 30 Sec < 9.32 mph = True	Immediately	Type A, 1 Trip
		DTC Pass	Drive with more than 6.2 mph for more than 60 Sec. without pressing brake pedal and no stability control active.					
Brake Pressure Sensor / Brake Pedal Position Sensor Correlation	P05FF	This monitoring checks for hydraulic circuit failures. It will check if there is a leakage or a large amount of air in the hydraulic circuit. A fault is set if the pressure sensor value stay at zero while the pedal Travel sensor value is over a threshold.	PTS signal AND Pressure signal	> 24 mm = 0 KPa	Full system mode	= On	0.2 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring checks a pressure sensor plausibility failure. A fault is set if the pressure sensor value is too high compared to the pedal travel sensor value.	PTS signal AND Pressure signal	= 0 mm > 25 KPa	Full system mode	= On	0.2 [Sec]	Type A, 1 Trip
		DTC Pass	The brake pedal has to be pressed for more than 1 second (the pressure should reach minimum 3000 kpa).					
Control Module Communication Chassis Expansion CAN Bus Off - Generic	U0077	The CAN (Control Area Network) bus E state is monitored periodically. A fault is set if the bus is in "Bus Off" state.	CAN bus E state	= Bus off	System voltage AND System voltage ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = True ≥ 5 Sec	0.09 [Sec]	Type A, 1 Trip
		This monitoring checksthe CAN initialization function has taken too long to finish . The access to message Ram by the CAN-Core is handle through a message interface register. In each cycle a CAN register bit is checked to determine if the bit is set. A fault is set if the loop lasts longer than a threshold	Number of CAN cycles	> 1000	Ignition key	= On	0.01 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 30sec without braking.					
Control Module Communication High Speed CAN Bus Off - Generic	U0073	The CAN (Control Area Network) bus A state is monitored periodically. A fault is set if the bus is in "Bus Off" state.	CAN bus A state	= Bus off	System voltage AND System voltage ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = True ≥ 5 Sec	0.24 [Sec]	Type A, 1 Trip
		This monitoring checksthe CAN initialization function has taken too long to finish . The access to message Ram by the CAN-Core is handle through a message interface register. In each cycle a CAN register bit is checked to determine if the bit is set. A fault is set if the loop lasts longer than a threshold	Number of CAN cycles	> 1000	Ignition key	= On	0.01 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 30sec without braking.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Control Module Internal Performance	P0606	This monitoring strategy checks for proper the CPU Compare Module functionality. The software is executed on 2 CPU cores simultaneously instruction by instruction (lock step mode). The output of both cores is compared by the CPU Compare Module. A self test runs at Init to verify that the CPU Compare Module is working properly. A fault is set if the self test failed.	Core Compare Module selfest	= failed	System voltage	> 6.9 V	Immediately	Type A, 1 Trip
		This monitoring strategy checks if there is a Central Processing Unit (CPU) exception. If a CPU exception occurs, normal program execution is no longer allowed (e.g. aborts from privileged modes). A fault is set if a data abortion, a prefetch abortion, or an undefined instruction occurs.	Data abortion occurs OR Prefetch abortion occurs OR Undefined instruction occurs	= True = True = True	Ignition key	= On	Immediately	Type A, 1 Trip
		This monitoring strategy checks if the execution of a sensitive process task jitters too much. A fault is set if the real process execution time is greater than its ideal start time increased by a percentage.	The execution time of the internal system process task (non ibooster systems)	> Process Ideal Time + 5% Sec	Ignition key	= On	Immediately	Type A, 1 Trip
		This monitoring checks the TPSW customer function accessibility area into the RAM. A fault is set if any customer SW variable or function tries to access outside its restricted area.	SW variable or function tries to access outside its restricted area	= True	Ignition key	= On	Immediately	Type A, 1 Trip
		This monitoring strategy checks if the A/D-converter reference voltage is out of range. A fault is set if the ADC band gap voltage is outside the allowable range.	Analog Digital Converter voltage OR Analog Digital Converter voltage	< 1.145 V > 1.345 V	Ignition key	= On	Immediately	Type A, 1 Trip
		This monitoring strategy checks if the ECU internal electrical enable line cannot be switched on or off via the software. The electrical enable line is set directly by a microcontroller pin. When the microcontroller port changes, the enable line may take the value set by the microcontroller. If the enable line does not changen this means that the ECU enable line has shorted to the ground or to the supply voltage line (3.3V). A fault is set if the ECU internal electrical enable line value is different than the value requested from the software.	The ECU internal electrical enable line cannot be switched ON or OFF by the software	= True	System voltage AND Fail-Safe Logic Test	> 6.9 V = On	0.45 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the ECU (Electronic Control Unit) internal hydraulic enable line. A fault is set if the ECU internal electrical enable line either is shorted to ground, is shorted to the supply voltage, or cannot be switched ON or OFF by the software.	ECU internal hydraulic enable line has a short to ground OR ECU internal hydraulic enable line has a short to supply voltage (3.3V) OR The ECU internal hydraulic enable line cannot be switched ON or OFF by the software	= True = True = True	System voltage	> 6.9 V	0.45 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the enable line is set properly. After the Fail-Safe Logic Test has finished the ECU (Electronic Control Unit) internal hydraulic and electrical enable lines are monitored. It is expected that the enable lines always stay at a high level. A fault is set if an interruption (an enable line at low level) of the hydraulic or electrical enable line is detected.	ECU internal hydraulic line state For time OR ECU internal electrical line state For time	= low > 0.05 Sec = low > 0.05 Sec	System voltage	> 6.9 V	0.05 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the error pin event counter is in range. The monitor pulls the error pin to test the event counter within the system chip. To prevent an electrical shutdown (which would disturb communication) during the provoked error pin event, the electrical decouple bit is set. A fault is set if the error pin event counter does not increment, or if the decouple bit is not reset.	Error pin event counter not incremented	= True	Ignition key	= On	1 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is a HET exception. A fault is set if a failure is detected in the EEPROM (Electronically Erasable Programmable Read-Only Memory) cell.	Failure detected in register HET	= True	Ignition key	= On	Immediately	Type A, 1 Trip
		This monitoring strategy checks for proper of the High End Timer Transfer Unit (HETTU) addressing functionality. When a pointer error is detected, the HETTU state switches to a specific value. A fault is set if the HETTU is in the pointer error state.	High End Timer Transfer Unit Status	= "pointer error"	Ignition key	= On	Immediately	Type A, 1 Trip
		This monitoring strategy checks the High End Timer Transfer Unit (HETTU) internal bus. A fault is set if a bus error is detected.	High End Timer Transfer Unit Status	= "bus error"	Ignition key	= On	Immediately	Type A, 1 Trip
		This monitoring strategy checks the High End Timer Transfer Unit (HETTU) internal bus. A fault is set if a busy bit error is detected.	High End Timer Transfer Unit Status	= "busy bit error"	Ignition key	= On	Immediately	Type A, 1 Trip
		This monitoring strategy checks if there was a High End Timer Transfer Unit (HETTU) exception. A fault is set if an exception occurs.	Failure detected in register INT	= True	Ignition key	= On	Immediately	Type A, 1 Trip
		This monitoring strategy checks whether any tasks failed to call. A fault is set if a task did not start in the expected time.	Watchdog detects a missing task	= True	Ignition key	= On	Immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks the feedback of the Fail-Safe Logic Test. The Fail-Safe Logic Test tests whether the system chip switches off the gate actuation of the Booster Master Switch when it detects a missing watchdog trigger. A fault is set if the feedback shows that the valve relay gate is not switched off.	Missing watchdog trigger AND No switched off valve relay gate	= True = True	System voltage	> 6.9 V	0.45 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the valve relay gate actuation is properly switched off via a Serial Peripheral Interface (SPI) command during the Fail-Safe Logic Test. A fault is set if the feedback shows that the valve relay gate is not switched off.	No switch off of the valve relay gate actuation via SPI	= True	System voltage	> 6.9 V	0.45 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the watchdog fault counter of the system integrated circuit. A fault is set if the value of this error counter exceeds a threshold.	Error counter	> 3	System voltage AND	> 6.9 V	Immediately	Type A, 1 Trip
		This monitoring strategy checks if the watchdog trigger is received as expected. An incorrect watchdog trigger signal is sent to the system chip watchdog function, which increments the watchdog error counter. A fault is set if the watchdog fault counter is not incremented.	Incorrect watchdog data sent to chip	= True	System voltage	> 6.9 V	1 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the watchdog trigger is received within a certain time by the system chip. A fault is set if not all watchdog tasks are executed whithin a certain period of time.	Number of watchdog tasks done	< Number of watchdog tasks	System voltage	> 6.9 V	1 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the status of the watchdog. During the initialization test the watchdog status feedback from the system chip is tested against several patterns according to the ongoing sub test. A fault is set if the watchdog status is not as expected.	Watchdog status	≠ expected watchdog status	System voltage	> 6.9 V	1 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the status of the watchdog. After the initialization test has finished, the status of the watchdog is continuously monitored. A fault is set if the watchdog status is not as expected.	Watchdog status	≠ expected watchdog status	System voltage	> 6.9 V	0.05 [Sec]	Type A, 1 Trip
		This monitoring strategy checks for correct NMI handling. The Error Signal Module is the central module at the microcontroller level; it handles severe microcontroller core failures and peripheral failures, and coordinates the logic tests during start-up. A fault is set if the Non-Maskable Interrupt handler detects a failure during initialization tests.	Non-maskable Interrupt is detected	= True	Ignition key	= On	Immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if a severe microcontroller core or peripheral failure has occurred. The Error Signal Module (ESM) is the central module at the microcontroller level; it handles severe microcontroller core and peripheral failures. A fault is set when a severe microcontroller core or peripheral failure is detected.	A microcontroller core failure via Error Signal Module is detected OR Peripheral failure via ESM is detected	= True = True	Ignition key	= On	Immediately	Type A, 1 Trip
		This monitoring strategy checks whether the HET has the proper reference signal frequency. The monitor compares the defined frequency with the actual reference signal frequency, which is calculated by the HET. A fault is set if the difference between the defined frequency and the actual frequency exceeds a threshold.	Absolute(Defined frequency - calculated frequency) / defined frequency	> 0.05	Ignition key	= On	Immediately	Type A, 1 Trip
		This monitoring strategy checks the Serial Peripheral Interface (SPI) functionalities and failures handling of the Application Specific Integrated Circuit (ASIC) used in the system. To do so, the SPI component provides special functions to perform the following tests : - reading from/writing to an undefined address EEPROM (Electronically Erasable Programmable Read-Only Memory) cell - writing to a non-writable EEPROM cell - reading a EEPROM cell with a parity failure during transmission - reading a EEPROM cell with a clock failure during transmission For each of these tests, a certain fault response is expected from the ASIC. A fault is set if at least one fault response is not as expected.	No or wrong error response from ASIC while reading from an undefined address register OR No or wrong error response from ASIC while writing to an undefined address register OR No or wrong error response from ASIC while writing to a non-writable register OR No or wrong error response from ASIC while reading a register with a parity error in frame 1 during transmission OR No or wrong error response from ASIC while reading a register with a parity error in frame 2 during transmission OR No or wrong error response from ASIC while reading a register with a clock failure (less clock pulses) during transmission OR No or wrong error response from ASIC while reading a register with a clock failure (more clock pulses) during transmission	= True = True = True = True = True = True = True	System voltage	> 6.9 V	immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		The monitoring checks the received data by the Application Specific Integrated Circuit (ASIC). The ASIC of the system is connected to the microcontroller via a Serial Peripheral Interface (SPI). A fault is set if not all data has been transmitted or received. Parity check - The ASIC of the system is connected to the microcontroller via a serial Peripheral Interface (SPI). The monitoring checks the received data by the ASIC. A fault is set if the calculated parity does not match the parity bit. Bit check - The ASIC of the system is connected to the microcontroller via a serial Peripheral Interface (SPI). The monitoring checks the received data by the ASIC. A fault is set if at least one bit of the actual transmitted data is not equal to the transmit bit in register. Rationality check - The ASICs of the system is connected to the microcontroller via a serial Peripheral Interface (SPI). When ASIC detects a transmission failure, it sends an error frame via the SPI. The monitoring checks the frames transmitted via the SPI. A fault is set if an error frame is transmitted.	Length of received data OR Calculated parity of the received data OR Time out error OR Acutal transmitted bits OR Clock failure OR Error frame	≠ length of send data ≠ received parity bit = True ≠ bits in register = True = bits in register	Ignition key	= On	0.001 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is a Serial Peripheral Interface (SPI) communication failure. The Application Specific Integrated Circuit (ASIC) of the system is connected to the microcontroller via a SPI. The microcontroller includes hardware monitoring of the ASIC to recognize failures of the necessary input signals. The Monitor reads the results of certain of this hardware monitoring by reading out the ASIC EEPROM (Electronically Erasable Programmable Read-Only Memory) cell via Serial Peripheral Interface. A fault is set if charge-pump failure bit, or clock-input-signal failure bit, or internal-oscillator-circuit failure bit is set.	Charge-pump failure bit is set OR Clock-input-signal failure bit is set OR Internal-oscillator-circuit failure bit is set		Ignition key AND First cyclic transmission to the ASICs occurred	= On = True	0.2 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks the voltage comparators of the Application Specific Integrated Circuit (ASIC). The ASIC has several voltage comparators to monitor the level of different voltage supplies. These comparators are tested at start-up for correct functionality, and the result of the test is stored as a EEPROM (Electronically Erasable Programmable Read-Only Memory) cell value. A fault is set if there is an error flag when the monitor reads the EEPROM cell value.	Error flag is set in a defined register	= True	System voltage	> 6.9 V	Three consecutive ignition cycles	Type A, 1 Trip
		This monitoring strategy checks if there is a Serial Peripheral Interface (SPI) communication failure. The L99H01 Application Specific Integrated Circuit (ASIC) of the system is connected to the microcontroller via a SPI. The microcontroller includes hardware monitoring of the ASIC to recognize failures of the necessary input signals. The Monitor reads the results of certain of this hardware monitoring by reading out the ASIC EEPROM (Electronically Erasable Programmable Read-Only Memory) cell via Serial Peripheral Interface. A fault is set if charge-pump failure bit, or watchdog failure bit, or Thermal failure bit is set.	Charge-pump failure bit is set OR Watchdog failure bit is set OR Thermal failure bit is set	= True = True = True	Ignition key AND First cyclic transmission to the L99H01 ASICs occurred	= On = True	0.005 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is a timeout of the Serial Peripheral Interface (SPI) communication to Application Specific Integrated Circuit (ASIC). The Application Specific Integrated Circuit (ASIC) of the system is connected to the microcontroller via a Serial Peripheral Interface (SPI). The goal is to monitor the duration of the SPI transmission. A fault is set if the SPI transfer to ASIC is not finished within a defined period.	Duration of SPI transfer to ASIC	> 0.005 Sec	Ignition key AND Cyclic Tasks Started	= On = True	0.01 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		The monitoring checks the received data by the Application Specific Integrated Circuit (ASIC). The ASIC of the system is connected to the microcontroller via a Serial Peripheral Interface (SPI). A fault is set if not all data has been transmitted or received. Clock Failure Check - The ASIC of the system is connected to the microcontroller via a serial Peripheral Interface (SPI). The monitoring check for any clock failures. Frame Error Check - The ASICs of the system is connected to the microcontroller via a serial Peripheral Interface (SPI). When ASIC detects a transmission failure, it sends an error frame via the SPI. The monitoring checks the frames transmitted via the SPI. A fault is set if an error frame is transmitted.	Clock failure OR Error frame received	= True ≠ bits in register	Ignition key AND Cyclic Tasks Started	= On = True	0.01 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is a timeout of the Serial Peripheral Interface (SPI) communication to Application Specific Integrated Circuit (ASIC). The Application Specific Integrated Circuit (ASIC) of the system is connected to the microcontroller via a Serial Peripheral Interface (SPI). The goal is to monitor the duration of the SPI transmission. A fault is set if the SPI transfer to ASIC is not finished within a defined period.	Duration of SPI transfer to ASIC	> 0.005 Sec	System voltage AND Cyclic Tasks Started	> 6.9 V = True	0.05 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		The monitoring checks the received data by the Application Specific Integrated Circuit (ASIC). The ASIC of the system is connected to the microcontroller via a Serial Peripheral Interface (SPI). A fault is set if not all data has been transmitted or received. Parity check - The ASIC of the system is connected to the microcontroller via a serial Peripheral Interface (SPI). The monitoring checks the received data by the ASIC. A fault is set if the calculated parity does not match the parity bit. Bit check - The ASIC of the system is connected to the microcontroller via a serial Peripheral Interface (SPI). The monitoring checks the received data by the ASIC. A fault is set if at least one bit of the actual transmitted data is not equal to the transmit bit in register. Rationality check - The ASICs of the system is connected to the microcontroller via a serial Peripheral Interface (SPI). When ASIC detects a transmission failure, it sends an error frame via the SPI. The monitoring checks the frames transmitted via the SPI. A fault is set if an error frame is transmitted.	Length of received data OR Calculated parity of the received data OR Clock failure OR Acutal transmitted bits OR Error frame received	≠ length of send data ≠ received parity bit = True ≠ bits in register ≠ bits in register	Ignition key	= On	0.05 [Sec]	Type A, 1 Trip
		This monitoring strategy checks for exceptions in Operating System. A fault is set if an exception occurs in the Operating System.	OS-exception occurs	= True	Ignition key	= On	Immediately	Type A, 1 Trip
		Detection of software component internal execution errors	Internal software state type	= Invalid	Ignition key	= On	0.01 [Sec]	Type A, 1 Trip
		This monitoring checks the TPSW-PBC function accessibility area into the RAM. A fault is set if the PBC SW variable or function tries to access outside its restricted area.	PBC SW function stays within its restricted aea	= False	Ignition key	= On	0.02 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the Static Random Access Memory (SRAM) and peripheral Random Access Memory (RAM) are initialized or not. The SRAM and peripheral RAM are cleared at power-up. Then This monitoring reads every SRAM and RAM addresses. A fault is set if at least one addresses is not initialized to zero.	At least one RAM or SRAM bit	≠ 0	Ignition key	= On	Immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks for proper pull-up resistor functionality. It monitors whether the motor relay pull-up (MRPU) switch inside the Application Specific Integrated Circuit (ASIC) is working as expected. A fault is set if the MRPU pin status does not match the selected switch state.	Motor relay pull-up pin status not correct	= True	System voltage AND Hydraulic pump motor	> 6.9 V = Off	0.5 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if a wrong hexfile was flashed in the AECU. The purpose of RTP pins is to do measurement of RAM variables. A fault is set if the RTP Enable pin is stuck to a high.	RTP Enable pin stuck to high	= True	Ignition key	= On	Immediately	Type A, 1 Trip
		The System Mode Manager (SMM) asks in parallel with multiple system modes for the individual modules. To do this, it receives requests from different parts of software which are initialized at the beginning and after a while a valid value is given which is not "init" value. A fault is set if after a while one requester is still in init value.	One requester still in init value for time	> 3.6 Sec	Ignition key	= On	3.6 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the microcontroller stack has over or underflowed. During initialization, stack memory cells are set at the beginning and at the end of the stack area: these Stack memory cells are checked periodically. A fault is set if one of these Stack memory cells has been overwritten.	End-stack word overwritten OR Beginning-stack word overwritten	= True = True	Ignition key	= On	0.04 [Sec]	Type A, 1 Trip
		During system start-up, the time required to configure the application software (ASW) is monitored. A fault is set if the configuration lasts longer than a defined amount of time.	ASW configuration time	> 5 Sec	Ignition key	= On	5 [Sec]	Type A, 1 Trip
		This monitoring strategy checks for an unsupported Bootblock and FSW clock configuration in ECU. Within an ECU, the Bootblock allows actualizing the application which is called FSW. A failure is set if the Bootblock and FSW clock settings are different.	Bootblock and FSW clock settings are different	= True	Ignition key	= On	Immediately	Type A, 1 Trip

		This monitoring strategy checks if an internal fault has occurred in the operating system. A fault is set if software interrupts have occurred but:
		- the interrupt is invalid.
		- An interrupt lock release is called without previous lock.
		- not all interrupts are released.
			Software interrupt occurred
			AND
			{
			Invalid interrupt occurred
			OR
			Interrupt lock release is called without previous lock
			OR
			Not all interrupts are released
			OR
			Interrupt lock time
			}
				= True
				
				= True
				
				= True
				
				= True
				
				> 0.001 Sec
					Ignition key	= On	Immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if interrupts are properly running. The error signal module is the central module in the microcontroller level. It handles severe microcontroller core failures or peripheral failures, and coordinates the logic tests during start-up. A fault is set if no or not expected non-maskable interrupt occurs during Init tests.	Failure detected during safety logic startup tests	= True	System voltage	> 6.9 V	Immediately	Type A, 1 Trip
		This monitoring strategy checks if the software is properly configured for the hardware. Software version and device identifiers of the Application Specific Integrated Circuit (ASIC) and of the microcontroller are compared with the software version and identifiers of the configuration software. A fault is set if a least one ID or software version does not match.	Received ID of microcontroller is not identical with the ID stored in the software	= True	Ignition key	= On	0.03 [Sec]	Type A, 1 Trip
		This monitoring checks the valve channels during the freewheeling test. This test consists of splitting up several small pulses to slowly accelerate the pump. The acceleration is slow in order to avoid noise generation. A fault is set if an unused valve channel is detected during the freewheeling test or if the Valve-Driver-ASIC (Application Specific Integrated Circuit) activation channel is defective.	Unused valve channel detected OR Valve-Driver-ASIC activation channel defect	= True = True	Ignition key AND FreeWheeling Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This is a monitoring of the Valve-Driver-ASIC (Application Specific Integrated Circuit) freewheeling path, which slowly accelerates the pump to avoid noise generation. A fault is set if the Valve-Driver-ASIC freewheeling path was activated for a longer time period than the maximum freewheeling time.	Valve-Driver-ASIC freewheeling path was activated for longer time than freewheeling time	> 0.03 Sec	Ignition key AND Valve test	= On = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the valve is activated properly. During an activation of all valves, the feedback gate of the Valve-Driver-ASIC (Application Specific Integrated Circuit) shows valve activation although the Hydraulic Enable of the Valve-Driver-ASIC is low with. A fault is set if the feedback duty on (Gate ON) for maximum valve actuation during testing exceeds a calibrated threshold.	Feedback duty on (Gate ON) for maximum actuation of valve under test	= 100 %	Ignition key	= On	0.005 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is a pulse width modulation (PWM) failure in all 12 valves. A fault is set if the PWM check sequence is not completed during the duration of the Valve Actuation Register Test (VART).	Pulse width modulation check sequence is not completed during the running period of Valve Actuation Register Test	= True	Ignition key AND PWM Monitor OR Valve Actuation Register Test OR Vaulve Drift Check	= On = On = On = On	0.005 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks the Silent Valve Driver Test (SVDT) results. SVDT is a periodic check that is initiated by the software. The test runs automatically at the Application Specific Integrated Circuit (ASIC), and in case of a positive result, feedback is sent to the software via the SPI (Serial Peripheral Interface) bus. A fault is set if successful feedback is not received from the finished Silent Valve Driver Test (VDT) via the SPI-bus.	Feedback of a successful finished Silent Valve Driver Test via SPI-bus not received	= True	Ignition key	= On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the configuration bits of the Valve-Driver-ASIC register are written correctly. A fault is set if the read data of the Application Specific Integrated Circuit (ASIC) configuration bits do not match with the corresponding written data in ASIC.	Configuration of Valve-Driver-ASIC register not correct	= True	Ignition key AND Hydraulic Enable signal high	= On = True	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the result of the built-in self-test (BIST) is correct. The built-in self-test (BIST) is an internal hardware valve driver test triggered by the software. It checks the functionality of both arithmetic logic units (ALU) of the current controller. Both ALUs are triggered by different patterns. A fault is set if the BIST results are not as expected.	Valve driver BIST result from ALU not as expected	= True	Ignition key AND BuidInSelfTest (BIST)	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the serial high end timer transmission between the microcontroller and the valve-driver has failed. A fault is set if a wrong protocol, timing deviation, or lack of data transmission is detected.	SHET protocol wrong OR Timing deviation OR No data transmission	= True = True = True	Ignition key	= On	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the VART (Valve Activation Register Test) detects an error. The internal valve driver activation registers are tested using the VART in order to detect any crosstalk or stuck situations. All the valves are opened and closed sequentially according to a matching test pattern. A valve opening draws a low valve relay current. A fault is set if an open load or under current state is not detected for each valve actuation.	Valve relay voltage / Internal supply voltage OR Valve Current	< 0.33 > 0.1 A	Ignition key	= On	140 [Sec]	Type A, 1 Trip
		This monitoring checks the plausibility of the valve activation state bit. The valve opening draws a low valve relay current. The bit should be set when the valve is off. A fault is set if the bit is set even though the ratio of valve relay output voltage (UVR) to internal supply voltage (UBVR) indicates that the valve is on.	Valve relay voltage / Internal supply voltage AND Valve actuation	> 0.5 = True	Ignition key AND Valve relay supply voltage	= On > 6.9 V	120 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring compares the valve relay output voltage read by the Application Specific Integrated Circuit (ASIC) with the valve relay output voltage read by the Analog to Digital Converter (ADC) in order to check that the valve driver ensures circuit continuity. A fault is set if the difference between the two voltages is above a calibrated threshold	Absolute(measured ASIC voltage - read ADC voltage)	> 0.4 V	Ignition key AND SilentValveDriverTest (SVDT)	= On = On	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if a low ohmic side circuit from the valve voltage (UVR) to the supply voltage (UBVR) occurs during the resistor measurement. During this measurement, the valve relay output voltage should ideally be zero. A fault is set if UVR is higher than a calibrated threshold.	Valve relay output voltage	> 1.26 V	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there are internal and input signal failures of the Application Specific Integrated Circuit (ASIC). The ASIC is connected to the microcontroller by Serial Peripheral Interface (SPI). The monitor reads the results of this hardware monitoring EEPROM (Electronically Erasable Programmable Read-Only Memory) cell using Serial Peripheral Interface. The bits of the EEPROM cell are set by the hardware logic “Voltage-Pre_regulator-Mode”. A fault is set if the voltage-pre-regulator-mode failure bit is set.	Voltage-pre-regulator-mode failure bit is set	= True	Ignition key	= On	0.2 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if wheel speed signals are correct. The Multiplexer IC inside the EBCU (Electronic Brake Control Unit) handles the EBCU internal transmission of the wheel speed sensor signals of all four wheels. To ensure safe EBCU internal transmission these signals are multiplexed and the multiplexed signal is sent on a separate signal path within EBCU. The Multiplexer IC signal check compares the EBCU internal signals with the multiplexed signal. A fault is set if the wheel speed signals and the multiplexed signal are not identical.	Wheel speed signal and multiplexed wheel speed sensor not identical	= True	System voltage AND Wheel speed sensor test completed	> 6.9 V = True	dependent on vehicle speed	Type A, 1 Trip
		This monitoring strategy checks if the current wheel speed sensor configuration is correct via Serial Peripheral Interface (SPI). The system supports different wheel speed sensor configurations. A fault is set if, for a calibrated duration, there is a mismatch between the current wheel speed sensor mode software configuration (stored in a register) and the hardware configuration.	Mismatch between current WSS Mode software configuration stored in a register and the hardware configuration For time	= True > 0.1 Sec	Ignition key AND First cyclic transmission to ASIC	= On = True	0.1 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if there is an hardware defect. The Wheel Speed Sensor (WSS) System Integrated Circuit performs a check of the WSS wirings at System start-up automatically by switching sensor supply lines separately and storing the states of input comparators in a buffer. The buffer content is then evaluated in software. A fault is set if the buffer content shows a physically impossible condition.	Detected wheel speed sensor line condition is physically impossible	= True	System voltage AND Initial wheel speed sensor hardware tests AND Started with Hardware Reset OR Started with Software Reset	> 6.9 V = On = True = True	0.015 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 30sec without braking. Accelerate vehicle to at least 18.6 mph and hold the speed for at least 20s.					
Control Module Long Term Memory Performance	P062F	This monitoring strategy checks if there is enough available space in the EEPROM (Electronically Erasable Programmable Read-Only Memory) to allocate a data field. A fault is set if the size of the data field is bigger than the amount of available space in EEPROM.	Data field size to allocate	> Available Space	System voltage AND Ignition key	> 6.9 V = On	Immediately	Type A, 1 Trip
		This monitoring strategy checks if it is possible to write data in persistent storage. Every write access to non-volatile memory in the EEPROM (Electronically Erasable Programmable Read-Only Memory) is protected by timeout monitoring and data verification after writing. The Persistent Data Manager checks persistent data access in EEPROM. A fault is set if a write operation occurs or if data verification after writing fails	Writing operation AND Read data different from written data	> 0.025 Sec = True	Ignition key	= On	immediately	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Control Module Long Term Memory Reset	P0603	This monitoring checks the write result at the end of the EEPROM write procedure. A fault is set if a cell is invalid which results to a read back error after writing	Read back error	= True	Ignition key	= On		Type A, 1 Trip
		This monitoring strategy checks if the customer identifier is correct. During initialization, the persistent data manager compare the EEPROM (Electronically Erasable Programmable Read-Only Memory) cell value with the expected customer ID. A fault is set if the expected customer ID does not match the stored customer ID.	Stored customer ID	≠ expected customer ID	System voltage AND Ignition key	> 6.9 V = On	Immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the system has not found the enhanced platform software end marker, which is used to help the system find the end of the data. At ignition state, the Persistent Data Manager checks the content of the EEPROM (Electronically Erasable Programmable Read-Only Memory). A fault is set if the enhanced platform software end marker has not been found.	No enhanced platform software end marker in EEPROM	= True	System voltage AND Ignition key	> 6.9 V = On	Immediately	Type A, 1 Trip
		This monitoring strategy checks if the stored data field size is correct. At ignition state, the Persistent Data Manager checks the content of the EEPROM (Electronically Erasable Programmable Read-Only Memory). A fault is set if a data field size in EEPROM does not match the corresponding data item configuration in the software.	Data field size in the EEPROM	≠ data size configuration in software	Ignition key	= On	Immediately	Type A, 1 Trip
		This monitoring strategy checks the reading accessibility of the EEPROM (Electronically Erasable Programmable Read-Only Memory). During initialization, the Persistent Data Manager checks the content of the EEPROM. A fault is set if an access error occurs while reading EEPROM.	Read error occurs OR Not expected Non-Markable Interrupt detected	= True = True	System voltage	> 6.9 V	Immediately	Type A, 1 Trip
		This monitoring strategy checks if the EEPROM (Electronically Erasable Programmable Read-Only Memory) memory is readable. Besides the management of the electronic stability system the Electronic Brake Control Unit (EBCU) performs various functional checks. Initially and periodically, the memory content is checked by calculating a 64-bit CRC (Cyclic Redundancy Check) value and comparing it with the checksum generated during the software build process. This algorithm checks the complete memory content. A fault is set if it is not possible to read back data from EEPROM or if the data read back from EEPROM is not valid.	EEPROM data cannot be read OR EEPROM data not valid	= True = True	Ignition key	= On	Immediately	Type A, 1 Trip
		This monitoring strategy checks if EEPROM (Electronically Erasable Programmable Read-Only Memory) access is possible. The reference resistor is used to calculate the reference current. A fault is set if it is not possible to load the reference resistor value stored in EEPROM. In this case, the EEPROM value is defective or unreadable.	Cannot load the reference resistor value stored in the EEPROM	= True	Ignition key AND Resistor Measurement Test	= On = On	Immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the reference resistor voltage stored in EEPROM (Electronically Erasable Programmable Read-Only Memory) matches the measured resistor voltage. The reference resistor voltage is measured in the factory. A fault is set if the absolute difference between the reference resistor voltage stored in EEPROM and the measured resistor voltage exceeds a calibrated threshold.	Absolute(Reference resistor voltage stored in the EEPROM - Measured resistor voltage)	> 10 %	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitor checks the configuration of the wheel speed sensors after ignition on. The failure is do to a PDM access problem or a wrong value in the wheel speed sensor type. A falure is set if after ignition ON, the configuration of the wheel speed sensor type is not possible.	Wheel speed sensor type configuration possible	= False	Ignition key	= On	immediately	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Control Module Random Access Memory (RAM)	P0604	This monitoring strategy checks the values of a specific RAM area. Furthermore, the address decoder is tested using test patterns to ensure bus integrity. The test writes different patterns at the addresses of this RAM area. Addresses are then read out and a signature for all the readout values is calculated. The original content in RAM is afterwards rewritten. The order of the patterns is chosen so that the signature the multibit and coupling failures can be set during the signature evaluation. A fault is set if a multibit or coupling failure is detected.	Multi-bits failure detected OR Coupling failure detected OR Address decoder test detects an error	= True = True = True	System voltage	> 6.9 V	Immediately	Type A, 1 Trip
		This monitoring strategy checks correct functionality of Random Access Memory (RAM) through a programmable Built In Self Test running in start-up phase.	Memory test fails	= True	Ignition key	= On	Immediately	Type A, 1 Trip
		This monitoring strategy checks if there is a single bit error at RAM. Because of Error Correction Code, RAM single-bit errors are always corrected. A fault is set if the number of bit errors exceeds a threshold.	Number of detected single-bit errors	> 2	Ignition key	= On	Immediately	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Control Module Read Only Memory (ROM)	P0601	This monitoring strategy checks if the CRC (Cyclic Redundancy Check) of Flash EEPROM (Electronically Erasable Programmable Read-Only Memory) is correct. Initially and periodically the complete Flash EEPROM contents are checked by calculating a CRC value and comparing it with the checksum generated during the software build process. A fault is set if a double bit error of Flash EEPROM is detected, or if more than a defined number of single bit errors are detected (otherwise, single bit errors are corrected).	Double bit error detected OR Number of detected single-bit errors	= True > 1	System voltage	> 6.9 V	Immediately, during start-up or respectively after 60 sec for cyclic flash checksum test.	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Ignition Switch - Accessory Position - Circuit Low	P2537	Detects an accessory position circuit open	Accessory .	= False	Propulsion System Active Propulsion System Active Time	= True > 0.5 Sec	0.5 [Sec]	Type B, 2 Trips
Ignition Switch - Circuit High	P2535	Detects if the Run/Crank input circuit is high	Short to Battery	> 5 V	CAN Communication And ECM Run/Crank Active Data	= Enabled = False	2.5 [Sec]	Type A, 1 Trip
Ignition Switch - Circuit Low	P2534	Detects if the Run/Crank input circuit is low	Short to Ground Or Open Condition	< 2 V = True	CAN Communication And ECM Run/Crank Active Data	= Enabled = Active	2.5 [Sec]	Type A, 1 Trip
Internal Control Module A/D Processing Performance	P060B	This monitoring strategy checks the conversion time of the ADC (Analog Digital Converter). The ADC periodically reads an analog signal and converts it into digital values. Before starting a new conversion, the monitor checks that the previous conversion is finished. A fault is set if the previous conversion is not finished for a number of checks.	Number of times that the previous analog to digital conversion is not finished	> 9	Ignition key	= On	0.003 [Sec]	Type A, 1 Trip
		This monitoring strategy checks proper functionality of ADC self-test. To do this, ADC channels are switched to two predefined internal microcontroller resistors to measure defined (voltage) levels (high and low).The absolute differences between the two measurements are calculated in unit digits. A fault will be set if the difference is greater than a threshold.	Absolute(difference between the two ADC measurements)	> 540 digitSec	Ignition key	= On	0.2 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks for correct internal Analog Digital Converter (ADC) functionality by comparing the analog motor voltage read in by the ADC with the digital motor voltage calculated by the Application Specific Integrated Circuit (ASIC) while the hydraulic pump is active. A fault is set if the deviation between the hydraulic pump motor voltage read by the ADC (analog) and the hydraulic pump motor voltage calculated by the ASIC (digital) exceeds a calibrated threshold.	Hydraulic pump motor voltage read by ADC (analog)/hydraulic pump motor voltage calculated by ASIC (digital)	> 0.25	Ignition key AND Hydraulic pump motor	= On = On	0.04 [Sec]	Type A, 1 Trip
		DTC Pass	Drive off, accelerate up to 37.2 mph and maintain this speed for at least 5s					
Left Front Inlet Control	C0010	This monitoring strategy checks if the Valve-Driver-ASIC (Application Specific Integrated Circuit) FreeWheeling component is defective. A fault is set if the valve driver freewheeling cannot be switched on or off or if the trigger state is incorrect.	Freewheeling of valve driver cannot be switched OR Trigger state not correct	= True = True	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the valve actuation corresponds to the expected value. The basic valve monitoring is triggered by the coordinator via the control message. A fault is set if the valve actuation is different from the expected value for a calibrated period of time.	Valve actuation	≠ expected value	Ignition key AND Resistor Measurement Test	= On = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the current through a valve is too high or too low. A fault is set if the valve current is above a calibrated threshold_1 or below a calibrated threshold_2 for a calibrated number of failed tests.	(Current through the valve OR Current through the valve) AND Both for a number of failed tests	> 0.12 A < 0.085 A > 5	Ignition key AND Leakage Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the voltage at the output Qx or at the gate to detect if the Valve-Driver-ASIC (Application Specific Integrated Circuit) output driver is not functioning correctly. All PWM (Pulse Width Modulation) signal positive edges are counted, and the low time duration is measured. The resulting value is read out via SPI (Serial Peripheral Interface). The high and low limits of the real PWM signal, which are set by the outpout driver, are calculated using the measured number of edges and the low time. The calculated high and low limits depend on the activation used. A fault is set if the current activation value is outside the calculated limits.	Measured actuation duty OR Measured actuation duty AND Both for a number of times	< Set Actuation Duty - 20% > Set Actuation Duty + 20% > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.05 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the transistor gates are set properly. Qx is the command sent to the transistor gate which commands the valve motor. The Qx monitor compares the expected value of Qx (the calculated Qx-ON/OFF value which is dependent on the current set valve activation) with the actual value of Qx (Qx-ON/OFF from the valve-related SPI (Serial Peripheral Interface) register) in order to check for correct output driver functionality (gate on/off). A fault is set if the actual Qx value does not match the expected Qx value.	(Measured Gate On Actuation Duty OR Measured Gate Off Actuation Duty) AND For a number of failed tests	< 95 % > 5 % > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the valve-related resistor value is out of range during the resistor measurement. This resistor value is calculated by taking the mean of the voltage through the resistor. A fault is set if the valve resistor value is too high or too low.	Comparison of calculated resistance and measured resistance OR Comparison of calculated resistance and measured resistance AND For a number of times	> 0.2 Of calculated resistance < -0.2 Of calculated resistance > 2	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is a short circuit between valves or a defective coil (due to Valve-Driver-ASIC (Application Specific Integrated Circuit) internal failure such as OpenLoad, UnderCurrent, OverCurrent, OverTemp, PGndLost or DxLost) during the Valve-Driver-ASIC Silent Valve Driver Test (SVDT). A fault is set if the ASIC current or temperature is below a calibrated threshold_1 or above a calibrated threshold_2, or if the High Side Switch Line Loss is below a calibrated threshold, for a calibrated number of failed tests.	(Current at ASIC OR Current at ASIC OR Temperature at ASIC OR Temperature at ASIC OR High Side Switch Line Loss) AND For a number of times	< 0.05 A > 0.14 A < 25 °C > 140 °C < 0.005 A > 2	Ignition key AND Silent Valve Driver Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the internal valve-driver-ASIC (Application Specific Integrated Circuit) register matches the current actuation during the Valve Actuation Register Test (VART). A fault is set if the measured gate actuation duty during the test actuation exceeds a calibrated threshold.	Measured gate actuation during test actuation AND For a number of times	< 0.005 A > 2	Ignition key AND Valve Activation Register Test	= On = On	0.015 [Sec]	Type A, 1 Trip
					See Disabling DTCs	Not Fault Active		
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Left Front Outlet Control	C0011	This monitoring strategy checks if the valve actuation corresponds to the expected value. The basic valve monitoring is triggered by the coordinator via the control message. A fault is set if the valve actuation is different from the expected value for a calibrated period of time.	Valve actuation	≠ expected value	Ignition key AND Resistor Measurement Test	= On = Off	0.03 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the current through a valve is too high or too low. A fault is set if the valve current is above a calibrated threshold_1 or below a calibrated threshold_2 for a calibrated number of failed tests.	(Current through the valve OR Current through the valve) AND Both for a number of failed tests	> 0.12 A < 0.085 A > 5	Ignition key AND Leakage Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the voltage at the output Qx or at the gate to detect if the Valve-Driver-ASIC (Application Specific Integrated Circuit) output driver is not functioning correctly. All PWM (Pulse Width Modulation) signal positive edges are counted, and the low time duration is measured. The resulting value is read out via SPI (Serial Peripheral Interface). The high and low limits of the real PWM signal, which are set by the outpout driver, are calculated using the measured number of edges and the low time. The calculated high and low limits depend on the activation used. A fault is set if the current activation value is outside the calculated limits.	Measured actuation duty OR Measured actuation duty AND Both for a number of times	< Set Actuation Duty - 20% > Set Actuation Duty + 20% > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.05 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the transistor gates are set properly. Qx is the command sent to the transistor gate which commands the valve motor. The Qx monitor compares the expected value of Qx (the calculated Qx-ON/OFF value which is dependent on the current set valve activation) with the actual value of Qx (Qx-ON/OFF from the valve-related SPI (Serial Peripheral Interface) register) in order to check for correct output driver functionality (gate on/off). A fault is set if the actual Qx value does not match the expected Qx value.	(Measured Gate On Actuation Duty OR Measured Gate Off Actuation Duty) AND For a number of failed tests	< 95 % > 5 % > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the valve-related resistor value is out of range during the resistor measurement. This resistor value is calculated by taking the mean of the voltage through the resistor. A fault is set if the valve resistor value is too high or too low.	Comparison of calculated resistance and measured resistance OR Comparison of calculated resistance and measured resistance AND For a number of times	> 0.2 Of calculated resistance < -0.2 Of calculated resistance > 2	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if there is a short circuit between valves or a defective coil (due to Valve-Driver-ASIC (Application Specific Integrated Circuit) internal failure such as OpenLoad, UnderCurrent, OverCurrent, OverTemp, PGndLost or DxLost) during the Valve-Driver-ASIC Silent Valve Driver Test (SVDT). A fault is set if the ASIC current or temperature is below a calibrated threshold_1 or above a calibrated threshold_2, or if the High Side Switch Line Loss is below a calibrated threshold, for a calibrated number of failed tests.	(Current at ASIC OR Current at ASIC OR Temperature at ASIC OR Temperature at ASIC OR High Side Switch Line Loss) AND For a number of times	< 0.05 A > 0.14 A < 25 °C > 140 °C < 0.005 A > 2	Ignition key AND Silent Valve Driver Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the internal valve-driver-ASIC (Application Specific Integrated Circuit) register matches the current actuation during the Valve Actuation Register Test (VART). A fault is set if the measured gate actuation duty during the test actuation exceeds a calibrated threshold.	Measured gate actuation during test actuation AND For a number of times	< 0.005 A > 2	Ignition key AND Valve Activation Register Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Left Front Wheel Speed Sensor Circuit High	C0503	This monitoring strategy checks if there is a shortcut of WSS signal line to the battery.	Voltage of WSS signal line	> 12 V	System voltage AND Wheel speed sensor test completed	> 6.9 V = True	0.12 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Left Front Wheel Speed Sensor Circuit Low	C0502	This monitoring strategy checks for a line failure on the front left wheel speed sensor. In the line monitor, if a failure is detected, ASIC registers are evaluated and the corresponding failures are set. A fault is set if no precise line failure can be determine.	A failure is detected AND Wheel Speed Sensor Current Supply Line Monitoring AND Wheel Speed Sensor Voltage Monitoring AND Wheel Speed Sensor Current Signal Line Monitoring	= True = False = False = False	System voltage AND Wheel speed sensor test completed	> 6.9 V = True	0.12 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is an electrical failure in the wheel speed sensors. The sensor current and the sensor voltage are monitored by a comparator circuit in an ASIC (Application Specific Integrated Circuit). A fault is set if the current at the supply line is below a calibrated threshold.	Sensor current at supply line	< 0.16 A	System voltage AND Wheel speed sensor test completed	> 6.9 V = True	0.12 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Left Front Wheel Speed Sensor Circuit/Open	C0500	This monitoring strategy checks if there is an electrical failure in the wheel speed sensors. The sensor current and the sensor voltage are monitored by a comparator circuit in an ASIC (Application Specific Integrated Circuit). A fault is set if the sensor current at the signal line is below a calibrated threshold.	Sensor current at the signal line	< 0.0038 A	System voltage AND Wheel speed sensor test completed	> 6.9 V = True	0.12 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Left Front Wheel Speed Sensor Incorrect Component Installed	C0555	This monitoring strategy checks if the Wheel Speed Sensor (WSS) is mounted at the correct wheel. Since the WSS signals differ for different WSS sensor types, the EBCU (Electronic Brake Control Unit) is able to recognize incorrect WSS placement by evaluating the signal. The intelligent WSS signal provides additional information (air gap) encoded in bits 0-8. Each detection event is followed by a stop pulse. A fault is set If the stop pulse is missing for a calibrated period of time.	No stop pulse according to wheel speed sensor protocol detected	= True	Wheel speed sensor test completed AND Ignition key	= True = On	3 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Left Front Wheel Speed Sensor Intermittent/Erratic	C0504	This monitoring strategy checks if the High End Timer Transfer Unit (HETTU) buffer has overflowed. The HETTU buffer stores the time stamp of the wheel speed sensor outputs. This buffer has a status which tells whether the buffer can be used or not. A common PIC (Programmable Interrupt Controller) checks if the HETTU buffer is in the overflow state. In this case the buffer cannot be used because more edges occur on the wheel speed sensor channels than the buffer can store. A fault is set if the HETTU buffer is in the overflow state.	HET TU buffer state	= Overflow	Ignition key	= On	0.03 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Left Front Wheel Speed Sensor Range/Performance	C0501	This monitoring strategy checks if there is a defective wheel speed sensor. A fault is set if the speed of one wheel speed sensor is zero and the other wheel speed sensor speeds are above a calibrated threshold. Additionally the vehicle speed has to be above a calibrated threshold.	Speed of 1 wheel AND Speed of 3 wheels	= 0 mph > 0 mph	Ignition key AND Anti-Lock Braking intervention AND Vehicle speed AND System voltage AND Traction Control System Intervention	= On = False > 11.8 mph > 6.9 V = False	Immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the wheel speed sensors is defective. It can be done after standstill, start-up monitoring at low speed, as well as while driving, start-up monitoring at high speed. The main principle of the start-up monitoring is to compare the speed signal from all four wheels to each other. A fault is set if the speed of the monitored wheel is below a calibrated threshold while the speed of the other wheels is above a calibrated threshold.	FR, RL, RR Wheel speed sensor AND FL Wheel speed sensor	> 7.45 mph = 0 mph	Check at low speed: Initial vehicle speed AND Anti-Lock Braking System intervention AND Traction control system intervention OR Check at high speed: Anti-Lock Braking System intervention AND Traction control system intervention	< 1.8 mph = False = False = False = False	Immediately	Type A, 1 Trip
		This monitoring strategy checks if the wheel speed signal is missing due to faulty wheel speed information. A fault is set if the wheel speed signal is missing for a calibrated duration (Δt) and the wheel deceleration is below a calibrated threshold.	No wheel speed signal for a time AND Wheel deceleration	> 0.08 Sec < 300 m/Sec^2	Ignition key AND Anti-Lock Braking intervention AND Vehicle speed AND System voltage AND Traction Control System Intervention AND Hydroplanning detected	= On = False > 26.84 mph > 6.9 V = False = False	0.08 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the wheel speed sensor PWM (Pulse Width Modulation) is functioning correctly. The wheel speed sensor returns a PWM signal with a frequency which is dependent on the vehicle velocity. The vehicle velocity is determined by counting every rising-edge of the signal periodically for a fixed time. A threshold is calculated with the two last rising-edges values to filter a missing edge value due to high deceleration. A fault is set if the number of rising-edges for the next cycle is lower than this calculated threshold. This monitor uses rough road detection to distinguish gaps in the edge cycle signal caused by real faults from those caused by driving on rough roads.	Number of rising-edge per cycle	< Threshold calculated by mean of the two latest edge-cycle	Vehicle speed AND Vehicle speed AND Anti-lock Brake System Interventions AND System voltage AND Ignition key	> 6.21 mph < 37.36 mph = False > 6.9 V = On	Immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks for a discontinuous wheel speed sensor signal, caused for example by impulse wheel vibration. The vibrations induce additional frequencies to the wheel speed sensor signal. The noise monitoring consists of three checks which lead to a noise fault. The first check evaluates the acceleration of each wheel speed sensor. The second check evaluates the amplitude of the noise events. A weighing factor is calculated according to the noise amplitude value. The third check evaluates the number of edges. A fault is set if two implausible high wheel speed accelerations occur within a calibrated duration, if the wheel speed acceleration is above a calibrated threshold, if the accumulation of the weighted noise amplitude is above a calibrated threshold during the actual driving cycle, or if the number of detected edges increases above a calibrated threshold within a calibrated period of time.	Wheel acceleration AND For a calibrated number of counts For time OR Wheel acceleration AND Accumulation of the weighted noise amplitude in current driving cycle OR Number of detected edges increases from To For time	> 9.81 m/Sec^2 = 2 < 1.2 Sec > 500 m/Sec^2 > 4 < 3 > 5 < 0.005 Sec	System voltage AND Ignition key	> 6.9 V = On	20 [Sec]	Type A, 1 Trip
		This monitoring strategy checks each wheel speed sensor signal for implausibly high wheel speed values. A fault is set if the wheel speed signal value is above a calibrated threshold for a calibrated duration.	Measured wheel speed For time	> 183.9 mph > 5.04 Sec	System voltage AND Ignition key	> 6.9 V = On	5.04 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the difference between the wheel speed sensor signals is within a range. A fault is set if the difference in wheel speed between a single wheel speed sensor and all other wheel speed sensors is above a calibrated threshold. If the vehicle speed is below a calibrated value, the malfunction threshold is a fixed value. If the vehicle speed is above this calibrated value, the malfunction threshold is proportional to the actual vehicle speed.	Difference between maximum and minimum wheel speed for vehicle speed OR Difference between maximum and minimum wheel speed for vehicle speed	> 3.7 mph < 12.4 mph > 6 % > 12.4 mph	Ignition key	= On	72 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the Wheel Speed Sensor (WSS) is mounted properly. This monitor continuously evaluates continuously the distance between the impulse wheel and the WSS. The WSS evaluates the magnetic flux density to detect an air gap failure. A fault is set if the air gap is too large which is indicated by a magnetic flux density below a calibrated threshold for a calibrated number of wheel rotations.	Magnetic flux density AND for a number of wheel rotations	< 0.0022 T > 5	Ignition key AND Wheel speed sensor test completed	= On = True	0.1 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		The monitoring checks if the stop pulse from each wheel speed sensor (WSS) is detected. The intelligent WSS signal provides additional information (air gap) encoded in bits 0-8. Each detection event is followed by a stop pulse. A fault is set if the Application Specific Integrated Circuit (ASIC) does not detect a stop pulse after some time and if there is no level change on the wheel speed sensor signal for some time.	No stop pulse detected For time OR No level change on signal For time	= True > 0.15 Sec = True > 3.5 Sec	Vehicle speed AND For time AND Wheel speed sensor test completed	< 1.12 mph > 10 Sec = True	3.5 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the supply voltage of the corresponding wheel speed sensor. Each wheel speed sensor is switched on separately. A fault is set if the sensor supply voltage is below a calibrated threshold during the initial phase.	Sensor supply voltage of the respective wheel speed sensor	< 11 V	Ignition key AND System voltage AND	= On > 6.9 V	0.035 [Sec]	Type A, 1 Trip
		DTC Pass	Accelerate vehicle to at least 37.3 mph and hold the speed for at least 7s					
Left Rear Brake Pressure Sensor Circuit High Voltage	C0576	This monitoring strategy checks if there is a short circuit to the supply voltage in the pressure sensor line. To do this, it compares the signal line voltage with the supply voltage. The signal line maximum voltage should be lower than the supply voltage. A fault is set if there is no difference in voltage between the signal line and the supply line.	Signal line voltage	> 3.3 V	Ignition key	= On	0.1 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Left Rear Brake Pressure Sensor Circuit Low Voltage	C0575	This monitoring strategy checks if there is a short circuit to ground in the pressure sensor line. To do this, it compares the signal line voltage with the ground voltage. The signal line minimum voltage should be higher than the ground voltage. A fault is set if there is no difference in voltage between the signal line and the ground.	Signal line voltage	< 0.3 V	Ignition key	= On	0.1 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Left Rear Brake Pressure Sensor Circuit Performance	C0578	This monitoring strategy checks if the offset compensation of the pressure sensor is out of range. The zero-point of the pressure sensor signal is adjusted to compensate for any signal drifts. The offset compensation is only performed when the brake pedal is not applied (corresponding to the pressure sensor zero point). A fault is set if the offset is outside a calibrated range.	Measured pressure OR Measured pressure	> 1500 KPa < -1500 KPa	System voltage AND Brake pedal is pushed AND Acceleration pedal is pushed AND Vehicle speed	> 6.9 V = False = True > 4.47 mph	Immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		DTC Pass	Drive off, accelerate up to 37.2 mph and maintain this speed for at least 5s					
Left Rear Inlet Control	C0018	This monitoring strategy checks if the Valve-Driver-ASIC (Application Specific Integrated Circuit) FreeWheeling component is defective. A fault is set if the valve driver freewheeling cannot be switched on or off or if the trigger state is incorrect.	Freewheeling of valve driver cannot be switched OR Trigger state not correct	= True = True	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the valve actuation corresponds to the expected value. The basic valve monitoring is triggered by the coordinator via the control message. A fault is set if the valve actuation is different from the expected value for a calibrated period of time.	Valve actuation	≠ expected value	Ignition key AND Resistor Measurement Test	= On = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the current through a valve is too high or too low. A fault is set if the valve current is above a calibrated threshold_1 or below a calibrated threshold_2 for a calibrated number of failed tests.	(Current through the valve OR Current through the valve) AND Both for a number of failed tests	> 0.12 A < 0.085 A > 5	Ignition key AND Leakage Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the voltage at the output Qx or at the gate to detect if the Valve-Driver-ASIC (Application Specific Integrated Circuit) output driver is not functioning correctly. All PWM (Pulse Width Modulation) signal positive edges are counted, and the low time duration is measured. The resulting value is read out via SPI (Serial Peripheral Interface). The high and low limits of the real PWM signal, which are set by the outpout driver, are calculated using the measured number of edges and the low time. The calculated high and low limits depend on the activation used. A fault is set if the current activation value is outside the calculated limits.	Measured actuation duty OR Measured actuation duty AND Both for a number of times	< Set Actuation Duty - 20% > Set Actuation Duty + 20% > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.05 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the transistor gates are set properly. Qx is the command sent to the transistor gate which commands the valve motor. The Qx monitor compares the expected value of Qx (the calculated Qx-ON/OFF value which is dependent on the current set valve activation) with the actual value of Qx (Qx-ON/OFF from the valve-related SPI (Serial Peripheral Interface) register) in order to check for correct output driver functionality (gate on/off). A fault is set if the actual Qx value does not match the expected Qx value.	(Measured Gate On Actuation Duty OR Measured Gate Off Actuation Duty) AND For a number of failed tests	< 95 % > 5 % > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.03 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the valve-related resistor value is out of range during the resistor measurement. This resistor value is calculated by taking the mean of the voltage through the resistor. A fault is set if the valve resistor value is too high or too low.	Comparison of calculated resistance and measured resistance OR Comparison of calculated resistance and measured resistance AND For a number of times	> 0.2 Of calculated resistance < -0.2 Of calculated resistance > 2	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is a short circuit between valves or a defective coil (due to Valve-Driver-ASIC (Application Specific Integrated Circuit) internal failure such as OpenLoad, UnderCurrent, OverCurrent, OverTemp, PGndLost or DxLost) during the Valve-Driver-ASIC Silent Valve Driver Test (SVDT). A fault is set if the ASIC current or temperature is below a calibrated threshold_1 or above a calibrated threshold_2, or if the High Side Switch Line Loss is below a calibrated threshold, for a calibrated number of failed tests.	(Current at ASIC OR Current at ASIC OR Temperature at ASIC OR Temperature at ASIC OR High Side Switch Line Loss) AND For a number of times	< 0.05 A > 0.14 A < 25 °C > 140 °C < 0.005 A > 2	Ignition key AND Silent Valve Driver Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the internal valve-driver-ASIC (Application Specific Integrated Circuit) register matches the current actuation during the Valve Actuation Register Test (VART). A fault is set if the measured gate actuation duty during the test actuation exceeds a calibrated threshold.	Measured gate actuation during test actuation AND For a number of times	< 0.005 A > 2	Ignition key AND Valve Activation Register Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Left Rear Outlet Control	C0019	This monitoring strategy checks if the valve actuation corresponds to the expected value. The basic valve monitoring is triggered by the coordinator via the control message. A fault is set if the valve actuation is different from the expected value for a calibrated period of time.	Valve actuation	≠ expected value	Ignition key AND Resistor Measurement Test	= On = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the current through a valve is too high or too low. A fault is set if the valve current is above a calibrated threshold_1 or below a calibrated threshold_2 for a calibrated number of failed tests.	(Current through the valve OR Current through the valve) AND Both for a number of failed tests	> 0.12 A < 0.085 A > 5	Ignition key AND Leakage Test	= On = On	0.015 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks the voltage at the output Qx or at the gate to detect if the Valve-Driver-ASIC (Application Specific Integrated Circuit) output driver is not functioning correctly. All PWM (Pulse Width Modulation) signal positive edges are counted, and the low time duration is measured. The resulting value is read out via SPI (Serial Peripheral Interface). The high and low limits of the real PWM signal, which are set by the outpout driver, are calculated using the measured number of edges and the low time. The calculated high and low limits depend on the activation used. A fault is set if the current activation value is outside the calculated limits.	Measured actuation duty OR Measured actuation duty AND Both for a number of times	< Set Actuation Duty - 20% > Set Actuation Duty + 20% > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.05 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the transistor gates are set properly. Qx is the command sent to the transistor gate which commands the valve motor. The Qx monitor compares the expected value of Qx (the calculated Qx-ON/OFF value which is dependent on the current set valve activation) with the actual value of Qx (Qx-ON/OFF from the valve-related SPI (Serial Peripheral Interface) register) in order to check for correct output driver functionality (gate on/off). A fault is set if the actual Qx value does not match the expected Qx value.	(Measured Gate On Actuation Duty OR Measured Gate Off Actuation Duty) AND For a number of failed tests	< 95 % > 5 % > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the valve-related resistor value is out of range during the resistor measurement. This resistor value is calculated by taking the mean of the voltage through the resistor. A fault is set if the valve resistor value is too high or too low.	Comparison of calculated resistance and measured resistance OR Comparison of calculated resistance and measured resistance AND For a number of times	> 0.2 Of calculated resistance < -0.2 Of calculated resistance > 2	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is a short circuit between valves or a defective coil (due to Valve-Driver-ASIC (Application Specific Integrated Circuit) internal failure such as OpenLoad, UnderCurrent, OverCurrent, OverTemp, PGndLost or DxLost) during the Valve-Driver-ASIC Silent Valve Driver Test (SVDT). A fault is set if the ASIC current or temperature is below a calibrated threshold_1 or above a calibrated threshold_2, or if the High Side Switch Line Loss is below a calibrated threshold, for a calibrated number of failed tests.	(Current at ASIC OR Current at ASIC OR Temperature at ASIC OR Temperature at ASIC OR High Side Switch Line Loss) AND For a number of times	< 0.05 A > 0.14 A < 25 °C > 140 °C < 0.005 A > 2	Ignition key AND Silent Valve Driver Test	= On = On	0.015 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the internal valve-driver-ASIC (Application Specific Integrated Circuit) register matches the current actuation during the Valve Actuation Register Test (VART). A fault is set if the measured gate actuation duty during the test actuation exceeds a calibrated threshold.	Measured gate actuation during test actuation AND For a number of times	< 0.005 A > 2	Ignition key AND Valve Activation Register Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Left Rear Wheel Speed Sensor Circuit High	C050F	This monitoring strategy checks if there is a shortcut of WSS signal line to the battery.	Voltage of WSS signal line	> 12 V	System voltage AND Wheel speed sensor test completed	> 6.9 V = True	0.12 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Left Rear Wheel Speed Sensor Circuit Low	C050E	This monitoring strategy checks for a line failure on the rear left wheel speed sensor. In the line monitor, if a failure is detected, ASIC registers are evaluated and the corresponding failures are set. A fault is set if no precise line failure can be determine.	A failure is detected AND Wheel Speed Sensor Current Supply Line Monitoring AND Wheel Speed Sensor Voltage Monitoring AND Wheel Speed Sensor Current Signal Line Monitoring	= True = False = False = False	System voltage AND Wheel speed sensor test completed	> 6.9 V = True	0.12 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is an electrical failure in the wheel speed sensors. The sensor current and the sensor voltage are monitored by a comparator circuit in an ASIC (Application Specific Integrated Circuit). A fault is set if the current at the supply line is below a calibrated threshold.	Sensor current at supply line	< 0.16 A	System voltage AND Wheel speed sensor test completed	> 6.9 V = True	0.12 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Left Rear Wheel Speed Sensor Circuit/Open	C050C	This monitoring strategy checks if there is an electrical failure in the wheel speed sensors. The sensor current and the sensor voltage are monitored by a comparator circuit in an ASIC (Application Specific Integrated Circuit). A fault is set if the sensor current at the signal line is below a calibrated threshold.	Sensor current at the signal line	< 0.0038 A	System voltage AND Wheel speed sensor test completed	> 6.9 V = True	0.12 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Left Rear Wheel Speed Sensor Incorrect Component Installed	C0557	This monitoring strategy checks if the Wheel Speed Sensor (WSS) is mounted at the correct wheel. Since the WSS signals differ for different WSS sensor types, the EBCU (Electronic Brake Control Unit) is able to recognize incorrect WSS placement by evaluating the signal. The intelligent WSS signal provides additional information (air gap) encoded in bits 0-8. Each detection event is followed by a stop pulse. A fault is set If the stop pulse is missing for a calibrated period of time.	No stop pulse according to wheel speed sensor protocol detected	= True	Wheel speed sensor test completed AND Ignition key	= True = On	3 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Left Rear Wheel Speed Sensor Intermittent/Erratic	C0510	This monitoring strategy checks if the High End Timer Transfer Unit (HETTU) buffer has overflowed. The HETTU buffer stores the time stamp of the wheel speed sensor outputs. This buffer has a status which tells whether the buffer can be used or not. A common PIC (Programmable Interrupt Controller) checks if the HETTU buffer is in the overflow state. In this case the buffer cannot be used because more edges occur on the wheel speed sensor channels than the buffer can store. A fault is set if the HETTU buffer is in the overflow state.	HET TU buffer state	= Overflow	Ignition key	= On	0.03 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Left Rear Wheel Speed Sensor Range/Performance	C050D	This monitoring strategy checks if there is a defective wheel speed sensor. A fault is set if the speed of one wheel speed sensor is zero and the other wheel speed sensor values are above a calibrated threshold. Additionally the vehicle speed has to be above a calibrated threshold.	Speed of 1 wheel AND Speed of 3 wheels	= 0 mph > 0 mph	Ignition key AND Anti-Lock Braking intervention AND Vehicle speed AND System voltage AND Traction Control System Intervention	= On = False > 11.8 mph > 6.9 V = False	Immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the wheel speed sensors is defective. It can be done after standstill, start-up monitoring at low speed, as well as while driving, start-up monitoring at high speed. The main principle of the start-up monitoring is to compare the speed signal from all four wheels to each other. A fault is set if the speed of the monitored wheel is below a calibrated threshold while the speed of the other wheels is above a calibrated threshold.	FR, FL, RR Wheel speed sensor AND RL Wheel speed sensor	> 7.45 mph = 0 mph	Check at low speed: Initial vehicle speed AND Anti-Lock Braking System intervention AND Traction control system intervention OR Check at high speed: Anti-Lock Braking System intervention AND Traction control system intervention	 < 1.8 mph = False = False = False = False	Immediately	Type A, 1 Trip
		This monitoring strategy checks if the wheel speed signal is missing due to faulty wheel speed information. A fault is set if the wheel speed signal is missing for a calibrated duration (Δt) and the wheel deceleration is below a calibrated threshold.	No wheel speed signal for a time AND Wheel deceleration	> 0.08 Sec < 300 m/Sec^2	Ignition key AND Anti-Lock Braking intervention AND Vehicle speed AND System voltage AND Traction Control System Intervention AND Hydroplanning detected	= On = False > 26.84 mph > 6.9 V = False = False	0.08 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the wheel speed sensor PWM (Pulse Width Modulation) is functioning correctly. The wheel speed sensor returns a PWM signal with a frequency which is dependent on the vehicle velocity. The vehicle velocity is determined by counting every rising-edge of the signal periodically for a fixed time. A threshold is calculated with the two last rising-edges values to filter a missing edge value due to high deceleration. A fault is set if the number of rising-edges for the next cycle is lower than this calculated threshold. This monitor uses rough road detection to distinguish gaps in the edge cycle signal caused by real faults from those caused by driving on rough roads.	Number of rising-edge per cycle	< Threshold calculated by mean of the two latest edge-cycle	Vehicle speed AND Vehicle speed AND Anti-lock Brake System Interventions AND System voltage AND Ignition key	> 6.21 mph < 37.36 mph = False > 6.9 V = On	Immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks for a discontinuous wheel speed sensor signal, caused for example by impulse wheel vibration. The vibrations induce additional frequencies to the wheel speed sensor signal. The noise monitoring consists of three checks which lead to a noise fault. The first check evaluates the acceleration of each wheel speed sensor. The second check evaluates the amplitude of the noise events. A weighing factor is calculated according to the noise amplitude value. The third check evaluates the number of edges. A fault is set if two implausible high wheel speed accelerations occur within a calibrated duration, if the wheel speed acceleration is above a calibrated threshold, if the accumulation of the weighted noise amplitude is above a calibrated threshold during the actual driving cycle, or if the number of detected edges increases above a calibrated threshold within a calibrated period of time.	Wheel acceleration AND For a calibrated number of counts For time OR Wheel acceleration AND Accumulation of the weighted noise amplitude in current driving cycle OR Number of detected edges increases from To For time	> 9.81 m/Sec^2 = 2 < 1.2 Sec > 500 m/Sec^2 > 4 < 3 > 5 < 0.005 Sec	System voltage AND Ignition key	> 6.9 V = On	20 [Sec]	Type A, 1 Trip
		This monitoring strategy checks each wheel speed sensor signal for implausibly high wheel speed values. A fault is set if the wheel speed signal value is above a calibrated threshold for a calibrated duration.	Measured wheel speed For time	> 183.9 mph > 5.04 Sec	System voltage AND Ignition key	> 6.9 V = On	5.04 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the difference between the wheel speed sensor signals is within a range. A fault is set if the difference in wheel speed between a single wheel speed sensor and all other wheel speed sensors is above a calibrated threshold. If the vehicle speed is below a calibrated value, the malfunction threshold is a fixed value. If the vehicle speed is above this calibrated value, the malfunction threshold is proportional to the actual vehicle speed.	Difference between maximum and minimum wheel speed for vehicle speed OR Difference between maximum and minimum wheel speed for vehicle speed	> 3.7 mph < 12.4 mph > 6 % > 12.4 mph	Ignition key	= On	72 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the Wheel Speed Sensor (WSS) is mounted properly. This monitor continuously evaluates continuously the distance between the impulse wheel and the WSS. The WSS evaluates the magnetic flux density to detect an air gap failure. A fault is set if the air gap is too large which is indicated by a magnetic flux density below a calibrated threshold for a calibrated number of wheel rotations.	Magnetic flux density AND for a number of wheel rotations	< 0.0022 T > 4	Ignition key AND Wheel speed sensor test completed	= On = True	0.1 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		The monitoring checks if the stop pulse from each wheel speed sensor (WSS) is detected. The intelligent WSS signal provides additional information (air gap) encoded in bits 0-8. Each detection event is followed by a stop pulse. A fault is set if the Application Specific Integrated Circuit (ASIC) does not detect a stop pulse after some time and if there is no level change on the wheel speed sensor signal for some time.	No stop pulse detected For time OR No level change on signal For time	= True > 0.15 Sec = True > 3.5 Sec	Vehicle speed AND For time AND Wheel speed sensor test completed	< 1.12 mph > 10 Sec = True	3.5 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the supply voltage of the corresponding wheel speed sensor. Each wheel speed sensor is switched on separately. A fault is set if the sensor supply voltage is below a calibrated threshold during the initial phase.	Sensor supply voltage of the respective wheel speed sensor	< 11 V	Ignition key AND System voltage AND	= On > 6.9 V	0.035 [Sec]	Type A, 1 Trip
		DTC Pass	Accelerate vehicle to at least 37.3 mph and hold the speed for at least 7s					
Lost Communication with Brake System Control Module B on Chassis Expansion Bus	U179D	This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x214 not received on Bus E	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.1 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x219 not received on Bus E	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.1 [Sec]	Type A, 1 Trip
		DTC Pass	After receving all monitored messages from the superised source					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Lost Communication with Engine Control Module	U0100	This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x1C5 not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.5 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x1F4 not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.25 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0xC9 not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.25 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x4C1 not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	1.25 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x3D3 not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.25 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x1C3 not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.25 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x2C3 not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.25 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x4F1 not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	2.5 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x1C4 not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.25 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x3E9 not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	5 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0xAA not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.25 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0xBE not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.25 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x1A3 not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	5 [Sec]	Type A, 1 Trip
		DTC Pass	After receving all monitored messages from the superised source					
Lost Communication with Transmission Control Module	U0101	This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x1F5 not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.25 [Sec]	Type A, 1 Trip
		DTC Pass	After receving all monitored messages from the superised source					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Lost Communication with Hybrid Powertrain Control Module	U0293	This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0xD3 not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.25 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x1DF not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.5 [Sec]	Type A, 1 Trip
		DTC Pass	After receving all monitored messages from the superised source					
Lost Communication with Hybrid Powertrain Control Module B	U179A	This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x236 not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.5 [Sec]	Type B, 2 Trips
		DTC Pass	After receving all monitored messages from the superised source					
Lost Communication with Hybrid Powertrain Control Module on Chassis Expansion CAN Bus	U18B5	This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x230 not received on Bus E	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.25 [Sec]	Type B, 2 Trips
		DTC Pass	After receving all monitored messages from the superised source					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Powertrain Control Module Indicated Requested Torque	C10EA	This monitoring strategy checks if the electric power train response(actual regenerative brake torque) does not correspond to the target regenerative brake torque, or if the signal transmission from the power train ECU (Electronic Control Unit) to the brake system ECU failed. A Fault is set if the electic power train has applied regenetive braking without the request of the brake system ECU.	(Actual regenerative brake torque signal value - Target regenerative brake torque)	> 700 Nm	Full system mode AND Regenerative braking OR Unintended regenerative braking was executed	= On = On = True	0.8 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the electric power train response(actual regenerative brake torque) does not correspond to the target regenerative brake torque, or if the signal transmission from the power train ECU (Electronic Control Unit) to the brake system ECU failed. In case of a braking situation, the ECU calculates the proportion of regenerative brake torque to non-regenerative brake torque. Then the regenerative brake torque must reach the regenerative brake torque request from the ECU. A fault is set if the actual regenerative brake torque provided by the electric power train ECU deviates by more than a certain amount from the target regenerative brake torque requested by the brake system.	(Actual regenerative brake torque signal value - Target regenerative brake torque)	> 700 Nm	Full system mode AND Regenerative braking is being requested OR Response of electicpowertrain does not match request	= On = True = True	0.8 [Sec]	Type A, 1 Trip
		DTC Pass	Turn on ignition. 1. Accelerate moderate to 24.8 mph and Brake to standstill with low decelerataion (brake time about 15sec), 2. Accelerate moderate to 24.8 mph and Brake to standstill with middle decelerataion (brake time about 7.5sec), 3. Accelerate moderate to 24.8 mph and Brake to standstill with low decelerataion (brake time about 15sec), 4. Accelerate moderate to 24.8 mph and Brake to standstill with middle decelerataion (brake time about 7.5sec)					
Pump Motor Relay Circuit High	C106B	This monitoring strategy checks if the hydraulic pump has an electrical fault. When the pump is not running. The monitor checks the voltage difference between MRD and MRS voltage and the current across the motor while the pump is activated, A fault is set if the voltage is greater than a calibrated threshold.	During motor actuation. Absolute (Hydraulic pump motor relay drain voltage - hydraulic pump motor relay source voltage)	 > 2 V	Ignition key AND Hydraulic pump motor AND System voltage	= On = On > 6.9 V	0.06 [Sec]	Type A, 1 Trip
		DTC Pass	Drive off, accelerate up to 37.2 mph and maintain this speed for at least 5s					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Pump Motor Relay Circuit Low	C106A	This monitoring strategy checks if there is an overload situation on the motor relay during actuation. A fault is set if the hydraulic pump motor relay cannot be switched-through completely. This happens when the voltage between the Motor Relay Drain (MRD) and the Motor Relay Source (MRS) is greater than a calibrated threshold.	During motor actuation. Absolute (Hydraulic pump motor relay drain voltage - hydraulic pump motor relay source voltage)	> 0.5 V	Ignition key AND Hydraulic pump motor AND System voltage	= On = On > 6.9 V	0.06 [Sec]	Type A, 1 Trip
		DTC Pass	Drive off, accelerate up to 37.2 mph and maintain this speed for at least 5s					
Regenerative Braking Axle Torque Achieved Message Counter Incorrect	C1287	This monitoring strategy checks whether the message is still alive or not. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). With each newly sent message a counter is incremented within the sending ECU. the counter value is enclosed within the message. The receiving control unit checks whether counters have been incremented. A fault is set if the counter value is not incremented.	Message 0x230 on Bus E counter halted	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.25 [Sec]	Type B, 2 Trips
		This monitoring strategy checks if the message checksum is correct. The network driver sends and receives all network messages. It also checks if the messages are correct (length, checksum, alive-counter, reception timeout). With each newly sent message a checksum is calculated within the sending ECU. The value of the checksum is enclosed within the message. The receiving control unit calculates the checksum again and compares it with the sent one. A fault is set if the received checksum is different from the calculated checksum.	Checksum of 0x230 on Bus E not correct	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.25 [Sec]	Type B, 2 Trips
Right Front Inlet Control	C0014	This monitoring strategy checks if the Valve-Driver-ASIC (Application Specific Integrated Circuit) FreeWheeling component is defective. A fault is set if the valve driver freewheeling cannot be switched on or off or if the trigger state is incorrect.	Freewheeling of valve driver cannot be switched OR Trigger state not correct	= True = True	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the valve actuation corresponds to the expected value. The basic valve monitoring is triggered by the coordinator via the control message. A fault is set if the valve actuation is different from the expected value for a calibrated period of time.	Valve actuation	≠ expected value	Ignition key AND Resistor Measurement Test	= On = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the current through a valve is too high or too low. A fault is set if the valve current is above a calibrated threshold_1 or below a calibrated threshold_2 for a calibrated number of failed tests.	(Current through the valve OR Current through the valve) AND Both for a number of failed tests	> 0.12 A < 0.085 A > 5	Ignition key AND Leakage Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the voltage at the output Qx or at the gate to detect if the Valve-Driver-ASIC (Application Specific Integrated Circuit) output driver is not functioning correctly. All PWM (Pulse Width Modulation) signal positive edges are counted, and the low time duration is measured. The resulting value is read out via SPI (Serial Peripheral Interface). The high and low limits of the real PWM signal, which are set by the outpout driver, are calculated using the measured number of edges and the low time. The calculated high and low limits depend on the activation used. A fault is set if the current activation value is outside the calculated limits.	Measured actuation duty OR Measured actuation duty AND Both for a number of times	< Set Actuation Duty - 20% > Set Actuation Duty + 20% > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.05 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the transistor gates are set properly. Qx is the command sent to the transistor gate which commands the valve motor. The Qx monitor compares the expected value of Qx (the calculated Qx-ON/OFF value which is dependent on the current set valve activation) with the actual value of Qx (Qx-ON/OFF from the valve-related SPI (Serial Peripheral Interface) register) in order to check for correct output driver functionality (gate on/off). A fault is set if the actual Qx value does not match the expected Qx value.	(Measured Gate On Actuation Duty OR Measured Gate Off Actuation Duty) AND For a number of failed tests	< 95 % > 5 % > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the valve-related resistor value is out of range during the resistor measurement. This resistor value is calculated by taking the mean of the voltage through the resistor. A fault is set if the valve resistor value is too high or too low.	Comparison of calculated resistance and measured resistance OR Comparison of calculated resistance and measured resistance AND For a number of times	> 0.2 Of calculated resistance < -0.2 Of calculated resistance > 2	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if there is a short circuit between valves or a defective coil (due to Valve-Driver-ASIC (Application Specific Integrated Circuit) internal failure such as OpenLoad, UnderCurrent, OverCurrent, OverTemp, PGndLost or DxLost) during the Valve-Driver-ASIC Silent Valve Driver Test (SVDT). A fault is set if the ASIC current or temperature is below a calibrated threshold_1 or above a calibrated threshold_2, or if the High Side Switch Line Loss is below a calibrated threshold, for a calibrated number of failed tests.	(Current at ASIC OR Current at ASIC OR Temperature at ASIC OR Temperature at ASIC OR High Side Switch Line Loss) AND For a number of times	< 0.05 A > 0.14 A < 25 °C > 140 °C < 0.005 A > 2	Ignition key AND Silent Valve Driver Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the internal valve-driver-ASIC (Application Specific Integrated Circuit) register matches the current actuation during the Valve Actuation Register Test (VART). A fault is set if the measured gate actuation duty during the test actuation exceeds a calibrated threshold.	Measured gate actuation during test actuation AND For a number of times	< 0.005 A > 2	Ignition key AND Valve Activation Register Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Right Front Outlet Control	C0015	This monitoring strategy checks if the valve actuation corresponds to the expected value. The basic valve monitoring is triggered by the coordinator via the control message. A fault is set if the valve actuation is different from the expected value for a calibrated period of time.	Valve actuation	≠ expected value	Ignition key AND Resistor Measurement Test	= On = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the current through a valve is too high or too low. A fault is set if the valve current is above a calibrated threshold_1 or below a calibrated threshold_2 for a calibrated number of failed tests.	(Current through the valve OR Current through the valve) AND Both for a number of failed tests	> 0.12 A < 0.085 A > 5	Ignition key AND Leakage Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the voltage at the output Qx or at the gate to detect if the Valve-Driver-ASIC (Application Specific Integrated Circuit) output driver is not functioning correctly. All PWM (Pulse Width Modulation) signal positive edges are counted, and the low time duration is measured. The resulting value is read out via SPI (Serial Peripheral Interface). The high and low limits of the real PWM signal, which are set by the outpout driver, are calculated using the measured number of edges and the low time. The calculated high and low limits depend on the activation used. A fault is set if the current activation value is outside the calculated limits.	Measured actuation duty OR Measured actuation duty AND Both for a number of times	< Set Actuation Duty - 20% > Set Actuation Duty + 20% > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.05 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the transistor gates are set properly. Qx is the command sent to the transistor gate which commands the valve motor. The Qx monitor compares the expected value of Qx (the calculated Qx-ON/OFF value which is dependent on the current set valve activation) with the actual value of Qx (Qx-ON/OFF from the valve-related SPI (Serial Peripheral Interface) register) in order to check for correct output driver functionality (gate on/off). A fault is set if the actual Qx value does not match the expected Qx value.	(Measured Gate On Actuation Duty OR Measured Gate Off Actuation Duty) AND For a number of failed tests	< 95 % > 5 % > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the valve-related resistor value is out of range during the resistor measurement. This resistor value is calculated by taking the mean of the voltage through the resistor. A fault is set if the valve resistor value is too high or too low.	Comparison of calculated resistance and measured resistance OR Comparison of calculated resistance and measured resistance AND For a number of times	> 0.2 Of calculated resistance < -0.2 Of calculated resistance > 2	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is a short circuit between valves or a defective coil (due to Valve-Driver-ASIC (Application Specific Integrated Circuit) internal failure such as OpenLoad, UnderCurrent, OverCurrent, OverTemp, PGndLost or DxLost) during the Valve-Driver-ASIC Silent Valve Driver Test (SVDT). A fault is set if the ASIC current or temperature is below a calibrated threshold_1 or above a calibrated threshold_2, or if the High Side Switch Line Loss is below a calibrated threshold, for a calibrated number of failed tests.	(Current at ASIC OR Current at ASIC OR Temperature at ASIC OR Temperature at ASIC OR High Side Switch Line Loss) AND For a number of times	< 0.05 A > 0.14 A < 25 °C > 140 °C < 0.005 A > 2	Ignition key AND Silent Valve Driver Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the internal valve-driver-ASIC (Application Specific Integrated Circuit) register matches the current actuation during the Valve Actuation Register Test (VART). A fault is set if the measured gate actuation duty during the test actuation exceeds a calibrated threshold.	Measured gate actuation during test actuation AND For a number of times	< 0.005 A > 2	Ignition key AND Valve Activation Register Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Right Front Wheel Speed Sensor Circuit High	C0509	This monitoring strategy checks if there is a shortcut of WSS signal line to the battery.	Voltage of WSS signal line	> 12 V	System voltage AND Wheel speed sensor test completed	> 6.9 V = True	0.12 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Right Front Wheel Speed Sensor Circuit Low	C0508	This monitoring strategy checks for a line failure on the front right wheel speed sensor. In the line monitor, if a failure is detected, ASIC registers are evaluated and the corresponding failures are set. A fault is set if no precise line failure can be determine.	A failure is detected AND Wheel Speed Sensor Current Supply Line Monitoring AND Wheel Speed Sensor Voltage Monitoring AND Wheel Speed Sensor Current Signal Line Monitoring	= True = False = False = False	System voltage AND Wheel speed sensor test completed	> 6.9 V = True	0.12 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is an electrical failure in the wheel speed sensors. The sensor current and the sensor voltage are monitored by a comparator circuit in an ASIC (Application Specific Integrated Circuit). A fault is set if the current at the supply line is below a calibrated threshold.	Sensor current at supply line	< 0.16 A	System voltage AND Wheel speed sensor test completed	> 6.9 V = True	0.12 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Right Front Wheel Speed Sensor Circuit/Open	C0506	This monitoring strategy checks if there is an electrical failure in the wheel speed sensors. The sensor current and the sensor voltage are monitored by a comparator circuit in an ASIC (Application Specific Integrated Circuit). A fault is set if the sensor current at the signal line is below a calibrated threshold.	Sensor current at the signal line	< 0.0038 A	System voltage AND Wheel speed sensor test completed	> 6.9 V = True	0.12 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Right Front Wheel Speed Sensor Incorrect Component Installed	C0556	This monitoring strategy checks if the Wheel Speed Sensor (WSS) is mounted at the correct wheel. Since the WSS signals differ for different WSS sensor types, the EBCU (Electronic Brake Control Unit) is able to recognize incorrect WSS placement by evaluating the signal. The intelligent WSS signal provides additional information (air gap) encoded in bits 0-8. Each detection event is followed by a stop pulse. A fault is set If the stop pulse is missing for a calibrated period of time.	No stop pulse according to wheel speed sensor protocol detected	= True	Wheel speed sensor test completed AND Ignition key	= True = On	3 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Right Front Wheel Speed Sensor Intermittent/Erratic	C050A	This monitoring strategy checks if the High End Timer Transfer Unit (HETTU) buffer has overflowed. The HETTU buffer stores the time stamp of the wheel speed sensor outputs. This buffer has a status which tells whether the buffer can be used or not. A common PIC (Programmable Interrupt Controller) checks if the HETTU buffer is in the overflow state. In this case the buffer cannot be used because more edges occur on the wheel speed sensor channels than the buffer can store. A fault is set if the HETTU buffer is in the overflow state.	HET TU buffer state	= Overflow	Ignition key	= On	0.03 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Right Front Wheel Speed Sensor Range/Performance	C0507	This monitoring strategy checks if there is a defective wheel speed sensor. A fault is set if the speed of one wheel speed sensor is zero and the other wheel speed sensor values are above a calibrated threshold. Additionally the vehicle speed has to be above a calibrated threshold.	Speed of 1 wheel AND Speed of 3 wheels	= 0 mph > 0 mph	Ignition key AND Anti-Lock Braking intervention AND Vehicle speed AND System voltage AND Traction Control System Intervention	= On = False > 11.8 mph > 6.9 V = False	Immediately	Type A, 1 Trip
		This monitoring strategy checks if the wheel speed sensors is defective. It can be done after standstill, start-up monitoring at low speed, as well as while driving, start-up monitoring at high speed. The main principle of the start-up monitoring is to compare the speed signal from all four wheels to each other. A fault is set if the speed of the monitored wheel is below a calibrated threshold while the speed of the other wheels is above a calibrated threshold.	FL, RL, RR Wheel speed sensor AND FR Wheel speed sensor	> 7.45 mph = 0 mph	Check at low speed: Initial vehicle speed AND Anti-Lock Braking System intervention AND Traction control system intervention OR Check at high speed: Anti-Lock Braking System intervention AND Traction control system intervention	 < 1.8 mph = False = False = False = False	Immediately	Type A, 1 Trip
		This monitoring strategy checks if the wheel speed signal is missing due to faulty wheel speed information. A fault is set if the wheel speed signal is missing for a calibrated duration (Δt) and the wheel deceleration is below a calibrated threshold.	No wheel speed signal for a time AND Wheel deceleration	> 0.08 Sec < 300 m/Sec^2	Ignition key AND Anti-Lock Braking intervention AND Vehicle speed AND System voltage AND Traction Control System Intervention AND Hydroplanning detected	= On = False > 26.84 mph > 6.9 V = False = False	0.08 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the wheel speed sensor PWM (Pulse Width Modulation) is functioning correctly. The wheel speed sensor returns a PWM signal with a frequency which is dependent on the vehicle velocity. The vehicle velocity is determined by counting every rising-edge of the signal periodically for a fixed time. A threshold is calculated with the two last rising-edges values to filter a missing edge value due to high deceleration. A fault is set if the number of rising-edges for the next cycle is lower than this calculated threshold. This monitor uses rough road detection to distinguish gaps in the edge cycle signal caused by real faults from those caused by driving on rough roads.	Number of rising-edge per cycle	< Threshold calculated by mean of the two latest edge-cycle	Vehicle speed AND Vehicle speed AND Anti-lock Brake System Interventions AND System voltage AND Ignition key	> 6.21 mph < 37.36 mph = False > 6.9 V = On	Immediately	Type A, 1 Trip
		This monitoring strategy checks for a discontinuous wheel speed sensor signal, caused for example by impulse wheel vibration. The vibrations induce additional frequencies to the wheel speed sensor signal. The noise monitoring consists of three checks which lead to a noise fault. The first check evaluates the acceleration of each wheel speed sensor. The second check evaluates the amplitude of the noise events. A weighing factor is calculated according to the noise amplitude value. The third check evaluates the number of edges. A fault is set if two implausible high wheel speed accelerations occur within a calibrated duration, if the wheel speed acceleration is above a calibrated threshold, if the accumulation of the weighted noise amplitude is above a calibrated threshold during the actual driving cycle, or if the number of detected edges increases above a calibrated threshold within a calibrated period of time.	Wheel acceleration AND For a calibrated number of counts For time OR Wheel acceleration AND Accumulation of the weighted noise amplitude in current driving cycle OR Number of detected edges increases from To For time	> 9.81 m/Sec^2 = 2 < 1.2 Sec > 500 m/Sec^2 > 4 < 3 > 5 < 0.005 Sec	System voltage AND Ignition key	> 6.9 V = On	20 [Sec]	Type A, 1 Trip
		This monitoring strategy checks each wheel speed sensor signal for implausibly high wheel speed values. A fault is set if the wheel speed signal value is above a calibrated threshold for a calibrated duration.	Measured wheel speed For time	> 183.9 mph > 5.04 Sec	System voltage AND Ignition key	> 6.9 V = On	5.04 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the difference between the wheel speed sensor signals is within a range. A fault is set if the difference in wheel speed between a single wheel speed sensor and all other wheel speed sensors is above a calibrated threshold. If the vehicle speed is below a calibrated value, the malfunction threshold is a fixed value. If the vehicle speed is above this calibrated value, the malfunction threshold is proportianal to the actual vehicle speed.	Difference between maximum and minimum wheel speed for vehicle speed OR Difference between maximum and minimum wheel speed for vehicle speed	> 3.7 mph < 12.4 mph > 6 % > 12.4 mph	Ignition key	= On	72 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the Wheel Speed Sensor (WSS) is mounted properly. This monitor continuously evaluates continuously the distance between the impulse wheel and the WSS. The WSS evaluates the magnetic flux density to detect an air gap failure. A fault is set if the air gap is too large which is indicated by a magnetic flux density below a calibrated threshold for a calibrated number of wheel rotations.	Magnetic flux density AND for a number of wheel rotations	< 0.0022 T > 4	Ignition key AND Wheel speed sensor test completed	= On = True	0.1 [Sec]	Type A, 1 Trip
		The monitoring checks if the stop pulse from each wheel speed sensor (WSS) is detected. The intelligent WSS signal provides additional information (air gap) encoded in bits 0-8. Each detection event is followed by a stop pulse. A fault is set if the Application Specific Integrated Circuit (ASIC) does not detect a stop pulse after some time and if there is no level change on the wheel speed sensor signal for some time.	No stop pulse detected For time OR No level change on signal For time	= True > 0.15 Sec = True > 3.5 Sec	Vehicle speed AND For time AND Wheel speed sensor test completed	< 1.12 mph > 10 Sec = True	3.5 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the supply voltage of the corresponding wheel speed sensor. Each wheel speed sensor is switched on separately. A fault is set if the sensor supply voltage is below a calibrated threshold during the initial phase.	Sensor supply voltage of the respective wheel speed sensor	< 11 V	Ignition key AND System voltage AND	= On > 6.9 V	0.035 [Sec]	Type A, 1 Trip
		DTC Pass	Accelerate vehicle to at least 37.3 mph and hold the speed for at least 7s					
Right Rear Inlet Control	C001C	This monitoring strategy checks if the Valve-Driver-ASIC (Application Specific Integrated Circuit) FreeWheeling component is defective. A fault is set if the valve driver freewheeling cannot be switched on or off or if the trigger state is incorrect.	Freewheeling of valve driver cannot be switched OR Trigger state not correct	= True = True	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the valve actuation corresponds to the expected value. The basic valve monitoring is triggered by the coordinator via the control message. A fault is set if the valve actuation is different from the expected value for a calibrated period of time.	Valve actuation	≠ expected value	Ignition key AND Resistor Measurement Test	= On = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the current through a valve is too high or too low. A fault is set if the valve current is above a calibrated threshold_1 or below a calibrated threshold_2 for a calibrated number of failed tests.	(Current through the valve OR Current through the valve) AND Both for a number of failed tests	> 0.12 A < 0.085 A > 5	Ignition key AND Leakage Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the voltage at the output Qx or at the gate to detect if the Valve-Driver-ASIC (Application Specific Integrated Circuit) output driver is not functioning correctly. All PWM (Pulse Width Modulation) signal positive edges are counted, and the low time duration is measured. The resulting value is read out via SPI (Serial Peripheral Interface). The high and low limits of the real PWM signal, which are set by the outpout driver, are calculated using the measured number of edges and the low time. The calculated high and low limits depend on the activation used. A fault is set if the current activation value is outside the calculated limits.	Measured actuation duty OR Measured actuation duty AND Both for a number of times	< Set Actuation Duty - 20% > Set Actuation Duty + 20% > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.05 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the transistor gates are set properly. Qx is the command sent to the transistor gate which commands the valve motor. The Qx monitor compares the expected value of Qx (the calculated Qx-ON/OFF value which is dependent on the current set valve activation) with the actual value of Qx (Qx-ON/OFF from the valve-related SPI (Serial Peripheral Interface) register) in order to check for correct output driver functionality (gate on/off). A fault is set if the actual Qx value does not match the expected Qx value.	(Measured Gate On Actuation Duty OR Measured Gate Off Actuation Duty) AND For a number of failed tests	< 95 % > 5 % > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the valve-related resistor value is out of range during the resistor measurement. This resistor value is calculated by taking the mean of the voltage through the resistor. A fault is set if the valve resistor value is too high or too low.	Comparison of calculated resistance and measured resistance OR Comparison of calculated resistance and measured resistance AND For a number of times	> 0.2 Of calculated resistance < -0.2 Of calculated resistance > 2	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if there is a short circuit between valves or a defective coil (due to Valve-Driver-ASIC (Application Specific Integrated Circuit) internal failure such as OpenLoad, UnderCurrent, OverCurrent, OverTemp, PGndLost or DxLost) during the Valve-Driver-ASIC Silent Valve Driver Test (SVDT). A fault is set if the ASIC current or temperature is below a calibrated threshold_1 or above a calibrated threshold_2, or if the High Side Switch Line Loss is below a calibrated threshold, for a calibrated number of failed tests.	(Current at ASIC OR Current at ASIC OR Temperature at ASIC OR Temperature at ASIC OR High Side Switch Line Loss) AND For a number of times	< 0.05 A > 0.14 A < 25 °C > 140 °C < 0.005 A > 2	Ignition key AND Silent Valve Driver Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the internal valve-driver-ASIC (Application Specific Integrated Circuit) register matches the current actuation during the Valve Actuation Register Test (VART). A fault is set if the measured gate actuation duty during the test actuation exceeds a calibrated threshold.	Measured gate actuation during test actuation AND For a number of times	< 0.005 A > 2	Ignition key AND Valve Activation Register Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Right Rear Outlet Control	C001D	This monitoring strategy checks if the valve actuation corresponds to the expected value. The basic valve monitoring is triggered by the coordinator via the control message. A fault is set if the valve actuation is different from the expected value for a calibrated period of time.	Valve actuation	≠ expected value	Ignition key AND Resistor Measurement Test	= On = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the current through a valve is too high or too low. A fault is set if the valve current is above a calibrated threshold_1 or below a calibrated threshold_2 for a calibrated number of failed tests.	(Current through the valve OR Current through the valve) AND Both for a number of failed tests	> 0.12 A < 0.085 A > 5	Ignition key AND Leakage Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the voltage at the output Qx or at the gate to detect if the Valve-Driver-ASIC (Application Specific Integrated Circuit) output driver is not functioning correctly. All PWM (Pulse Width Modulation) signal positive edges are counted, and the low time duration is measured. The resulting value is read out via SPI (Serial Peripheral Interface). The high and low limits of the real PWM signal, which are set by the outpout driver, are calculated using the measured number of edges and the low time. The calculated high and low limits depend on the activation used. A fault is set if the current activation value is outside the calculated limits.	Measured actuation duty OR Measured actuation duty AND Both for a number of times	< Set Actuation Duty - 20% > Set Actuation Duty + 20% > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.05 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the transistor gates are set properly. Qx is the command sent to the transistor gate which commands the valve motor. The Qx monitor compares the expected value of Qx (the calculated Qx-ON/OFF value which is dependent on the current set valve activation) with the actual value of Qx (Qx-ON/OFF from the valve-related SPI (Serial Peripheral Interface) register) in order to check for correct output driver functionality (gate on/off). A fault is set if the actual Qx value does not match the expected Qx value.	(Measured Gate On Actuation Duty OR Measured Gate Off Actuation Duty) AND For a number of failed tests	< 95 % > 5 % > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the valve-related resistor value is out of range during the resistor measurement. This resistor value is calculated by taking the mean of the voltage through the resistor. A fault is set if the valve resistor value is too high or too low.	Comparison of calculated resistance and measured resistance OR Comparison of calculated resistance and measured resistance AND For a number of times	> 0.2 Of calculated resistance < -0.2 Of calculated resistance > 2	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is a short circuit between valves or a defective coil (due to Valve-Driver-ASIC (Application Specific Integrated Circuit) internal failure such as OpenLoad, UnderCurrent, OverCurrent, OverTemp, PGndLost or DxLost) during the Valve-Driver-ASIC Silent Valve Driver Test (SVDT). A fault is set if the ASIC current or temperature is below a calibrated threshold_1 or above a calibrated threshold_2, or if the High Side Switch Line Loss is below a calibrated threshold, for a calibrated number of failed tests.	(Current at ASIC OR Current at ASIC OR Temperature at ASIC OR Temperature at ASIC OR High Side Switch Line Loss) AND For a number of times	< 0.05 A > 0.14 A < 25 °C > 140 °C < 0.005 A > 2	Ignition key AND Silent Valve Driver Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the internal valve-driver-ASIC (Application Specific Integrated Circuit) register matches the current actuation during the Valve Actuation Register Test (VART). A fault is set if the measured gate actuation duty during the test actuation exceeds a calibrated threshold.	Measured gate actuation during test actuation AND For a number of times	< 0.005 A > 2	Ignition key AND Valve Activation Register Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Right Rear Wheel Speed Sensor Circuit High	C0515	This monitoring strategy checks if there is a shortcut of WSS signal line to the battery.	Voltage of WSS signal line	> 12 V	System voltage AND Wheel speed sensor test completed	> 6.9 V = True	0.12 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Right Rear Wheel Speed Sensor Circuit Low	C0514	This monitoring strategy checks for a line failure on the rear right wheel speed sensor. In the line monitor, if a failure is detected, ASIC registers are evaluated and the corresponding failures are set. A fault is set if no precise line failure can be determine.	A failure is detected AND Wheel Speed Sensor Current Supply Line Monitoring AND Wheel Speed Sensor Voltage Monitoring AND Wheel Speed Sensor Current Signal Line Monitoring	= True = False = False = False	System voltage AND Wheel speed sensor test completed	> 6.9 V = True	0.12 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is an electrical failure in the wheel speed sensors. The sensor current and the sensor voltage are monitored by a comparator circuit in an ASIC (Application Specific Integrated Circuit). A fault is set if the current at the supply line is below a calibrated threshold.	Sensor current at supply line	< 0.16 A	System voltage AND Wheel speed sensor test completed	> 6.9 V = True	0.12 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Right Rear Wheel Speed Sensor Circuit/Open	C0512	This monitoring strategy checks if there is an electrical failure in the wheel speed sensors. The sensor current and the sensor voltage are monitored by a comparator circuit in an ASIC (Application Specific Integrated Circuit). A fault is set if the sensor current at the signal line is below a calibrated threshold.	Sensor current at the signal line	< 0.0038 A	System voltage AND Wheel speed sensor test completed	> 6.9 V = True	0.12 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Right Rear Wheel Speed Sensor Incorrect Component Installed	C0558	This monitoring strategy checks if the Wheel Speed Sensor (WSS) is mounted at the correct wheel. Since the WSS signals differ for different WSS sensor types, the EBCU (Electronic Brake Control Unit) is able to recognize incorrect WSS placement by evaluating the signal. The intelligent WSS signal provides additional information (air gap) encoded in bits 0-8. Each detection event is followed by a stop pulse. A fault is set If the stop pulse is missing for a calibrated period of time.	No stop pulse according to wheel speed sensor protocol detected	= True	Wheel speed sensor test completed AND Ignition key	= True = On	3 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Right Rear Wheel Speed Sensor Intermittent/Erratic	C0516	This monitoring strategy checks if the High End Timer Transfer Unit (HETTU) buffer has overflowed. The HETTU buffer stores the time stamp of the wheel speed sensor outputs. This buffer has a status which tells whether the buffer can be used or not. A common PIC (Programmable Interrupt Controller) checks if the HETTU buffer is in the overflow state. In this case the buffer cannot be used because more edges occur on the wheel speed sensor channels than the buffer can store. A fault is set if the HETTU buffer is in the overflow state.	HET TU buffer state	= Overflow	Ignition key	= On	0.03 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Right Rear Wheel Speed Sensor Range/Performance	C0513	This monitoring strategy checks if there is a defective wheel speed sensor. A fault is set if the speed of one wheel speed sensor is zero and the other wheel speed sensor values are above a calibrated threshold. Additionally the vehicle speed has to be above a calibrated threshold.	Speed of 1 wheel AND Speed of 3 wheels	= 0 mph > 0 mph	Ignition key AND Anti-Lock Braking intervention AND Vehicle speed AND System voltage AND Traction Control System Intervention	= On = False > 11.8 mph > 6.9 V = False	Immediately	Type A, 1 Trip
		This monitoring strategy checks if the wheel speed sensors is defective. It can be done after standstill, start-up monitoring at low speed, as well as while driving, start-up monitoring at high speed. The main principle of the start-up monitoring is to compare the speed signal from all four wheels to each other. A fault is set if the speed of the monitored wheel is below a calibrated threshold while the speed of the other wheels is above a calibrated threshold.	FR, FL, RL Wheel speed sensor AND RR Wheel speed sensor	> 7.45 mph = 0 mph	Check at low speed: Initial vehicle speed AND Anti-Lock Braking System intervention AND Traction control system intervention OR Check at high speed: Anti-Lock Braking System intervention AND Traction control system intervention	 < 1.8 mph = False = False = False = False	Immediately	Type A, 1 Trip
		This monitoring strategy checks if the wheel speed signal is missing due to faulty wheel speed information. A fault is set if the wheel speed signal is missing for a calibrated duration (Δt) and the wheel deceleration is below a calibrated threshold.	No wheel speed signal for a time AND Wheel deceleration	> 0.08 Sec < 300 m/Sec^2	Ignition key AND Anti-Lock Braking intervention AND Vehicle speed AND System voltage AND Traction Control System Intervention AND Hydroplanning detected	= On = False > 26.84 mph > 6.9 V = False = False	0.08 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the wheel speed sensor PWM (Pulse Width Modulation) is functioning correctly. The wheel speed sensor returns a PWM signal with a frequency which is dependent on the vehicle velocity. The vehicle velocity is determined by counting every rising-edge of the signal periodically for a fixed time. A threshold is calculated with the two last rising-edges values to filter a missing edge value due to high deceleration. A fault is set if the number of rising-edges for the next cycle is lower than this calculated threshold. This monitor uses rough road detection to distinguish gaps in the edge cycle signal caused by real faults from those caused by driving on rough roads.	Number of rising-edge per cycle	< Threshold calculated by mean of the two latest edge-cycle	Vehicle speed AND Vehicle speed AND Anti-lock Brake System Interventions AND System voltage AND Ignition key	> 6.21 mph < 37.36 mph = False > 6.9 V = On	Immediately	Type A, 1 Trip
		This monitoring strategy checks for a discontinuous wheel speed sensor signal, caused for example by impulse wheel vibration. The vibrations induce additional frequencies to the wheel speed sensor signal. The noise monitoring consists of three checks which lead to a noise fault. The first check evaluates the acceleration of each wheel speed sensor. The second check evaluates the amplitude of the noise events. A weighing factor is calculated according to the noise amplitude value. The third check evaluates the number of edges. A fault is set if two implausible high wheel speed accelerations occur within a calibrated duration, if the wheel speed acceleration is above a calibrated threshold, if the accumulation of the weighted noise amplitude is above a calibrated threshold during the actual driving cycle, or if the number of detected edges increases above a calibrated threshold within a calibrated period of time.	Wheel acceleration AND For a calibrated number of counts For time OR Wheel acceleration AND Accumulation of the weighted noise amplitude in current driving cycle OR Number of detected edges increases from To For time	> 9.81 m/Sec^2 = 2 < 1.2 Sec > 500 m/Sec^2 > 4 < 3 > 5 < 0.005 Sec	System voltage AND Ignition key	> 6.9 V = On	20 [Sec]	Type A, 1 Trip
		This monitoring strategy checks each wheel speed sensor signal for implausibly high wheel speed values. A fault is set if the wheel speed signal value is above a calibrated threshold for a calibrated duration.	Measured wheel speed For time	> 183.9 mph > 5.04 Sec	System voltage AND Ignition key	> 6.9 V = On	5.04 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the difference between the wheel speed sensor signals is within a range. A fault is set if the difference in wheel speed between a single wheel speed sensor and all other wheel speed sensors is above a calibrated threshold. If the vehicle speed is below a calibrated value, the malfunction threshold is a fixed value. If the vehicle speed is above this calibrated value, the malfunction threshold is proportianal to the actual vehicle speed.	Difference between maximum and minimum wheel speed for vehicle speed OR Difference between maximum and minimum wheel speed for vehicle speed	> 3.7 mph < 12.4 mph > 6 % > 12.4 mph	Ignition key	= On	72 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the Wheel Speed Sensor (WSS) is mounted properly. This monitor continuously evaluates continuously the distance between the impulse wheel and the WSS. The WSS evaluates the magnetic flux density to detect an air gap failure. A fault is set if the air gap is too large which is indicated by a magnetic flux density below a calibrated threshold for a calibrated number of wheel rotations.	Magnetic flux density AND for a number of wheel rotations	< 0.0022 T > 4	Ignition key AND Wheel speed sensor test completed	= On = True	0.1 [Sec]	Type A, 1 Trip
		The monitoring checks if the stop pulse from the Wheel Speed Sensor of each wheel is detected. The intelligent WSS signal provides additional information (air gap) encoded in bits 0-8. Each detection event is followed by a stop pulse. A fault is set if the Application Specific Integrated Circuit (ASIC) does not detect a stop pulse after some time and if there is no level change on the wheel speed sensor signal for some time.	No stop pulse detected For time OR No level change on signal For time	= True > 0.15 Sec = True > 3.5 Sec	Vehicle speed AND For time AND Wheel speed sensor test completed	< 1.12 mph > 10 Sec = True	3.5 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the supply voltage of the corresponding wheel speed sensor. Each wheel speed sensor is switched on separately. A fault is set if the sensor supply voltage is below a calibrated threshold during the initial phase.	Sensor supply voltage of the respective wheel speed sensor	< 11 V	Ignition key AND System voltage AND	= On > 6.9 V	0.035 [Sec]	Type A, 1 Trip
		DTC Pass	Accelerate vehicle to at least 37.3 mph and hold the speed for at least 7s					
Software Incompatibility With Brake System Control Module "B" - Generic	U031C	This monitoring checks if there is a mismatch between the iBooster compatibilty index signal and the current configuration in ESP. A fault is set if the signal "Ebrake Assist Compatibility Index" is received with an incompatible index value.	"Ebrake Assist Compatibility Index" is received with an incompatible index value	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.1 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
System Voltage	P0560	This monitoring strategy checks if the resistance in the internal valve supply voltage (UBVR) line is faulty or too high by checking the voltage. A supply line failure is detected during the Valve Activation Supply Line Test (VAST). A fault is set if the ratio of internal valve supply voltage to system voltage is above a calibrated threshold.	Internal valve supply voltage / System voltage	> 0.25	Vehicle speed AND Ignition key AND System voltage	> 9.32 mph = On > 6.9 V	0.015 [Sec]	Type A, 1 Trip
		DTC Pass	Accelerate vehicle to at least 18.6 mph and hold the speed for at least 20s					
System Voltage High	P0563	This monitoring checks the system supply voltage. A fault is set if the voltage is greater than a calibrated threshold.	CAN supply voltage	> 17 V	Ignition key	= On	0.09 [Sec]	Type B, 2 Trips
		This monitoring strategy checks if the motor relay is in an overvoltage situation. This protects the hydraulic pump against overvoltage. A fault is set if the supply voltage is above a calibrated threshold.	Voltage at motor relay	> 17 V	System voltage AND Ignition key	> 6.9 V = On	1 [Sec]	Type B, 2 Trips
		DTC Pass	Turn ignition on and wait for at least 30sec without braking.					
System Voltage Low	P0562	This monitoring strategy checks if Ecu supply voltage is out of range low, which means below the HW (Hardware) switch off threshold but the HW is not switched off for the particular time. A fault is set if the Ecu supply voltage is below a threshold.	Ecu supply voltage	< 4.9 V	Ignition key	= On	0.2 [Sec]	Special Type C
		This monitoring strategy checks if the hydraulic components are in a hard undervoltage situation. A fault is set if the hydraulic supply voltage drops below a calibrated threshold.	Hydraulic supply voltage	< 6.9 V	Ignition key	= On	1 [Sec]	Special Type C
		This monitoring strategy checks the lower functional voltage range of the hydraulic components to ensure full system functionality. A fault is set if the valve voltage or the motor voltage drops below a calibrated threshold.	Valve relay voltage	< 9.4 V	Ignition key	= On	1 [Sec]	Special Type C
		This monitoring checks the system supply voltage. A fault is set if the voltage is less than a calibrated threshold.	CAN supply voltage	< 7.5 V	Ignition key	= On	0.09 [Sec]	Special Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if there is an undervoltage of the ASIC internal Sigma Delta Modulator (SDM). This monitoring works through an ASIC which measures an undervoltage and indicates an insufficient supply voltage of sigma delta converter to the microcontroller with SPI (Serial Peripheral Interface) protocol. A fault is set if the SDM (Sigma Delta Modulator) supply voltage is below a calibrated threshold.	Sigma delta converter supply voltage	< 5.5 V	Ignition key	= On	0.01 [Sec]	Special Type C
		DTC Pass	Turn ignition on and wait for at least 30sec without braking.					
Traction Control Front Isolation Solenoid Valve Circuit	C1590	This monitoring strategy checks if the Valve-Driver-ASIC (Application Specific Integrated Circuit) FreeWheeling component is defective. A fault is set if the valve driver freewheeling cannot be switched on or off or if the trigger state is incorrect.	Freewheeling of valve driver cannot be switched OR Trigger state not correct	= True = True	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the valve actuation corresponds to the expected value. The basic valve monitoring is triggered by the coordinator via the control message. A fault is set if the valve actuation is different from the expected value for a calibrated period of time.	Valve actuation	≠ expected value	Ignition key AND Resistor Measurement Test	= On = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the current through a valve is too high or too low. A fault is set if the valve current is above a calibrated threshold_1 or below a calibrated threshold_2 for a calibrated number of failed tests.	(Current through the valve OR Current through the valve) AND Both for a number of failed tests	> 0.12 A < 0.085 A > 5	Ignition key AND Leakage Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the voltage at the output Qx or at the gate to detect if the Valve-Driver-ASIC (Application Specific Integrated Circuit) output driver is not functioning correctly. All PWM (Pulse Width Modulation) signal positive edges are counted, and the low time duration is measured. The resulting value is read out via SPI (Serial Peripheral Interface). The high and low limits of the real PWM signal, which are set by the outpout driver, are calculated using the measured number of edges and the low time. The calculated high and low limits depend on the activation used. A fault is set if the current activation value is outside the calculated limits.	Measured actuation duty OR Measured actuation duty AND Both for a number of times	< Set Actuation Duty - 20% > Set Actuation Duty + 20% > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.05 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the transistor gates are set properly. Qx is the command sent to the transistor gate which commands the valve motor. The Qx monitor compares the expected value of Qx (the calculated Qx-ON/OFF value which is dependent on the current set valve activation) with the actual value of Qx (Qx-ON/OFF from the valve-related SPI (Serial Peripheral Interface) register) in order to check for correct output driver functionality (gate on/off). A fault is set if the actual Qx value does not match the expected Qx value.	(Measured Gate On Actuation Duty OR Measured Gate Off Actuation Duty) AND For a number of failed tests	< 95 % > 5 % > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the valve-related resistor value is out of range during the resistor measurement. This resistor value is calculated by taking the mean of the voltage through the resistor. A fault is set if the valve resistor value is too high or too low.	Comparison of calculated resistance and measured resistance OR Comparison of calculated resistance and measured resistance AND For a number of times	> 0.2 Of calculated resistance < -0.2 Of calculated resistance > 2	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is a short circuit between valves or a defective coil during the Valve-Driver-ASIC (Application Specific Integrated Circuit) internal failure such as OpenLoad, UnderCurrent, OverCurrent, OverTemp, PGndLost or DxLost) during the Valve-Driver-ASIC Silent Valve Driver Test (SVDT). A fault is set if the ASIC current or temperature is below a calibrated threshold_1 or above a calibrated threshold_2 for a calibrated number of failed tests. A fault is also set if the High Side Switch Line Loss is below a calibrated threshold.	(Current at ASIC OR Current at ASIC OR Temperature at ASIC OR Temperature at ASIC OR High Side Switch Line Loss) AND For a number of times	< 0.05 A > 0.14 A < 25 °C > 140 °C < 0.005 A > 2	Ignition key AND Silent Valve Driver Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the internal valve-driver-ASIC (Application Specific Integrated Circuit) register matches the current actuation during the Valve Actuation Register Test (VART). A fault is set if the measured gate actuation duty during the test actuation exceeds a calibrated threshold.	Measured gate actuation during test actuation AND For a number of times	< 0.005 A > 2	Ignition key AND Valve Activation Register Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the drift effects in the hardware current controller. The current regulator inside the valve driver returns current feedback for each activated valve. A fault is set if the difference between an activated valve's measured activation (current regulator feedback) and activation calculated from the previous resistor measurement values (current pattern) is above a calibrated threshold.	Comparison of calculated current with measured current AND Comparison of calculated current with measured current	> 20 % < -20 %	Ignition key AND Vehicle speed AND Previous successful resistor measurement AND Valve Drift Check	= On > 9.32 mph = True = active	0.025 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		DTC Pass	Turn ignition on and wait for at least 5sec. Accelerate vehicle to at least 18.6 mph and hold the speed for at least 20s		d			
Traction Control Front Prime Solenoid Valve Circuit	C158F	This monitoring strategy checks if the Valve-Driver-ASIC (Application Specific Integrated Circuit) FreeWheeling component is defective. A fault is set if the valve driver freewheeling cannot be switched on or off or if the trigger state is incorrect.	Freewheeling of valve driver cannot be switched OR Trigger state not correct	= True = True	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the valve actuation corresponds to the expected value. The basic valve monitoring is triggered by the coordinator via the control message. A fault is set if the valve actuation is different from the expected value for a calibrated period of time.	Valve actuation	≠ expected value	Ignition key AND Resistor Measurement Test	= On = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the current through a valve is too high or too low. A fault is set if the valve current is above a calibrated threshold_1 or below a calibrated threshold_2 for a calibrated number of failed tests.	(Current through the valve OR Current through the valve) AND Both for a number of failed tests	> 0.12 A < 0.085 A > 5	Ignition key AND Leakage Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the voltage at the output Qx or at the gate to detect if the Valve-Driver-ASIC (Application Specific Integrated Circuit) output driver is not functioning correctly. All PWM (Pulse Width Modulation) signal positive edges are counted, and the low time duration is measured. The resulting value is read out via SPI (Serial Peripheral Interface). The high and low limits of the real PWM signal, which are set by the outpout driver, are calculated using the measured number of edges and the low time. The calculated high and low limits depend on the activation used. A fault is set if the current activation value is outside the calculated limits.	Measured actuation duty OR Measured actuation duty AND Both for a number of times	< Set Actuation Duty - 20% > Set Actuation Duty + 20% > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.05 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the transistor gates are set properly. Qx is the command sent to the transistor gate which commands the valve motor. The Qx monitor compares the expected value of Qx (the calculated Qx-ON/OFF value which is dependent on the current set valve activation) with the actual value of Qx (Qx-ON/OFF from the valve-related SPI (Serial Peripheral Interface) register) in order to check for correct output driver functionality (gate on/off). A fault is set if the actual Qx value does not match the expected Qx value.	(Measured Gate On Actuation Duty OR Measured Gate Off Actuation Duty) AND For a number of failed tests	< 95 % > 5 % > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the valve-related resistor value is out of range during the resistor measurement. This resistor value is calculated by taking the mean of the voltage through the resistor. A fault is set if the valve resistor value is too high or too low.	Comparison of calculated resistance and measured resistance OR Comparison of calculated resistance and measured resistance AND For a number of times	> 0.2 Of calculated resistance < -0.2 Of calculated resistance > 2	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is a short circuit between valves or a defective coil during the Valve-Driver-ASIC (Application Specific Integrated Circuit) internal failure such as OpenLoad, UnderCurrent, OverCurrent, OverTemp, PGndLost or DxLost) during the Valve-Driver-ASIC Silent Valve Driver Test (SVDT). A fault is set if the ASIC current or temperature is below a calibrated threshold_1 or above a calibrated threshold_2 for a calibrated number of failed tests. A fault is also set if the High Side Switch Line Loss is below a calibrated threshold.	(Current at ASIC OR Current at ASIC OR Temperature at ASIC OR Temperature at ASIC OR High Side Switch Line Loss) AND For a number of times	< 0.05 A > 0.14 A < 25 °C > 140 °C < 0.005 A > 2	Ignition key AND Silent Valve Driver Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the internal valve-driver-ASIC (Application Specific Integrated Circuit) register matches the current actuation during the Valve Actuation Register Test (VART). A fault is set if the measured gate actuation duty during the test actuation exceeds a calibrated threshold.	Measured gate actuation during test actuation AND For a number of times	< 0.005 A > 2	Ignition key AND Valve Activation Register Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Traction Control Rear Isolation Solenoid Valve Circuit	C1592	This monitoring strategy checks if the Valve-Driver-ASIC (Application Specific Integrated Circuit) FreeWheeling component is defective. A fault is set if the valve driver freewheeling cannot be switched on or off or if the trigger state is incorrect.	Freewheeling of valve driver cannot be switched OR Trigger state not correct	= True = True	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the valve actuation corresponds to the expected value. The basic valve monitoring is triggered by the coordinator via the control message. A fault is set if the valve actuation is different from the expected value for a calibrated period of time.	Valve actuation	≠ expected value	Ignition key AND Resistor Measurement Test	= On = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the current through a valve is too high or too low. A fault is set if the valve current is above a calibrated threshold_1 or below a calibrated threshold_2 for a calibrated number of failed tests.	Current through valve AND Current through valve AND Both for a number of failed tests	> 0.12 A < 0.085 A	Ignition key AND Leakage Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the voltage at the output Qx or at the gate to detect if the Valve-Driver-ASIC (Application Specific Integrated Circuit) output driver is not functioning correctly. All PWM (Pulse Width Modulation) signal positive edges are counted, and the low time duration is measured. The resulting value is read out via SPI (Serial Peripheral Interface). The high and low limits of the real PWM signal, which are set by the outpout driver, are calculated using the measured number of edges and the low time. The calculated high and low limits depend on the activation used. A fault is set if the current activation value is outside of the calculated limits.	Measured actuation duty OR Measured actuation duty AND Both for a number of times	< Set Actuation Duty - 20% > Set Actuation Duty + 20% > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.05 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the transistor gates are set properly. Qx is the command sent to the transistor gate which commands the valve motor. The Qx monitor compares the expected value of Qx (the calculated Qx-ON/OFF value which is dependent on the current set valve activation) with the actual value of Qx (Qx-ON/OFF from the valve-related SPI (Serial Peripheral Interface) register) in order to check for correct output driver functionality (gate on/off). A fault is set if the actual Qx value does not match the expected Qx value.	(Measured Gate On Actuation Duty OR Measured Gate Off Actuation Duty) AND Both for a number of failed tests	< 95 % > 5 % > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring checks if the valve-related resistor value is out of range during the resistor measurement. This resistor value is calculated by taking the mean of the voltage through the resistor. A fault is set if the valve resistor value is too high or too low.	Comparison of calculated resistance and measured resistance OR Comparison of calculated resistance and measured resistance	> 0.2 Of calculated resistance > -0.2 Of calculated resistance	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring checks if there is a short circuit between valves or a defective coil (due to Valve-Driver-ASIC (Application Specific Integrated Circuit) internal failures such as OpenLoad, UnderCurrent, OverCurrent, OverTemp, PGndLost or DxLost) during the Valve-Driver-ASIC Silent Valve Driver Test (SVDT). A fault is set if the ASIC current or temperature is below a calibrated threshold_1 or above a calibrated threshold_2 for a calibrated number of failed tests. A fault is also set if the High Side Switch Line Loss is below a calibrated threshold_5.	Current at ASIC OR Current at ASIC OR Temperature at ASIC OR Temperature at ASIC OR High Side Switch Line Loss) AND For a number of times	< 0.05 A > 0.14 A < 25 °C > 140 °C < 0.005 A > 2	Ignition key AND Silent Valve Driver Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring checks if the internal valve-driver-ASIC (Application Specific Integrated Circuit) register matches the current actuation during the Valve Actuation Register Test. A fault is set if the measured gate actuation duty during the test actuation exceeds a calibrated threshold for a calibrated period of time.	Measured gate actuation during test actuation	< 0.005 A	Ignition key AND Valve Activation Register Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Traction Control Rear Prime Solenoid Valve Circuit	C1591	This monitoring strategy checks if the Valve-Driver-ASIC (Application Specific Integrated Circuit) FreeWheeling component is defective. A fault is set if the valve driver freewheeling cannot be switched on or off or if the trigger state is incorrect.	Freewheeling of valve driver cannot be switched OR Trigger state not correct	= True = True	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the valve actuation corresponds to the expected value. The basic valve monitoring is triggered by the coordinator via the control message. A fault is set if the valve actuation is different from the expected value for a calibrated period of time.	Valve actuation	≠ expected value	Ignition key AND Resistor Measurement Test	= On = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the current through a valve is too high or too low. A fault is set if the valve current is above a calibrated threshold_1 or below a calibrated threshold_2 for a calibrated number of failed tests.	Current through valve AND Current through valve AND Both for a number of failed tests	> 0.12 A < 0.085 A	Ignition key AND Leakage Test	= On = On	0.015 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks the voltage at the output Qx or at the gate to detect if the Valve-Driver-ASIC (Application Specific Integrated Circuit) output driver is not functioning correctly. All PWM (Pulse Width Modulation) signal positive edges are counted, and the low time duration is measured. The resulting value is read out via SPI (Serial Peripheral Interface). The high and low limits of the real PWM signal, which are set by the outpout driver, are calculated using the measured number of edges and the low time. The calculated high and low limits depend on the activation used. A fault is set if the current activation value is outside the calculated limits.	Measured actuation duty OR Measured actuation duty AND Both for a number of times	< Set Actuation Duty - 20% > Set Actuation Duty + 20% > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.05 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the transistor gates are set properly. Qx is the command sent to the transistor gate which commands the valve motor. The Qx monitor compares the expected value of Qx (the calculated Qx-ON/OFF value which is dependent on the current set valve activation) with the actual value of Qx (Qx-ON/OFF from the valve-related SPI (Serial Peripheral Interface) register) in order to check for correct output driver functionality (gate on/off). A fault is set if the actual Qx value does not match the expected Qx value.	(Measured Gate On Actuation Duty OR Measured Gate Off Actuation Duty) AND Both for a number of failed tests	< 95 % > 5 % > 5	Ignition key AND Resistor Measurement Test AND Leakage Test AND Valve Activation Register Test AND Silent Valve Driver Test	= On = Off = Off = Off = Off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the valve-related resistor value is out of range during the resistor measurement. This resistor value is calculated by taking the mean of the voltage through the resistor. A fault is set if the valve resistor value is too high or too low.	Comparison of calculated resistance and measured resistance OR Comparison of calculated resistance and measured resistance	> 0.2 Of calculated resistance > -0.2 Of calculated resistance	Ignition key AND Resistor Measurement Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring checks if there is short circuit between valves or a defective coil (due to Valve-Driver-ASIC (Application Specific Integrated Circuit) internal failures such as OpenLoad, UnderCurrent, OverCurrent, OverTemp, PGndLost or DxLost) during the Valve-Driver-ASIC Silent Valve Driver Test (SVDT). A fault is set if the ASIC current or temperature is below a calibrated threshold_1 or above a calibrated threshold_2 for a calibrated number of failed tests. A fault is also set if the High Side Switch Line Loss is below a calibrated threshold_5.	Current at ASIC OR Current at ASIC OR Temperature at ASIC OR Temperature at ASIC OR High Side Switch Line Loss) AND For a number of times	< 0.05 A > 0.14 A < 25 °C > 140 °C < 0.005 A > 2	Ignition key AND Silent Valve Driver Test	= On = On	0.015 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring checks if the internal valve-driver-ASIC (Application Specific Integrated Circuit) register matches the current actuation during the Valve Actuation Register Test. A fault is set if the measured gate actuation duty during the test actuation exceeds a calibrated threshold.	Measured gate actuation during test actuation	< 0.005 A	Ignition key AND Valve Activation Register Test	= On = On	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the drift effects in the hardware current controller. The current regulator inside the valve driver returns current feedback for each activated valve. A fault is set if the difference between an activated valve's measured activation (current regulator feedback) and activation calculated from the previous resistor measurement values (current pattern) is above a calibrated threshold.	Comparison of calculated current with measured current AND Comparison of calculated current with measured current	> 20 % < - 20 %	Ignition key Vehicle speed AND Previous successful resistor measurement AND Valve Drift Check	= On > 9.32 mph = True = active	0.03 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec. Accelerate vehicle to at least 18.6 mph and hold the speed for at least 20s					
Valve Relay Circuit	C106D	This monitoring strategy checks if the valve relay is correctly activated by comparing the valve relay output voltage (UVR) to the supply voltage (UBVR). The valve relay is typically switched on or off during the Fail-Safe Logic Test (FSLT) to detect if the valve relay has not switched on successfully. A fault is set if the resulting ratio of UVR to UBVR is below a calibrated threshold.	Valve relay output voltage / Valve relay supply voltage	< 0.7	Ignition key AND Fail-Safe Logic Test	= On = On	0.45 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the valve relay is correctly activated by comparing the valve relay output voltage (UVR) to the valve relay supply voltage (UBVR). A fault is set if the resulting ratio is below a calibrated threshold which indicates that the valve relay has not switched on successfully.	Valve relay output voltage / Valve relay supply voltage	< 0.7	Ignition key AND Fail-Safe Logic Test is finished AND Valve relay output voltage mid level supply	= On = True = On	0.025 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Valve Relay Circuit High	C1070	This monitoring strategy checks if the valve relay output voltage (UVR) voltage is shorted to the valve relay supply voltage (UBVR), if the valve relay is stuck, or if a missing valve relay watchdog is not detected. Two separate tests check if the valve relay can be switched off. The first test checks if a missing Built In Self Test (BIST) watchdog leads to a switched off valve relay because the hydraulic state "off". The second test checks if the valve-relay-safety-switch detects a missing valve-relay-watchdog, which must lead to a switched off valve relay. During checks, the Fail-Safe Logic Test (FSLT) derives the valve relay status by comparing the valve relay supply voltage to the valve relay voltage. A fault is set if test 1 or 2 detects that the valve relay is still switched on.	Missing BIST watchdog detected OR Valve relay safety switch detects a missing valve relay watchdog	= True = True	Ignition key AND Initial Fail-Safe Logic Test is running	= On = True	0.45 [Sec]	Type A, 1 Trip
		This monitoring checks if there is a short circuit to the valve relay. All hydraulic valves are supplied with power through one relay. This relay is checked for circuit continuity. A fault is set if the valve solenoid high side voltage is above a calibrated threshold, meaning a short circuit to the battery voltage is detected. The threshold depends on the system voltage.	Valve relay solenoid low side voltage	> 4.8 V	Ignition key AND Valve relay enabled AND System voltage	= On = False > 6.9 V	0.2 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Valve Relay Circuit Low	C106F	This monitoring strategy checks if a valve relay high ohmic short to ground has occured by comparing the valve relay output voltage (UVR) to the valve relay supply voltage (UBVR). A fault is set if the resulting ratio is below a calibrated threshold which indicates that the valve relay is shorted to ground.	Valve relay output voltage / Valve relay supply voltage	< 0.3	Ignition key AND Valve relay supply voltage	= On > 6.9 V	0.2 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is a valve relay short to ground by comparing the valve relay output voltage (UVR) to the valve relay supply voltage (UBVR). A fault is set if the resulting ratio is below a calibrated threshold which indicates that the valve relay is shorted to ground.	Valve relay output voltage / Valve relay supply voltage	< 0.10	Ignition key AND Valve relay supply voltage	= On > 5 V	0.04 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Valve Relay Circuit Performance	C106E	This monitoring strategy checks if the supply voltage (UBVR) is too low during evaluation of failsafe logic. During an undervoltage situation, an evaluation of the valve relay safety switch test is not possible. A fault is set if the supply voltage (UBVR) is below a calibrated threshold for a calibrated period of time.	Valve relay supply line voltage For time	< 5 V > 0.5 Sec	Ignition key AND Fail-Safe Logic Test	= On = On	0.5 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Vehicle Speed - Wheel Speed Correlation	P215A	This monitoring strategy checks if the ABS (Anti-lock Brake System) is correctly triggered. Normally, an ABS intervention should be applied for limited time. A fault is set if the system detects an ABS intervention for more than a calibrated period of time.	Anti-lock Brake System intervention for a period of time	> 60 Sec	System voltage AND Electronic Brake Control Unit state	> 6.9 V = Started with hardware reset	60 [Sec]	Type A, 1 Trip
		This monitor checks the wheel speed sensor signals for not plausible or invalid signals. The failure is set if at least three Wheel Speed Sensor (WSS) failure suspicions are set (at the same time). These WSS failure suspicions are set by other wheel speed monitorings.	Wheel Speed Sensor faliure suspicions set	> 2	System voltage AND Ignition key	> 6.9 V = On	0.5 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if whether at one or at several wheels no impulse wheel or impulse wheels with wrong tooth-/multiple number or wheels with a different circumference are mounted. Additionally, signal-loss caused by too high airgap between sensor and impulse wheel is detected at least over time; if another plausibility monitoring wa not successful. A fault is set if an individual wheel monitor detects a deviation above a calibrated threshold but is not able to identify the faulty wheel speed sensor.	Difference between maximum and minimum wheel speed for vehicle speed OR Difference between maximum and minimum wheel speed for vehicle speed	> 3.7 mph < 12.4 mph > 6 % > 12.4 mph	Ignition key	= On	80 [Sec]	Type A, 1 Trip
		This monitoring checks for wheel speed sensor failures. A suspected wheel speed sensor failure is set if any of the following monitors set a suspected failure flag: noise monitor, slip monitor, dynamic monitor, absent signal monitor or flat tire monitor. If a wheel speed sensor failure has occured, the Traction Control System (TCS) and the valve drift check are not available. A fault is set if more than one suspected wheel speed sensor failure occur simultaneously.	Number of suspected wheel speed sensor failures in the same time	= 2	Ignition key AND System voltage AND Ignition key	= On > 6.9 V = On	0.1 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring checks for wheel speed sensor failures. A suspected wheel speed sensor failure is set if any of the following monitors set a suspected failure flag: noise monitor, slip monitor, dynamic monitor, absent signal monitor or flat tire monitor. If a wheel speed sensor failure has occured, the Traction Control System (TCS) and the valve drift check are not available. A fault is set if more than one suspected wheel speed sensor failure occur simultaneously for longeer than a calibrated duration.	Number of suspected wheel speed sensor failures in the same time For time	= 2 > 0.5 Sec	Ignition key AND System voltage	= On > 6.9 V	> 0.5 [Sec]	Type A, 1 Trip
		DTC Pass	Drive off and straight ahead with more than 37.2 mph for at least 40s.					
Wheel Speed Sensors Supply Circuit High	C05A3	This monitoring strategy detects wheel speed sensor supply line short to battery by monitoring reverse current.	Reverse current detected on WSS supply line for	> 3.5 Sec	Ignition key	= On	3.5 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 5sec.					
Wheel Speed Sensors Supply Circuit Low	C05A4	This monitoring strategy checks the for an undervoltage situation with the System ASIC internal hardware comparator. This comparator monitors the voltage between the wheel speed sensor (WSS) power supply line and WSS signal line. A fault is set if the voltage between the WSS power suply line and WSS signal line is under the threshold.	voltage between the WSS power suply line and WSS signal line	< 6.7 V	System voltage AND Wheel speed sensor test completed	> 6.9 V = True	0.06 [Sec]	Type A, 1 Trip
		DTC Pass	Turn ignition on and wait for at least 30sec without braking.					
Lost Communication with Central Gateway Module	U0146	This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x3CF not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.25 [Sec]	Type B, 2 Trips
		DTC Pass	After receving all monitored messages from the superised source					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Brake Booster Internal Power Driver Range/Performance	C0595	This monitoring strategy checks the ability of the Booster Master Switch to be switched correctly. This is done by checking in 3 steps: a) The booster master switch is switched on. After a defined period the test checks if the booster master switch is switched on by evaluating the ratio of Voltage Sensor 2 and Voltage Sensor 1	Voltage Sensor2 / Voltage Sensor1	< 0.88	Software State	= Init	0.015 [Sec]	Type A, 1 Trip
		b) The Booster Master Switch is switched off. After a defined period the Voltage Sensor 2 value is evaluated.	Voltage Sensor2	> 0.88 V	Software State	= Init	0.015 [Sec]	Type A, 1 Trip
		c) The booster master switch is switched on again. After a defined period the test checks if the booster master switch is switched on by evaluating the ratio of Voltage Sensor 2 and Voltage Sensor 1	Voltage Sensor2 / Voltage Sensor1	< 0.88	Software State	= Init	0.015 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Brake Booster Motor "A" Current Sensor Circuit Range/Performance	C0596	This monitoring strategy checks the functionality of the over current detection system by switching the comparator off and on. This is done by setting the pulse width modulated signal to the minimum or maximum pulse ratio. The proper comparator switching is verified by reading back the comparator's output via a feedback line. A fault is set - if the comparator's output does not indicate the correct switch position for the current pulse ratio. - if the voltage at the Booster Master Switch UB6 is not close to zero or to the power supply battery voltage (UBB), depending on the current pulse ratio.	PWM ratio VoltageSensor 2/ VoltageSensor 1 PWM ratio VoltageSensor 2	= maximum < 0.88 = minimum > 0.88 V	Software State BMS control BMS control	= Init = switched on = swtiched off	0.03 [Sec]	Type A, 1 Trip
		This monitoring strategy checks for over current at the electric motor driver. Current through the motor driver is monitored by hardware and the feedback pin reports if over current has been detected. A fault is set if the feedback pin is at a high level.	Feedback pin level	logical high	Software State	=Init OR Running OR Shutdown	0.03 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Brake Booster Motor "A" Performance	C0594	This monitoring strategy checks if the movement of electric motor is in proper direction. This is done by: a) Checking if the sign of the target speed matches that of the actual speed. b) Checking the changes in direction of the measured electric motor speed within a period. A counter is incremented each time a change in direction is detected.	 Absolute(actual electric motor speed) Or Counter	 '< 15 rad/Sec > 7	Software State Absolute(target electric motor speed) Absolute(target electric motor speed)- Absolute(actual electric motor speed)	= Running OR Shutdown > 25 rad/Sec > 15 rad/Sec	0.15 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks the oscillation of the ibooster motor.A fault is set if if the sign of the actual motor speed has changed to often within a short time interval and no change of the sign of the desired speed.	sign of the actual motor speed has changed AND Sign of the desired speed has change	= True = False	Software State AND Brake Light Switch	= Running OR Shutdown = On	0.15 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is an unintended backward rotation of the ESC electric motor. The speed controller monitor detects an unintended backward rotation of the brake booster electric motor. A fault is set if the speed deviation is greater than a threshold.	target electric motor speed - Absolute(actual electric motor speed)	> 40 rad/Sec	Software State target electric motor speed actual electric motor speed	= Running OR Shutdown > 0 rpm ≤ 1 rpm	0.015 [Sec]	Type A, 1 Trip
		DTC PASS	Apply the brake pedal for about 50% for at least 1 sec and then release the brake pedal.					
Brake Booster Motor "A" Phase U-V-W Circuit Low	C0580	This monitoring strategy checks if the gate supply voltage of the electric motor bridge driver is too low. A gate under voltage protection circuit as a part of electric motor driver circuit compares the gate supply voltage of the bridge driver with the power supply of the electric motor. A fault is set if the gate supply voltage is too low compared to the power supply of the electric motor.	Voltage Sensor 2 – Gate supply voltage	> 7 V	Software State	= Running OR Shutdown	0.005 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Brake Booster Motor "A" Phase U-V-W Circuit Range/Performance	C0582	This monitoring strategy checks if two or more gate transistors out of six of the B6-bridge are shorted to each over. One high-side transistor and one low-side transistor of different electric motor phases are switched on simultaneously (all 6 combinations will be switched once within one test execution). If two gates are shorted, one transistor switches on unintentionally, leading to a very high current. A fault is set if the current exceeds a threshold.	Current	> 150 A	Software State	= Running OR Shutdown	0.004 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Brake Booster Motor "A" Phase U-V-W Circuit/Open	C057F	This monitoring strategy checks if MOS-FETs of electric motor driver can be controlled and actuate properly. This monitoring strategy checks if MOS-FETs of electric motor driver can be controlled and actuate properly. A fault is set if a low-side transistor is switched on and the PhaseW voltage is in range. Similarly A fault is set if a high-side transistor is switched on and the PhaseW voltage is in range.	low-side transistor PhaseW voltage / Voltage Sensor 2 OR high-side transistor PhaseW voltage / Voltage Sensor 2	switched on ≥ 0.463 switched on ≤ 0.483	Software State electric motor	= Running OR Shutdown = not controlled	0.005 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Brake Booster Motor "A" Phase U-V-W Current High	C0590	This monitoring strategy checks if there is a positive leakage current at the electric motor driver circuit during control. Leakage current at motor driver is monitored during inactivity of half bridge. A fault is set if the leakage current is above a threshold.	Current Sensor	> 20 A	Software State electric motor	= Running OR Shutdown = controlled	0.005 [Sec]	Type A, 1 Trip
		DTC PASS	Apply the brake pedal for about 50% for at least 1 sec and then release the brake pedal.					
Brake Booster Motor "A" Phase U-V-W Current Low	C0591	This monitoring strategy checks if the leakage current at the motor is in range low. Leakage current at motor driver is monitored during inactivity of half bridge. A fault is set if the leakage current is below a threshold.	Current Sensor	< -20 A	Software State electric motor	= Running OR Shutdown = controlled	0.005 [Sec]	Type A, 1 Trip
		DTC PASS	Apply the brake pedal for about 50% for at least 1 sec and then release the brake pedal.					
Brake Booster Motor "A" Position Sensor Circuit Range/Performance	C058A	This monitoring strategy checks if the RPS1 has a gradient failure. The Electric Motor Speed is equivalent to the gradient of the rotor rotation. A fault is set if the RPS 1 gradient exceeds a threshold.	Absolute(RPS1 gradient)	> 73 °/mSec	Software State	= Running OR Shutdown	0.005 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the rationality of the measured electric motor backward stop position. At end of line, the electric motor backward stop position is stored at EEPROM. This monitor compares the measured electric motor backward stop position with the stored electric motor backward stop position. If there electric motor rotates more than a threshold value to move to backward stop position, a mechanical defect should be present. A negative deviation of expected rotation will be detected by PreDriveCheck monitor. A fault is set if the difference between the measured electric motor backward stop position and the stored electric motor backward stop position exceeds a threshold.	Absolute(measured electric motor backward stop position - stored electric motor backward stop position)	> 60 °	Software State	= Running OR Shutdown	0.005 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks for proper eBoost actuator functionality. (a) A command is sent to move the boost body to the backward bound position (housing). (b) Once the backward bound position is reached (when the boost body comes in contact with the housing), a command is sent to move the boost body forwards to the idle position. A fault is set if (a) : - the backward position is not reached within a calibrated time, depending of last post drive check. - the electric motor is rotating in the wrong direction with a speed exceeding a threshold. (b): - the idle position is not reached within a calibrated time	Absolute(electric motor speed) electric motor moving direction OR backward bound position OR idle position	> 20 rad/s opposite than controlled not reached not reached	Software State	= Init	3 [sec]	Type A, 1 Trip
		This monitoring strategy checks the rationality of RPS1. The rotor angle is calculated internally in RPS1 IC using the raw values of the X and Y direction of the magnetic field orientation after they are internally corrected (e.g. due to off-center positioning of the sensor chip in the magnetic field). This internal calculation is monitored by an redundant recalculation in eBoost ECU using the transmitted X and Y raw values and correction values delivered by the rotor position sensor 1 IC. Both rotor angles, the RPS1 delivered one and the eBoost calculated one, are compared. A fault is set if the deviation between the recalculated angle and the RPS 1 angle delivered by the rotor position Sensor 1 IC exceeds a threshold.	Absolute(measured RPS1 angle - recalculated angle)	> 7.8 °	Software State	= Running OR Shutdown	0.05 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if vector length of RPS vector does not exceed an upper threshold. A permanent magnet is located at the end of the electric motor shaft. The RPS uses the Giant Magneto Resistance (GMR) principle to measure the X and Y direction of the magnetic field. The rotor position is calculated using these raw values after they are internally corrected (e.g due to off-center positioning of the sensor chip in the magnetic field). At a given temperature, the vector length ($\sqrt{(X^2 + Y^2)}$) should be constant due to the defined magnetic field. Hence within the calibrated temperature range of -50°C to 150°C the vector length must lie within a defined range. A fault will be set if the calculated vector length is above a threshold.	Calculated vector length	> 20000 digits	Software State	= Running OR Shutdown	0.05 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the vector length value from the Rotor Position Sensor (RPS) is in range low. A permanent magnet is located at the end of the brake booster motor shaft. The Rotor Position Sensor (RPS) uses the Giant Magneto Resistance (GMR) principle to measure the X and Y direction of the magnetic field. The rotor position is calculated using these raw values after they are internally corrected (e.g due to off-center positioning of the sensor chip in the magnetic field). At a given temperature, the vector length ($\sqrt{X^2 + Y^2}$) should be constant due to the defined magnetic field. Hence within the calibrated temperature range of -50°C to 150°C the vector length must lie within a defined range. A fault will be set if the calculated vector length is below a threshold.	Calculated vector length	< 3922 digits	Software State	= Running OR Shutdown	0.05 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is a noise in the RPS1 vector length. By design, the vector length ($\sqrt{X^2 + Y^2}$) is almost constant, but noise or failures on the X, Y or correction values might lead to an oscillation of the vector length. A high pass filter cuts unwanted high frequencies and noise. A fault will be set if the peak amplitude of the oscillation or noise of the RPS1 vector length is greater than a threshold	Absolute(Noise amplitude)	> 190 digits	Software State	= Running OR Shutdown	0.05 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Brake Booster Rotor Position Sensor Configuration Error	C1277	This monitoring strategy checks if the rotor position sensor IC configuration EEPROM cell is valid. The configuration EEPROM cells of the Rotor Position Sensor (RPS) integrated circuit are monitored to ensure that the original configuration does not change. A fault is set if at least one monitored bit in the rotor position sensor IC configuration EEPROM cells differs from expected value.	Bit value	≠ expected bit value	Software State	= Running OR Shutdown	0.02 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Brake Booster Rotor Position Sensor Message Counter Incorrect	C1276	This monitoring strategy checks if all RPS (Rotor Position Sensor) data are periodically updated. For the raw values, the correction values and the rotor angle, an update-flag within the RPS safety word exists which shows if all these values are periodically updated, not updated or still in the init-state. A fault will be set if the update-flag within the RPS safety word is either "not updated" or "init".	update-flag of RPS safety word OR update-flag of RPS safety word	= NOT_UPDATED = INIT	Software State	= Running OR Shutdown	0.1 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the RPS1 internal clock works properly. The life counter monitoring detects if the internal IC clock is running with the desired frequency. At each clock cycle a counter is incremented in register cell. Between two monitoring tasks, the counter is incremented in a range corresponding to the ratio of clock-frequency to monitoring-frequency. A fault will be set if the counter increment is outside the range.	Counter increment OR Counter increment	< 6 > 24	Software State	= Running OR Shutdown	0.015 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if The Cyclic Redundancy Check (CRC) is correct. A CRC is sent from the Rotor Position Sensor (RPS) IC to the eBoost ECU for all data which is checked by eBoost. A fault is set if the recalculated CRC does not match the received one.	calculated checksum	≠ received checksum	Software State	= Running OR Shutdown	0.005 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Brake Booster Rotor Position Sensor Unexpected Reset	C1275	This monitoring strategy checks if there was an unexpected reset at RPS. According to the specification of the Rotor Position Sensor (RPS) chip, the sensor can perform a reset under specific conditions (e.g. under voltage). If a reset happens, the position of the electric motor cannot be calculated anymore. The Hardware Related Software (HSW) checks if a reset of the sensor has happened by monitoring the reset-flag in EEPROM cell. A fault is set if the reset flag is set.	Reset-flag	= 1	Software State	= Running OR Shutdown	immediately	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Brake Pedal Position Sensor "A" Circuit High	P057D	This monitoring strategy checks if there is a circuit high at BPTS A. The brake pedal travel sensor signal A line monitor detects a short circuit to the supply voltage when no level change is detected for a period and logical signal level is high. A fault is set if there is a circuit high at BPTS A.	BPTS A signal line voltage AND rising or falling edge of BPTS A PWM	> 4.7 V = not detected	Software State	= Running OR Shutdown	0.03 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Brake Pedal Position Sensor "A" Circuit Intermittent/Erratic	P057E	This monitoring strategy checks if there is a BPTS A gradient error. This monitoring is detecting the gradient only in backward direction. There is no definition possible, how quick a driver can push the brake pedal. Negative gradient monitoring is used to prevent mechanical defects. A fault is set if the gradient of signal A is out of range.	BPTS A gradient	< -2000 mm/Sec	Software State	= Running OR Shutdown	0.005 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Brake Pedal Position Sensor "A" Circuit Low	P057C	This monitoring strategy checks if there is a circuit low at BPTS A. The brake pedal travel sensor signal A line monitor detects a short circuit to ground when no level change is detected for a period and logical signal level is low. A fault is set if there is a circuit low at BPTS A.	BPTS A signal line rising or falling edge of BPTS A PWM	< 0.3 V = not detected	Software State	= Running OR Shutdown	0.03 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Brake Pedal Position Sensor "A" Circuit Range/Performance	P057B	This monitoring strategy checks if BPTS A is out of range high. A fault is set if the BPTS A is above a threshold.	BPTS A	> 47 mm	Software State	= Running OR Shutdown	0.04 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if BPTS A is out of range low. A fault is set if the BPTS A is above a threshold.	BPTS A	< -0.5 mm	Software State	= Running OR Shutdown	0.04 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is a BPTS A communication fault. The brake pedal travel senor module is working with a frequency of 1 kHz. This is done by checking if - the frequency of the Pulse Width Modulated signal is in range. - the duty cycle of the Pulse Width Modulated brake of pedal position sensor A is in range. A fault is set if - the frequency is out of range. - the duty cycle of BPTS A is out of range.	BPTS A PWM frequency OR BPTS A PWM frequency OR BPTS A PWM duty cycle OR BPTS A PWM duty cycle	< 879.3 1/Sec > 1127.17 1/Sec < 7.32 % > 92.83 %	Software State	= Running OR Shutdown	0.1 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Brake Pedal Position Sensor "A"/"B" Correlation	P05E0	This monitoring strategy checks if there is a deviation between the two sensor channels. A fault is set if the absolute value of the difference between both signals exceeds a threshold.	Absolute(BPTS A - BPTS B) OR Absolute(BPTS A - BPTS B)	> 1 mm > 0.5 mm	BPTS A signal AND BPTS B signal OR BPTS A signal AND BPTS B signal	> 42 mm > 42 mm ≤ 42 mm ≤ 42 mm	0.5 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if zero position of brake pedal is in range. The brake pedal travel sensor provides two separate signals with different transmissions and signal conditionings. This monitor checks if the arithmetic mean of BPTS A and BPTS B when brake pedal is not applied is within a tolerated range. A fault is set if the arithmetic mean of BPTS A and BPTS B Is above a threshold.	(BPTS A + BPTS B) / 2 (BPTS A + BPTS B) / 2	> 0.6 mm < 1.5 mm	Software State	= Running OR Shutdown	0.5 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait at least 60 sec with released brake pedal while the brake system and fluid has a temperature of approximately 20C					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Brake Pedal Position Sensor "B" Circuit High	P05DE	This monitoring strategy checks if there is a circuit high at BPTS B. The brake pedal travel sensor signal B line monitor detects a short circuit to the supply voltage when no level change is detected for a period and logical signal level is high. A fault is set if there is a circuit high at BPTS B.	BPTS B signal line rising or falling edge of BPTS B PWM	> 4.7 V = not detected	Software State	= Running OR Shutdown	0.03 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Brake Pedal Position Sensor "B" Circuit Intermittent/Erratic	P05DF	This monitoring strategy checks if there is a BPTS B gradient error. This monitoring is detecting the gradient only in backward direction. There is no definition possible, how quick a driver can push the brake pedal. Negative gradient monitoring is used to prevent mechanical defects. A fault is set if the gradient of BPTS B is above a threshold.	BPTS B gradient	< -2000 mm/Sec	Software State	= Running OR Shutdown	0.005 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Brake Pedal Position Sensor "B" Circuit Low	P05DD	This monitoring strategy checks if there is a circuit low at BPTS B. The brake pedal travel sensor signal B line monitor detects a short circuit to ground when no level change is detected for a period and logical signal level is low. A fault is set if there is a circuit low at BPTS B.	BPTS B signal line rising or falling edge of BPTS B PWM	< 0.3 V = not detected	Software State	= Running OR Shutdown	0.03 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Brake Pedal Position Sensor "B" Circuit Range/Performance	P05DC	This monitoring strategy checks if BPTS B is out of range high. A fault is set if the BPTS B is above a threshold.	BPTS B	> 47 mm	Software State	= Running OR Shutdown	0.04 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if BPTS B is out of range low. A fault is set if the BPTS B is above a threshold.	BPTS B	< -0.5 mm	Software State	= Running OR Shutdown	0.04 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there is a BPTS B communication fault. The brake pedal travel senor module is working with a frequency of 1 kHz. This is done by checking if - the frequency of the Pulse Width Modulated signal is in range. - the duty cycle of the Pulse Width Modulated brake of pedal position sensor A is in range. A fault is set if - the frequency is out of range. - the duty cycle of BPTS B is out of range.	BPTS B PWM frequency OR BPTS B PWM frequency OR BPTS B PWM duty cycle OR BPTS B PWM duty cycle	< 879.3 1/Sec > 1127.17 1/Sec < 7.32 % > 92.83 %	Software State	= Running OR Shutdown	0.1 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Brake System Information 1 Message Counter Incorrect	C1278	This monitoring strategy checks whether the message is still alive or not. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). With each newly sent message a counter is incremented within the sending ECU. the counter value is enclosed within the message. The receiving control unit checks whether counters have been incremented. A fault is set if the counter value is not incremented.	Message 0x21B on Bus E counter halted	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.2 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the message checksum is correct. The network driver sends and receives all network messages. It also checks if the messages are correct (length, checksum, alive-counter, reception timeout). With each newly sent message a checksum is calculated within the sending ECU. The value of the checksum is enclosed within the message. The receiving control unit calculates the checksum again and compares it with the sent one. A fault is set if the received checksum is different from the calculated checksum.	Checksum of 0x21B on Bus E not correct	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.2 [Sec]	Type A, 1 Trip
Brake System Information 2 Message Counter Incorrect	C1279	This monitoring strategy checks whether the message is still alive or not. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). With each newly sent message a counter is incremented within the sending ECU. the counter value is enclosed within the message. The receiving control unit checks whether counters have been incremented. A fault is set if the counter value is not incremented.	Message 0x21E on Bus E counter halted	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.2 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the message checksum is correct. The network driver sends and receives all network messages. It also checks if the messages are correct (length, checksum, alive-counter, reception timeout). With each newly sent message a checksum is calculated within the sending ECU. The value of the checksum is enclosed within the message. The receiving control unit calculates the checksum again and compares it with the sent one. A fault is set if the received checksum is different from the calculated checksum.	Checksum of 0x21E on Bus E not correct	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.2 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Control Module Communication Chassis Expansion CAN Bus Off - Generic	U0077	The CAN (Control Area Network) bus E state is monitored periodically. A fault is set if the bus is in "Bus Off" state.	CAN bus E state	= Bus off	System voltage AND System voltage ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = True ≥ 5 Sec	0.09 [Sec]	Type A, 1 Trip
		This monitoring checks if the CAN initialization function has taken too long to finish . The access to message Ram by the CAN-Core is handle through a message interface register. In each cycle a CAN register bit is checked to determine if the bit is set. A fault is set if the loop lasts longer than a threshold	Number of CAN cycles	> 1000	Software State	= Init	0.01 [sec]	Type A, 1 Trip
Control Module Communication High Speed CAN Bus Off - Generic	U0073	The CAN (Control Area Network) bus A state is monitored periodically. A fault is set if the bus is in "Bus Off" state.	CAN bus A state	= Bus off	System voltage AND System voltage ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = True ≥ 5 Sec	0.24 [Sec]	Type B, 2 Trips
		This monitoring checks if the CAN initialization function has taken too long to finish . The access to message Ram by the CAN-Core is handle through a message interface register. In each cycle a CAN register bit is checked to determine if the bit is set. A fault is set if the loop lasts longer than a threshold	Number of CAN cycles	> 1000	Software State	= Init	0.01 [sec]	Type B, 2 Trips
Control Module Input Power "A" Circuit High	U3502	This monitoring checks the system supply voltage. A fault is set if the voltage is greater than a calibrated threshold.	CAN supply voltage	> 16 V	Software State	= Running	0.09 [Sec]	Type B, 2 Trips
		DTC PASS	Turn ignition on and wait for at least 30sec					
Control Module Input Power "A" Circuit Low	U3501	This monitoring strategy checks if voltage sensor 3 is out of range low, which means below the HW (Hardware) switch off threshold but the HW is not switched off for the particular time. A fault is set if the voltage sensor 3 is below a threshold	Ecu supply voltage	< 4.9 V	Software State	= Running	0.2 [Sec]	Special Type C
		This monitoring checks the system supply voltage. A fault is set if the voltage is less than a calibrated threshold.	CAN supply voltage	< 7.5 V	Software State	= Running	0.09 [Sec]	Special Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		DTC PASS	Turn ignition on and wait for at least 30sec					
Control Module Input Power "B" Circuit/Open	U3007	A fault is set if the Voltage Sensor 1 voltage drops below a threshold.	Voltage Sensor 1	< 2 V	Software State	= Running OR Shutdown	0.1 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Control Module Input Power "B" Circuit High	U3506	This monitoring strategy checks the power supply battery (UBB) voltage. A fault is set If the UBB detection voltage is above the voltage limit for an extended period of time.	UBB AND Period of time	> 17 V = 90 Sec	Software State	= Running OR Shutdown	90 [Sec]	Type B, 2 Trips
		This monitoring strategy checks the range of the supply voltage of the complex device driver module. A fault is set if this voltage is above a calibrated threshold.	Complex device motor voltage	> 18 V	Software State	= Running OR Shutdown	1.1 [Sec]	Type B, 2 Trips
		This monitoring strategy checks the power supply battery (UBB) voltage. A fault is set if the performance is reduced due to a voltage UBB above the level 1.	UBB AND Period of time	> 16.5 V = 1.1 Sec	Software State	= Running OR Shutdown	1.1 [Sec]	Type B, 2 Trips
		DTC PASS	Turn ignition on and wait for at least 90sec					
Control Module Input Power "B" Circuit Low	U3505	This monitoring strategy checks if Voltage Sensor 1 is out of range low. A fault is set if the voltage sensor 1 is below a threshold.	Voltage Sensor 1	< 6 V	Software State	= Running OR Shutdown	30 [Sec]	Special Type C
		This monitoring strategy checks the power supply battery (UBB) voltage. A fault is set If the UBB detection voltage is below the voltage limit for an extended period of time.	UBB AND Period of time	< 9.3 V = 90 Sec	Software State	= Running OR Shutdown	90 [Sec]	Special Type C
		This monitoring strategy checks the range of the supply voltage of the complex device driver module. A fault is set if the voltage is less than a threshold.	Complex device motor voltage	< 6 V	Software State	= Running OR Shutdown	0.2 [Sec]	Special Type C
		This monitoring strategy checks the power supply battery (UBB) voltage. A fault is set if the system performance is reduced due to low voltage under level 1.	UBB	< 9.3 V	Software State	= Running OR Shutdown	0.2 [Sec]	Special Type C
		This monitoring strategy checks the power supply battery (UBB) voltage. A fault is set if the system performance is reduced due to low voltage under level 2.	UBB	< 7.5 V	Software State	= Running OR Shutdown	0.2 [Sec]	Special Type C
		DTC PASS	Turn ignition on and wait for at least 90sec					
Control Module Input Power "C" Circuit High	U350A	This monitoring strategy checks if Voltage Sensor 2 is out of range high. A fault is set if the Voltage Sensor 2 is above a threshold.	Voltage Sensor 2	> 19.8 V	Software State AND vehicle speed	= Running OR Shutdown > 4 mph	90 [Sec]	Type A, 1 Trip
		DTC PASS	Drive straight ahead for at least 3.1 mile					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Control Module Input Power "C" Circuit Low	U3509	This monitoring strategy checks if Voltage Sensor 2 is out of range low. A fault is set if the Voltage Sensor 2 is below a threshold.	Voltage Sensor 2	< 6 V	Software State AND vehicle speed	= Running OR Shutdown > 4 mph	90 [Sec]	Type A, 1 Trip
		DTC PASS	Drive straight ahead for at least 3.1 mile					
Control Module Input Power Circuit "A/B" Correlation	U3018	This monitoring checks if the battery power supply (UBB) is not too low compared to the ECU power supply to ensure a reliable switching of the Booster Master Swith. A fault is set if the difference between UBB and UB_ECU is higher than a threshold	UBB - UB_ECU	> 7 V	Software State	= Init OR Running OR Shutdown	0.01 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the battery can provide enought power to the system. The central coordinator component in Electric Brake Booster Control Module is used to coordinate some initial tests and specific cyclic Electric Brake Booster Control Module Monitoring which depends on each other. A prerequisite for all initial tests except for the failsafe logic handler test is a sufficient Electric Brake Booster Control Module Power Supply Battery UBB. If the voltage is too low, the coordinator tests are delayed. During initial phase, all tests must be done once. If the initial phase takes too long, an undervoltage situation is given. A fault is set if any tests are initially delayed.	UBB OR [UBB_ECU AND UBB-UBB_ECU] OR [UBB_ECU AND UBB-UBB_ECU]	< 6 V > 8.5 V > 3.5 V ≤ 8.5 V > 1.5 V	Software state	= Init	0.5 [sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Control Module Input Power Circuit "B/C" Correlation	U3019	This monitoring strategy checks Voltage divider drift between the booster circuit supply line (Voltage Sensor 1) and the Motor Driver supply line (Voltage Sensor 2). A fault is set if the ratio of Voltage Sensor 1 and Voltage Sensor 2is outside a range.	Voltage Sensor 2/Voltage Sensor 1 OR Voltage Sensor 2/Voltage Sensor 1	> 1.321 < 0.766	Software State	= Running OR Shutdown	2 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Control Module Internal Performance	P0606	This monitoring strategy checks the proper functionality of the CPU Compare Module. The software is executed on 2 CPU cores simultaneously instruction by instruction (lock step mode). The output of both cores is compared by the CPU Compare Module. A self test runs at Init to verify that the CPU Compare Module is working properly. A fault will be set if the selftest failed.	Core Compare Module selfest	= failed	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if there is a CPU exception. A fault is set if a data abort, a prefetch abort, or an undefined instruction occurs.	Data abort occurs OR Prefetch abort occurs OR Undefined instruction occurs	= True = True = True	Software State	= Init OR Running OR Shutdown	immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the execution of a sensitive process task jitters too much. A fault is set if the real process execution time is greater than its ideal start time increased by a percentage.	The execution time of the internal system process task (ibooster systems)	> Ideal Time + 10% s	Software State	= Init OR Running OR Shutdown	Immediately	Type A, 1 Trip
		This monitoring strategy checks if the reference voltage of A/D-converter is out of range. A fault is set if the bandgap voltage of the ADC is outside the allowable range.	Analog Digital Converter bandgap voltage OR Analog Digital Converter bandgap voltage	< 1145 V > 1345 V	Software State	= Init OR Running OR Shutdown	immediately	Type A, 1 Trip
		This monitoring strategy tests whether the system chip detects a missing watchdog trigger. At Initialization, the safety controller switches off the BMS. At switched off the BMS, a watchdog trigger is expected. If this trigger is missed, A fault is set. A fault is set if BMS switched off does not set a watchdog trigger.	Watchdog trigger AND BMS gate	missed not switched off	Software State	= Init	1 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the motor driver circuit is able to be switched off and on. The electric motor driver switching (on/off) is tested by the microcontroller and the safety controllers to detect any short-circuit or interruption of the enable signal line. A fault is set if the electric motor driver is not properly switched off and on.	(Command sent : AND Motor Driver) OR (Command sent : AND Motor Driver)	 switch off enabled switch on disabled	Software State	= Init	1 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the error pin event counter is in range. The monitor pulls the error pin to test the event counter within the system chip. To prevent an electrical shutdown (which would disturb communication) during the provoked error pin event, the electrical decouple bit is set. A fault is set if the error pin event counter does not increment, or if the decouple bit is not reset.	Error pin event counter not incremented	= True	Software State	= Running	1 [sec]	Type A, 1 Trip
		This monitoring strategy checks if there is a High End Timer (HET) exception. A fault is set if a failure is detected in the EEPROM cell.	Failure detected in register of High End Timer	= True	Software State	= Init OR Running OR Shutdown	immediately	Type A, 1 Trip
		This monitoring strategy checks for proper of the High End Timer Transfer Unit (HETTU) addressing functionality. When a pointer error is detected, the HETTU state switches to a specific value. A fault is set if the HETTU is in the pointer error state.	High End Timer Transfer Unit Status	= "pointer error"	Software State	= Init OR Running OR Shutdown	Immediately	Type A, 1 Trip
		This monitoring strategy checks the High End Timer Transfer Unit (HETTU) internal bus. A fault is set if a bus error is detected.	High End Timer Transfer Unit Status	= "bus error"	Software State	= Init OR Running OR Shutdown	Immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks the High End Timer Transfer Unit (HETTU) internal bus. A fault is set if a bus error is detected.	High End Timer Transfer Unit Status	= "busy bit error"	Software State	= Init OR Running OR Shutdown	Immediately	Type A, 1 Trip
		This monitoring strategy checks if there was a High End Timer Transfer Unit (HETTU) exception. A fault is set if an exception occurs.	Failure detected in register INT	= True	Software State	= Running	Immediately	Type A, 1 Trip
		This monitoring strategy checks if the eBoost internal motor driver enable signal line or the electrical enable signal line are in logical low. It is expected that the enable signal lines always stay at a high voltage level (except when the SW intends a different state). A fault is set if at least one of the pins reports a logical low.	Pin level of Motor Driver enable line OR Pin level of electrical enable line	= 0 (logical low) = 0 (logical low)	Software State AND failsafe logic test	= Running OR Shutdown = Finished	0.05 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if there was a task failed to call. A fault will be set if a task did not start in the expected time.	Watchdog detects a missing task	= True	Software State	= Init OR Running OR Shutdown	immediately	Type A, 1 Trip
		This monitoring strategy checks the system integrated circuit watchdog fault counter. A fault is set if this error counter exceeds a threshold.	Error counter	> 3	Software State	= Running OR Shutdown	immediately	Type A, 1 Trip
		This monitoring strategy checks if the watchdog trigger is received as expected. An incorrect watchdog trigger signal is sent to the system chip watchdog function, which increments the watchdog error counter. A fault is set if the watchdog fault counter is not incremented.	Incorrect watchdog data sent to chip	= True	Software State	= Running OR Shutdown	1 [sec]	Type A, 1 Trip
		This monitoring strategy checks if all possible watchdog triggers are received within a certain time by the system chip. A fault will be set if not all watchdog tasks are done in a certain period.	Number of watchdog tasks done	< Number of watchdog tasks	Software State	= Running OR Shutdown	0.45 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the status of the watchdog. During the initialization test the watchdog status feedback from the system chip is tested against several patterns according to the ongoing sub test. A fault is set if the watchdog status is not as expected.	Watchdog status	≠ expected watchdog status	Software State	= Running OR Shutdown	1 [sec]	Type A, 1 Trip
		This monitoring strategy checks the status of the watchdog. After the Init test has finished, the status of the watchdog respectively the safety logic is being continuous Monitored. A fault will be set if the status is not as expected.	Watchdog status	≠ expected watchdog status	Software State	= Running OR Shutdown	0.05 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks correct handling of NMI. The Error Signal Module is the central module at the microcontroller level; it handles severe microcontroller core failures or peripheral failures, and coordinates the logic tests during start-up. A fault is set if the Non-Maskable Interrupt handler detects a failure During Init tests.	Non-Maskable Interrupt occurs	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if a severe microcontroller core or peripheral failure occurred. The Error Signal Module (ESM) is the central module at the microcontroller level; it handles severe microcontroller core or peripheral failures. A fault is set when severe microcontroller core or peripheral failures occurred.	A microcontroller core failure via Error Signal Module is detected OR Peripheral failure via ESM is detected	= True = True	Software State	= Running OR Shutdown	immediately	Type A, 1 Trip
		This monitoring strategy checks whether the HET has the proper reference signal frequency. The monitor compares the defined frequency with the actual reference signal frequency, which is calculated by the HET. A fault is set if the difference between the defined frequency and the actual frequency exceeds a threshold.	Absolute(Defined frequency - calculated frequency) / defined frequency	> 0.05	Software State	= Running OR Shutdown	immediately	Type A, 1 Trip
		This monitoring strategy tests the Serial Peripheral Interface (SPI) functionality and failure handling of the Application Specific Integrated Circuits (ASIC) used in the system. To do so, the SPI component provides special functions to perform the following tests : - reading from/writing to an undefined address EEPROM cell - writing to a non-writable EEPROM cell - reading a EEPROM cell with a parity failure during transmission - reading a EEPROM cell with a clock failure during transmission For each of these tests, a certain fault response is expected from the ASIC. A fault is set if at least one fault response does not match the expected one.	No or wrong fault response from ASIC while reading from an undefined address register OR No or wrong fault response from ASIC while writing to an undefined address register OR No or wrong fault response from ASIC while writing to a non-writable register OR No or wrong fault response from ASIC while reading a register with a parity error in frame 1 during transmission OR No or wrong fault response from ASIC while reading a register with a parity error in frame 2 during transmission OR No or wrong fault response from ASIC while reading a register with a clock failure (less clock pulses) during transmission OR No or wrong fault response from ASIC while reading a register with a clock failure (more clock pulses) during transmission	= True = True = True = True = True = True = True	Software State	= Init	immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		The monitoring checks the received data by the Application Specific Integrated Circuit (ASIC). The ASIC of the system is connected to the microcontroller via a Serial Peripheral Interface (SPI). A fault is set if not all data has been transmitted or received. Parity check - The ASIC of the system is connected to the microcontroller via a serial Peripheral Interface (SPI). The monitoring checks the received data by the ASIC. A fault is set if the calculated parity does not match the parity bit. Bit check - The ASIC of the system is connected to the microcontroller via a serial Peripheral Interface (SPI). The monitoring checks the received data by the ASIC. A fault is set if at least one bit of the actual transmitted data is not equal to the transmit bit in register. Rationality check - The ASICs of the system is connected to the microcontroller via a serial Peripheral Interface (SPI). When ASIC detects a transmission failure, it sends an error frame via the SPI. The monitoring checks the frames transmitted via the SPI. A fault is set if a wrong frame is transmitted.	Length of received data OR Calculated parity of the received data OR Time out error OR Acutal transmitted bits OR Clock failure OR Data received	≠ length of send data ≠ received parity bit = True ≠ bits in register = True ≠ bits in register	Software State	= Init OR Running	0.001 [sec]	Type A, 1 Trip
		This monitoring strategy checks if there is a Serial Peripheral Interface (SPI) communication failure. The Application Specific Integrated Circuits (ASIC) of the system are connected to the microcontroller via a SPI. The microcontroller includes hardware Monitoring of the ASIC to recognize failures of the necessary input signals. The Monitor reads the results of certain of this hardware Monitoring by reading out the ASIC EEPROM cell via Serial Peripheral Interface. A fault is set if charge-pump failure bit, or clock-input-signal failure bit, or internal-oscillator-circuit failure bit is set.	Charge-pump failure bit is set OR Clock-input-signal failure bit is set OR Internal-oscillator-circuit failure bit is set	= True = True = True	Software State	= Init	0.2 [Sec]	Type A, 1 Trip
		This monitoring strategy checks the voltage comparators of the ASIC. The Application Specific Integrated Circuit (ASIC) has several voltage comparators to monitor the level of different voltage supplies. These comparators are tested at start-up for correct functionality, and the result of the test is stored as a EEPROM cell value. A fault is set if there is an error flag when the monitor reads the EEPROM cell value.	Error flag is set in a defined register	= True	Software State	= Init	Three consecutive ignition cycles	Type A, 1 Trip
		This monitoring strategy checks if there is a timeout of the Serial Peripheral Interface (SPI) communication to Application Specific Integrated Circuit (ASIC). The Application Specific Integrated Circuit (ASIC) of the system is connected to the microcontroller via a Serial Peripheral Interface (SPI). The goal is to monitor the duration of the SPI transmission. A fault is set if the SPI transfer to ASIC is not finished within a defined period.	Duration of SPI transfer to ASIC	> 0.005 Sec	Software State	= Init	0.05 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		The monitoring checks the received data by the Application Specific Integrated Circuit (ASIC). The ASIC of the system is connected to the microcontroller via a Serial Peripheral Interface (SPI). A fault is set if not all data has been transmitted or received. Parity check - The ASIC of the system is connected to the microcontroller via a serial Peripheral Interface (SPI). The monitoring checks the received data by the ASIC. A fault is set if the calculated parity does not match the parity bit. Bit check - The ASIC of the system is connected to the microcontroller via a serial Peripheral Interface (SPI). The monitoring checks the received data by the ASIC. A fault is set if at least one bit of the actual transmitted data is not equal to the transmit bit in register. Rationality check - The ASICs of the system is connected to the microcontroller via a serial Peripheral Interface (SPI). When ASIC detects a transmission failure, it sends an error frame via the SPI. The monitoring checks the frames transmitted via the SPI. A fault is set if an error frame is transmitted.	Length of received data OR Calculated parity of the received data OR Clock failure OR Acutal transmitted bits OR Error frame received	≠ length of send data ≠ received parity bit = True ≠ bits in register ≠ bits in register	Software State	= Init OR Running OR Shutdown	0.05 [sec]	Type A, 1 Trip
		This monitoring strategy checks if there was an exception in Operating System. A fault is set if an exception occurs in the Operating System.	OS-exception occurs	= True	Software State	= Running OR Shutdown	immediately	Type A, 1 Trip
		This monitoring strategy checks if the Static Random Access Memory (SRAM) and peripheral Random Access Memory (RAM) are initialized or not. The SRAM and peripheral RAM are cleared at power-up. Then this Monitoring reads every SRAM and RAM addresses. A fault will be set if at least one adresse is not initialized to zero.	At least one RAM or SRAM bit	≠ 0	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if a wrong hexfile was flashed in the AECU. The purpose of RTP pins is to do measurement of RAM variables. A fault is set if the RTP Enable pin is stuck to a high.	RTP Enable pin stuck to high	= True	Software State	= Init	Immediately	Type A, 1 Trip
		The System Mode Manager (SMM) asks in parallel with multiple system modes for the individual modules. To do this, it receives requests from different parts of software which are initialized at the beginning and after a while a valid value is given which is not "init" value. A fault is set if after a while one requester is still in init value.	One requester still in init value for time	> 3.6 Sec	Software State	= Running	3.6 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if the microcontroller stack has over or underflowed. During initialization, stack memory cells are set at the beginning and at the end of the stack area: these Stack memory cells are checked periodically. A fault is set if one of these Stack memory cells has been overwritten.	End-stack word overwritten OR Beginning-stack word overwritten	= True = True	Software State	= Init	0.04 [sec]	Type A, 1 Trip
		This monitoring strategy checks the time to configure the Application Software, during the system startup. A fault will be set if it lasts longer than a defined period.	ASW configuration time	> 5 Sec	Software State	= Init	5 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks for an unsupported Bootblock and FSW clock configuration in ECU. Within an ECU, the Bootblock allows actualizing the application which is called FSW. A failure is set if the Bootblock and FSW clock settings are different.	Bootblock and FSW clock settings are different	= True	Software State	= Init	Immediately	Type A, 1 Trip

		This monitoring strategy checks if an internal fault has occurred in the operating system. A fault is set if software interrupts have occurred but:
		- the interrupt is invalid.
		- An interrupt lock release is called without previous lock.
		- not all interrupts are released.
			Software interrupt occurred
			AND
			{
			Invalid interrupt occurred
			OR
			Interrupt lock release is called without previous lock
			OR
			Not all interrupts are released
			OR
			Interrupt lock time
			}
				= True
				
				= True
				
				= True
				
				= True
				
				> 0.001 Sec
					Software State	= Init OR Running OR Shutdown	Immediately	Type A, 1 Trip

		This monitoring strategy checks if interrupts are properly running. The error signal module is the central module in the microcontroller level. It handles severe microcontroller core failures or peripheral failures, and coordinates the logic tests during start-up. A fault is set if no or not expected non-maskable interrupt occurs during Init tests.	Failure detected during safety logic startup tests	= True	System voltage	> 6.9 V	Immediately	Type A, 1 Trip
		This monitoring strategy checks if the software is properly configured for the hardware. Software version and device identifiers of the Application Specific Integrated Circuit (ASIC) and of the microcontroller are compared with the software version and identifiers of the configuration software. A fault is set if a least one ID or software version does not match.	Received ID of microcontroller is not identical with the ID stored in the software	= True	Software State	Init	0.03 [sec]	Type A, 1 Trip
		This monitoring strategy checks if there are internal and input signal failures of the Application Specific Integrated Circuit (ASIC). The ASIC is connected to the microcontroller by Serial Peripheral Interface (SPI). The monitor reads the results of this hardware monitoring EEPROM cell using Serial Peripheral Interface. The bits of the EEPROM cell are set by the hardware logic "Voltage-Pre_regulator-Mode". A fault is set if the voltage-pre-regulator-mode failure bit is set.	Voltage-pre-regulator-mode failure bit is set	= True	Software State	= Running OR Shutdown	0.2 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 30sec					
Control Module Long Term Memory Performance	P062F	This monitoring checks for a plausible EEPROM ceel defect. A fault is set if the "gap lap adjust" correction factor can not be read from the EEPROM	Gap lap adjust correction factor can not be read	= True	Software State	= Init	Immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks for a plausible EEPROM cell defect. A fault is set if the update of the plant Jump-In Gain adjustment failed.	Update of Plant Jump-In Gain Adjustment failed	= True	Software State	= Init	Immediately	Type A, 1 Trip
		This monitoring strategy checks if there is enough available space in the EEPROM (Electronically Erasable Programmable Read-Only Memory) to allocate a data field. A fault is set if the size of the data field is bigger than the amount of available space in EEPROM.	Data field size to allocate	> Available Space	Software State	= Init OR Running OR Shutdown	immediately	Type A, 1 Trip
		This monitoring strategy checks if it is possible to write data in persistent storage. Every write access to non-volatile memory in the EEPROM (Electronically Erasable Programmable Read-Only Memory) is protected by timeout monitoring and data verification after writing. The Persistent Data Manager checks persistent data access in EEPROM. A fault is set if a write operation occurs or if data verification after writing fails.	Writing operation	> 0.025 Sec	Software State	= Running	immediately	Type A, 1 Trip
		This monitoring strategy check if the the Master Cylinder pressure sensor offset can be written. A fault is set if the value can not be written in the EEPROM during postrun	write failure occured	= True	Software State	= Shutdown	immediately	Type A, 1 Trip
		This monitoring checks if there is no write failure during the system shutdown phase. A fault is set if values can not be written in the EEPROM during postrun	write failure occured	= True	Software State	= Shutdown	0.02 [Sec]	Type A, 1 Trip
		This monitoring checksthe CAN initialization function has taken too long to finish . The access to message Ram by the CAN-Core is handle through a message interface register. In each cycle a CAN register bit is checked to determine if the bit is set. A fault is set if the loop lasts longer than a threshold	Number of CAN cycles	> 1000	Software State	= Running	0.02 [Sec]	Type A, 1 Trip
		This monitoring checksthe CAN initialization function has taken too long to finish . The access to message Ram by the CAN-Core is handle through a message interface register. In each cycle a CAN register bit is checked to determine if the bit is set. A fault is set if the loop lasts longer than a threshold	Number of CAN cycles	> 1000	Software State	= Running	0.02 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Control Module Long Term Memory Reset	P0603	This monitoring cheks for a plausible EEPROM cell defect. A fault is set if the regenerative braking counter value can not be read from the EEPROM	Regenrative braking counter value can not be read	= True	Software State	= Init	Immediately	Type A, 1 Trip
		This monitoring checks for a plausible EEPROM cell defect. A fault is set if the delta dead volume of the Pression-Volume (pV) characteristics can not be read from the EEPROM	Delta dead volume of the pV characteristics can not be read	= True	Software State	= Init	Immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring cheks for a plausible EEPROM cell defect. A fault is set if the Pressure-Volume characteristics correction factor can not be read from the EEPROM.	Pressure-Volume characteristics correction factor can not be read	= True	Software State	= Init	Immediately	Type A, 1 Trip
		This monitoring strategy checks the stored value of Elektric Motor idle position. The rotor idle position is written to an EEPROM cell at the end of the production line. This EEPROM cell is read at Ignition State. A fault will be set if the stored value of the "Motor_IdlePositionTravel" could not be read from EEPROM cell.	Read failure occurs	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if there is no calibration of electric motor idle position. The rotor idle position is written to a EEPROM cell of an EEPROM at end of production line. This EEPROM cell is read at Ignition State. A fault is set if the EEPROM cell is empty.	Register is empty	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if the stored Electric Motor angle at the lower end stop position can be read. The brake booster electric motor angle at the lower end stop position is measured and written to an EEPROM cell at the end of the production line. This EEPROM cell is read at Ignition State. A fault is set if a read failure occurs.	Read failure occurs	= True	Software State	= Init	immediately	Type A, 1 Trip
		This Monitoring checks that one value of the eBoost basic Init conditions is available. The brake booster motor angle at backwards bound is measured and written to an EEPROM cell at end of production line. This EEPROM cell is read at Ignition State. A fault is set if the EEPROM cell is empty.	Register is empty	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if there is a reading problem of the EEPROM. The plunger release position is written to an EEPROM cell of an EEPROM at the end of the production line. This EEPROM cell is read at Ignition State. A fault is set if a read failure occurs.	Read failure occurs	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if data in EEPROM is empty. The plunger release position is written to a EEPROM cell the end of production line. This EEPROM cell is read at Ignition State. A fault is set if the EEPROM cell is empty.	Register is empty	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if the customer identifier is correct. At Init, the persistent data manager checks the mismatch of the EEPROM cell value and expected customer ID. A fault is set if the expected customer ID does not match with the stored customer ID.	Stored customer ID	≠ expected customer ID	Software State	= Init	immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the system do not find the enhanced platform software end marker which is use to help the system to find the end of data. At ignition state, the Persistent Data Manager checks the content of the EEPROM. A fault is set if the enhanced platform software end marker has not been found.	No enhanced platform software end marker in EEPROM	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks the stored data field size is correct. At Ignition State, the Persistent Data Manager checks the content of the EEPROM. A fault is set if a data field size in EEPROM does not match data item configuration in software.	Data field size in the EEPROM	≠ data size configuration in software	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks the reading accessibility of the EEPROM. At Init, the Persistent Data Manager checks the content of the EEPROM. A fault is set if an access error occurs while reading the EEPROM.	Read error occurs OR Not expected Non-Markable Interrupt detected	= True = True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if a stored BPTS value can be read. The BPTS detects the position of the brake pedal. Before providing proper values, the BPTS has to be calibrated using calibration values stored in an EEPROM cell. This EEPROM cell is read during the eBoost initialization state. A fault is set if a read failure occurs.	read failure occured	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if the EEPROM cell which contains the calibrations value of the Brake Pedal Travel Sensor (BPTS) is empty. The BPTS provides two separate signals with different transmissions and signal conditionings. Each signal is calibrated at end of production line, and calibration values are written to a cell of an EEPROM. This EEPROM cell is read at Ignition State. A fault is set if the EEPROM cell is empty.	Register is empty	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if the calibrated position value can be read. The Brake Pedal Travel Sensor (BPTS) detects the position of the brake pedal. Before providing proper values, it has to be calibrated by using calibration values stored in an EEPROM cell. This EEPROM cell is read at Init State. A fault is set if a read failure occurs.	Read failure occurs	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if the calibrated offset value can be read. The Brake Pedal Travel Sensor (BPTS) detects the position of the brake pedal. Before providing proper values, it has to be calibrated by using calibration values stored in an EEPROM cell. This EEPROM cell is read at Init State. A fault is set if a read failure occurs.	Read failure occurs	= True	Software State	= Init	immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the EEPROM cell which contains the calibrated offset value is empty. The Brake Pedal Travel Sensor (BPTS) detects the position of the brake pedal. Before providing proper values, it has to be calibrated by using calibration values stored in a EEPROM cell in an EEPROM memory. This EEPROM cell is read at Ignition State. A fault is set if the EEPROM cell is empty.	Register is empty	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if the calibrated value can be read. The Brake Pedal Travel Sensor (BPTS) detects the position of the brake pedal. Before providing proper values, it has to be calibrated by using calibration values stored in an EEPROM cell in an EEPROM memory. This EEPROM cell is read at Init State. A fault is set if a read failure occurs.	Read failure occurs	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if the calibrated offset value can be read. The Brake Pedal Travel Sensor (BPTS) detects the position of the brake pedal. Before providing proper values, it has to be calibrated by using calibration values stored in an EPPROM cell. This EEPROM cell is read at Init State. A fault is set if a read failure occurs.	Read failure occurs	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if the EEPROM cell which contains the calibrations value is empty. The Brake Pedal Travel Sensor (BPTS) detects the position of the brake pedal. Before providing proper values, it has to be calibrated by using calibration values stored in an EEPROM cell. This EEPROM cell is read at Ignition State. A fault is set if the EEPROM cell is empty.	Register is empty	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks the compensation of the 1, 2, 6 or 8 order of RPS signal. A fault is set If the compensation of 1, 2, 6 or 8 order of RPS signal is not working due to a lack of informations of the EEPROM.	Lack of information of the EEPROM for RPS	= True	Software State	= Init	0.005 [Sec]	Type A, 1 Trip
		This monitoring strategy checks if a stored value of RPS x-value offset could be read. The correction value for the X raw signal of the Rotor Position Sensor (RPS) is written to an EEPROM cell at end of production line. This EEPROM cell is read at Init State. A fault is set if a read failure occurs.	Read failure occurs	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if the EEPROM cell which contains the offset of the X-value of RPS is empty.The correction value for the X raw signal of the Rotor Position Sensor (RPS) is written to an EEPROM cell at the end of the production line. This EEPROM cell is read at Ignition State. A fault is set if the EEPROM cell is empty.	Register is empty	= True	Software State	= Init	immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if a stored value of RPS y-value offset could be read. The correction value for the Y raw signal of the Rotor Position Sensor (RPS) is written to an EEPROM cell at end of production line. This EEPROM cell is read at Init State. A fault is set if a read failure occurs.	Read failure occurs	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if the EEPROM cell which contains the offset of the Y-value of RPS is empty. The correction value for the Y raw signal of the Rotor Position Sensor (RPS) is written to an EEPROM cell at the end of the production line. This EEPROM cell is read at Ignition State. A fault is set if the EEPROM cell is empty.	Register is empty	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if a stored value of RPS synchronicity could be read. The amplitude synchronicity of the X and Y raw values of the Rotor Position Sensor (RPS) is written to an EEPROM cell at end of production line. This EEPROM cell is read at Init State. A fault is set if a read failure occurs.	Read failure occurs	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if the EEPROM cell which contains the offset of the X-value of RPS is empty. The amplitude synchronicity of the X and Y raw values of the Rotor Position Sensor (RPS) are written to an EEPROM cell at the end of the production line. This EEPROM cell is read at Ignition State. A fault is set if the EEPROM cell is empty.	Register is empty	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if the Rotor Position Sensor (RPS) offset can be read. The RPS offset is written to an EEPROM cell at end of production line. This EEPROM cell is read at Init State. A fault is set if a read failure occurs.	Read failure occurs	= True	Software State	= Init	immediately	Type A, 1 Trip
		This monitoring strategy checks if the EEPROM cell which contains the offset of the RPS is empty. The rotor idle position is written to an EEPROM cell at the end of the production line. This EEPROM cell is read at Ignition State. A fault is set if the EEPROM cell is empty.	Register is empty	= True	Software State	= Init	immediately	Type A, 1 Trip
		DTC PASS	Turn ignition off and wait at least 90 sec, turn ignition on and wait 5sec					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Control Module Random Access Memory (RAM)	P0604	This monitoring strategy checks the values of a specific RAM area. Furthermore, the address decoder is tested using test patterns to ensure bus integrity. The test writes different patterns at the addresses of this RAM area. Addresses are then read out and a signature for all the readout values is calculated. The original content in RAM is afterwards rewritten. The order of the patterns is chosen so that the signature the multibit and coupling failures can be set during the signature evaluation. A fault is set if a multibit or coupling failure is detected.	Multi-bits failure detected OR Coupling failure detected OR Address decoder test detects an error	= True = True = True	System voltage	> 6.9 V	Immediately	Type A, 1 Trip
		This monitoring strategy checks correct functionality of Random Access Memory (RAM). A programmable Built In Self Test runs in start-up phase. It is a test implemented in hardware, triggered and evaluated in software. A fault is set if the memory test detects a failure.	Memory test detects a fault	= True	Software State	= Init	Immediately	Type A, 1 Trip
		This monitoring strategy checks if there is a single bit error at RAM. Because of Error Correction Code, RAM single-bit errors are always corrected. A fault will be set if the numberof bit errors exceeds a threshold.	Number of detected single-bit errors	> 2	Software State	= Running OR Shutdown	immediately	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Control Module Read Only Memory (ROM)	P0601	This monitoring strategy checks the correct CRC of Flash EEPROM. Initially and cyclically the complete Flash EEPROM contents is checked by calculating a CRC value and comparing it with the checksum generated during the software build process. A fault is set if a double bit error of Flash EEPROM is detected, or if more than a number of single bit errors are detected (otherwise single bit errors are corrected).	Double bit error detected OR Number of detected single bit errors	= True > 1	Software State	= Init OR Running OR Shutdown	immediately During Startup or respectively after 60 sec for cyclic flash checksum test.	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Extended Brake Pedal Travel	C0075	This monitoring strategy checks if the differential stroke is in range. Due to a mechanical coupling of the boost body and the pedal travel sensor, the differential stroke can only have defined range. A fault is set if the differential stroke exceeds the range.	brake pedal stroke - boost body stroke	< - 5.0 mm	Software State	= Running OR Shutdown	0.04 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Ignition Switch - Accessory Position - Circuit Low	P2537	Detects an accessory position circuit open	Accessory .	= False	Propulsion System Active Propulsion System Active Time	= True > 0.5 Sec	0.5 [sec]	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Ignition Switch - Circuit High	P2535	Detects if the Run/Crank input circuit is high	Short to Battery	> 5 V	CAN Communication And ECM Run/Crank Active Data	= Enabled = False	2.5 [sec]	Type A, 1 Trip
Ignition Switch - Circuit Low	P2534	Detects if the Run/Crank input circuit is low	Short to Ground Or Open Condition	< 2 V = True	CAN Communication And ECM Run/Crank Active Data	= Enabled = Active	2.5 [sec]	Type A, 1 Trip
Internal Control Module A/D Processing Performance	P060B	This monitoring strategy checks the conversion time of the ADC (Analog Digital Converter). The ADC periodically reads an analog signal and converts it into digital values. Before starting a new conversion, the monitor checks that the previous conversion is finished. A fault is set if the previous conversion is not finished for a number of checks.	number of conversions which could not be finished in time	> 9	Software State	= Running	0.003 [sec]	Type A, 1 Trip
		This monitoring strategy checks proper functionality of ADC self-test. To do this, ADC channels are switched to two predefined internal microcontroller resistors to measure defined (voltage) levels (high and low).The absolute differences between the two measurements are calculated in unit digits. A fault will be set if the difference is greater than a threshold.	Absolute(difference between the two ADC measurements)	> 540 digits	Software State	= Running	0.2 [sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Lost Communication with Brake System Control Module on Bus E	U1833	This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x21B not received on Bus E	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.1 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x21E not received on Bus E	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.1 [Sec]	Type A, 1 Trip
Lost Communication With ECM/PCM "A"	U0100	This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0xC9 not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.25 [sec]	Type B, 2 Trips
		This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x4C1 not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	1.25 [sec]	Type B, 2 Trips
Lost Communication With Hybrid Powertrain Control Module	U0293	This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x1DF not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.1 [Sec]	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Sensor Reference Voltage "A" Circuit Range/Performance	P06A6	This monitoring strategy checks if the BPTS supply voltage is in range. The Brake Booster Electronic Control Unit (ECU) evaluates the supply voltage of the brake pedal position sensors. A fault is set if the supply voltage is outside of a certain range.	BPTS supply voltage OR BPTS supply voltage	< 4.68 V > 5.32 V	Software State	= Init OR Running OR Shutdown	0.06 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Sensor Reference Voltage "B" Circuit Range/Performance	P06A7	This monitoring strategy checks if the RPS1 supply voltage is in range. Periodically the RPS1 IC transmits a safety word together with raw values. The voltage-flag of the RPS1 safety word indicates either one of the following errors (failure modes cannot be distinguished): • Under voltage error • Over voltage error • Open circuit A fault is set if the voltage-flag of the RPS1 safety word is set.	voltage-flag of RPS1 safety word set	= True	Software State	= Running OR Shutdown	0.02 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
Sensor Reference Voltage A Circuit Low	P0642	This monitoring strategy checks if the BPTS supply under voltage. A fault is set if BPTS under voltage is caused by Voltage Sensor3 under voltage.	BPTS supply voltage AND Voltage Sensor3	< 4.68 V < 5.6 V	Software State	= Running OR Shutdown	0.06 [Sec]	Type A, 1 Trip
		DTC PASS	Turn ignition on and wait for at least 5sec					
System Configuration Error	C1449	This monitoring strategy checks if the calibrated idle position can be reached at the end of BPTS calibration routine at end of production line.	Idle position not reached	= True	Software State	= Diag	immediately	Type A, 1 Trip
		This monitoring strategy checks if all written BPTS calibration values can be read at the end of production line.	read failure occured	= True	Software State	= Diag	immediately	Type A, 1 Trip
		This monitoring strategy checks if the BPTS calibration routine has been completed at the end of production line	Calibration routine aborted	= True	Software State	= Diag	immediately	Type A, 1 Trip
		This monitoring checks if the pre drive check is missed at the end of the production line	Pre drive check missed	= True	Sofware State	= Diag	immediately	Type A, 1 Trip
		This monitoring strategy checks if measured value for idle position at OES calibration routine can be written. A fault is set if the value can not be written in the EEPROM at the end of the production line	write failure occured	= True	Software State	= Diag	immediately	Type A, 1 Trip
		This monitoring strategy checks if measured electric motor angle value at OES calibration routine can be written. A fault is set if the value can not be written in the EEPROM at the end of the production line	write failure occured	= True	Software State	= Diag	immediately	Type A, 1 Trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		This monitoring strategy checks if the measured value of punger release position at OES calibration routine can be written. A fault is set if the value can not be written in the EEPROM at the end of the production line	write failure occured	= True	Software State	= Diag	immediately	Type A, 1 Trip
		This monitoring strategy checks if the BPTS hysteresis value can be written. A fault is set if the value can not be written in the EEPROM at the end of the production line	write failure occured	= True	Software State	= Diag	immediately	Type A, 1 Trip
		This monitoring strategy checks if the BPTS1 offset based on mounting position can be written. A fault is set if the value can not be written in the EEPROM at the end of the production line	write failure occured	= True	Software State	= Diag	immediately	Type A, 1 Trip
		This monitoring strategy checks if the BPTS2 offset based on mounting position can be written. A fault is set if the value can not be written in the EEPROM at the end of the production line	write failure occured	= True	Software State	= Diag	immediately	Type A, 1 Trip
		This monitoring strategy checks if the calibration value of BPTS1 has been written at the enod of production line.	write failure occured	= True	Software State	= Diag	immediately	Type A, 1 Trip
		This monitoring strategy checks if the calibration value of BPTS2 has been written at the enod of production line.	write failure occured	= True	Software State	= Diag	immediately	Type A, 1 Trip
		This monitoring strategy checks if the RPS1 X value offset can be written. A fault is set if the value can not be written in the EEPROM at the end of the production line	write failure occured	= True	Software State	= Diag	immediately	Type A, 1 Trip
		This monitoring strategy checks if the offset Y value of RPS1 can be written. A fault is set if the value can not be written in the EEPROM at the end of the production line	write failure occured	= True	Software State	= Diag	immediately	Type A, 1 Trip
		This monitoring strategy checks if the synchonicity value of RPS1 can be written. A fault is set if the value can not be written in the EEPROM at the end of the production line	write failure occured	= True	Software State	= Diag	immediately	Type A, 1 Trip
Lost Communication with Central Gateway Module	U0146	This monitoring strategy checks if no messages are sent. The network driver has to send and receive all network messages. At the same time it has to check that the messages are correct (length, checksum, alive-counter, reception timeout). The diagnostic performs a Time out check. A fault is set if no message is received within a defined amount of time.	0x3CF not received on Bus A	= True	System voltage AND System voltage AND Bus Off Fault Active ECU is sending/receiving on CAN AND ECU Power Mode transition diagnostic enable delay timer	> 7.5 V < 16 V = False = True ≥ 5 Sec	0.25 [Sec]	Type B, 2 Trips
		DTC Pass	After receving all monitored messages from the superised source					