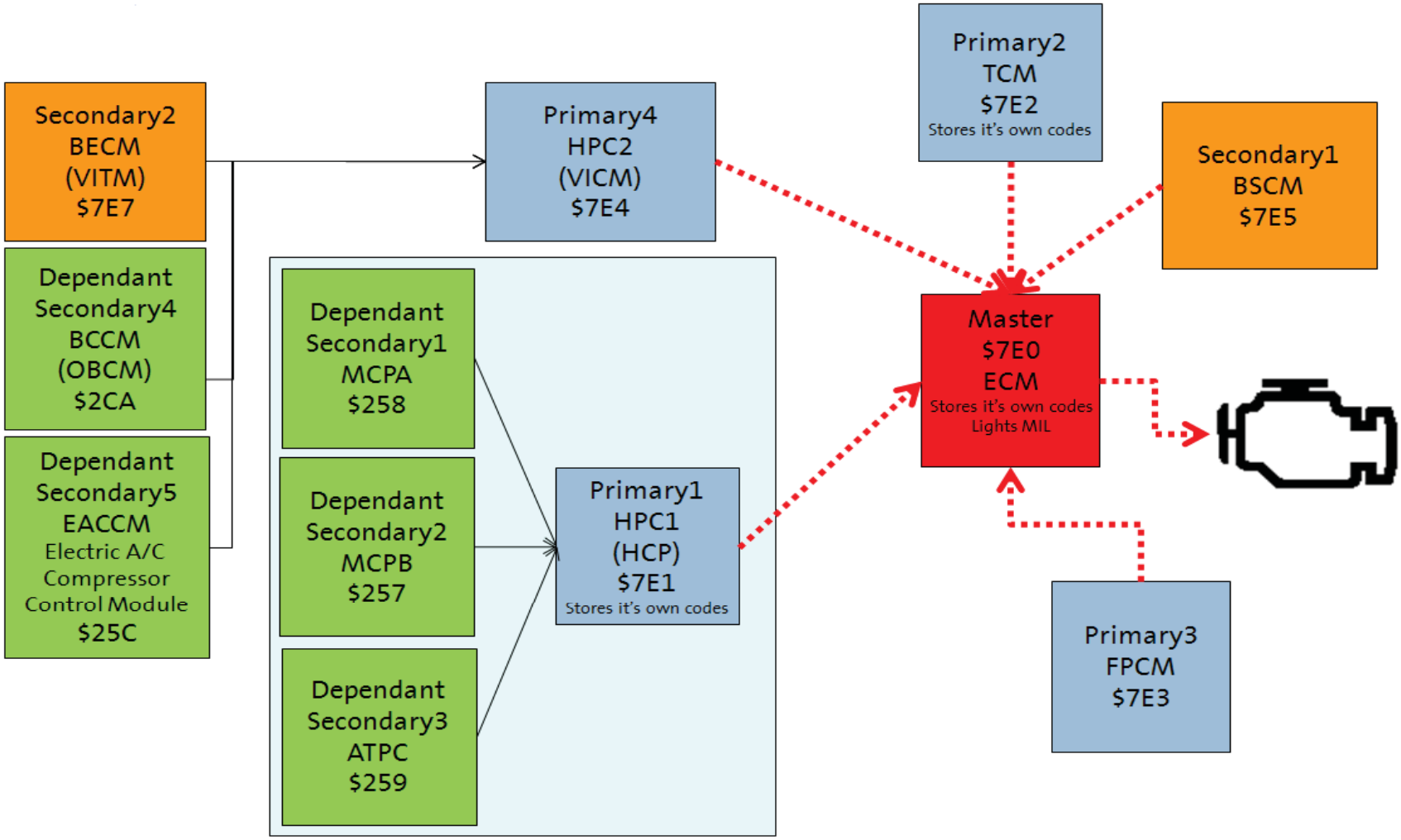


MY12 EREV Volt OBD Cert Application - There are many OBD Controllers represented:
Colors indicate the type of OBD controller.
Red = MASTER (ECM) - Stores Codes - Supports M01-0A - Controls MIL
Blue = PRIMARY (HPC1, TCM, FPCM, HPC2) - Stores Codes - Supports Modes 01, 04, 09, 0A
Orange = SECONDARY (BECM, BSCM) - Supports Modes 01, 04, 09, 0A
Green = DEPENDANT SECONDARY (MCPA, MCPB, ATPC, BCCM, EACCM)

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Intake Camshaft Actuator Solenoid Circuit – Bank 1	P0010	Detects a VVT system error by monitoring the circuit for electrical integrity	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		System supply voltage is within limits Output driver is commanded on, Ignition switch is in crank or run position	> 11 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Trips 2 B Type
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 > KtPHSD_phi_CamPosErrorLimIc1 Deg (see Supporting Table)	DTC's are NOT active: P0010 IntkCMP B1 Circuit IntakeCamSensorTFTKO CrankSensorTFTKO CrankIntakeCamCorrelationFA Engine is running VVT is enabled Desired camshaft position > 0 Power Take Off (PTO) not active	System Voltage > 11 Volts, Both Desired & Measured cam positions cannot be < KtPHSD_phi_CamPosErrorLimIc1 or > than (29.0 - KtPHSD_phi_CamPosErrorLimIc1). Desired cam position cannot vary more than 3.0 Cam Deg for at least KtPHSD_t_StablePositionTimeIc1 seconds (see Supporting Tables)	135 failures out of 150 samples 100 ms /sample	Trips 2 B Type
Exhaust Camshaft Actuator Solenoid Circuit – Bank 1	P0013	Detects a VVT system error by monitoring the circuit for electrical integrity	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		System supply voltage is within limits Output driver is commanded on, Ignition switch is in crank or run position	> 11 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Trips 2 B Type

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 > KtPHSD_phi_CamPosErrorLimEc1 Deg (see Supporting Table)	DTC's are NOT active: P0013 IntkCMP B1 Circuit ExhaustCamSensorTFTKO CrankSensorTFTKO CrankExhaustCamCorrelationFA Engine is running VVT is enabled Desired camshaft position > 0 Power Take Off (PTO) not active	System Voltage > 11 Volts, Both Desired & Measured cam positions cannot be < KtPHSD_phi_CamPosErrorLimEc1 or > than (Exh23.5 - KtPHSD_phi_CamPosErrorLimEc1). Desired cam position cannot vary more than 3.0 Cam Deg for at least KtPHSD_t_StablePositionTimeEc1 seconds (see Supporting Tables)	135 failures out of 150 samples 100 ms /sample	Trips 2 B Type
Crankshaft Position (CKP)-Camshaft Position (CMP) Correlation Bank 1 Sensor A	P0016	Detects cam to crank misalignment by monitoring if cam sensor pulse for bank 1 sensor A occurs during the incorrect crank position	4 cam sensor pulses more than -10 crank degrees before or 10 crank degrees after nominal position in one cam revolution.		Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs:	P0335, P0336 P0340, P0341 5VoltReferenceA_FA 5VoltReferenceB_FA	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 "Cam Correlation Oil Temperature Threshold".	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 last execution of diagnostic	< 1.0 seconds	One sample per cam rotation	
Crankshaft Position (CKP)-Camshaft Position (CMP) Correlation Bank 1 Sensor B	P0017	Detects cam to crank misalignment by monitoring if cam sensor pulse for bank 1 sensor B occurs during the incorrect crank position	4 cam sensor pulses more than -10 crank degrees before or 10 crank degrees after nominal position in one cam revolution.		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	 P0335, P0336 P0365, P0366 5VoltReferenceA_FA 5VoltReferenceB_FA < 1.0 seconds	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 "Cam Correlation Oil Temperature Threshold". One sample per cam	Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							rotation	
O2S Heater Control Circuit Bank 1 Sensor 1	P0030	This DTC checks the Heater Output Driver circuit for electrical integrity.	Voltage low during driver open state (indicates short-to-ground or open circuit) or voltage high during driver closed state (indicates short to voltage).		Ignition Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	2 trips Type B
O2S Heater Control Circuit Bank 1 Sensor 2	P0036	This DTC checks the Heater Output Driver circuit for electrical integrity.	Voltage low during driver open state (indicates short-to-ground or open circuit) or voltage high during driver closed state (indicates short to voltage).		Ignition Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	2 trips Type B
HO2S Heater Resistance Bank 1 Sensor 1	P0053	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Heater Resistance outside of the expected range of	7.0 < Ω < 13.0	No Active DTC's Coolant – IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run time	ECT_Sensor_FA P2610 IAT_SensorFA < 8.0 ºC > 28800 seconds -30.0 < ºC < 45.0 < 32.0 volts < 0.275 seconds	Once per valid cold start	2 trips Type B
HO2S Heater Resistance Bank 1 Sensor 2	P0054	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Heater Resistance outside of the expected range of	7.0 < Ω < 13.0	No Active DTC's Coolant – IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run time	ECT_Sensor_FA P2610 IAT_SensorFA < 8.0 ºC > 28800 seconds -30.0 < ºC < 45.0 < 32.0 volts < 0.275 seconds	Once per valid cold start	2 trips Type B
Radiator Coolant Temp Sensor Circuit Low Voltage	P00B3	This DTC detects a short to ground in the RCT signal circuit or the RCT sensor.	RCT Resistance (@ 150ºC)	< 34 Ohms	Engine run time Or IAT min	> 10.0 seconds ≤ 70.3 °C	5 failures out of 10 samples	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							1 sec/ sample Continuous	
Radiator Coolant Temp Sensor Circuit High Voltage	P00B4	Circuit Continuity This DTC detects a short to high or open in the RCT signal circuit or the RCT sensor.	RCT Resistance (@ -60ºC)	> 260000 Ohms	Engine run time Or IAT min	> 60.0 seconds ≥ -7.0 °C	5 failures out of 10 samples 1 sec/ sample Continuous	2 trips Type B
Radiator Coolant Temp - Engine Coolant Temp (ECT) Correlation	P00B6	This DTC detects a difference between ECT and RCT after a soak condition.	A failure will be reported if any of the following occur: 1) Absolute difference between ECT at power up & RCT at power up is ≥ an IAT based threshold table lookup value(fast fail). 2) Absolute difference between ECT at power up & RCT at power up is > by	See "P00B6: Fail if power up ECT exceeds RCT by these values" in the Supporting tables section	No Active DTC's Engine Off/Propulsion System Off Soak Time Non-volatile memory initization Test complete this trip Test aborted this trip	VehicleSpeedSensor_FA IAT_SensorCircuitFA THMR_RCT_Sensor_Ckt_FA THMR_ECT_Sensor_Ckt_FA IgnitionOffTimeValid TimeSinceEngineRunningValid > 28800 seconds = Not occurred = False = False	1 failure 500 msec/ sample Once per valid cold start	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			20.0 C and a block heater has not been detected. 3) ECT at power up > IAT at power up by 20.0 C and the time spent cranking the engine without starting is greater than 1.0 seconds with the LowFuelConditionDiag	= False	IAT LowFuel Condition Diag	≥ -7 ºC = False		
					Block Heater detection is enabled when either of the following occurs:			
					1) ECT at power up > IAT at power up by	> 20.0 ºC		
					2) Cranking time	< 0 Seconds		
					Block Heater is detected and diagnostic is aborted when 1) or 2) occurs. Diagnostic is aborted when 3) or 4) occurs:			
					1a) Vehicle drive time 1b) Vehicle speed 1c) Additional Vehicle drive time is provided to 1a when Vehicle speed is below 1b as follows: 1d) IAT drops from power up IAT	> 0 Seconds with > 0 MPH and 0.00 times the seconds with vehicle speed below 1b ≥ 255.0 ºC		
					2a) ECT drops from power up ECT 2b) Engine run time	> 255 ºC Within > 255 Seconds		
					3) Engine run time with vehicle speed below 1b 4) Minimum IAT during test	> 1800 Seconds ≤ -7.0 ºC		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Engine Coolant Flow Insufficient	P00B7	This DTC detects a Insufficient Flow Condition (i.e.. Stuck Closed Thermostat)	Engine Coolant Temp (ECT) is greater than 117 Deg C and Difference between ECT and RCT is greater than 45 Deg C. When above is present for more than 5 seconds, fail counts start.		No Active DTC's Engine run time OR Engine Coolant Temp	THMR_RCT_Sensor_Ckt_FA THMR_ECT_Sensor_Ckt_FA > 45 seconds > 70.0 Deg C	30 failures out of 200 samples 1 sec/ sample Continuous	2 trips Type B
Mass Air Flow System Performance	P0101	Determines if the MAF sensor is stuck within the normal operating range	Filtered Throttle Model Error AND ABS(Measured Flow – Modeled Air Flow) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	<= 125 kPa*(g/s) > 10 grams/sec > 20.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 500 RPM <= 8000 RPM >= -7 Deg C <= 125 Deg C >= -20 Deg C <= 125 Deg C >= 0.25 Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow Error multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Est MAP Model 2 Error multiplied by MAP2	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:	Residual Weight Factor based on RPM See table "IFRD Residual Weighting Factors". MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA ECT_Sensor_Ckt_FP IAT_SensorFA IAT_SensorCircuitFP		
Mass Air Flow Sensor Circuit Low Frequency	P0102	Detects a continuous short to low or a open in either the signal circuit or the MAF sensor	MAF Output	<= 1800 Hertz (0 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
Mass Air Flow Sensor Circuit High Frequency	P0103	Detects a high frequency output from the MAF sensor	MAF Output	>= 14500 Hertz (108 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
Manifold Absolute Pressure Sensor Performance	P0106	Determines if the MAP sensor is stuck within the normal operating range	Filtered Throttle Model Error AND ABS(Measured MAP – MAP Model 1) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	<= 125 kPa*(g/s) > 20.0 kPa > 20.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 500 RPM <= 8000 RPM >= -7 Deg C <= 125 Deg C >= -20 Deg C <= 125 Deg C >= 0.25	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
						Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM MAP Model 1 Error multiplied by MAP1 Residual Weight Factor based on RPM MAP Model 2 Error multiplied by MAP2 Residual Weight Factor based on RPM See table "IFRD Residual Weighting Factors".		
					No Active DTCs:	MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA ECT_Sensor_Ckt_FP IAT_SensorFA IAT_SensorCircuitFP		
			<u>Engine Not Rotating Case:</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		4 failures out of 5 samples 1 sample every 12.5 msec	
						> 8.0 seconds		
					Engine is not rotating			

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:	EngModeNotRunTmErr MAP_SensorFA AAP_SnsrFA MAP_SensorCircuitFP AAP_SnsrCktFP		
Manifold Absolute Pressure Sensor Circuit Low	P0107	Detects a continuous short to low or open in either the signal circuit or the MAP sensor.	MAP Voltage	< 3.0 % of 5 Volt Range (0.2 Volts = 3.5 kPa)	Continuous		320 failures out of 400 samples 1 sample every 12.5 msec	Type B 2 trips
Manifold Absolute Pressure Sensor Circuit High	P0108	Detects an open sensor ground or continuous short to high in either the signal circuit or the MAP sensor.	MAP Voltage	> 90.0 % of 5 Volt Range (4.5 Volts = 115.0 kPa)	Continuous		320 failures out of 400 samples 1 sample every 12.5 msec	Type B 2 trips
Intake Air Temperature Sensor Circuit Performance	P0111	Detects an IAT sensor that has stuck in range by comparing to engine coolant temperature at startup	ABS(Power Up IAT - Power Up ECT)	> 40 deg C	Time between current ignition cycle and the last time the engine was running Power Up ECT No Active DTCs:	> 28800 seconds < 60 deg C ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSensorCktFA	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B 2 trips
Intake Air Temperature Sensor Circuit Low (High Temperature)	P0112	Detects a continuous short to ground in the IAT signal circuit or the IAT sensor	Raw IAT Input	< 62 Ohms (~150 deg C)	Engine Run Time	> 0.0 seconds	40 failures out of 50 samples 1 sample every 100 msec	Type B 2 trips
Intake Air Temperature Sensor Circuit High (Low	P0113	Detects a continuous open circuit in the IAT signal circuit or the IAT sensor	Raw IAT Input	> 126840 Ohms (~-60 deg C)	Engine Run Time	> 0.0 seconds	40 failures out of 50 samples 1 sample every 100	Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Temperature)							msec	
Intake Air Temperature Sensor Intermittent In-Range	P0114	Detects a noisy or erratic IAT signal circuit or IAT sensor	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current IAT reading - IAT reading from 100 milliseconds previous)	> 125 DegC 10 consecutive IAT samples	Continuous		4 failures out of 5 samples	Type B 2 trips
Engine Coolant Temperature (ECT) Sensor Performance	P0116	This DTC detects ECT temp sensor stuck in mid range.	A failure will be reported if any of the following occur: 1) ECT at power up > IAT at power up by an IAT based table lookup value after a minimum 28800 second soak (fast fail). 2) ECT at power up > IAT at power up by 20.0 C after a minimum 28800 second soak and a block heater has not been detected. 3) ECT at power up > IAT at power up by 20.0 C after a minimum 28800 seconds soak and the time spent	See "P0116: Fail if power up ECT exceeds IAT by these values" in the Supporting tables section	No Active DTC's Non-volatile memory initization Test complete this trip Test aborted this trip IAT LowFuelCondition Diag	VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_Ckt_FA IgnitionOffTimeValid TimeSinceEngineRunning Valid = Not occurred = False = False ≥ -7 ºC = False	1 failure 500 msec/ sample Once per valid cold start	2 trips Type B
					Block Heater detection is enabled when either of the following occurs: 1) ECT at power up > IAT at power up by 2) Cranking time **Block Heater is detected and diagnostic is aborted when 1) or 2)**	> 20.0 ºC < 0.0 Seconds		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			cranking the engine without starting is greater than 0.0 seconds with the LowFuelConditionDiag	= False	**occurs. Diagnostic is aborted when 3) or 4) occurs:** 1a) Vehicle drive time 1b) Vehicle speed 1c) Additional Vehicle drive time is provided to 1a when Vehicle speed is below 1b as follows: 1d) IAT drops from power up IAT 2a) ECT drops from power up ECT 2b) Engine run time 3) Engine run time with vehicle speed below 1b 4) Minimum IAT during test	> 0 Seconds with > 0 MPH 0.00 times the seconds with vehicle speed below 1b ≥ 255.0 ºC ≥ 255 ºC Within ≤ 65535 Seconds > 1800 Seconds ≤ -7 ºC		
Engine Coolant Temp Sensor Circuit Low	P0117	Circuit Continuity This DTC detects a short to ground in the ECT signal circuit or the ECT sensor.	ECT Resistance (@ 150ºC)	< 34 Ohms			5 failures out of 6 samples 1 sec/ sample Continuous	2 trips Type B
Engine Coolant Temp Sensor Circuit High	P0118	Circuit Continuity This DTC detects a short to high or open in	ECT Resistance (@ -60ºC)	> 260000 Ohms	Engine run time Or IAT min	> 10.0 seconds ≥ 0.0 °C	5 failures out of 6 samples	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		the ECT signal circuit or the ECT sensor.					1 sec/ sample Continuous	
Engine Coolant Temperature (ECT) Sensor Circuit Intermittent	P0119	Circuit Continuity This DTC detects large step changes in the ECT signal circuit or the ECT sensor. Allowable high and low limits are calculated for the next sample based on the previous sample and the time constant of the sensor.	ECT temperature step change: 1) postive step change is greater than high limit OR 2) negitive step change is lower than low limit.		No Active DTC's	P0117 P0118	3 failures out of 4 samples 1 sec/ sample Continuous	2 trips Type B
Throttle Position Sensor Performance	P0121	Determines if the Throttle Position Sensor input is stuck within the normal operating range	Filtered Throttle Model Error AND ABS(Measured Flow – Modeled Air Flow) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	> 125 kPa*(g/s) > 10 grams/sec <= 20.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 500 RPM <= 8000 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C >= 0.25 Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow Error multiplied by MAF	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:	Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Est See table "IFRD Residual Weighting Factors". MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA ECT_Sensor_Ckt_FP IAT_SensorFA IAT_SensorCircuitFP		
TPS1 Circuit Low	P0122	Detects a continuous or intermittent short or open in TPS1 circuit	TPS1 Voltage <	0.325		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (P06A3)	639/1279 counts; 153 counts continuous; 3.125 ms /count in the ECM main processor	Trips: 1 Type: A MIL: YES
TPS1 Circuit High	P0123	Detects a continuous or intermittent short or open in TPS1 circuit	TPS1 Voltage >	4.75		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (P06A3)	639/1279 counts; 153 counts continuous; 3.125 ms /count in the ECM main processor	Trips: 1 Type: A MIL: YES
Engine Coolant Temperature	P0128	This DTC detects if the engine coolant	Engine run time is accumulated when airflow	See “P0128: Maximum	No Active DTC's	MAF_SensorFA IAT_SensorFA	1 failure to set DTC	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Below Stat Regulating Temperature		temperature rises too slowly due to an ECT or Cooling system fault	is ≥ 1 grams per sec during Range #1 or #2: Range #1 (Primary) ECT reaches Commanded temperature minus 11.0 °C when IAT min is < 60.0°C and ≥ -7.0°C. Range #2 (Alternate) ECT reaches Commanded temperature minus 11.0 °C when IAT min is < -50.0°C and ≥ -50.0°C.	Accumulated Time for IAT and Start-up ECT conditions“ in the Supporting tables section	Engine not run time Engine run time Fuel Condition **Range #1 (Primary) Test** ECT at start run Average Airflow T-Stat Heater duty commanded cycle **Range #2 (Alternate) Test** ECT at start run Average Airflow T-Stat Heater duty commanded cycle	THMR_RCT_Sensor_Ckt_FA THMR_ECT_Sensor_Ckt_FA ≥ 1800 seconds 1 ≤ Eng Run Tme ≤ 1800 seconds Ethanol ≤ 86% 10.0 ≤ ECT ≤ 59.0 °C ≥ 1.0 gps ≤ 50 % **Not used in this application** -7.0 ≤ ECT ≤ 10.0 °C ≥ 1.0 gps ≤ 50 %	1 sec/ sample Once per ignition key cycle	
O2S Circuit Low Voltage Bank 1 Sensor 1	P0131	This DTC determines if the O2 sensor circuit is shorted to low.	Oxygen Sensor Signal	< 50 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	380 failures out of 475 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						FuelInjectorCircuit_FA		
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					EGR intrusive test	= Not active		
					System Voltage	10.0 < Volts < 32.0		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9912 < ratio < 1.0400		
					Air Per Cylinder	50 < mgram < 500		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel Condition	Ethanol ≤ 87%		
					Fuel State	DFCO not active		
					All of the above met for	> 5.0 seconds		
O2S Circuit High Voltage Bank 1 Sensor 1	P0132	This DTC determines if the O2 sensor circuit is shorted to high.	Oxygen Sensor Signal	> 1050 mvolts	**Open Test Criteria**		100 failures out of 125 samples	2 trips Type B
					No Active DTC's	TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA	Frequency: Continuous in 100 milli - second loop	
					System Voltage	10.0 < Volts < 32.0		
					AFM Status	= All Cylinders active		
					Heater Warm-up delay	= Complete		
					Engine Run Time	> 5 seconds		
					Engine Run Accum	> 150 seconds		
					Fuel Condition	≤ 87 % Ethanol		
					No Active DTC's	MAP_SensorFA EvapPurgeSolenoidCircuit_FA		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA		
					Low Fuel Condition Diag	= False		
					Fuel Condition	≤ 87 % Ethanol		
					Initial delay after Open Test Criteria met (cold start condition)	> 45.0 seconds when engine soak time > 28800 seconds		
					Initial delay after Open Test Criteria met (not cold start condition)	> 45.0 seconds when engine soak time ≤ 28800 seconds		
					Equivalence Ratio	0.9912 ≤ ratio ≤ 1.0400		
					Air Per Cylinder	50.0 ≤ mgram ≤ 500.0		
					Fuel Control State	not = Power Enrichment		
					All of the above met for	> 5.0 seconds		
O2S Slow Response Bank 1 Sensor 1	P0133	This DTC determines if the O2 sensor response time is degraded.	The average response time is caluclated over the test time, and compared to the threshold. Refer to **"P0133 - O2S Slow Response Bank 1 Sensor 1"** Pass/Fail Threshold table in the Supporting Tables tab.		No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA	Sample time is 60 seconds Frequency: Once per trip	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						EvapSmallLeak_FA		
						EvapEmissionSystem_FA		
						FuelTankPressureSnsrCkt_FA		
						FuelInjectorCircuit_FA		
						AIR System FA		
						EthanolCompositionSensor_FA		
						EngineMisfireDetected_FA		
						P0131		
						P0132		
						P0134		
					System Voltage	10.0 < Volts < 32.0		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B1S1)** in Supporting Tables tab.		
					O2 Heater on for	≥ 40 seconds		
					Learned Htr resistance	= Valid		
					Engine Coolant	> 50 ºC		
					IAT	> -40 ºC		
					Engine run Accum	> 90 seconds		
					Time since any AFM status change	> 2.0 seconds		
					Time since Purge On to Off change	> 2.0 seconds		
					Time since Purge Off to On change	> 2.0 seconds		
					Engine airflow	17 ≤ grams per second ≤ 40		
					Engine speed	1000 <= RPM <= 3500		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Fuel	< 87 % Ethanol		
					Baro	> 70 kpa		
					Air Per Cylinder	≥ 150 mGrams		
					Low Fuel Condition			
					Diag	= False		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					LTM fuel cell	= Enabled		
					Transient Fuel Mass	≤ 100.0 mgrams		
					Baro	= Not Defaulted		
					Fuel Control State	not = Power Enrichment		
					Fuel State Commanded	DFCO not active		
					Proportional Gain	≥ 0.0 %		
					All of the above met for	> 1.0 seconds		
O2S Circuit Insufficient Activity Bank 1 Sensor 1	P0134	This DTC determines if the O2 sensor circuit is open.	Oxygen Sensor Signal	> 1700 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA	200 failures out of 250 samples. Frequency: Continuous	2 trips Type B
					System Voltage	10.0 < Volts < 32.0		
					AFM Status	= All Cylinders active	100msec loop	
					Heater Warm-up delay	= Complete		
					Engine Run Time	> 5 seconds		
					Engine Run Accum	> 150 seconds		
					Fuel	≤ 87 % Ethanol		
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.	Heater Current outside of the expected range of	0.3 < Amps < 2.5	No Active DTC's	ECT_Sensor_FA	8 failures out of 10 samples Frequency: 2 tests per trip	2 trips Type B
					System Voltage	10.0 < Volts < 32.0		
					Heater Warm-up delay	= Complete		
					O2S Heater device control	= Not active		
					B1S1 O2S Heater Duty Cycle	> zero	30 seconds delay between tests and 1 second execution rate	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					All of the above met for	> 120 seconds		
O2S Circuit Low Voltage Bank 1 Sensor 2	P0137	This DTC determines if the O2 sensor circuit is shorted to low.	Oxygen Sensor Signal	< 50 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	430 failures out of 540 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					EGR intrusive test	= Not active		
					System Voltage	10.0 < Volts < 32.0		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9912 ≤ ratio ≤ 1.0400		
					Air Per Cylinder	50 ≤ mgrams ≤ 500		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel Condition	Ethanol <= 87%		
					Fuel State	DFCO not active		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					All of the above met for	> 5.0 seconds		
O2S Circuit High Voltage Bank 1 Sensor 2	P0138	This DTC determines if the O2 sensor circuit is shorted to high.	Oxygen Sensor Signal	> 1050 mvolts	**Open Test Criteria**		100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B
					No Active DTC's	TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA		
					System Voltage	10.0 < Volts < 32.0		
					AFM Status	= All Cylinders active		
					Heater Warm-up delay	= Complete		
					Engine Run Time	> 5 seconds		
					Fuel Condition	≤ 87 % Ethanol		
					No Active DTC's	MAP_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA		
					Low Fuel Condition Diag	= False		
					Fuel Condition	≤ 87 % Ethanol		
					Initial delay after Open Test Criteria met (cold start condition)	> 45.0 seconds when engine soak time > 28800 seconds		
					Initial delay after Open Test Criteria met (not cold start condition)	> 45.0 seconds when engine soak time ≤ 28800 seconds		
					Equivalence Ratio	0.9912 ≤ ratio ≤ 1.0400		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Air Per Cylinder Fuel Control State	50 ≤ mgrams ≤ 500 not = Power Enrichment		
					All of the above met for	> 5.0 seconds		
O2 Sensor Slow Response Rich to Lean Bank 1 Sensor 2	P013A	This DTC determines if the post catalyst O2 sensor has Slow Response in a predefined Rich to Lean voltages range during Rich to Lean transition. The diagnostic is an intrusive test which runs in a DFCO mode to achieve the required response.	The EWMA of the Post O2 sensor normalized integral value OR The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)	> 8.0 units > 74 grams (upper threshold is 450 mvolts and lower threshold is 150 mvolts)	No Active DTC's B1S2 Failed this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Post fuel cell DTC's Passed DTC's Passed	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013B, P013E, P013F, P2270 or P2271 10.0 < Volts < 32.0 = Valid = Not Valid = Not Valid, See definition of **Green Sensor Delay Criteria (B1S2)** in Supporting Tables tab. = False = enabled P2270 (and P2272 if applicable) P013E (and P014A if applicable)	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.	1 trips Type A EWMA
					After above conditions are met: DFCO mode is continued (wo driver initiated pedal			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					input).			
O2 Sensor Slow Response Lean to Rich Bank 1 Sensor 2	P013B	This DTC determines if the post catalyst O2 sensor has Slow Response in a predefined Lean to Rich voltages range during Lean to Rich transition. The diagnostic is an intrusive test which increases the delivered A/F ratio to achieve the required rich threshold.	The EWMA of the Post O2 sensor normalized integral value OR The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)	> 8.0 units > 120 grams (lower threshold is 350 mvolts and upper threshold is 600 mvolts)	No Active DTC's B1S2 Failed this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Post fuel cell DTC's Passed	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013A, P013E, P013F, P2270 or P2271 10.0 < Volts < 32.0 = Valid = Not Valid = Not Valid, See definition of **Green Sensor Delay Criteria (B1S2)** in Supporting Tables tab. = False = enabled P2270 (and P2272 if applicable) P013E (and P014A if applicable) P013A (and P013C if applicable) P2271 (and P2273 if applicable) P013F (and P014B if applicable)	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.	1 trips Type A EWMA

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					After above conditions are met: Fuel Enrich mode continued.			
O2 Sensor Delayed Response Rich to Lean Bank 1 Sensor 2	P013E	This DTC determines if the post catalyst O2 sensor has an initial delayed response to an A/F change from Rich to Lean. The diagnostic is an intrusive test which runs in a DFCO mode to achieve the required response.	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 greater or equal to	> 450 mvolts > 33 grams > 2 secs > 2 grams	No Active DTC's B1S2 Failed this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Post fuel cell DTC's Passed	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013A, P013B, P013F, P2270 or P2271 10.0 < Volts < 32.0 = Valid = Not Valid = Not Valid, See definition of **Green Sensor Delay Criteria (B1S2)** in Supporting Tables tab. = False = enabled P2270 (and P2272 if applicable)	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.	2 trips Type B
					DFCO mode entered (wo driver initiated pedal input).			
O2 Sensor Delayed Response	P013F	This DTC determines if the post catalyst O2	Post O2 sensor voltage	< 350 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted	Frequency: Once per trip	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Lean to Rich Bank 1 Sensor 2		sensor has an initial delayed response to an A/F change from Lean to Rich. The diagnostic is an intrusive test which increases the delivered A/F ratio to achieve the required rich threshold.	AND The Accumulated mass air flow monitored during the Delayed Response Test	> 120 grams		ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013A, P013B, P013E, P2270 or P2271 10.0 < Volts < 32.0 = Valid = Not Valid = Not Valid, See definition of **Green Sensor Delay Criteria (B1S2)** in Supporting Tables tab. = False = enabled P2270 (and P2272 if applicable) P013E (and P014A if applicable) P013A (and P013C if applicable) P2271 (and P2273 if applicable)	Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	
					B1S2 Failed this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Post fuel cell DTC's Passed			
					After above conditions are met: Fuel Enrich mode entered.			
O2S Circuit Insufficient Activity	P0140	This DTC determines if the O2 sensor circuit is	Oxygen Sensor Signal	> 1700 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted	200 failures out of 250 samples.	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Bank 1 Sensor 2		open.				MAF_SensorFA EthanolCompositionSensor_FA System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Fuel	Frequency: Continuous 10.0 <Volts < 32.0 = All Cylinders active 100msec loop = Complete > 5 seconds > 150 seconds ≤ 87 % Ethanol	
O2S Heater Performance Bank 1 Sensor 2	P0141	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	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** Time	ECT_Sensor_FA 10.0 < Volts < 32.0 = Complete = Not active > zero > 120 seconds	8 failures out of 10 samples Frequency: 2 tests per trip 30 seconds delay between tests and 1 second execution rate.	2 trips Type B
Fuel System Too Lean Bank 1	P0171	Determines if the fuel control system is in a lean condition, based on the filtered long-term fuel trim.	The filtered long-term fuel trim metric	>= 1.250	Engine speed BARO Coolant Temp MAP Inlet Air Temp MAF Fuel Level	400 <rpm< 6100 > 70 kPa -38 <°C< 130 15 <kPa< 255 -20 <°C< 150 1.0 <g/s< 512.0 > 10 % or if fuel sender is faulty	Frequency: 100 ms Continuous Loop	2 Trip(s) Type B
					Long Term Fuel Trim data accumulation:	> 20.0 seconds of data must accumulate on each trip, with at least 15.0 seconds of data in the current fuel trim cell before a pass or fail decision can be made.		
					fuel trim diagnosed during decels? No			
					Long-Term Fuel Trim Cell Usage			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Sometimes, certain Long-Term Fuel Trim Cells are not utilized for control or diagnosis. **Please see "Supporting Tables" Tab for a list of cells utilized for diagnosis.**			
					Fuel Control Status			
					Closed Loop Long Term FT	Enabled Enabled **Please see "Closed Loop Enable Criteria" and "Long Term FT Enable Criteria" in Supporting Tables.**		
					Fuel Consumed	> 65535.0 liters of fuel consumed after a fuel fill event ("Virtual Flex Fuel Sensor applications only)		
					EGR Flow Diag. Intrusive Test Not Active Catalyst Monitor Intrusive Test Not Active Post O2 Diag. Intrusive Test Not Active Device Control Not Active EVAP Diag. “tank pull down” Not Active			
					No active DTCs:			
					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. There are two methods to determine a Rich fault. They are Passive and Intrusive. The Intrusive test is described below:	**Passive Test:**			Secondary Parameters and Enable Conditions are identical to those for P0171, with the exception that fuel level is not considered.	Frequency: 100 ms Continuous Loop	2 Trip(s) Type B
			The filtered Non-Purge Long Term Fuel Trim metric	<= 0.795 (a Passive Test decision cannot be made when Purge is enabled)				
			Intrusive Test:					
			The filtered Purge Long Term Fuel Trim metric	<= 0.800				
			AND					
			The filtered Non-Purge Long Term Fuel Trim metric	<= 0.795 for 2 out of 3 intrusive segments				
		Intrusive Test: When the filtered Purge Long Term Fuel Trim metric is <= 0.800, purge is ramped off to determine if excess purge vapor is the cause of the rich condition. If the filtered Purge Long Term Fuel Trim metric > 0.800, the test passes without	Segment Def'n: Segments can last up to 35 seconds and are separated by the lesser of 30 seconds of purge-on time or enough time to purge 5 grams of vapor. A maximum of 3 completed segments or 25 attempts are allowed for each intrusive test.					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		test passes without checking the filtered Non-Purge Long Term Fuel Trim metric. Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, and the execution frequency of other diagnostics.	After an intrusive test report is completed, another intrusive test cannot occur for 299 seconds to allow sufficient time to purge excess vapors from the canister. During this period, fuel trim will pass if the filtered Purge-on Long Term fuel trim > Purge Rich Limit Table for at least 150 seconds, indicating that the canister has been purged.					
Injector 1	P0201	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage for greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
Injector 2	P0202	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage for greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Injector 3	P0203	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage for greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
Injector 4	P0204	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage for greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
TPS2 Circuit Low	P0222	Detects a continuous or intermittent short or open in TPS2 circuit	TPS2 Voltage <	0.25		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (P06A3)	639/1279 counts; 153 counts continuous; 3.125 ms /count in the ECM main processor	Trips: 1 Type: A MIL: YES
TPS2 Circuit High	P0223	Detects a continuous or intermittent short or open in TPS2 circuit	TPS2 Voltage >	4.59		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (P06A3)	639/1279 counts; 153 counts continuous; 3.125 ms /count in the ECM main processor	Trips: 1 Type: A MIL: YES
Random Misfire Detected	P0300	These DTC's will determine if a random or a cylinder specific	Deceleration index vs. Engine Speed Vs Engine load	(>Idle SCD AND > Idle SCD ddt Tables)	Engine Run Time ECT	> 2 crankshaft revolutions -7ºC < ECT < 125ºC	Emission Exceedence = any (5) failed 200 rev blocks out of (16)	2 Trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Cylinder 1 Misfire Detected Cylinder 2 Misfire Detected Cylinder 3 Misfire Detected Cylinder 4 Misfire Detected Cylinder 5 Misfire Detected Cylinder 6 Misfire Detected Cylinder 7 Misfire Detected Cylinder 8 Misfire Detected	P0301 P0302 P0303 P0304 P0305 P0306 P0307 P0308	misfire is occurring by monitoring crankshaft velocity	Deceleration index calculation is tailored to specific veh. 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. see Algorithm Description Document for additional details.	**OR** (>SCD Delta AND > SCD Delta ddt Tables) **OR** (>Idle Cyl Mode AND > Idle Cyl Mode ddt Tables) **OR** (>Cyl Mode AND > Cyl Mode ddt Tables) **OR** (>Rev Mode Table) **OR** (> AFM Table in Cyl Deact mode)	If ECT at startup then ECT System Voltage + Throttle delta - Throttle delta Early Termination option	< -7ºC 21ºC < ECT < 125ºC 9.00 < volts < 32.00 < 100.00% per 25 ms < 100.00% per 25 ms NotEnabled	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 > 1000 and < 3200 at end of trip** **Initial Emission Exceedence = fails when MF% > Emission Failure Threshold**	(Mil Flashes with Catalyst Damaging Misfire)
			Misfire Percent Emission Failure Threshold	≥ 0.63% P0300 ≥ 0.63% emission				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Misfire Percent Catalyst Damage	> "Catalyst Damaging Misfire Percentage" Table whenever secondary conditions are met.	Engine Speed Engine Load Misfire counts (at low speed/loads, one cylinder may not cause cat damage)	> 6500 rpm AND > 40 % load AND < 180 counts on one cylinder	any Catalyst Exceedence = (1) 200 rev block as data supports for catalyst damage. Failure reported with (1 or 3) Exceedences in FTP, or (1) Exceedence outside FTP.	
			When engine speed and load are less than the FTP cals (3) catalyst damage exceedences are allowed.	≤ 0 FTP rpm AND ≤ 0 FTP % load			Continuous	
					Engine Speed	1250 < rpm < (4900) - 50 Engine speed limit is a function of inputs like Gear and temperature Engine Speed Limit = 4900 rpm (Rev, Gears 1-6) Engine Speed Limit = 2000 rpm (P,N)	4 cycle delay	
				disable conditions:	No active DTCs:	TPS_FA EnginePowerLimited MAF_SensorTFTKO MAP_SensorTFTKO IAT_SensorTFTKO ECT_Sensor_Ckt_TFTKO 5VoltReferenceB_FA	4 cycle delay	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						CrankSensorTestFailedTKO CrankSensorFaultActive CrankIntakeCamCorrelationFA CrankExhaustCamCorrelationFA CrankCamCorrelationTFTKO AnyCamPhaser_FA AnyCamPhaser_TFTKO If Monitor Rough Road=1 and RoughRoadSource="TOSS" Transmission Output Shaft Angular Velocity Validity (Auto Trans only) Clutch Sensor FA (Manual Trans only) TransEngagedState_FA (Auto Trans only)		
					P0315 & engine speed	> 1000 rpm		
					Fuel Level Low	LowFuelConditionDiagnosti	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 Fuel Management	Transition in progress	0 cycle delay	
					Undetectable engine speed and engine load region	invalid speed load range in **decel index** tables	4 cycle delay	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Abusive Engine Over Speed	> 8192 rpm	0 cycle delay	
					Below zero torque (except CARB approved 3000 rpm to redline triangle.)	< "Zero torque engine load" in Supporting Tables tab	4 cycle delay	
					Below zero torque: TPS Veh Speed	 ≤ 2% > 318 mph	4 cycle delay	
					EGR Intrusive test	Active	12 cycle delay	
					Manual Trans	Clutch shift	0 cycle delay	
					Throttle Position AND Automatic transmission shift	> 100.00%	0 cycle delay	
					Driveline Ring Filter active 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: Stop filter early:	 > "Ring Filter" in Supporting Tables tab engine cycles after misfire > "Number of Normals" in Supporting Tables tab engine cycles after misfire		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Abnormal engine speed oscillations: (Rough road etc) Off Idle, number of consecutive decelerating cylinders after accelerating,: (Number of decels can vary with misfire detection equation) TPS Engine Speed Veh Speed SCD Cyl Mode Rev Mode	 > 1 % > 1000 rpm > 0 mph > SCD Mode > Cylinder Mode > Rev Mode in Supporting Tables tab		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Misfire Pattern Recognition Enabled: Validates misfire vs. false detection	0 (1 = Enabled)		
					Engine Speed	Between > 700 RPM and < 3000 RPM		
					Veh Speed	> 0.62 mph		
					Final fail conditions within:	> "min multiplier" or < "max multiplier" in Supporting Tables tab of misfire threshold for a given engine speed and load		
					Monitor Rough Road	0 (1=Yes)		
					Rough Road Source	TOSS		
					IF Rough Road is			
Crankshaft Position System Variation Not Learned	P0315	Monitor for valid crankshaft error compensation factors	Sum of Compensation factors	≥ 2.0400 OR ≤ 1.9960	OBD Manufacturer Enable Counter	= 0	0.50 seconds Frequency Continuous 100 msec	1 Trips Type A
Knock Sensor (KS) Performance Per Cylinder	P0324	This diagnostic checks for knock sensor performance out of the normal expected range due to: 1) Excessive knock **and** 2) Abnormal engine	Common Enable Criteria		Diagnostic Enabled	TRUE	First Order Lag Filter with Weight Coefficient	Type: B MIL: YES Trips: 2
					Engine Speed	≤ 8500 RPM		
					Engine Air Flow	≥ 40 mg/cylinder and ≤ 2000 mg/cylinder		
					ECT	≥ -40 deg's C		
					IAT	≥ -40 deg's C		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		noise on a per cylinder basis						
			Specific Enable Criteria and Thresholds					
			1. Filtered Knock Intensity (for Excessive Knock)	> 4.0000	Engine Speed Engine running	≥ 600 RPM ≥ 1.3 seconds	Weight Coefficient = 0.0400 Updated each engine event	
			2. Filtered FFT Intensity: (for Abnormal Noise)	< Abnormal Noise Threshold (see supporting tables)	Engine Speed Engine running	≥ 8000 RPM ≥ 0.4 seconds	Weight Coefficient = 0.0100 Updated each engine event	
Knock Sensor (KS) Circuit Bank 1	P0325	This diagnostic checks for an open in the knock sensor circuit	Filtered FFT Output	> OpenCktThrshMin **and** < OpenCktThrshMax See Supporting Tables for OpenCktThrshMin & Max	Diagnostic Enabled	TRUE	First Order Lag Filter with Weight Coefficient	Type: B MIL: YES Trips: 2
					Engine Speed	≥ 600 RPM and ≤ 8500 RPM		
					Engine Air Flow	≥ 40 mg/cylinder and ≤ 2000 mg/cylinder		
					ECT	≥ -40 deg's C	Weight Coefficient = 0.0100 Updated each engine event	
					IAT	≥ -40 deg's C		
					Engine running	≥ 5.0 seconds		
Knock Sensor (KS) Performance Bank 1	P0326	This diagnostic checks for knock sensor performance out of the normal expected range due to 1. Excessive knock **or** 2. Abnormal	Common Enable Criteria		Diagnostic Enabled	TRUE	First Order Lag Filter with Weight Coefficient	Type: B MIL: YES Trips: 2
					Engine Speed	≤ 8500 RPM		
					Engine Air Flow	≥ 40 mg/cylinder and ≤ 2000 mg/cylinder		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		engine noise on a per bank/sensor basis			ECT	≥ -40 deg's C		
					IAT	≥ -40 deg's C		
			1. Filtered Knock Intensity (for Excessive Knock)	> 2.4140	Engine Speed Engine running	≥ 600 RPM ≥ 5.0 seconds	Weight Coefficient = 0.0100 Updated each engine event	
			2. Filtered FFT Intensity: (for Abnormal Noise)	< Abnormal Noise Threshold (see supporting tables)	Engine Speed Engine running	≥ 2000 RPM ≥ 1.5 seconds	Weight Coefficient = 0.0100 Updated each engine event	
Knock Sensor (KS) Circuit Low Bank 1	P0327	This diagnostic checks for an out of range low knock sensor signal	Sensor Input Signal Line	< 0.57 Volts	Diagnostic Enabled	TRUE	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
					Engine Speed	> 0 RPM and < 8500 RPM		
			or					
			Sensor Return Signal Line	< 0.40 Volts				
Knock Sensor (KS) Circuit High Bank 1	P0328	This diagnostic checks for an out of range high knock sensor signal	Sensor Input Signal Line	> 2.76 Volts	Diagnostic Enabled?	Enabled	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
					Engine Speed	> 0 RPM and < 8500 RPM		
			or					
			Sensor Return Signal Line	> 1.95 Volts				
Crankshaft Position (CKP) Sensor A Circuit	P0335	Determines if a fault exists with the crank position sensor signal	<u>Engine-Cranking Crankshaft Test:</u> Time since last crankshaft position sensor pulse received		<u>Engine-Cranking Crankshaft Test:</u> Starter engaged AND		<u>Engine-Cranking Crankshaft Test:</u> Continuous 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
				>= 4.0 seconds	(cam pulses being received OR (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow	 = FALSE = FALSE = FALSE > 3.0 grams/second		
			Time-Based Crankshaft Test: No crankshaft pulses received	>= 0.7 seconds	Time-Based Crankshaft Test: Engine is Running Starter is not engaged No DTC Active:	 5VoltReferenceB_FA	Time-Based Crankshaft Test: Continuous every 12.5 msec	
			Event-Based Crankshaft Test: No crankshaft pulses received		Event-Based Crankshaft Test: Engine is Running OR Starter is engaged No DTC Active:	 5VoltReferenceA_FA 5VoltReferenceB_FA P0365 P0366	Event-Based Crankshaft Test: 2 failures out of 10 samples One sample per engine revolution	
Crankshaft Position (CKP) Sensor A Performance	P0336	Determines if a performance fault exists with the crank position sensor signal	Crank Re-synchronization Test: Time in which 10 or more crank re-synchronizations occur	< 10.0 seconds	Crank Re-synchronization Test: Engine Air Flow Cam-based engine speed No DTC Active:	 >= 3.0 grams/second > 450 RPM 5VoltReferenceB_FA P0335	Crank Re-synchronization Test: Continuous every 250 msec	Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Time-Based Crankshaft Test: No crankshaft synchronization gap found Engine Start Test during Crank: Time since starter engaged without detecting crankshaft synchronization gap Event-Based Crankshaft Test: Crank Pulses received in one engine revolution OR Crank Pulses received in one engine revolution	>= 0.4 seconds >= 1.5 seconds < 51 > 65	Time-Based Crankshaft Test: Engine is Running Starter is not engaged No DTC Active: Engine Start Test during Crank: Starter engaged AND (cam pulses being received OR (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow Event-Based Crankshaft Test: Engine is Running OR Starter is engaged No DTC Active:	5VoltReferenceB_FA = FALSE = FALSE = FALSE > 3.0 grams/second 5VoltReferenceA_FA 5VoltReferenceB_FA P0365 P0366	Time-Based Crankshaft Test: Continuous every 12.5 msec Engine Start Test during Crank: Continuous every 100 msec Event-Based Crankshaft Test: 8 failures out of 10 samples One sample per engine revolution	
Camshaft Position (CMP) Sensor	P0340	Determines if a fault exists with the cam	Engine Cranking Camshaft Test:		Engine Cranking Camshaft Test:		Engine Cranking Camshaft Test:	Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Circuit Bank 1 Sensor A		position bank 1 sensor A signal	Time since last camshaft position sensor pulse received OR Time that starter has been engaged without a camshaft sensor pulse <u>Time-Based Camshaft Test:</u> Fewer than 4 camshaft pulses received in a time <u>Fast Event-Based Camshaft Test:</u> No camshaft pulses received during first 12 MEDRES events (There are 12 MEDRES events per engine cycle)	>= 5.5 seconds >= 4.0 seconds > 3.0 seconds	Starter engaged AND (cam pulses being received OR (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow <u>Time-Based Camshaft Test:</u> Engine is Running Starter is not engaged No DTC Active: <u>Fast Event-Based Camshaft Test:</u> 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:	= FALSE = FALSE = FALSE > 3.0 grams/second 5VoltReferenceA_FA 5VoltReferenceA_FA 5VoltReferenceB_FA	Continuous every 100 msec <u>Time-Based Camshaft Test:</u> Continuous every 100 msec <u>Fast Event-Based Camshaft Test:</u> Continuous every MEDRES event	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						CrankSensor_FA		
			Slow Event-Based Camshaft Test: The number of camshaft pulses received during 100 engine cycles	= 0	Slow Event-Based Camshaft Test: Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Slow Event-Based Camshaft Test: 8 failures out of 10 samples Continuous every engine cycle	
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor A	P0341	Determines if a performance fault exists with the cam position bank 1 sensor A signal	Fast Event-Based Camshaft Test: The number of camshaft pulses received during first 12 MEDRES events is less than 4 or greater than 6 (There are 12 MEDRES events per engine cycle)		Fast Event-Based Camshaft Test: 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:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Fast Event-Based Camshaft Test: Continuous every MEDRES event	Type B 2 trips
			Slow Event-Based Camshaft Test: The number of camshaft pulses received during 100 engine cycles OR	< 398 > 402	Slow Event-Based Camshaft Test: Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Slow Event-Based Camshaft Test: 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	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 1	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
IGNITION CONTROL #2 CIRCUIT	P0352	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 2	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
IGNITION CONTROL #3 CIRCUIT	P0353	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 3	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
IGNITION CONTROL #4 CIRCUIT	P0354	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 4	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2

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	Determines if a fault exists with the cam position bank 1 sensor B signal	Engine Cranking Camshaft Test: Time since last camshaft position sensor pulse received OR Time that starter has been engaged without a camshaft sensor pulse Time-Based Camshaft Test: Fewer than 4 camshaft pulses received in a time Fast Event-Based Camshaft Test: No camshaft pulses received during first 12 MEDRES events (There are 12 MEDRES events per engine cycle)	 >= 5.5 seconds >= 4.0 seconds > 3.0 seconds	Engine Cranking Camshaft Test: Starter engaged AND (cam pulses being received OR (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow Time-Based Camshaft Test: Engine is Running Starter is not engaged No DTC Active: Fast Event-Based Camshaft Test: Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged	 = FALSE = FALSE = FALSE > 3.0 grams/second 5VoltReferenceA_FA	Engine Cranking Camshaft Test: Continuous every 100 msec Time-Based Camshaft Test: Continuous every 100 msec Fast Event-Based Camshaft Test: Continuous every MEDRES event	Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA		
			Slow Event-Based Camshaft Test: The number of camshaft pulses received during 100 engine cycles	= 0	Slow Event-Based Camshaft Test: Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Slow Event-Based Camshaft Test: 8 failures out of 10 samples Continuous every engine cycle	
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor B	P0366	Determines if a performance fault exists with the cam position bank 1 sensor B signal	Fast Event-Based Camshaft Test: The number of camshaft pulses received during first 12 MEDRES events is less than 4 or greater than 6 (There are 12 MEDRES events per engine cycle)		Fast Event-Based Camshaft Test: Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged		Fast Event-Based Camshaft Test: Continuous every MEDRES event	Type B 2 trips
					No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA		
			Slow Event-Based Camshaft Test: The number of camshaft pulses received during 100 engine cycles		Slow Event-Based Camshaft Test: Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA	Slow Event-Based Camshaft Test: 8 failures out of 10 samples	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			OR	< 398 > 402		5VoltReferenceB_FA CrankSensor_FA	Continuous every engine cycle	
Catalyst System Low Efficiency Bank 1 - revised	P0420	Oxygen Storage	Normalized Ratio OSC Value (EWMA filtered)	< 0.400	**All enable criteria associated with P0420 can be found under P2270 - (O2 Sensor Signal Stuck Lean Bank 1 Sensor 2)**		1 test attempted per valid decel period Minimum of 1 test per trip Maximum of 6 tests per trip Frequency: Fueling Related : 12.5 ms OSC Measurements: 100 ms Temp Prediction: 1000ms	Type A 1 Trip(s)
		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 table (based on temp and exhaust gas flow) 3. WorstPassing OSC value (based on temp and exhaust gas flow)			**Rapid Step Response (RSR) feature will initiate multiple tests:** If the difference between current EWMA value and the current OSC Normalized Ratio value is > 0.40 and the current OSC Normalized Ratio value is < 0.28 Maximum of 18 RSR tests to detect failure when RSR is enabled. **General Enable Criteria**			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		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.			In addition to the p-codes listed under P2270, the following DTC's shall also not be set: O2S_Bank_1_Sensor_1_FA O2S_Bank_1_Sensor_2_FA O2S_Bank_2_Sensor_1_FA O2S_Bank_2_Sensor_2_FA			
		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. **These conditions and their related values are listed in the "Secondary Parameters" and "Enable Conditions" section of this document for P2270 (O2 Sensor Signal Stuck Lean Bank 1 Sensor 2)**						
Evaporative Emission System Leak Detection Reference Orifice Low Flow	P043E	A plugged ELCP reference orifice is detected.	While performing 1st 0.020" reference orifice vacuum measurement for or 2nd 0.020" reference orifice vacuum measurement for	360 seconds	Propulsion system not active time Odometer	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles	Up to twice per trip, for each required wake-up event 100 msec loop	2 trip Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
(Sealed Fuel System)			If the difference between the ELCP pressure sensor (absolute) reading taken before the end of the reference measurement and the final ELCP pressure sensor (absolute) reading is then a stabilized 0.020" reference orifice vacuum measurement could not be obtained and the DTC fails.	30 seconds. 10 seconds > 220 Pa	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 Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time	≥ 0.062 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 1 MPH 0 ≥ 0 seconds ≥ 0 seconds
			If 1st 0.020" reference orifice vacuum measurement is after then a plugged ELCP reference orifice is detected and the DTC fails. If 2nd 0.020" reference orifice vacuum measurement is	> 4000 Pa 360 seconds	**Abort Conditions:** Min fuel level slosh Max fuel level slosh Key up during test Refueling request button pressed Service bay test active	≥ 190 % ≤ 200 %		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			after then a plugged ELCP reference orifice is detected and the DTC fails.	> 4510 Pa 30 seconds	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 P0451 P1458 P145C P145D P145E P2421 P2422 P2450		
Evaporative Emission System	P043F	A missing ELCP reference orifice is	If 1st 0.020” reference orifice vacuum		Propulsion system not active time		Up to twice per trip, for each required	2 trip Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Leak Detection Reference Orifice High Flow (Sealed Fuel System)		detected.	measurement is after then a missing ELCP reference orifice is detected and the DTC fails. If 2nd 0.020” reference orifice vacuum measurement is after then a missing ELCP reference orifice is detected and the DTC fails.	< 1180 Pa 360 seconds < 1180 Pa 30 seconds	Odometer 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 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 ≥ 0.062 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 1 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 %	wake-up event 100 msec loop	

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	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	P0451 P1458 P145C P145D P145E P2421 P2422		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						P2450		
EVAP System Small Leak Detected (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 1009 Pa or a fuel tank system vacuum greater than -1011 Pa then both the	If the ELCP pressure sensor (gauge) vacuum reading is less than the 0.020" reference orifice vacuum measurement times a plus a offset for then the fuel tank system has a small leak and the DTC fails.	1.00 multiplier 200 Pa 400 seconds	Propulsion system not active time Odometer 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 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	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.062 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 1 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 %	Once per trip, for each required wake-up event 100 msec loop	2 trip Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		1011 Pa then both the small leak and large leak diagnostics pass without using the ELCP vacuum pump.				≤ 200 %		
					Key up during test			
					Refueling request button pressed			
					Service bay test active			
					Device control exceeds	0.5 seconds		
		The Fast Pass Full Test Sequence is conducted on the 5th consecutive fast pass. All other times, the Fast Pass Reduced Test Sequence is conducted to conserve battery state of charge. The Fast Pass Reduced 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.			**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 P1458		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						P145C P145D P145E P145F P2421 P2422 P2450		
Evaporative Emission System Purge Control Valve Open Circuit (Sealed Fuel System)	P0443	This DTC checks for open circuit failures during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		PT Relay Voltage	Voltage ≥ 11 volts	20 failures out of 25 samples 250 ms / sample	2 trips Type B
Evaporative Emission System Vent Solenoid Control Open Circuit (Sealed Fuel System)	P0449	This DTC checks for open circuit failures during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.				20 failures out of 25 samples 250 ms / sample	2 trips Type B
Fuel Tank Pressure (FTP) Sensor Circuit Performance Diagnostic (Sealed Fuel System)	P0451	Fuel Tank Pressure (FTP) Sensor Correlation Diagnostic.	After a delay time of and a stabilization time of <u>This section of the diagnostic can both pass and fail</u> IF 1) the FTP sensor reading	2 seconds 3 seconds	<u>Propulsion System Not Active</u> Propulsion system not active time Odometer Drive distance Min baro Max baro	 4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.062 miles ≥ 70 kPa ≤ 110 kPa	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	2 trip Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			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 is and	> -3811 Pa < 3388 Pa, > -3736 Pa < 3313 Pa, > 3000 Pa 5 seconds < -3811 Pa > 3388 Pa,	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 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 pressed Service bay test active Device control exceeds	≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 1 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 %		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			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.	< -3736 Pa > 3313 Pa, 5 seconds	**No Active DTC's**	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		
					No Active DTC's TFTKO <u>Propulsion System Active and Engine On</u> Min baro Max baro Min OAT Max OAT Vehicle not in assembly plant (value must = 0)	P1458 P145D ≥ 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
						0		
					Engine Running			
					Run/Crank Voltage	Voltage ≥ 11 volts		
					Purge is not enabled			
					Abort Conditions:			
					Refueling request button pressed			
					Device control exceeds			
						0.5 seconds		
					No Active DTC's			
						MAP_SensorFA EnginePowerLimited AmbientAirDefault OAT_EstAmbTemp_FA P0442 P0443 P0449 P0452 P0453 P0455 P0458 P0459 P0498 P0499 P1458 P1459 P145A P145D P145E P2400 P2401 P2402 P2418 P2419 P2420		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						P2422 P2450		
Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage (Sealed Fuel System)	P0452	This DTC will detect a Fuel Tank Pressure (FTP) sensor signal that is too low out of range.	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 % of Vref or ~ -4377 Pa)			640 failures out of 800 samples 12.5 ms / sample	2 trips Type B
Fuel Tank Pressure (FTP) Sensor Circuit High Voltage (Sealed Fuel System)	P0453	This DTC will detect a Fuel Tank Pressure (FTP) sensor signal that is too high out of range.	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% of Vref or ~ 3950 Pa)			640 failures out of 800 samples 12.5 ms / sample	2 trips Type B
EVAP System Large Leak Detected (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	After a refueling event has been detected and the small/large leak diagnostics have not passed. If the ELCP pressure sensor (gauge) vacuum reading is less than the 0.020" reference orifice vacuum measurement times a plus a offset times a for than the fuel tank system	1.00 multiplier	Propulsion system not active time Odometer Drive distance Min baro Max baro Min fuel level Max fuel level Fuel level increase for ECT Min IAT Max IAT	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.062 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≥ 10 % ≥ 5 seconds ≤ 40 °C ≥ 4 °C ≤ 45 °C	Once per trip after a refueling event has been detected, for each required wake-up event 100 msec loop	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		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 1009 Pa or a fuel tank system vacuum greater than -1011 Pa then both the small leak and large leak diagnostics pass without using the ELCP vacuum pump. The Fast Pass Full Test Sequence is	then the fuel tank system has a large leak and the DTC fails.	200 Pa 0.20 multiplier 400 seconds	Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 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 Max fuel level slosh Key up during test Refueling request button pressed Service bay test active Device control exceeds **No Active DTC's**	≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 1 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 % 0.5 seconds		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		conducted on the 5th consecutive fast pass. All other times, the Fast Pass Reduced Test Sequence is conducted to conserve battery state of charge. The Fast Pass Reduced 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.			**No Active DTC's TFTKO**	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 P1458 P145C P145D P145E P145F P2421 P2422 P2450		
Evaporative Emission System Purge Control	P0458	This DTC checks for short to low voltage circuit failures during	The ECM detects that the commanded state of the driver and the actual state		PT Relay Voltage	Voltage ≥ 11 volts	20 failures out of 25 samples	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Valve Circuit Low (Sealed Fuel System)		operation.	of the control circuit do not match.				250 ms / sample	
Evaporative Emission System Purge Control Valve Circuit High (Sealed Fuel System)	P0459	This DTC checks for short to high voltage circuit failures during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		PT Relay Voltage	Voltage ≥ 11 volts	20 failures out of 25 samples 250 ms / sample	2 trips Type B
Fuel Level Sensor 1 Performance	P0461	This DTC will detect a fuel sender stuck in range in the primary fuel tank.	Delta Fuel Volume change over an accumulated 149 miles.	< 3 liters	Engine Running No active DTCs:	 VehicleSpeedSensor_FA	250 ms / sample	2 trips Type B
Fuel Level Sensor 1 Circuit Low Voltage	P0462	This DTC will detect a fuel sender stuck out of range low in the primary fuel tank.	Fuel level Sender % of 5V range	< 10 %			100 failures out of 125 samples 100 ms / sample	2 trips Type B
Fuel Level Sensor 1 Circuit High Voltage	P0463	This DTC will detect a fuel sender stuck out of range high in the primary fuel tank.	Fuel level Sender % of 5V range	> 60 %			100 failures out of 125 samples 100 ms / sample	2 trips Type B
Evaporative	P0497	Low purge flow is	After an initial time delay of		Min baro	≥ 70 kPa	Once per trip with	2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Emission System Low Purge Flow Diagnostic (Sealed Fuel System)		detected	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 ≥ 996 Pa 3 seconds < 299 Pa 0.2 seconds, < 996 Pa 20 seconds	Max baro Min OAT Max OAT Engine Vacuum Purge flow to enable Purge flow to disable 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 Fuel tank protection active when FTP sensor for **No Active DTC's**	≤ 110 kPa ≥ 4 °C ≤ 35 °C > 5 kPa >= 1.39 % requested < 1.1 % requested 0 Voltage ≥ 11 volts 0.5 seconds < -3238 Pa 5.0 seconds MAP_SensorFA EnginePowerLimited AmbientAirDefault OAT_EstAmbTemp_FA P0442 P0443 P0449 P0451	Propulsion System Active and Engine On 100 msec loop	Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						P0452 P0453 P0455 P0458 P0459 P0498 P0499 P1458 P1459 P145A P145D P145E P2400 P2401 P2402 P2418 P2419 P2420 P2422 P2450		
Evaporative Emission System Vent Solenoid Control Circuit Low (Sealed Fuel System)	P0498	This DTC checks for short to low voltage circuit failures during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.				20 failures out of 25 samples 250 ms / sample	2 trips Type B
Evaporative Emission System Vent Solenoid Control Circuit High (Sealed Fuel System)	P0499	This DTC checks for short to high voltage circuit failures during operation. If the P0499 is active, an intrusive test is performed with the vent solenoid commanded closed for 15 seconds.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.				20 failures out of 25 samples 250 ms / sample	2 trips Type B

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) Sensor Performance	P0531	Determines if the Air Conditioning High Side Pressure Sensor circuit voltage is stuck or biased in range	**Engage Test:** **To fail a currently passing test:**		Compressor Type = Electric Driven Diagnostic enabled/ disabled Enable with Key Off	Enabled Enabled Enabled		2 trip(s) Type B
			The filtered, weighted difference between measured Delta and predicted delta (a function of ambient temp, coolant temp, and fan speed.):	Filtered Weighted residual < = 0.15	Filtered AC HSPS test weighting factors (function of ambient temp, engine coolant temperature, and fan speed). Details on Supporting Tables Tab (P0531 Section)	Weighting Factor > 1.0 and Coolant Factor > -0.0 AND < 16.0 and # of Test Samples > 100 Compressor Speed > 300 RPM	Performed every 100 msec	
			To pass a currently failing test: The filtered, weighted difference between measured Delta and predicted delta (a function of ambient temp, coolant temp, and fan speed.):	Engaged Test: Filtered Weighted residual > 0.15	Filtered AC HSPS test weighting factors (function of ambient temp, engine coolant temperature, and fan speed). Details on Supporting Tables Tab (P0531 Section)	Weighting Factor > 1.0 and Coolant Factor > -0.0 AND < 16.0 and # of Test Samples > 100 Compressor Speed > 300 RPM	Performed every 100 msec	
			On Test: The pressure sensor has to be less than athreshold value when engaged (a function of ambient temp)	On Test: Pressure < Threshold	Diagnostic enabled/ disabled Fault Threshold (function of ambient temperature). Details on Supporting Tables Tab (P0531 Section)	Enabled Delay Time > 0	80 failures out of 100 samples Performed every 100 msec	
						Fault bundles:		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						ACHighSidePressSnsrCkt FA ACFailedOnSD ACThrmlRefrigSpdVld ACCMLostComm		
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	< 3 percent	Sensor Present Diagnostic enabled/ disabled	Enabled Enabled	80 failures out of 100 samples Performed every 25 msec	2 trip(s) Type B
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	> 85 percent	Sensor Present Diagnostic enabled/ disabled	Enabled Enabled	80 failures out of 100 samples Performed every 25 msec	2 trip(s) Type B
Cruise Control Mutil-Functon Switch Circuit	P0564	Detect when cruise control multi-function switch circuit (analog) voltage is in an illegal range	Cruise Control analog circuit voltage must be in an "illegal range" for greater than a calibratable period of time for cruise switch states that are received over serial data		CAN cruise switch diagnostic enable in ECM	TRUE	fail continuously for greater than 0.500 seconds	Type: C MIL: NO Trips: 1

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 for architecture where cruise switch states are received over serial data		CAN cruise switch diagnostic enable in ECM	TRUE	fail continuously for greater than 90.000 seconds	Type: C MIL: NO Trips: 1
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 for architecture where cruise switch states are received over serial data		CAN cruise switch diagnostic enable in ECM	TRUE	fail continuously for greater than 90.000 seconds	Type: C MIL: NO Trips: 1
Cruise Control Input Circuit	P0575	Detects rolling count or protection value errors in Cruise Control Switch Status serial data signal	If x of y rolling count / protection value faults occur, disable cruise for duration of fault		Cruise Control Switch Serial Data Error Diagnostic Enable	TRUE	10/16 counts	Type: C MIL: NO Trips: 1
Thermostat Heater	P0597	This DTC checks the T-	Voltage low during driver				15 failures out of 30	2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Open Circuit		stat Heater Driver Output circuit for electrical integrity.	open state (indicates short-to-ground or open circuit). Fault present state for Open circuit is determined from output driver status byte.		Run Crank Ignition in Range Engine not cranking Run Crank active Above is true and Last Open Circuit Test	= True = True = True = not Indeterminate	samples 1 sec/ sample Continuous	Type B
Thermostat Heater Control Circuit Low	P0598	This DTC checks the T-stat Heater Driver Output circuit for electrical integrity.	Voltage low during driver open state (indicates short-to-ground or open circuit). Fault present state for Ground Short circuit is determined from output driver status byte.		Run Crank Ignition in Range Engine not cranking Run Crank active Above is true and Last Ground Short Circuit Test	= True = True = True = not Indeterminate	15 failures out of 30 samples 1 sec/ sample Continuous	2 trips Type B
Thermostat Heater Control Circuit High	P0599	This DTC checks the T-stat Heater Driver Output circuit for electrical integrity.	Voltage high during driver closed state (indicates short-to-power). Fault present state for Power Short circuit is determined from output driver status byte.		Run Crank Ignition in Range Engine not cranking Run Crank active Above is true and Last Power Short Circuit Test	= True = True = True = not Indeterminate	15 failures out of 30 samples 1 sec/ sample Continuous	2 trips Type B
Control Module Read Only Memory (ROM)	P0601	This DTC will be stored if the calibration check sum is incorrect or the	The Primary Processor's calculated checksum does not match the stored	1 failure if the fault is detected during the first pass. 5 failures			Diagnostic runs continuously in the background	Trips: 1 Type:

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		flash memory detects an uncorrectable error via the Error Correcting Code.	checksum value. Covers all software and calibrations.	if the fault occurs after the first pass is complete.				A MIL: YES
			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				
Control Module Not Programmed	P0602	This DTC will be stored if the PCM is a service PCM that has not been programmed.	Output state invalid		PCM State	= crank or run	Diagnostic runs at powerup and once per second continuously after that	Type A 1 trips
						PCM is identified through calibration as a Service PCM		

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 at controller power-up	Checksum at power-up does not match checksum at power-down				Diagnostic runs at powerup Diagnostic reports a fault if 4 failures occur	Type A 1 trips
ECM RAM Failure	P0604	Indicates that the ECM has detected a RAM fault:						Trips: 1 Type: A
		Primary Processor System RAM Fault	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)	MIL: YES
		Primary Processor Cache RAM Fault	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)	
		Primary Processor TPU RAM Fault	Indicates that the primary processor is unable to correctly read data from or write data to TPU RAM.				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
			Detects data read does not match data written >=	5 counts				
		Primary Processor Update Dual Store RAM Fault	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 seconds			When dual store updates occur.	
		Primary Processor Write Protected RAM Fault	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)	
		Secondary Processor RAM Fault	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)	
Internal ECM Processor Integrity Fault	P0606	Indicates that the ECM has detected an internal processor integrity fault:						Trips: 1 Type: A MIL: YES
		Primary Processor SPI Fault Detected	Loss or invalid message of SPI communication from the Secondary Processor at initialization detected by the Primary Processor or	Loss or invalid message at initialization detected or loss or invalid message after a valid	Run/Crank Voltage OR Run/Crank Voltage	>= 6.41V	In the primary processor, 159/399counts intermittent or 39 counts continuous; 39	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			loss or invalid message of SPI communication from the Secondary Processor after a valid message was recieved by the Primary Processor	message was recieved	Else	>= 11.00 The failure will be reported for all conditions	counts continuous @ initialization. 12.5 ms /count in the ECM main processor	
		Secondary Processor SPI Fault Detected	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 recieved 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 counts continuous; 0 counts continuous @ initialization. 12.5 ms /count in the ECM main processor	
		Secondary Processor Stack Fault	Checks for stack over or underflow in secondary processorby looking for corruption of known pattern at stack boundaries. Checks number of stack over/under flow since last powerup reset >=		Stack Limit Test Enabled	TRUE	variable, depends on length of time to corrupt stack	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				5				
		Secondary processor received incorrect Keys	MAIN processor is verified by responding to a seed sent from the secondary with a key response to secondary. Checks number of incorrect keys received > or Secondary processor has not received a new within time limit	2 incorrect seeds within 8 messages, 0.200 seconds	Ignition State	Run OR Crank	150 ms for one seed continually failing	
		MAIN processor did not receive seed within time limit	Time new seed not received exceeded			always running	0.450 seconds	
		MAIN processor test for seeds to arrive in a known sequence	MAIN processor receives seed in wrong order			always running	3 / 17 counts intermittent. 50 ms/count in the ECM main	
		Secondary processor ALU check	2 fails in a row in the Secondary processor's ALU check		ALU Test Enabled	TRUE	25 ms	
		Secondary processor register configuration check	2 fails in a row in the Secondary processor's configuration register masks versus known good data		Configuration Register Test Enabled	TRUE	12.5 to 25 ms	
		MAIN processor discrete fault:	Secondary processor detects an error in the toggling of a hardware discrete line controlled by		Main CPU State Of Health Fault Enabled Time from Initialization	TRUE	50 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			the MAIN processor: number of discrete changes >= or <= over time window(50ms)	7 17		>= 0.488 seconds		
		MAIN detected corruption in throttle or pedal critical RAM data	memory and complement memory do not agree				409.59 seconds	
		MAIN Processor Performance Check	Software background task first pass time to complete exceeds		Run/Crank voltage	> 6.41 V	360.000 seconds	
		MAIN processor ALU check	2 fails in a row in the MAIN processor's ALU check		ALU Test Enabled	TRUE	25 ms	
		MAIN processor configuration register check	2 fails in a row in the MAIN processor's configuration register masks versus known good data		Configuration Register Test Enabled	TRUE	12.5 to 25 ms	
		MAIN Stack Fault	Checks number of stack over/under flow since last powerup reset >=	5	Stack Limit Test Enabled	TRUE	variable, depends on length of time to corrupt stack	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		MAIN processor ADC test	Voltage deviation >	0.495	A2D Converter Test Enabled	TRUE	5 / 10 counts or 0.150 seconds continuous; 50 ms/count in main processor	
		Flash ECC Fault	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)	Flash ECC Circuit Test Enabled	TRUE	variable, depends on length of time to access flash with corrupted memory	
		RAM ECC Fault	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)	RAM ECC Circuit Test Enable	TRUE	variable, depends on length of time to access flash with corrupted memory	
		MAIN DMA transfer check	MAIN processor DMA transfer from Flask to RAM has 1 failure		DMA Transfer Check Enabled	TRUE	variable, depends on length of time to write flash to RAM	

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	This DTC checks for a shorted low circuit while the device is commanded on.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage Engine Speed	Voltage ≥ 11 volts ≥ 0 RPM	8 failures out of 10 samples 250 ms / sample	2 trips Type B
Fuel Pump Relay Control Circuit High Voltage	P0629	This DTC checks for an open and shorted high circuit while the device is commanded off.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage Engine Speed	Voltage ≥ 11 volts ≥ 0 RPM	8 failures out of 10 samples 250 ms / sample	2 trips Type B
Control Module EEPROM Error	P062F	Indicates that the NVM Error flag has not been cleared	The next write to NVM will not succeed or the assembly calibration integrity check failed.		Ignition State	= accesory, run, or crank	1 test failure Diagnostic runs once at powerup	Type A 1 trips
VIN Not Programmed or Mismatched - Engine Control Module (ECM)	P0630	This DTC checks VIN is correctly written	At least one of programed VIN's digit	= 00 or FF	OBD Manufacturer Enable Counter	= 0	250 ms / test Continuous	Type A 1 trips
5 Volt Reference #1 Circuit	P0641	Detects a continuous or intermittent short on the 5 volt reference circuit #1	ECM Vref1 < or ECM Vref1 >> or the difference between ECM filtered Vref1 and Vref1 >	4.875 5.125 0.05	Run/Crank Voltage	> 6.41	19/39counts or 0.1875 sec continuous; 12.5 ms/count in main processor	Trips: 1 Type: A MIL: YES

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)	P0650	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage Remote Vehicle Start is not active	Voltage ≥ 11 volts	20 failures out of 25 samples 250 ms / sample	2 trip Type B NO MIL
5 Volt Reference #2 Circuit	P0651	Detects a continuous or intermittent short on the 5 volt reference circuit #2	ECM Vref2 < or ECM Vref2 >> or the difference between ECM filtered Vref2 and Vref2 >	4.875 5.125 0.05	Run/Crank Voltage	> 6.41	19/39 counts or 0.1875 sec continuous; 12.5 ms/count in main processor	Trips: 1 Type: A MIL: YES
Powertrain Relay Control (ODM)	P0685	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage	Voltage ≥ 11 volts	8 failures out of 10 samples 250 ms / sample	2 trips Type B
Powertrain Relay Feedback Circuit High	P0690	This DTC is a check to determine if the Powertrain relay is functioning properly.	Voltage stuck high PT Relay feedback voltage is when commanded 'OFF'	 > 2 volts	Powertrain relay commanded "ON" No active DTCs:	 PowertrainRelayStateOn_FA	Stuck Test: 100 ms/ sample Continuous failures ≥ 4 seconds	2 trips Type B
5 Volt Reference #3 Circuit	P0697	Detects a continuous or intermittent short on the 5 volt reference circuit #3	ECM Vref3 < or ECM Vref3 >> or the difference between ECM filtered Vref3 and Vref3 >	4.875 5.125 0.05	Run/Crank Voltage	> 6.41	19/39 counts or 0.1875 sec continuous; 12.5 ms/count in main processor	Trips: 1 Type: A MIL: YES

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel Pump Control Module (FPCM) Requested MIL Illumination	P069E	Monitors the FPCM MIL request line to determine when the FPCM has detected a MIL illuminating fault.	Fuel Pump Control Module Emissions-Related DTC set		Time since power-up	> 3 seconds	Continuous	Type A 1 trips MIL: NO
5 Volt Reference #4 Circuit	P06A3	Detects a continuous or intermittent short on the 5 volt reference circuit #4	ECM Vref4 < or ECM Vref4 >> or the difference between ECM filtered Vref4 and Vref4 >	4.875 5.125 0.05	Run/Crank Voltage	> 6.41	19/39counts or 0.1875 sec continuous; 12.5 ms/count in main processor	Trips: 1 Type: A MIL: YES
Internal Control Module Knock Sensor Processor 1 Performance	P06B6	This diagnostic checks for a fault with the internal test circuit used only for the '20 kHz' method of the Open Circuit Diagnostic	Gated FFT Diagnostic Output (VaKNKD_k_OpenTestCktIntFilter[0])	> OpenTestThreshLo **and** < OpenTestThreshHi See Supporting Tables	Diagnostic Enabled? Engine Speed Engine Air Flow Engine running	Enabled > 600 RPM and < 5000 RPM ≥ 40 mg/cylinder and ≤ 2000 mg/cylinder ≥ 5.0 seconds	First Order Lag Filter with Weight Coefficient Weight Coefficient = 0.0100 Updated each engine event	Type: B MIL: YES Trips: 2
Control Module Wake-up Circuit Performance Diagnostic (Sealed Fuel System)	P06E4	VICM Wake-up events were not received	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:		Odometer 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 ≥ 0.062 miles ≥ 0 hours ≥ 0 hours	Once per each wake-up event when Propulsion System is not active Final decision is made when Propulsion System is Active 100 msec loop	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			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			VehicleSpeedSensor_FA ModuleOffTime_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA		
			If the 5.0 hour wake-up event did not occur from to then a failure has occurred.	4.3 hours 5.8 hours				
			If the 7.0 hour wake-up event did not occur from to then a failure has occurred.	6.0 hours 8.1 hours				
			If the 9.5 hour wake-up event did not occur from to then a failure has occurred.	8.2 hours 11.0 hours				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			At Propulsion System Active, if any of the wake-up events indicate a failure then the DTC fails.					
Transmission Control Module (TCM) Requested MIL Illumination	P0700	Monitors the TCM MIL request line to determine when the TCM has detected a MIL illuminating fault.	Transmission Emissions-Related DTC set			Time since power-up > 3 seconds	Continuous	Type A 1 trips MIL: NO
Traction Control Torque Request Circuit	P0856	Determines if torque request from the EBTCM is valid	Serial Communication 2's complement message - ($140 for PPEI2 or $1C9 for PPEI3, $1CA/$1C6 for Hybrid))	Message <> 2's complement of message	Serial communication to EBTCM (U0108) Power Mode Engine Running	No loss of communication = Run = True	**All except Class2 PWM:** Count of 2's complement values not equal >= 10 Performed every 12.5 msec	
			OR					
			Serial Communication message ($140 for PPEI2 or $1C9 for PPEI3, $1CA/$1C6 for Hybrid)) rolling count value	Message rolling count value <> previous message rolling count value plus one	Status of traction in GMLAN message ($4E9)	= Traction Present	6 rolling count failures out of 10 samples Performed every 12.5 msec	
			OR					
			Too many minimum limit torque request transitions occur from TRUE to FALSE to TRUE within a	Requested torque intervention type toggles from not increasing request to			>= 3 multi-transitions out of 5 samples. Performed every 200 ms	1 trip(s) Special

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			time period Torque request greater than torque request diagnostic maximum threshold	increasing request > 250 Nm for engine based traction torque system, > 2588 Nm for axle based traction torque system			>= 4 out of 10 samples Performed every 12.5 msec	Type C
Hybrid Powertrain Control Module (HPC) Requested MIL Illumination	P0AC4	Monitors the HPC MIL request line to determine when the HPC has detected a MIL illuminating fault.	HPC Emissions-Related DTC set			Time since power-up > 3 seconds	Continuous	Type A 1 trips MIL: NO
Inlet Airflow System Performance	P1101	Determines if there are multiple air induction problems affecting airflow and/or manifold pressure.	Filtered Throttle Model Error AND (ABS(Measured Flow – Modeled Air Flow) Filtered OR ABS(Measured MAP – MAP Model 1) Filtered AND	<= 125 kPa*(g/s) > 10 grams/sec > 20.0 kPa)	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 500 RPM <= 8000 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C >= 0.25 Filtered Throttle Model Error multiplied by TPS Residual Weight Factor	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
			ABS(Measured MAP – MAP Model 2) Filtered	> 20.0 kPa	No Active DTCs:	based on RPM Modeled Air Flow Error multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Est MAP Model 1 Error multiplied by MAP1 Residual Weight Factor based on RPM MAP Model 2 Error multiplied by MAP2 Residual Weight Factor based on RPM See table "IFRD Residual Weighting Factors". MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA ECT_Sensor_Ckt_FP IAT_SensorFA IAT_SensorCircuitFP		
O2S Insufficient Switching Bank 1 Sensor 1	P1133	This DTC determines if the O2 sensor is no longer sufficiently switching.	Fault condition present if Half Cycle L/R or R/L Switches are below the threshold.	H/C L/R switches < Threshold, or H/C R/L switches < Threshold, (refer to table named "P1133 - O2S HC L to R Switches Limit Bank 1 Sensor 1" Pass/Fail Threshold	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA	Sample time is 60 seconds Frequency: Once per trip	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				table & "P1133 - O2S HC R to L Switches Limit Bank 1 Sensor 1" Pass/Fail Threshold table in Supporting tables tab)		EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA EthanolCompositionSensor_FA		
				< 3				
			OR					
			Slope Time L/R Switches					
			OR	< 3		EngineMisfireDetected_FA		
			Slope Time R/L Switches		Bank 1 Sensor 1 DTC's not active	= P0131, P0132 or P0134		
					System Voltage	10.0 < Volts < 32.0		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B1S1)** in Supporting Tables tab.		
					O2 Heater on for	≥ 40 seconds		
					Learned Htr resistance	= Valid		
					Engine Coolant	> 50 ºC		
					IAT	> -40 ºC		
					Engine run Accum	> 90 seconds		
					Time since any AFM status change	> 2.0 seconds		
					Time since Purge On to Off change	> 2.0 seconds		
					Time since Purge Off to			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					On change Engine airflow Engine speed Fuel Baro Air Per Cylinder Low Fuel Condition Diag Fuel Control State Closed Loop Active LTM fuel cell Transient Fuel Mass Baro Fuel Control State Fuel State Commanded Proportional Gain **All of the above met for** Time	> 2.0 seconds 17 ≤ gps ≤ 40 1000 ≤ RPM ≤ 3500 < 87 % Ethanol > 70 kpa ≥ 150 mgrams = False = Closed Loop = TRUE = Enabled ≤ 100.0 mgrams = Not Defaulted not = Power Enrichment DFCO not active ≥ 0.0 % > 1.0 seconds		
Mass Air Flow A Supply Voltage Control Circuit Low	P121B	Electrical Integrity of the Mass Air Flow Power Supply Circuit - Shorted to Ground	ECM detects that commanded and actual states of output driver do not match because the output is shorted to ground		Mass Air Flow Power is commanded on		40 failures out of 50 samples 1 sample every 100 msec	Type B 2 trips
Mass Air Flow A Supply Voltage Control Circuit High	P121C	Electrical Integrity of the Mass Air Flow Power Supply Circuit - Shorted to Power	ECM detects that commanded and actual states of output driver do not match because the output is shorted to power		Mass Air Flow Power is commanded off		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
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) OR Average desired accumulated exhaust power - Average actual accumulated exhaust power (too little energy delivered to catalyst) (EWMA filtered)	< -32.00 KJ/s (high RPM failure mode) > 4.15 KJ/s (low RPM failure mode)	**To enable the diagnostic, the Cold Start Emission Reduction Strategy must be Active per the following:**		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.	Type A 1 Trip(s)
					Catalyst Temperature	< 350.00 degC		
					AND			
					Engine Coolant	> -10.00 degC		
					AND			
					Engine Coolant	<= 180.00 degC		
					The Cold Start Emission Reduction strategy must not be exiting. The strategy will exit per the following:			
					Catalyst Temperature	>= 550.00 degC		
					AND			
					Engine Run Time	>= 30.00 seconds		
					OR			
					Engine Run Time	> "Extended Engine Exit Time" This Extended Engine Exit time is a function of percent ethanol. **Refer to "Supporting Tables" for details.**		

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	< 621.37 MPH		
					Allow diagnostic to calculate residual in an off-idle state	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)		
					If the value above is equal to a value of 1 then this "DriverOffAccelPedal" will not be checked. However, if the above value is equal to a value of 0 then driver must be off the accel pedal. This checks that the final accel pedal position (comprehending deadband and hysteresis) is essentially zero.			
					A change in throttle position (tip-in/tip-out) will initiate a delay in the calculation of the average qualified residual value. When the			
					Pedal Close Delay Timer	> 0.00 seconds		
					the diagnostic will continue the calculation.			
					Clutch Pedal Top of Travel Achieved and Clutch Pedal Bottom of Travel Achieved. **Refer to the "Clutch Pedal Top of Travel Achieved criteria"** and **"Clutch Pedal Bottom of Travel Achieved criteria"** section of the "Supporting Tables" tab criteria			
					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			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					period. **Refer below.**			
					Time Weighting Factor	> 0 These are scalar values that are a function of engine run time. **Refer to "Supporting Tables" for details.**		
					General Enable			
					DTC's Not Set			
					AcceleratorPedalFailure			
					ECT_Sensor_FA			
					IAT_SensorCircuitFA			
					ManTempSensorCircuitFA			
					CrankSensorFaultActive			
					FuelInjectorCircuit_FA			
					MAF_SensorFA			
					MAP_SensorFA			
					EngineMisfireDetected_FA			
					Clutch Sensor FA			
					IAC_SystemRPM_FA			
					IgnitionOutputDriver_FA			
					P050A (ColdStrt_IAC_SysPerf)			
					P050B (ColdStrtIgnTmngPerf)			
					TPS_FA			
					VehicleSpeedSensor_FA			
					5VoltReferenceMAP_OOR_Flt			
					TransmissionEngagedState_FA			
					EngineTorqueInaccurate			
Evaporative Emission System Leak Detection Pump Pressure Sensor Circuit Performance Diagnostic (Sealed Fuel System)	P1458	ELCP Pressure Sensor Correlation Diagnostic	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		Propulsion System Not Active Propulsion system not active time Odometer	 4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles	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	2 trip Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			counter. This diagnostic runs for	> 3000 Pa	Drive distance Min baro	≥ 0.062 miles ≥ 70 kPa	Second time diagnostic runs, 50 failures out of 63 samples	
				14 seconds.	Max baro Min fuel level Max fuel level	≤ 110 kPa ≥ 10 % ≤ 90 %		
			<u>Propulsion System Active</u>		ECT Min IAT Max IAT	≤ 40 °C ≥ 4 °C ≤ 45 °C	100 msec loop	
			After a stabilization time of	10 seconds.	Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455	≥ 0 hours ≥ 0 hours		
			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.	0.1 miles,	Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time	≥ 10 volts ≤ 1 MPH 0 ≥ 0 seconds	When Propulsion System Active 50 failures out of 63 samples	
				> 15000 Pa		≥ 0 seconds	100 msec loop	
			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	0.1 miles,	**Abort Conditions:** Min fuel level slosh Max fuel level slosh Key up during test Refueling request button pressed Service bay test active	≥ 190 % ≤ 200 %		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			is then increment the fail counter.		Device control exceeds	0.5 seconds		
				> 20000 Pa	**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 P145E P145F P2421 P2422 P2450		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Propulsion System Active			
					Min baro	≥ 70 kPa		
					Max baro	≤ 110 kPa		
					Min OAT	≥ 4 °C		
					Max OAT	≤ 35 °C		
					Vehicle not in assembly plant (value must = 0)	0		
					Run/Crank Voltage	Voltage ≥ 11 volts		
					Purge is not enabled			
					Abort Conditions:			
					Refueling request button pressed			
					Device control exceeds	0.5 seconds		
					FTP correlation diagnostic (P0451) is running			
					Purge Low Flow diagnostic (P0497) is running			
					No Active DTC's	MAP_SensorFA EnginePowerLimited AmbientAirDefault OAT_EstAmbTemp_FA P0443 P0458 P0459 P1459		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						P145A P145D P2400 P2401 P2402 P2418 P2419 P2420 P2450		
Evaporative Emission System Leak Detection Pump Pressure Sensor Circuit Low Voltage (Sealed Fuel System)	P1459	This DTC will detect an ELCP pressure sensor signal that is too low out of range.	ELCP pressure sensor signal	< 0.70 volts (14 % of Vref or ~ 47 kPa)			640 failures out of 800 samples 12.5 ms / sample	2 trips Type B
Evaporative Emission System Leak Detection Pump Pressure Sensor Circuit High Voltage (Sealed Fuel System)	P145A	This DTC will detect an ELCP pressure sensor signal that is too high out of range.	ELCP pressure sensor signal	> 4.85 volts (97% of Vref or ~ 123 kPa)			640 failures out of 800 samples 12.5 ms / sample	2 trips Type B
Evaporative Emission System Leak Detection Pump	P145C	This DTC will detects an ELCP vacuum pump that is stuck off.	When the ELCP vacuum pump is commanded on during the 1st 0.020" reference orifice vacuum		Propulsion system not active time	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or	Up to twice per trip, for each required wake-up event	2 trip Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Performance/Stuck Off (Sealed Fuel System)			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		8.2 ≤ time ≤ 11.0 hours	100 msec loop	
					Odometer	≥ 9.9 miles		
					Drive distance	≥ 0.062 miles		
					Min baro	≥ 70 kPa		
					Max baro	≤ 110 kPa		
					Min fuel level	≥ 10 %		
					Max fuel level	≤ 90 %		
					ECT	≤ 40 °C		
					Min IAT	≥ 4 °C		
					Max IAT	≤ 45 °C		
					Time since last test when passing P0442/P0455	≥ 0 hours		
					Time since last test when failing P0442/P0455	≥ 0 hours		
			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 30 seconds				
					Voltage	≥ 10 volts		
					Vehicle speed	≤ 1 MPH		
					Vehicle not in assembly plant (value must = 0)	0		
					Propulsion system not active time	≥ 0 seconds		
					Previous propulsion system active time	≥ 0 seconds		
					Abort Conditions:			
					Min fuel level slosh	≥ 190 %		
					Max fuel level slosh	≤ 200 %		
					Key up during test			
					Refueling request button pressed			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					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 P1458 P145D P145E P2421 P2422 P2450		

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 (Sealed Fuel System)	P145D	This DTC detects an ELCP vacuum pump that is stuck on.	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.	> 1000 Pa 8 seconds > 1180 Pa 14 seconds	Propulsion system not active time Odometer 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 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 ≥ 0.062 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 1 MPH 0 ≥ 0 seconds ≥ 0 seconds	Once or twice per trip, for each required wake-up event 100 msec loop	2 trip Type B

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						P0451 P1458 P145C P145E P2421 P2422 P2450		
EVAP System Leak Between Vent Control Valve and Leak Detection Pump (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. 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 Diurnal Control Valve (DCV) and the ELCP leak detection pump to determine if a leak exists.	If the ELCP pressure sensor (gauge) vacuum reading is less than the 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 30 seconds	Propulsion system not active time Odometer 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 Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.062 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 1 MPH 0 ≥ 0 seconds	Up to once per trip, for each required wake-up event 100 msec loop	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						≥ 0 seconds		
					Abort Conditions:			
					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		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						AccCktLo_FA ModuleOffTime_FA		
					No Active DTC's TFTKO	P043E P043F P0451 P1458 P145C P145D P2450		
Evaporative Emission System Leak Detection Reference Orifice Performance (Sealed Fuel System)	P145F	1st and 2nd 0.020" reference orifice vacuum measurements do not correlate.	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.	> 510 Pa 30 seconds	Propulsion system not active time Odometer 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 Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.062 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 1 MPH 0	Up to once per trip, for each required wake-up event 100 msec loop	2 trip Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					active time	≥ 0 seconds		
					Previous propulsion system active time	≥ 0 seconds		
					Abort Conditions:			
					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		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA		
					No Active DTC's TFTKO	P043E P043F P0451 P1458 P145C P145D P145E P2421 P2422 P2450		
Cooling Fan 1 Output Circuit (ODM)	P1485	This DTC checks for open circuit failures during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Battery voltage to enable Battery voltage to remain enabled Accessory line is high for **No Active DTC's**	≥ 11 volts ≥ 10 volts > 5 seconds P2537	50 failures out of 63 samples 100 ms / sample	2 trips Type B
Cooling Fan 1 Output Circuit Low Voltage (ODM)	P1486	This DTC checks for short to low voltage circuit failures during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Battery voltage to enable Battery voltage to remain enabled Accessory line is high for	≥ 11 volts ≥ 10 volts > 5 seconds	50 failures out of 63 samples 100 ms / sample	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTC's	P2537		
Cooling Fan 1 Output Circuit High Voltage (ODM)	P1487	This DTC checks for short to high voltage circuit failures during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Battery voltage to enable Battery voltage to remain enabled Accessory line is high for **No Active DTC's**	≥ 11 volts ≥ 10 volts > 5 seconds P2537	50 failures out of 63 samples 100 ms / sample	2 trips Type B
Steady State Actuation Fault	P1516	Detect an inablity to maintain a steady state throttle position	Throttle is considered to be steady state when: Change in throttle position over 12.5 msec is <	 0.25 percent 4.00 seconds	Run/Crank Voltage	> 6.41	0.49 ms	Trips: 1 Type: A MIL: YES
Cruise Control Switch State Undertermined	P155A	Detects when cruise switch state cannot be determined, such as low voltage conditions	cruise switch state remains undetermined for greater than a calibratable time				fail continuously for greater than 0.5 seconds	Type: C MIL: NO Trips: 1
Hybrid Control Torque Request Circuit	P15F2	Determines if torque request from the HCP is valid	1. Serial Communication 2's complement not equal for message $181	Message <> 2's complement of message	Secondary High Speed Bus is Present No Serial communication loss to		>= 10 Password Protect errors out of 16 samples	1 trip(s)

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HCP (U1817)			Type A
			OR 2. Serial Communication rolling count value shall be + 1 from previous $181 message	Message rolling count value <> previous message rolling count value plus one			**OR** >= 10 Rolling count errors out of 16 samples Pass diagnostic if samples >=16	
					Run Crank Active	>= 0.20 Sec	Performed every 12.5 msec	
Hybrid Control Speed Request Circuit	P15F9	Determines if torque request from the HCP is valid	1. Serial Communication 2's complement not equal for message $281	Message <> 2's complement of message	No Serial communication loss to HCP (U1817)		>= 10 Password Protect errors out of 16 samples	2 trip(s)
					Run Crank Active	>= 0.50 Sec		Type B
			OR 2. Serial Communication rolling count value shall be + 1 from previous $281 message	Message rolling count value <> previous message rolling count value plus one			**OR** >= 10 Rolling count errors out of 16 samples Pass diagnostic if samples >=16	
							Performed every 12.5 msec	
Brake Pedal Position Sensor Signal Message Counter Incorrect	P15FB	Detects rolling count or protection value errors in Chassis Brake Pedal Position Emissions Related serial data signal	If x of y rolling count / protection value faults occur, default brake pedal positiion to zero for duration of fault		Chassis Brake Pedal Position Emissions Related Serial Data Error Diagnostic Enable	TRUE	10/16 counts	Type: B MIL: YES

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
								Trips: 2
EVAP System Alarm Clock Signal Not Received (Sealed Fuel System)	P162D	ECM could not set VICM Alarm Clock	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	4.3 hours 5.8 hours	Odometer 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 ≥ 0.062 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	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			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. At Propulsion System Active, if any of the wake-up events indicate a failure then the DTC fails.	6.0 hours 8.1 hours 8.2 hours 11.0 hours				
Ignition Voltage Correlation	P1682	Detect a continuous or intermittent out of correlation between the Run/Crank Ignition Voltage & the Powertrain Relay Ignition Voltage	|Run/Crank – PT Relay Ignition| >	3.00 Volts	Powertrain commanded on and (Run/Crank voltage > or PT Relay Ignition voltage and Run/Crank voltage >	Table, f(IAT). See supporting tables > 5.5 > 5.5	240/480counts or 0.4750 sec continuous; 12.5 ms/count in main processor	Trips: 1 Type: A MIL: YES

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	P16F3	Detect Processor Calculation faults due to RAM corruptions, ALU failures and ROM failures						Trips: 1 Type: A MIL: YES
			Difference between Cruise Axle Torque Arbitrated Request and Cruise Axle Torque Request exceeds threshold	143.88 Nm	Cruise Engaged for	> 4.00 seconds	Up/down timer 175 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 164.43Nm Low Threshold -164.43Nm	Ignition State	Accessory / Run / Crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Accessory drive friction torque is out of bounds given by threshold range	High Threshold 164.43 Nm Low Threshold 0.00 Nm	Ignition State	Accessory / Run / 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 / 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
			Generator friction torque is out of bounds given by threshold range	High Threshold 164.43 Nm Low Threshold 0.00 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Min. Axle Torque Capacity is greater than threshold	-2520.00 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Commanded Predicted Axle Torque and its dual store do not match	1 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Rate limited cruise axle torque request and its dual store do not match	143.88 Nm	Ignition State	Accessory / Run / 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 2) Absolute difference of Calculated accelerator pedal position compensated for carpet	1) 5.00 %	Ignition State	Accessory / Run / Crank	Up/down timer 175 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
			learn and error conditions and its dual store do not equal 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	1151.00 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Commanded axle torque is less than its redundant calculation by threshold	-863.25 Nm	Ignition State Redundant Commanded Axle Torque	Accessory / Run / Crank < -863.25	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Rate limited vehicle speed and its dual store do not equal	NA	Time since first CAN message with vehicle speed	>= 0.500sec	5/8counts; 25.0msec/count	
			transfer case neutral request from four wheel drive logic does not match with operating conditions	NA	Ignition State	Accessory / Run / Crank	14/16 counts; 25.0msec/count	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Transfer Case Range	Valid and Not Over-Ridden		
			transfer case neutral and its dual store do not equal	NA	Ignition State	Accessory / Run / Crank	5/15 counts; 25.0msec/count	
			Throttle progression mode and its dual store do not equal	NA	Ignition State	Accessory / Run / Crank	Up/down timer 175ms 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 / Crank	5/15 counts; 25.0msec/count	
			TOS to wheel speed conversion factor and its dual store do not equal	NA	Ignition State	Accessory / Run / Crank	10/16 counts; 25.0msec/count	
			Commanded Predicted Engine Torque and its dual store do not match	N/A	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Zero pedal axle torque is out of bounds given by threshold range	High Threshold 1151.00 Nm Low Threshold -1726.50 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 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
			Creep Coast Axle Torque is out of bounds given by threshold range	High Threshold 1151.00 Nm Low Threshold -1726.50 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Difference between Driver Requested Immediate Torque primary path and its secondary exceeds threshold	1151.00 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			1. Driver Predicted Request is greater than its redundant calculation plus threshold 2. Driver Predicted Request is less than its redundant calculation minus threshold	1151.00 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Driver Immediate Request is less than its redundant calculation minus threshold	1151.00 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			1. Commanded Immediate Request is greater than its redundant calculation plus threshold 2.	1151.00 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 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
			Commanded Immediate Request is less than its redundant calculation minus threshold					
			Commanded Immediate Response Type is set to Inactive	N/A	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Commanded Immediate Engine Request is greater than its redundant calculation plus threshold	164.43 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Commanded Predicted Engine Request is greater than its redundant calculation plus threshold	164.43 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Regeneration Brake Assist is not within a specified	Brake Regen Assist < 0 Nm or	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			range	Brake Regen Assist > 1000.00 Nm			down time multipier	
Drive Mode Switch Fault	P1762	Detect a rolling count error in Drive Mode Switch serial data	Rolling count failures for Drive Mode Switch.	> 3	Diagnostic Enabled Vehicle Speed for Engine Speed for	TRUE ≤ 155 MPH ≥ 5 seconds 0 ≤ RPM ≤ 7500 ≥ 5 seconds	8 seconds	Trips: 1 Type: C MIL: No
Driver Intended Brake Torque Fault	P1B12	Detect a rolling count or protection value error in Driver Intended Brake Torque serial data	X of Y failure criteria have been met for rolling count or protection errors for Driver Intended Brake Torque.		Propulsion System Diagnostic Enabled Manufaturer Enable Counter	Active TRUE 0	10/16 counts or 0.488 seconds continuous; 25 ms/count in main processor	Trips: 1 Type: C MIL: NO
Hybrid Powertrain Control Module 2 Requested MIL Illumination	P1E00	Monitors the Hybrid Powertrain Control Module 2 MIL request line to determine when the Hybrid Powertrain Control Module 2 has detected a MIL	Hybrid Powertrain Control Module 2-Related DTC set		Time since power-up	> 3 seconds	Continuous	Type A 1 trips MIL: NO
Control Module Throttle Actuator Position Performance	P2101	1) Detect a throttle positioning error	Difference between measured throttle position and modeled throttle position > Difference between modeled throttle position	10.00 percent	TPS minimum learn is not active and Throttle is being Controlled and (Engine Running or Ignition Voltage or Ignition Voltage)	Run/Crank voltage > 6.41 > 11 > 5.5	1. 39counts; 12.5 ms/count in the primary processor	Trips: 1 Type: A MIL: YES

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			and measured throttle position >	10.00 percent	Ignition voltage failure is false (P1682)			
		2) Throttle control is driving the throttle in the incorrect direction	Throttle Position >	37.60 percent	TPS minimum learn is active Powertrain relay voltage	 > 6.41 Volts	2. 11 counts; 12.5 ms/count in the primary processor	
		3) Throttle control exceeds the reduced power limit	Throttle Position >	36.60 percent	Reduced Power is True Powertrain relay voltage	 > 6.41 Volts	3. 11 counts; 12.5 ms/count in the primary processor	
Throttle return to default	P2119	Throttle unable to return to default throttle position after de-energizing ETC motor.	TPS1 Voltage > AND TPS2 Voltage > On the main processor	1.617 1.727	Throttle de-energized No TPS circuit faults PT Relay Voltage > 5.500	No 5V reference error or fault for # 4 5V reference circuit (P06A3)	0.4969 sec	Trips: 1 Type: C MIL: NO
Accelerator Pedal Position (APP) Sensor 1 Lo	P2122	Detect a continuous or intermittent short or open in the APP sensor #1 on Main processor	APP1 Voltage <	0.463	Run/Crank Voltage	> 6.41 No 5V reference error or	19/39 counts or 14 counts continuous; 12.5 ms/count in the main processor	Trips: 1 Type: A MIL: YES

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						fault for # 4 5V reference circuit (P06A3)		
Accelerator Pedal Position (APP) Sensor 1 Hi	P2123	Detect a continuous or intermittent short or open in the APP sensor #1 on Main processor	APP1 Voltage >	4.75	Run/Crank Voltage	> 6.41 No 5V reference error or fault for # 4 5V reference circuit (P06A3)	19/39 counts or 14 counts continuous; 12.5 ms/count in the main processor	Trips: 1 Type: A MIL: YES
Accelerator Pedal Position (APP) Sensor 2 Lo	P2127	Detect a continuous or intermittent short or open in the APP sensor #2 on Main processor	APP2 Voltage <	0.325	Run/Crank Voltage	> 6.41 No 5V reference error or fault for # 4 5V reference circuit (P0697)	19/39counts or 14 counts continuous; 12.5 ms/count in the main processor	Trips: 1 Type: A MIL: YES
Accelerator Pedal Position (APP) Sensor 2 Hi	P2128	Detect a continuous or intermittent short or open in the APP sensor #2 on Main processor	APP2 Voltage >	2.6	Run/Crank Voltage	> 6.41 No 5V reference error or fault for # 4 5V reference circuit (P0697)	19/39 counts or 14 counts continuous; 12.5 ms/count in the main processor	Trips: 1 Type: A MIL: YES
Throttle Position (TP) Sensor 1-2 Correlation	P2135	1. Detects a continuous or intermittent correlation fault between TPS sensors #1 and #2 on Main processor	1. Difference between TPS1 displaced and TPS2 displaced >	1. 7.022% offset at min. throttle position with a linear threshold to 9.622% at max. throttle position	Run/Crank Voltage	> 6.41	1 & 2: 639/1279 counts or 154 counts continuous; 3.125 ms/count in the main processor	Trips: 1 Type: A MIL: YES

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			2. Difference between (normalized min TPS1) and (normalized min TPS2) >	2. 5.000 % Vref		No TPS sensor faults (P0122, P0123, P0222, P0223) No 5V reference error or fault for # 4 5V reference circuit (P06A3)		
Accelerator Pedal Position (APP) Sensor 1-2 Correlation	P2138	Detects a continuous or intermittent correlation fault between APP sensors #1 and #2 on Main processor	1. Difference between APP1 displaced and APP2 displaced > 2. Difference between (normalized min APP1) and (normalized min APP2) >	1. 10.001% offset at min. pedal position with a linear threshold to 10.001% at max. pedal position 2. 5.000% Vref	Run/Crank Voltage	> 6.41 No APP sensor faults (P2122, P2123,P2127, P2128) No 5V reference errors or faulst for # 3 & # 4 5V reference circuits (P06A3, P0697)	1 & 2: 19/39 counts intermittent or 15 counts continuous, 12.5 ms/count in the main processor	Trips: 1 Type: A MIL: YES
Vehicle Speed – Output Shaft Speed Correlation	P215B	Detect invalid vehicle speed source.	The absolute difference between wheel speed vehicle speed and TOS vehicle speed greater than > Secure vehicle speed source is unavailable	6.21 mph	CAN timer >	0.5000 sec Secure vehicle speed source is TOS vehicle speed or wheel speed vehicle speed Trans engaged state is not equal to not engaged.	400/800 counts for wheel speed correlation or 400/800 counts for TOS correlation; 25ms/count	Trips: 1 Type: A MIL: YES

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	TP sensors were not in the minmum learn window after multiple attempts to learn the minimum.	During TPS min learn on the Main processor, TPS Voltage >	0.955	Run/Crank Voltage	> 6.41	2.0 secs	Trips: 1 Type: A MIL: YES
			Number of learn attempts >	10 counts				
Cooling System Performance	P2181	This DTC detects thermostat malfunction (i.e. stuck open)	Engine Coolant Temp (ECT) is ≤ commanded temperature minus 11 Deg C and normalized ratio is ≤ than 4. When above is present for more than 5 seconds, fail counts start.		No Active DTC's Engine not run time Engine run time Fuel Condition ECT at Power Up IAT min T-Stat Heater duty cycle commanded Airflow	MAF_SensorFA IAT_SensorFA THMR_RCT_Sensor_Ckt_FA THMR_ECT_Sensor_Ckt_FA ≥ 1800 seconds 50 ≤ Time ≤ 1370 seconds Ethanol ≤ 86% -40.0 ≤ ECT ≤ 59.0 °C -7°C ≤ IAT ≤ 60°C. ≤ 50 % 1.0 ≤ Airflow ≤ 100.0 GPS	20 failures out of 150 samples 1 sec/ sample Once per ignition key cycle	2 trips Type B
			Engine total airgrams is accumulated when 1 ≤ AirFlow ≤ 100 grams per second.					
			Ratio Definition: Current temp difference between ECT and RCT minus PwrUp difference divided by total airgrams. Note: Minimum total airgrams is 100.0 grams.					
Air Fuel Imbalance	P219A	Determines if a cylinder-to-cylinder air-	**The following criteria apply to:**	**Bank 1**	System Voltage is NOT <	10.0 Volts	Minimum of 1 test per trip	1 Trip(s)

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Bank 1		fuel imbalance is present by monitoring the pre and post catalyst O2 sensor voltage characteristics. The pre voltage is used to generate a ratio metric. A normal system will generally result in a negative ratio while a failing system will generally result in a positive ratio. The post voltage is used to generate an X out of Y metric, where Y represents the number of samples and X represents the number of those samples that failed.	Filtered Ratio	> 0.49	for >=	0.2 seconds	Maximum of 10 tests per trip 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, 9.0 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.	Type A
					Fuel Level	> 10.0 percent AND no fuel level sensor fault		
					ECT	> -20 degrees C		
			Exclude AFM (DoD) Ratio data from Ratio value	YES	Cumulative engine run time	> 40.0 seconds		
					Engine speed always	< 10000.0 rpm		
			AFM (DoD) operation required in order to report: **AND** AFM (DoD) Filtered Ratio	NO > 0.49	Diagnostic runs at Idle regardless of speed, load, air flow, spark advance, and phaser angle:	NO		
			AND		**Engine speed during:**			
			Post O2 Feature Enabled: **AND** Filtered Post catalyst O2 voltage is NOT between for more than out of during non-AFM	NO 600 and 800 mV 50.0 62.5 seconds	Normal operation	1200 <= rpm <= 3800		
					Intrusive cam	0 <= rpm <= 0		
					AFM (DoD)	1200 <= rpm <= 3800		
					AFM (DoD) and intrusive cam	0 <= rpm <= 0		
					Post O2 testing	0 <= rpm <= 10000		
					Engine speed range is less than: during a short term sample	100 rpm		
			OR		**Mass Airflow During:**			
			for more than out of during AFM	50.0 62.5 seconds	Normal operation	0 <= g/s <= 10000		
					Intrusive cam	0 <= g/s <= 0		
					AFM (DoD)	0 <= g/s <= 10000		
		Monitor Strategy Notes: The AFIM Filtered Ratio is derived from the pre-O2 sensor voltage metric known as Variance. Variance is the statistical variation of the O2 sensor voltage over one	**NOTE:** The Post O2 Logic is enabled only when operating in an enabled Post O2 Cell. The following Post O2 Cells are enabled:	Decel: NO	AFM (DoD) and intrusive cam	0 <= g/s <= 0		
				Idle: NO	Post O2 testing	0 <= g/s <= 10000		
				Cruise: NO	Cumulative delta mass air flow does not exceed: during a short term sample	5 g/s		
				Light Accel: NO				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		voltage over one engine cycle. The reason we use Variance is because it comprehends O2 signal deviation from nominal on a cylinder firing event basis. This metric is representative of the air/fuel imbalance.		Heavy Accel: NO				
			NOTE: The "filtered Post catalyst O2 voltage" referred to above is the result of applying a first order lag filter to the Post O2 voltage used by the closed loop fuel control system. The filter coefficient is:	0.001	Filtered Mass Airflow does not change by more than: every 12.5 ms Note: first order lag filter coefficient applied to MAF:	0.20 g/s 0.050	The post catalyst O2 sensor voltage is sampled every 12.5 ms. The cumulative time required for the post O2 portion of the diagnostic to report is 62.5 seconds.	
					Air Per Cylinder During:			
					Normal operation	120 <= mg/cylinder <= 400		
					Intrusive cam	0 <= mg/cylinder <= 0		
			Note: Instusive phaser control is active, allowing a specified phaser angle during certain operating conditions:	NO	AFM (DoD)	0 <= mg/cylinder <= 10000		
					AFM (DoD) and intrusive cam	0 <= mg/cylinder <= 0		
					Post O2 testing	0 <= mg/cylinder <= 10000	Note: If the post O2 feature is enabled, both the front and post portions of the diagnostic must complete before reporting. If the post O2 feature is not enabled, only the front portion must complete before reporting.	
			The AFIM Filtered Ratio metric is the difference between the current, measured Variance metric and a 17x17 table lookup value (the threshold), divided by a second 17 x 17 table lookup value (the normalizer), and finally multiplied by a Quality Factor, also a 17 x 17 table lookup value (the latter ranges between 0 and 1, based on robustness to false diagnosis in the current operating region). The reason we use a ratio of the Variance is so that we can normalize the failure metric over various	The Quality Factor (QF) calibrations are located in a 17x17 lookup table versus engine speed and load (see Supporting Tables). A QF of “1” is an indication that we were able to achieve at least 4sigma/2sigma robustness in that speed/load region. QF values less than “1” indicate that we don’t have 4sigma/2sigma robustness in that region. The quality of the data is	Filtered APC shall not change by more than: between 12.5 ms samples. Note: first order lag filter coefficient applied to APC:	5.00 percent 1.000		
					APC range during short term sample shall not exceed:	75 mg/cylinder		
					Spark Advance During:			
					Normal operation	5 <= degrees <= 55		
					Intrusive cam	0 <= degrees <= 0		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			engine speed and load regions since engine speed and load directly impact the magnitude of the Variance metric.	determined via statistical analysis of Variance data. QF values less than 0.99 identify regions where diagnosis is not possible.	AFM (DoD)	5 <= degrees <= 55		
					AFM (DoD) and intrusive cam	0 <= degrees <= 0		
					Throttle Area (percent of max) During:			
					Normal operation	0 <= percent <= 200		
					Intrusive cam	0 <= percent <= 0		
					AFM (DoD)	0 <= percent <= 200		
					AFM (DoD) and intrusive cam	0 <= percent <= 0		
					Intake Cam Phaser Angle During:			
					Normal operation	0 <= degrees <= 25		
					Intrusive cam	0 <= degrees <= 0		
					AFM (DoD)	0 <= degrees <= 100		
					AFM (DoD) and intrusive cam	0 <= degrees <= 0		
					Exhaust Cam Phaser Angle During:			
					Normal operation	0 <= degrees <= 25		
					Intrusive cam	0 <= degrees <= 0		
					AFM (DoD)	0 <= degrees <= 100		
					AFM (DoD) and intrusive cam	0 <= degrees <= 0		
					Average O2 voltage change since last sample	< 2 millivolts		
					An AFM (DoD) state change will cause the	NO		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					current sample to be discarded:			
					Quality Factor	>= 0.99 in the current operating region		
					AIR pump not on			
					CASE learn not active			
					EGR - no device control, no intrusive diagnostics			
					EVAP - no device control, no intrusive diagnostics			
					Engine OverSpeed Protection Not Active			
					Idle speed control normal			
					No EngineMisfireDetected_FA			
					No MAP_SensorFA			
					No MAF_SensorFA			
					No ECT_Sensor_FA			
					No TPS_ThrottleAuthorityDefaulted			
					No FuelInjectorCircuit_FA			
					No AIR System FA			
					No EvapExcessPurgePsbl_FA			
					PTO Not Active			
					Injector base pulse width above min limit			
					Fuel Control Status			
					Closed Loop Long Term FT Enabled	for >= 1.2 seconds **Please see "Closed Loop Enable Criteria" and "Long Term FT Enable Criteria" in Supporting Tables.**		
					Rapid Step Response (RSR):			
					RSR will trigger if the ratio result from the last test is or for AFM (DoD) is **AND** it exceeds the last filtered ratio by at least:	 >= 0.20 >= 0.20	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
					or for AFM (DoD) by at least: Once triggered, the filtered ratio is reset to: or for AFM (DoD) is reset to:	0.50 0.50 0.00 0.00		
					Fast Initial Response (FIR):			
					FIR will trigger when an NVM reset or code clear occurs. Once triggered, the non-AFM filtered ratio is reset to: and the AFM filtered ratio is reset to:	0.00 0.00		
O2 Sensor Signal Stuck Lean Bank 1 Sensor 2	P2270	This DTC determines if the post catalyst O2 sensor is stuck in a normal lean voltage range and thereby can no longer be used for post oxygen sensor fuel control or for catalyst monitoring. The diagnostic is an intrusive test (during coast) which increases the delivered fuel to achieve the required rich threshold	Post O2 sensor signal AND The Accumulated mass air flow monitored during the Stuck Lean Voltage Test	< 850 mvolts > 120 grams	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA	Frequency: Once per trip Note: if Reset Fast Response Function = FALSE for the given Fuel Bank OR Rapid Response Active = TRUE, multiple tests per trip are allowed.	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		[illegible] threshold.			B1S2 Failed this key cycle	P013A, P013B, P013E, P013F, P2270 or P2271		
					System Voltage	10.0 < Volts < 32.0		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B1S2)** in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		
					Pedal position	≤ 100.0 %		
					Engine Speed to initially enable test	1800 ≤ RPM ≤ 3500		
					Engine Speed range to keep test enabled (after initially enabled)	1700 ≤ RPM ≤ 3650		
					Engine Airflow	18 ≤ gps ≤ 28		
					Vehicle Speed to initially enable test	24.9 ≤ MPH ≤ 90.1		
					Vehicle Speed range to keep test enabled (after initially enabled)	21.7 ≤ MPH ≤ 93.2 mph		
					Closed loop integral	0.84 ≤ C/L Int ≤ 1.07		
					Closed Loop Active	= TRUE		
					Evap	not in control of purge		
					Ethanol	not in estimate mode		
					Post fuel cell	= enabled		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater on Time	≥ 60.0 sec		
					Predicted Catalyst temp	0 ≤ ºC ≤ 1000		
					Fuel State	= DFCO possible		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					All of the above met for at least 3.0 seconds, and then the Force Cat Rich intrusive stage is requested.			
O2 Sensor Signal Stuck Rich Bank 1 Sensor 2	P2271	This DTC determines if the post catalyst O2 sensor is stuck in a normal rich voltage range and thereby can no longer be used for post oxygen sensor fuel control or for catalyst monitoring. The diagnostic is an intrusive test which requests the DFCO mode to achieve the required lean threshold.	Post O2 sensor signal AND The Accumulated mass air flow monitored during the Stuck Rich Voltage Test	> 100 mvolts > 36 grams	No Active DTC's B1S2 Failed this key cycle System Voltage ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Engine Speed Engine Airflow Vehicle Speed Closed loop integral Closed Loop Active Evap Ethanol Post fuel cell	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013A, P013B, P013E, P013F or P2270 10.0 < Volts < 32.0 = Not Valid = Not Valid, See definition of **Green Sensor Delay Criteria (B1S2)** in Supporting Tables tab. = False 1800 ≤ RPM ≤ 3500 18 ≤ gps ≤ 28 24.9 ≤ MPH ≤ 90.1 0.84 ≤ C/L Int ≤ 1.07 = TRUE not in control of purge not in estimate mode = enabled	Frequency: Once per trip Note: if Reset Fast Response Function = FALSE for the given Fuel Bank OR Rapid Response Active = TRUE, multiple tests per trip are allowed.	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Power Take Off EGR Intrusive diagnostic All post sensor heater delays O2S Heater on Time Predicted Catalyst temp Fuel State DTC's Passed DTC's Passed DTC's Passed	= not active = not active = not active ≥ 60.0 sec 0 ≤ ºC ≤ 1000 = DFCO possible = P2270 (and P2272 if applicable) = P013E (and P014A if applicable) = P013A (and P013C if applicable)		
					After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).			
Evaporative Emission System Leak Detection Pump Control Open Circuit (Sealed Fuel System)	P2400	This DTC checks for open circuit failures during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.				20 failures out of 25 samples 250 ms / sample	2 trips Type B
Evaporative Emission System Leak Detection	P2401	This DTC checks for short to low voltage circuit failures during	The ECM detects that the commanded state of the driver and the actual state				20 failures out of 25 samples	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pump Control Circuit Low (Sealed Fuel System)		operation.	of the control circuit do not match.				250 ms / sample	
Evaporative Emission System Leak Detection Pump Control Circuit High (Sealed Fuel System)	P2402	This DTC checks for short to high voltage circuit failures during operation. If the P2402 is active, an intrusive test is performed with the pump commanded on for 15 seconds.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.				20 failures out of 25 samples 250 ms / sample	2 trips Type B
Evaporative Emission System Switching Valve Control Open Circuit (Sealed Fuel System)	P2418	This DTC checks for open circuit failures during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.				20 failures out of 25 samples 250 ms / sample	2 trips Type B
Evaporative Emission System Switching Valve Control Circuit Low (Sealed Fuel System)	P2419	This DTC checks for short to low voltage circuit failures during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.				20 failures out of 25 samples 250 ms / sample	2 trips Type B

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 (Sealed Fuel System)	P2420	This DTC checks for short to high voltage circuit failures during operation. If the P2420 is active, an intrusive test is performed with the switching valve commanded on for 15 seconds.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.				20 failures out of 25 samples 250 ms / sample	2 trips Type B
EVAP System Vent Valve Stuck Closed (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.	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.	> 697 Pa < -697 Pa. < 1000 Pa 10 seconds	Propulsion system not active time Odometer 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 Voltage Vehicle speed	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.062 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 1 MPH	Up to once per trip, for each required wake-up event 100 msec loop	2 trip Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			When no pressure or vacuum exists in the fuel tank system		Vehicle not in assembly plant (value must = 0)	0		
					Propulsion system not active time	≥ 0 seconds		
			When the FTP sensor indicates a pressure or a vacuum	< 697 Pa > -697 Pa.	Previous propulsion system active time	≥ 0 seconds		
			With the DCV commanded opened and the ELCP vacuum pump commanded on, if the 0.020" reference orifice vacuum measurement minus the ELCP pressure sensor (gauge) vacuum reading is after then the DCV is stuck closed and the DTC fails.		**Abort Conditions:**			
					Min fuel level slosh	≥ 190 %		
					Max fuel level slosh	≤ 200 %		
					Key up during test			
					Refueling request button pressed			
				< 300 Pa 5 seconds	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		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						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 P1458 P145C P145D P145F P2422 P2450		
ELCP Switching Valve Control Performance (Sealed Fuel System)	P2450	This DTC detects a ELCP switching valve that is stuck.	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 Odometer 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	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.062 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C	Up to once per trip, for each required wake-up event 100 msec loop	2 trip Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						≥ 0 hours		
					Time since last test when failing P0442/P0455	≥ 0 hours		
					Voltage	≥ 10 volts		
					Vehicle speed	≤ 1 MPH		
					Vehicle not in assembly plant (value must = 0)	0		
					Propulsion system not active time	≥ 0 seconds		
					Previous propulsion system active time	≥ 0 seconds		
					Abort Conditions:			
					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		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						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 P1458 P145C P145D P2422		
Ignition Switch Accessory Position Circuit Low (EREV/PHEV only)	P2537	This DTC checks for short to low voltage circuit failures during operation.	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 > 0.5 seconds. Diagnostic fails when pass counts are				12.5 ms / sample Once per trip	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				< 8 counts.				
ECM/PCM Internal Engine Off Timer Performance	P2610	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 ECM 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 > 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.	2 trips Type B

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	Electrical Integrity of the Crankshaft Position Singal Output Circuit - Shorted to Ground	ECM detects that commanded and actual states of output driver do not match because the output is shorted to ground		Powertrain Relay Voltage Engine is not cranking Crankshaft Position Output is commanded high	>= 11.00 Volts	40 failures out of 50 samples 1 sample every 100 msec	Type B 2 trips
Crankshaft Position Signal Output Circuit High	P2619	Electrical Integrity of the Crankshaft Position Singal Output Circuit - Shorted to Power	ECM detects that commanded and actual states of output driver do not match because the output is shorted to power		Powertrain Relay Voltage Engine is not cranking Crankshaft Position Output is commanded low	>= 11.00 Volts	40 failures out of 50 samples 1 sample every 100 msec	Type B 2 trips
O2Sensor Circuit Range/ Performance Bank 1 Sensor 1	P2A00	This DTC determines if the O2 sensor voltage is not meeting the voltage criteria to enable closed loop fueling.	Closed Loop O2S ready flag A) O2S signal must be To set Closed Loop ready flag Closed Loop O2S ready flag B) Once set to ready O2S cannot be for Then set Closed Loop ready flag	= False < 1100 mvolts = True = True > 1100 mvolts > 5.0 seconds = False	No Active DTC's System Voltage Engine Speed Engine Airflow Engine Coolant Engine Metal Overtemp Active Converter Overtemp Active	TPS_ThrottleAuthorityDefaulted MAP_SensorFA ECT_Sensor_FA FuelInjectorCircuit_FA P0131, P0151 P0132, P0152 10.0 < Volts < 32.0 1000 ≤ RPM ≤ 3400 4.0 ≤ gps ≤ 30.0 ≥ 70.0 ºC = False = False	200 failures out of 250 samples. Frequency: Continuous 100msec loop	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Fuel State AFM Status Predicted Exhaust Temp (B1S1) Engine run time Fuel Enrichment **All of the above met for**	DFCO not active = All Cylinders active ≥ 0.0 ºC > 100 seconds = Not Active > 5 seconds		
Control Module Communication Bus A Off	U0073	This DTC monitors for a BUS A off condition	Bus off failures	≥ 10 counts	**General Enable Criteria:**		Diagnostic runs in 12.5 ms loop	1 Trip(s)
			out of these samples	≥ 10 counts	U0073	Not Active on Current Key Cycle		Type A
					Normal CAN transmission on Bus A	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			
					Ignition voltage	>= 11.00 or >= 6.41		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					Diagnostic Enable	1		
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds			
					CAN hardware is bus OFF for	> 0.1125 seconds		
Control Module Communication Bus B Off	U0074	This DTC monitors for a BUS B off condition	Bus off failures	≥ 10 counts	**General Enable Criteria:**		Diagnostic runs in 12.5 ms loop	1 Trip(s)

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			out of these samples	≥ 10 counts	U0074	Not Active on Current Key Cycle		Type A
					Normal CAN transmission on Bus B	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			
					Ignition voltage	>= 11.00 or >= 6.41		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					Diagnostic Enable	1		
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds			
					CAN hardware is bus OFF for	> 0.1125 seconds		
Lost Communication With TCM	U0101	This DTC monitors for a loss of communication with the transmission control module	Message is not received from controller for Message $0C7 Message $0F9 Message $1F5	≥ 10.0 seconds ≥ 0.5 seconds ≥ 0.5 seconds	**General Enable Criteria:**		Diagnostic runs in 12.5 ms loop	1 Trip(s)
					U0073	Not Active on Current Key Cycle		Type A
					Normal CAN transmission on Bus A	Enabled		
					Device Control	Not Active		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			
					Ignition voltage	>= 11.00 or >= 6.41		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					Diagnostic Enable	1		
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					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		
					U0101	Not Active on Current Key Cycle		
					TCM	is present on the bus		
Lost Communication With Fuel Pump Control Module	U0109	This DTC monitors for a loss of communication with the fuel pump control module	Message is not received from controller for	≥ 10.0seconds	**General Enable Criteria:**		Diagnostic runs in 12.5 ms loop	2 Trip(s)
					U0073	Not Active on Current Key Cycle		Type B
					Normal CAN transmission on Bus A	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Ignition Voltage Criteria:			
					Ignition voltage	>= 11.00 or >= 6.41		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					Diagnostic Enable	1		
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					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		
					U0109	Not Active on Current Key Cycle		
					Fuel Pump Control Module	is present on the bus		
Lost Communication With Brake System Control Module	U0129	This DTC monitors for a loss of communication with the Brake System Control Module.	Message is not received from controller for	≥ 10.0seconds	**General Enable Criteria:**		Diagnostic runs in 12.5 ms loop	2 Trip(s)
					U0073	Not Active on Current Key Cycle		Type B
					Normal CAN transmission on Bus A	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Ignition voltage	>= 11.00 or >= 6.41		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					Diagnostic Enable	1		
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					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		
					U0129	Not Active on Current Key Cycle		
					Brake System Control Module	is present on the bus		
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	≥ 10.0seconds	**General Enable Criteria:**		Diagnostic runs in 12.5 ms loop	1 Trip(s)
					U0073	Not Active on Current Key Cycle		Type C
					Normal CAN transmission on Bus A	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Ignition voltage	>= 11.00 or >= 6.41		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					Diagnostic Enable	1		
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					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		
					U0140	Not Active on Current Key Cycle		
					Body Control Module	is present on the bus		
Lost Communication with Electric A/C Compressor Control Module	U016B	This DTC monitors for a loss of communication with the Electric A/C Compressor Control Module.	Message is not received from controller for	≥ 10.0seconds	**General Enable Criteria:**		Diagnostic runs in 12.5 ms loop	2 Trip(s)
					U0073	Not Active on Current Key Cycle		Type B
					Normal CAN transmission on Bus A	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Ignition voltage	>= 11.00 or >= 6.41		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					Diagnostic Enable	1		
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					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		
					U016B	Not Active on Current Key Cycle		
					Electric A/C Compressor Control Module	is present on the bus		
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	≥ 10.0seconds	**General Enable Criteria:**		Diagnostic runs in 12.5 ms loop	1 Trip(s)
					U0073	Not Active on Current Key Cycle		Type A
					Normal CAN transmission on Bus A	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Ignition voltage	>= 11.00 or >= 6.41		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					Diagnostic Enable	1		
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					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		
					U0293	Not Active on Current Key Cycle		
					Hybrid Powertrain Control Module	is present on the bus		
Lost Communication with Hybrid Powertrain Control Module B	U179A	This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module B	Message is not received from controller for	≥ 10.0 seconds	**General Enable Criteria:**		Diagnostic runs in 12.5 ms loop	2 Trip(s)
					U0073	Not Active on Current Key Cycle		Type B
					Normal CAN transmission on Bus A	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Ignition voltage	>= 11.00 or >= 6.41		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					Diagnostic Enable	1		
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					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		
					Hybrid Powertrain Control Module B	is present on the bus		
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	≥ 0.5seconds	**General Enable Criteria:**		Diagnostic runs in 12.5 ms loop	1 Trip(s)
					U0074	Not Active on Current Key Cycle		Type A
					Normal CAN transmission on Bus B	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Ignition voltage	>= 11.00 or >= 6.41		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					Diagnostic Enable	1		
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					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		
					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
Crank Pulse Diagnostics								
Crankshaft Position (CKP) Sensor A Circuit	P0335	Detects Lack of Response from 58X Crank Sensor	Crank Sync State (Lores Crank Compared to Hires Crank)	No Activity	HWIO based crank decode status	NOT DisableCrank	1500ms **Pass Conditions:** Crank Sync State ≠ No Activity	Two Trips, Type B
Crankshaft Position (CKP) Sensor A Performance	P0336	Detects Invalid 58X Crank Sensor Signal	Crank Sync State (Lores Crank Compared to Hires Crank)	Verify Sync	HWIO based crank decode status	NOT DisableCrank	400ms OR 10 crank re-sync events in a 10 second window **Pass Criteria:** Crank Status = CrankInSync for 10 seconds	Two Trips, Type B
Idle Speed Diagnostics								
Idle Diagnostics P0506, P0507 have the following common enable criteria	***				No Active DTCs: No Active DTCs: No Active DTCs: Accelerator pedal position	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		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Accel Pedal position Engine State Vehicle speed Commanded RPM Delta IdleConditons present	<= 1 % Running (not starting or stopping states) <= 0.6 mph < 50 RPM for >= 5 seconds		
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	Filtered input speed error (desired - actual) is greater than fail threshold 75 RPM. Filter coefficient for engine speed = 0.002	** Common Enables		1 loop execution at 100 ms rate	Two Trips, Type B
		DTC Pass	Idle speed		** Common Enables		Pass condition met for 15 seconds	
		DTC RePass after failure	Idle Speed	Filtered input speed error (desired - actual), is less than fail threshold 50. Filter coefficient for engine speed = 0.002	No Active DTCs: ** Common Enables	P0507	Pass condition met for 15 seconds	
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	Filtered input speed error (desired - actual) is less than fail threshold -150 RPM. Filter coefficient for engine speed = 0.002	** Common Enables		1 loop execution at 100 ms rate	Two Trips, Type B
		DTC Pass	Idle speed		** Common Enables		Pass condition met for 15 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC RePass after failure	Idle Speed	Filtered input speed error (desired - actual), is greater than fail threshold - 140. Filter coefficient for engine speed = 0.00375	No Active DTCs: ** Common Enables	P0506	Pass condition met for 15 seconds	
Power Moding Diagnostics								
System Voltage Low	P0562	Sets when the low voltage system voltage is below a threshold	Ignition Voltage	<= 10 Volts	Ignition Key Status Engine Speed	RUN/CRANK >= 0 RPM	5 seconds in a 6 second window	Special Type C
		DTC Pass		> 10 Volts			1 second	
System Voltage Hi	P0563	Sets when the low voltage system voltage is above a threshold	Ignition Voltage	>= 18 Volts	Ignition Key Status	RUN/CRANK	5 seconds in a 6 second window	Special Type C
		DTC Pass		Ignition Voltage < 18 Volts			1 second	
Ignition Switch Run/Start Position Circuit Low	P2534	Detects a run crank relay open circuit	Runk Crank Line voltage	<= 2 Volts	CAN Communication ECM run crank active data	enabled available and active	60 seconds (2400 * 0.025) in a 65 second window (2600 * 0.025)	One Trip, Type A
		DTC Pass	Run Crank Line Voltage	> 5 Volts			5 seconds (200 * 0.025)	
Ignition Switch Run/Start Position Circuit High	P2535	Detects a run crank relay short to power	Runk Crank Line voltage	> 5 V	CAN Communication ECM run crank active data	enabled available and false	12 seconds (480 * 0.025) in a 15 second window (600 * 0.025)	One Trip, Type A
		DTC Pass	Run Crank Line Voltage	< 2V			3 seconds (120 * 0.025)	

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 Propulsion System Propulsion System Active Time	Not Test Failed This Key On and Not Test Passed This Key On Active > 0.5 seconds	0.2 seconds (8 * 0.025)	One Trip, Type A
		DTC Pass	Accessory	TRUE			0.2 seconds (8 * 0.025)	
Stuck Clutch Diagnostics								
Transmission Friction Element A Stuck On	P07A3	Detects an applied or welded clutch (C1)	Clutch slip observed	=0	C1 clutch state Clutch slip	=offgoing <= 30 RPM/s	2s * 3 fail attempts + 2 *30 second wait between attempts 3 time retry strategy	One Trip, Type A
		DTC Pass	C1 Slip observed	=1	C1 Slip Speed	> 30 RPM		
Transmission Friction Element B Stuck On	P07A5	Detects an applied or welded offgoing clutch (C2) Detects an applied or welded clutch (C2)	Clutch slip observed **OR** Clutch slip ref Clutch slip actual	=0 >360 rpm <100 rpm	C1 clutch state Clutch slip	=offgoing <= 30 RPM/s	.9s 20.6s = (.2s * 3 fail attempts + 2 *10 second wait between attempts)	One Trip, Type A
		DTC Pass	C2 Slip observed Clutch slip reference Clutch slip actual	=1 >360 rpm >200 rpm	C1 Slip Speed	> 30 RPM	.3 s (12*.025s)	
Transmission Friction Element C Stuck On	P07A7	Detects an applied or welded clutch (C2)	Clutch slip ref Clutch slip actual	>360 rpm <100 rpm			20.6s = (.2s * 3 fail attempts + 2 *10 second wait between attempts)	One Trip, Type A
		DTC Pass	Clutch slip reference Clutch slip actual	>360 rpm >200 rpm			.3 s (12*.025s)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Transm'n Auxilary Oil Pump Diagnostics								
Auxiliary Transmission Fluid Pump Performance	P2797	This diagnostic monitors the aux pump performance based on aux pump filtered desired and actual speed values	Difference between desired and actual aux pump speed	>650 rpm for >.25s	Aux Pump Speed Command RunCrankActive	>= 600 RPM FOR 1 second = 1 for > 0.2 s	Fail Condition met for 3 seconds (120 * 0.025) in a 1.25 second (150 * 0.025) window	One Trip, Type A
		DTC Pass	Aux pump speed	|Aux pump speed - Commanded Aux pump Speed| <= 650 RPM			Pass met for 0.5 seconds ((165-160) * 0.025)	
Transm'n Output Speed Sensor								
Output Speed Sensor Circuit Direction Error	P077B	The DTC detects if the Transmission Output Speed Sensor Direction is Incorrect by Comparing with Calculated Direction from Motor Speed Sign	Transmission Output Speed Direction Raw	≠ Motor Direction	Transmission Output Speed Hybrid Motor Speed based Estimated Output Speed is Valid Transmission Output Speed and Motor Output Speed Difference Motor Estimated Transmission Output Speed	Not FAULT ACTIVE Calculated based on M1 or M2 Speed Equation ≤ 50 RPM ≥ 50 RPM	0.325 seconds (13 counts at 25ms) **Pass Conditions** Opposite of FAIL for 5 seconds (200 counts at 25ms)	One Trip, Type A
Vehicle Speed Output Shaft Speed Correlation	P215B	The DTC Monitors if the Difference between the Transmission Output Speed and Output Speed Calculated from the Wheel Speed Sensors	Transmission Output Speed and Output Speed Calculated from the Wheel Speed Sensors Difference	6.2 mph	Number of Secured Vehicle Speed Sources Secured Vehicle Speed Use Transmission	2 TRUE	10 seconds (400 counts at 25ms) **Pass Conditions** Opposite of Fail for 20 seconds (800 counts	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Output Speed Secured Vehicle Speed Use Wheel Speed	 TRUE	at 25ms)	
Internal Mode Switch 2								
** Common Enable Criteria All IMS Diagnostics have the following Common Enable Criteria	***				Ignition Voltage Run/Crank Active Vehicle Speed Engine Speed	11V < IGN < 32V TRUE < 124 mph for 5 seconds 0 ≤ Engine Speed ≤ 7500		
Internal Mode Switch 2 R1 Circuit Low Voltage	P181C	The DTC Monitors if the IMS R1 Circuit is Shorted to a Low Voltage	Converted Directional IMS AND Directional IMS R1	Transitional 17 R1 Circuit Has Not Been Observed High	Converted Directional IMS AND Directional IMS R1 **Common Enable Criteria	Transitional 2 R1 Circuit NOT High for 5 seconds	2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS R1 Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Internal Mode Switch 2 R1 Circuit High Voltage	P181D	The DTC Monitors if the IMS R1 Circuit is Shorted to a High Voltage	Converted Directional IMS AND Directional IMS R1	Transitional 30 R1 Circuit Has Not Been Observed Low	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS R1 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 R2 Circuit Low Voltage	P181E	The DTC Monitors if the IMS R2 Circuit is Shorted to a Low Voltage	Converted Directional IMS AND Directional IMS R2	DRIVE R2 Circuit Has Not Been Observed High	Converted Directional IMS AND Directional IMS R2 Directional IMS R2 **Common Enable Criteria	PARK R2 Circuit Low for 5 seconds	2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS R2 Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 R2 Circuit High Voltage	P181F	The DTC Monitors if the IMS R2 Circuit is Shorted to a High Voltage	Converted Directional IMS AND	Transitional 14 OR Transitional 29	**Common Enable Criteria		2.7 seconds (108 counts at 25ms)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Directional IMS R2	R2 Circuit Has Not Been Observed Low			**Pass Conditions** IMS R2 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	
Internal Mode Switch 2 D1 Circuit Low Voltage	P183A	The DTC Monitors if the IMS D1 Circuit is Shorted to a Low Voltage	Converted Directional IMS AND Directional IMS D1	Transitional 8 OR Transitional 20 D1 Circuit Has Not Been Observed High	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS D1 Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 D1 Circuit High Voltage	P183B	The DTC Monitors if the IMS D1 Circuit is Shorted to a High Voltage	Converted Directional IMS AND Directional IMS D1	Transitional 27 D1 Circuit Has Not Been Observed Low	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS D1 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 D2 Circuit Low Voltage	P183C	The DTC Monitors if the IMS D2 Circuit is Shorted to a Low Voltage	Converted Directional IMS AND Directional IMS D1	Transitional 24 D2 Circuit Has Not Been Observed High	**Common Enable Criteria		2.7 seconds (108 counts at 25ms)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							Pass Conditions IMS D2 Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	
Internal Mode Switch 2 D2 Circuit High Voltage	P183D	The DTC Monitors if the IMS D2 Circuit is Shorted to a High Voltage	Converted Directional IMS AND Directional IMS D2	Transitional 11 AND Transitional 23 D2 Circuit Has Not Been Observed Low	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS D2 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2-Invalid Range	P183E	The DTC Monitors if the IMS is in an Invalid Range	Converted Directional IMS	Illegal (All Circuits Open)	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** Opposite of Fail for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 1-2 Correlation	P183F	The DTC Monitors if the IMS Direction and Range Correlation is Invalid	Converted Directional IMS	Correlation Fault Neutral (With No IMS Faults the Direction IMS and Range IMS Indicate Different Detent Postions)	**Common Enable Criteria		1.25 seconds (50 counts at 25ms) **Pass Conditions** Opposite of Fail for 1.7 seconds (68 counts at 25ms)	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Internal Mode Switch 2 S Circuit Low Voltage	P184A	The DTC Monitors if the IMS S Circuit is Shorted to a Low Voltage	Converted Directional IMS AND Directional IMS S Circuit	Transitional 9 Has Not Been Observed High	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS S Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 S Circuit High Voltage	P184B	The DTC Monitors if the IMS S Circuit is Shorted to a High Voltage	Converted Directional IMS AND Directional IMS S Circuit AND Directional IMS R1	Transitional 26 AND DRIVE Has Not Been Observed Low R1 Has Been Observed Low	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS S Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Battery Pack Diagnostics								
Hybrid Battery System Discharge Time Too Long	P0C76	High voltage bus discharge time too long	High Voltage Inverter Rationalized Voltage	> 200V after 3.5 seconds	Vehicle Power Mode	= RUN	2 Failures out of 2 Samples Frequency: Runs Once per Key-Cycle	Special Type C
Discharge Switch Circuit Open	P1A56	High voltage bus discharge circuit failed Discharge circuit status	High voltage bus voltage delta after commanded discharge circuit event Unavailable	< 75V after 500ms 10 counts	Vehicle Power Mode	= RUN	1 Failure 10 discharge unavailable events	Special Type C

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							Frequency: Runs once per key-cycle Pass: High voltage bus delta > 75V after 500ms of a commanded discharge event	
Hybrid Battery Contactor Status Circuit Low	P1E08	The DTC monitors the redundant contactor status signal	Redundant contactor status signal PWM	< 10%	Vehicle Power Mode	~= OFF	4s out of a 5s window	Two Trips, Type B
Hybrid Battery Contactor Status Circuit High	P1E09	The DTC monitors the redundant contactor status signal	Redundant contactor status signal PWM	> 90%	Vehicle Power Mode	~= OFF	4s out of a 5s window	Two Trips, Type B
Autostart Diagnostic								
Hybrid System Performance	P0AB9	This diagnostic indicates an autostart or autostop attempt failed.	Engine state	not running	Clutch 3 slip state	Not fault pending or fault active	15s	One Trip, Type A
Engine Performance Diagnostic								
Engine Performance - No Torque Detected	P16E0	This diagnostic indicates that the engine is not producing torque.	Measured Engine Sensed Torque	< 0 Nm	All Secondary Parameters Listed below must be meet for 2 seconds		3.5s out of a 4s window (12.5ms)	One Trip, Type A
			AND Sensed Engine Torque Error	> 50 Nm	Engine Actual Torque Fault	FALSE		
					DTC's not Fault Active	U0100		
					Engine Start Stop State	= Engine Running		
					Engine Torque Command Immediate	≥ 50 Nm		
					Low Fuel Condition	FALSE		
					Fuel Level Data Fault	FALSE		
Controller Diagnostics								

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 the checksum on ROM (flash) memory*						One Trip, Type A
		DTC Fail case 1: This DTC will be stored if any check sum in the **boot** is incorrect	Calculated Checksum does not match stored checksum		Ignition Status	= Run or Crank	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5 failures Frequency: Runs continuously in the background	
		DTC Fail case 2: This DTC will be stored if any check sum in the **calibration** is incorrect						
		DTC Fail case 3: This DTC will be stored if any check sum in the **software** is incorrect						
		DTC Pass:		ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false				
Control Module Not Programmed	P0602	*This Diagnostic tests for whether a controller has been programmed*						One Trip, Type A
		DTC Fail case 1: Indicates that the HCP needs to be programmed	Fails if No Start Calibration is set to true which is only available on a new un-programmed HCP		Ignition Status	= Run or Crank	Runs once at power up	
		DTC Pass:		Enable cal = false				
Control Module Long	P0603	*This Diagnostic tests for BINVDM errors*						One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Term Memory Reset		**DTC Fail case 1:** Non-volatile memory (**Static**) checksum error at controller power-up	Checksum at power-up does not match checksum at power-down		Ignition Status	= Run or Crank	1 failure Frequency: Once at powerup	
		DTC Fail case 2: Non-volatile memory (**Preserved**) checksum error at controller power-up						
		DTC Fail case 3: Non-volatile memory (**BINVDM**) checksum error at controller power-up						
		DTC Fail case 4: Non-volatile memory (**ShutdownFinished**) checksum error at controller power-up						
		DTC Pass:		No ROM memory faults				
Control Module Random Access Memory (RAM) Failure	P0604	*This Diagnostic tests that the RAM is functioning correctly*						One Trip, Type A
		DTC Fail case 1: The primary Ye variable does not match the redundant Ya variable **Dual Store** RAM	Ye variable	≠ Ya Variable	Ignition Status	= Run or Crank	Runs real time	
		DTC Fail case 2: Indicates that HCP is unable to correctly write to **Write Protect** RAM	Memory location is locked	Function is trying to write to that location			1 failure Frequency: Once at powerup	
		DTC Fail case 3: During a running reset the RAM fault is still present during Init **Main SOH** RAM	RAM fault	= true @ init				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 4: Indicates that HCP is unable to correctly write and read data to and from **System** RAM	HWIO detects Fault	= true				
		DTC Fail case 5: Indicates that HCP is unable to correctly write and read data to and from **Cache** RAM	HWIO detects Fault	= true				
		DTC Fail case 6: Indicates that HCP is unable to correctly write and read data to and from **eTPU** RAM	HWIO detects Fault	= true				
		DTC Pass:		No errors in 1000ms MainSOH RAM faults = false CommFlts = false System RAM faults = false CacheRam faults = false eTPU RAM faults = false				
Control Module Internal Performance	P0606	*This Diagnostic tests all the internal processor integrity subsystems*						One Trip, Type A
		DTC Fail case 1: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctd SPI_Flt	HWIO detects Fault	= true (in SPI Hardware)	Run/Crank Voltage OR Powertrain Relay Voltage Diagnostic System Enable Powermoding	> 9.5 Volts = true = Accesory or Off	28 fail counts out of 32 sample counts Executes in a 6.25ms loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 2: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndNotRunningSeedKyTst	Key Value	= Calibration Value	SRAR shutdowns SPI Fault RunCrank Active Ram or ROM fault 12V battery Seed received in wrong order fault Vehicle Speed Seed/Key Timeout Powermode	= False =False = False = false >11V = false <= 0 MPH = False = off for less than 5 seconds	Detects in 150ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 3: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndFailsToTakeRmdlActn	IPT Detects faulty harware in Inhibit path IPT feedback	≠ calibration Value	HV Bat contactor Staus Available MMDR HPMR HV Battery Contactors Motor Faults Motor Speed SRAR shutdowns SPI Fault RunCrank Active Ram or ROM fault	= True = Powerdown Wait State = Eval BP Open State >= 80 V = Closed = False <= 10 RPM = False =False = False = False	Up down counter = 3	
					12V battery Seed received in wrong order fault Vehicle Speed Seed/Key Timeout Powermode	>11V = false <= 0 MPH = False = off for less than 5 seconds		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 4: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndRxIncorrectKeys	Key Value	≠ Calibration Value	1. Number Of Mains 2. IPT status	1. > 0 2. = Not running for > 0.075s	Detects in 150ms or two consecutive faulty keys	
		DTC Fail case 5: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSdKeyTimeout	seed does not update	within Calibration threshold	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	Detects in 1 sec	
		DTC Fail case 6: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSdRxWrongOrdr	Seed sequence	≠ expected order	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	12 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 7: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainSequenceFlt	Seed timeout PSW Fault	> 200 ms = True	1. Seed Update Key StoreFault Enable OR 2. Program Sequence Watch Enable	1. = True 2. = True	3 fail counts out of 4 sample counts Executes in a 50ms loop Detects in 200ms	
		DTC Fail case 8: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainALU_Flt	HWIO detects Fault	=2 (ina row)	1. ALU Test Enabled 2. Diagnostic system status 3. Code clear active 4. PMDI Low voltage clear diag enable conditons met	1. = TRUE 2. = Enabled 3. >= 0.15s 4. = True	runs continuously in 12.5ms loop Detects in 12.5ms	
		DTC Fail case 9: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainCfgRegFlt	HWIO detects Fault	=2 (in arow)	1. Diagnostic Test Enabled 2. Diagnostic system status 3. Code clear active 4. PMDI Low voltage clear diag enable conditons met	1. = TRUE 2. = Enabled 3. >= 0.15s 4. = True	runs continuously in 12.5ms loop Detects in 12.5ms	
		DTC Fail case 10: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainStackFlt	HWIO detects Fault	= 5 (Since Powerup)	Diagnostic Test Enabled Diagnostic System Enables	= True =True	Runs Continuously in 100ms loop Detects in 500ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 11: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainADC_Flt	Continuous Fault	> 200ms	1. A2D Converter Test Enabled 2. PT Relay Voltage 3. Run Crank Voltage	1. = TRUE 2. > -1 3. > 7	5 fail counts out of 8 sample counts Executes in a 50ms loop Detects in 200ms	
		DTC Fail case 12: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RunCrankCorrFlt	Run Crank on Seconday Processor	≠ Run Crank Active	1. Run Crank Discrete Diagnostic Enable 2. SPI Faults	1. = True 2. = False	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		DTC Fail case 13: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_FlashECC_CktTest	HWIO detects Fault	= 3 /10 5/10	1. Flash ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 14: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RAM_ECC_CktTest	HWIO detects Fault	= 3 /10 5/10	1. RAM ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	
		DTC Fail case 15: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_DMA_Xfer Test	HWIO detects Fault or Memory Copy Error	= True or =True	Diagnostic Test Enabled	= TRUE		
Torque Security Diagnostics								
Internal Control Module Torque Performance	P061A	*This Diagnostic tests if the regen is reported accurately to the brake control module*						One Trip, Type A
		DTC Fail case 1: The Estimated output torque Commanded exceeds the upper Regen torque limit	The Estimated output torque Commanded	>The drivers output torque Request + .2g (534Nm)	Regenerative Braking Torque	> 0 Nm	14 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		DTC Pass:		The Estimated output torque Commanded <= The drivers output torque Request + .2g (534Nm)				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Internal Control Module Torque Calculation Performance	P061B	*This Diagnostic tests if the hybrid torque command can create an unintended acceleration/decelerration or wrong direction hazzard*						One Trip, Type A
		DTC Fail case 1: The Estimated output torque Commanded exceeds the upper torque limit To Max Fault	The Estimated output torque Commanded	> Maximum of either the drivers output torque request or zero plus .2g (534Nm)		Runs continuously when a torque source is present	14 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		DTC Fail case 2: The Estimated output torque Commanded exceeds the lower torque limit To Min Fault	The Estimated output torque Commanded	< Minimum of either the drivers output torque request or zero minus .2g (534Nm)				
		DTC Fail case 3: Transmission output torque rationality check violated To Req Rat Fault	Axle torque request is converted to transmission output torque. When this converted output torque violates the rationality check comparison by 1 Nm for greater than 200ms a failure is flagged.	1Nm				
		DTC Fail case 4: Brake torque request rationality check violated To Req Rat Fault	Brake torque request is converted to transmission output torque. When this converted output torque violates the rationality check comparison by 1 Nm for greater than 200ms a failure is flagged.					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 5: Output torque negative when driver request is positive Sign Diff Fault	When the PRNDL equals drive and the driver requested torque is positive while the commanded output torque is negative and below a -0.2g (-534Nm) threshold for greater than 200ms.	-534Nm (equivalent to -0.2g)	Vehicle Speed TOSS sensor fault is active or vehicle speed sensor fault is active	< 7mph		
		DTC Fail case 6: Output torque positive when driver request is negative Sign Diff Fault	When the PRNDL equals reverse and driver requested torque is negative while the commanded output torque is positive and greater than a 0.2g (534Nm) threshold for greater than 200ms.	534Nm (equivalent to 0.2g)				
		DTC Fail case 7: The primary Input Torque Correction does not equal the redundant calculation Ti Corr Fault	When the redundant calculation of the input torque correction is .2g (534Nm)	> or < the primary calculation		Runs continuously when a torque source is present		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 8: The Traction Motor torque command exceeds the motor torque capacity Tm Cmd Fault	The Traction Motor torque command	>Maximum motor torque capacity plus .2g (534Nm) or less than the minimum torque capacity minus .2g (534Nm)				
Control Module Long Term Memory Performance	P062F	*This Diagnostic tests for unuseable BINVDM (flash) memory only*						One Trip, Type A
		DTC Fail case 1: Indicates that the NVM Error flag **HWIO Bat Write will not succeed** set	Last EEPROM write did not complete		Ignition State	= accesory, run, or crank	1 failure Frequency: Once at power-up	
		DTC Fail case 2: Indicates that the NVM Error flag **HWIO Assembly Cal** set						
		DTC Pass:		NV writewillnotsucceed = fail Assemblycalfail = false				
Torque Management System – Forced Engine Shutdown	P06AF	*This Diagnostic checks that the ECM is still functioning correctly*						One Trip, Type A
		DTC Fail case 1: The main processor monitor ring compares the ECM 2nd pattern (nibble pattern) to known good pattern to determine ECM state of health.	The nibble pattern is incorrect	The pattern does not match (F, 5, B, D, A, 6, 3, 0)	Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	8 fail counts out of 12 sample counts Executes in a 12.5 ms Loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass:		2nd RX pattern smpl > Smpl Limit Nibble pattern completed				
Supply Voltage Circuit Diagnostics								
Supply Voltage Circuit 2 Low Voltage	P150D							Special Type C
		DTC Fail case 1: Supply Voltage Circuit 2 Low Voltage	Ignition Voltage	< 8V	Enable Cals Diag System Disable	= true = false	20 Fail count out of 25 sample counts Executes in a 100ms loop Detects in 2.5s	
		DTC Pass:		No failure in 2.5s				
Supply Voltage Circuit 1 Low Voltage	P150E							Special Type C
		DTC Fail case 1: Supply Voltage Circuit 1 Low Voltage	Ignition Voltage	< 8V	Enable Cals Diag System Disable	= true = false	20 Fail count out of 25 sample counts Executes in a 100ms loop Detects in 2.5s	
		DTC Pass:		No failure in 2.5s				
Alive Rolling Count Diagnostics								
Alive Rolling Count / Protection Value fault for the Engine Actual Torque Steady State	P15F0	*This Diagnostic checks for corruption in signals sent over CAN for the Engine Actual Torque Steady State*						One Trip, Type A
		DTC Fail case 1: Detect the ARC (Alive Rolling Count) or Protection Value fault by checking the ARC and Protection Value of the Engine Actual Torque Steady State	The current alive rolling count value does not equal the previous alive rolling count value incremented by 1 OR	Current ARC ≠ Previous ARC +1	Ignition Key Status	Run/Crank for > 0.5 seconds	14 fail counts out of 16 sample counts Executes in a 12.5 ms Loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			The primary signal value does not equal the protection value	Primary Value ≠ Protection Value				
Alive Rolling Count / Protection Value fault for the commanded predicted axle torque	P15F1	*This Diagnostic checks for corruption in signals sent over CAN for the commanded predicted axle torque*						One Trip, Type A
		DTC Fail case 1: Detect the ARC (Alive Rolling Count) or Protection Value fault by checking the ARC and Protection Value of the commanded predicted axle torque	The current alive rolling count value does not equal the previous alive rolling count value incremented by 1	Current ARC ≠ Previous ARC +1	Ignition Key Status	Run/Crank for > 0.5 seconds	14 fail counts out of 16 sample counts Executes in a 12.5 ms Loop Detects in 200ms	
			OR The primary signal value does not equal the protection value	Primary Value ≠ Protection Value				
Alive Rolling Count / Protection Value fault for the Regenerative Braking Axle Torque	P1B15	*This Diagnostic checks for corruption in signals sent over CAN for the Regenerative Braking Axle Torque*						One Trip, Type A
		DTC Fail case 1: Detect the ARC (Alive Rolling Count) Protection Value fault by checking the ARC and Protection Value of the Regenerative Braking Axle Torque	The current alive rolling count value does not equal the previous alive rolling count value incremented by 1	Current ARC ≠ Previous ARC +1	Ignition Key Status	Run/Crank for > 0.5 seconds	21 fail counts out of 32 sample counts Executes in a 6.25 ms Loop Detects in 200ms	
			OR The primary signal value does not equal the protection value	Primary Value ≠ Protection Value				
Internal Control Module Transmission Direction Range Switch	P16F2	*Detect transmission direction errors by reading the states of the Direction IMS switches as well as determining a transmission direction and comparing it to the transmission direction from the primary controls path.*						One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Switch		**DTC Fail case 1:** No direction match with no IMS failures	Read the Direction IMS switches and determine that they represent a valid transmission direction (P,R,N,D) but it does not match the transmission direction determined by the primary controls path.		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		DTC Fail case 2: Multiple transmission directions with no IMS failures	Read the Direction IMS switches and determine that they represent more than one valid transmission direction (P,R,N,D).					
		DTC Fail case 3: No direction match with one IMS failure	Read the Direction IMS switches and determine that one switch has failed and calculate a transmission direction, but it does not match the transmission direction determined by the primary controls path.					
		DTC Fail case 4: Multiple transmission directions with one IMS failure	Read the Direction IMS switches and determine that one switch has failed and calculate a transmission direction and determine that they represent more than one valid transmission direction (P,R,N,D).					
		DTC Fail case 5: Unable to determine transmission direction	Reads the Direction IMS switches and determine that more than one switch has failed and cannot calculate a transmission direction.					

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	P16F3	*Detect the dual store memory fault by comparing the primary value and the dual store value of the individual variables*						One Trip, Type A
		DTC Fail case 1: Detect the dual store memory fault by comparing the primary Ve signals and the We redundant signals	The primary value and the dual store value are not equal			Runs continuously	Signal DependendantX fail counts out of Y sample counts Executes in a Xms loop **All Detected in 200ms**	
		DTC Fail case 2: Detect the dual store memory fault by comparing the primary Ye signals and the Ya redundant signals				Fail Timer incremented Runs continuously	> 175ms Detects in 200ms	
		DTC Pass:		No errors in 1000ms				
Internal Control Module Transmission Range Control Performance	P16F4	*Detect transmission range errors by comparing the Direction IMS switches with the Range IMS information from the TCM.*						One Trip, Type A
		DTC Fail case 1: Positive transmission ranges that do not match	The Range IMS and Direction IMS from the primary controls path and both have valid transmission positions (P, R, N, D) but the two do not match.		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 2: Error corrected Direction IMS does not match	The Range IMS has a valid transmission position and the Direction IMS from the primary controls path has an error corrected transmission position, but the two do not match.					
		DTC Fail case 3: Range IMS is between valid transmission positions and Direction IMS is error corrected	The Range IMS indicates a transitional PRNDL position and the Direction IMS has an error corrected transmission position.					
		DTC Fail case 4: Range IMS is invalid and Direction IMS is error corrected	The Range IMS is invalid due to a fault or a problem with the TCM, and the Direction IMS has an error corrected transmission position.					
		DTC Fail case 5: Range IMS is between valid transmission positions and Direction IMS is invalid	The Range IMS indicates a transitional PRNDL position and the Direction IMS is invalid due to a fault or a problem with the HCP					
		DTC Fail case 6: Range IMS and Direction IMS are both invalid	The Range IMS is invalid due to a fault or a problem with the TCM, and the Direction IMS is invalid due to a fault or a problem with the HCP					
Internal Control Module Commanded Range State	P16F6	*The Transmission Range State monitor verifies that there are no mismatches in system equations, the transmission range state being executed is valid, and the transmission range state has not performed an invalid transition*						One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 1: Invalid Transmission Range State	The current Transmission Range State being used by the system is detected to be an invalid value within the current Transmission Range State Group.			Runs continuously	1 failure Detected within 25ms of failure	
		DTC Fail case 2: Invalid Transmission Range State Group	The current Transmission Range State Group being used by the system is an invalid value.					
		DTC Fail case 3: Invalid Transmission Range State transition	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.					
		DTC Fail case 4: Range Equation mismatches current Transmission Range State	The Range Equation can not be rationalized against the current Transmission Range State.					
		DTC Fail case 5: Torque Determination State mismatches current Transmission Range State	The Torque Determination State can not be rationalized against the current Transmission Range State.					
		DTC Fail case 6: Input Torque Optimization State mismatches current Transmission Range State	The Input Torque Optimization State can not be rationalized against the current Transmission Range State					
Redundant Speed Sensor Circuit Diagnostics								
Control Module Redundant Drive Motor A Speed	P1E4A	*This Diagnostic rationalizes the HCP calculated MTR Aspeed against MCP A calculated MTR A speed*						One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Motor A Speed Sensing Circuit		**DTC Fail case 1:** The difference between Mtr A calculated speed and HCP calculated MTR A speed exceeds a threshold	The difference between Mtr A calculated speed and HCP calculated MTR A speed	> 400	Enable Cal Run/Crank Voltage OR Run/Crank Voltage Secured	= true = true	21 fail counts out of 32 sample counts Executes in a 6.25ms loop Detects in 200ms	
Control Module Redundant Drive Motor B Speed Sensing Circuit	P1E4B	*This Diagnostic rationalizes the HCP calculated MTR B speed against MCP B calculated MTR B speed*						One Trip, Type A
		DTC Fail case 1: The difference between Mtr B calculated speed and HCP calculated MTR B speed exceeds a threshold	The difference between Mtr B calculated speed and HCP calculated MTR B speed	> 400	Enable Cal Run/Crank Voltage OR Run/Crank Voltage Secured	= true = true	21 fail counts out of 32 sample counts Executes in a 6.25ms loop Detects in 200ms	
Communication Diagnostics								
Control Module Comm'n Bus A Off	U0073	*This diagnostic indicates a bus off condition on HSGMLAN (Bus A)*						One Trip, Type A
		DTC Fail case 1: Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.	CAN device driver	= bus-off state.	Run/Crank Voltage OR Powertrain Relay Voltage Power Mode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission	> 9.5 Volts =RUN =FALSE =TRUE =TRUE	4 fail counts out of 5 samples counts Executes in a 12.5ms loop Detects in 450 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Control Module Comm'n Bus B Off	U0074	*This diagnostic indicates a bus off condition on the PTE (Bus B)*						One Trip, Type A
		DTC Fail case 1: Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.	CAN device driver	= bus-off state.	Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	4 fail counts out of 5 samples counts Executes in a 12.5ms loop Detects in 450 ms	
					Power Mode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Control Module Comm'n Bus E Off	U0077	*This diagnostic indicates a bus off condition on the CE (Bus E)*						One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 1: Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.	CAN device driver	= bus-off state.	Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	4 fail counts out of 5 samples counts Executes in a 12.5ms loop Detects in 450 ms	
					Power Mode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With ECM/PCM on Bus A	U0100	*This diagnostic indicates a lost communication between the HCP and the ECM on Bus A*						One Trip, Type A
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the ECM on Bus A	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					Power Mode	=RUN/ACC		
					Bus Off Fault Active	=FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With TCM	U0101	*This diagnostic indicates a lost communication between the HCP and the TCM on Bus A*						One Trip, Type A
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the TCM on Bus A	Missed TCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop	
					Power Mode	=RUN/ACC	Detects in 500 ms	
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Brake System Control Module	U0129	*This diagnostic indicates a lost communication between the HCP and the BSCM on Bus A*						Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the EBCM on Bus A	Missed EBCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage Power Mode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	> 9.5 Volts =RUN/ACC =FALSE =TRUE =TRUE =FALSE >=3 sec	Executes in a 6.25ms loop Detects in 500 ms	
Lost Communication With Body Control Module	U0140	*This diagnostic indicates a lost communication between the HCP and the BCM on Bus A*						Special Type C
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the BCM on Bus A	Missed BCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage Power Mode Bus Off Fault Active Normal Communication Enabled	> 9.5 Volts =RUN/ACC =FALSE =TRUE	Executes in a 6.25ms loop Detects in 500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Powertrain Control Module B	U179A	*This diagnostic indicates a lost communication between the HCP and the VICM on Bus A*						One Trip, Type A
		DTC Fail case 1: Lost Communication with Hybrid Powertrain	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay	> 9.5 Volts	Executes in a 6.25ms loop	
					Power Mode	=RUN/ACC		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With ECM/PCM on Bus B	U1818	*This diagnostic indicates a lost communication between the HCP and the ECM on Bus B*						One Trip, Type A
		DTC Fail case 1: Detects that CAN serial data	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay	> 9.5 Volts	Executes in a 6.25ms loop	
					Power Mode	=RUN/ACC		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Powertrain Control Module B on Bus B	U182D	*This diagnostic indicates a lost communication between the HCP and the VICM on Bus B*						One Trip, Type A
		DTC Fail case 1: Lost Communication with Hybrid Powertrain Control Module B on Bus B (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					Power Mode	=RUN/ACC		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message	=TRUE		
					Diagnostic System	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With BSCM on Bus E	U1833	*This diagnostic indicates a lost communication between the HCP and the BSCM on Bus E*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the BSCM	Missed BSCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					Power Mode	=RUN/ACC		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	=TRUE =FALSE >=3 sec		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Power Moding Diagnostics								
System Voltage Low	P0562	Sets when the low voltage system voltage is below a threshold	Ignition Voltage	Ignition Voltage <= 10 Volts	RunCrankActive Engine Speed	= 1 >= 0 RPM	5 seconds in a 6 second window	Special Type C
		DTC Pass		Ignition Voltage > 10 Volts			1 second	
System Voltage Hi	P0563	Sets when the low voltage system voltage is above a threshold	Ignition Voltage	Ignition Voltage >= 18 Volts	RunCrankActive	= 1	5 seconds in a 6 second window	Special Type C
		DTC Pass		Ignition Voltage < 18 Volts			1 second	
Shift Solenoid Hydraulic Diagnostics								
Shift Solenoid Hydraulic Diagnostics P0751, P0752, P0756, P0757 have the following common enable criteria	***				Line Pressure Estimate Propulsion System Active	> 325 kpa AND >= 325 kpa FOR > 1 seconds AND > 100 kpa = 1		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Shift Solenoid Valve A Stuck Off	P0751	This DTC will indicate when Shift Solenoid Valve A (X Valve) is stuck in the hydraulically low position This detection only occurs during an X valve transition	X valve is determined to be in a hydraulically Low state when it has been commanded hydraulically High.	X Commanded Hi for > XvalveTurnOnTime + 1 seconds Where XValveTurnOnTime: Trans Fluid Temp Time -40 0.50 -30 0.35 -20 0.250 -10 0.09 20 0.05 140 0.02	X Command X Position	1 0	Fail Conditions met for 3 seconds	One Trip, Type A
		DTC Pass	X valve completes Low to High transition without failure		X Command X Position	1 1	1 loop execution at 0.0125 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Shift Solenoid Valve A Stuck On	P0752	This DTC will indicate when Shift Solenoid Valve A (X Valve) is stuck in the hydraulically hi position This DTC is linked to both a steady state and transitional test.	X valve is determined to be in a hydraulically high state when it has been commanded to a low state.	**Transition Case:** X commanded Low for > (XvalveTurnOffTm + 1) seconds Where XValveTurnOffTime: Trans Fluid Temp Time -40 4 -30 2.25 -20 1.4 -10 .5 20 0.265 140 0.0325	X Command X Position	0 1	Fail Conditions met for 3 seconds	One Trip, Type A
		DTC Pass (**Transitional Pass**)	X valve completes High to Low transition without failure		X Command X position PCS2 and PCS4 Monitors	0 0 No Fault Pending	5 seconds	
				Steady State Case: Simultaneous failures occur on both PCS2 and PCS4 monitors	XY state	EVT Lo **OR** EVT Hi	Fail Conditions met for 2 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					PCS2 and PCS4 faults	Occur Simultaneously - within (VlvXStckHiSteadyStWindow + 0.1) seconds Where VlvXStckHiSteadyStWindow: Trans Fluid Temp Time -50 0.50 -32 0.50 -24 0.50 -5 0.50 4 0.50 40 0.50		
		DTC Pass (**Steady State Pass**)	X valve completes High to Low transition without failure		X Command X position PCS2 and PCS4 Monitors	0 0 No Fault Pending	5 seconds	
Shift Solenoid Valve B Stuck Off	P0756	This DTC will indicate when Shift Solenoid Valve B (Y Valve) is stuck in the hydraulically low position This detection only occurs during an Y valve transition	The Y valve is determined to be in a hydraulically Low state when it has been commanded hydraulically High.	Y Commanded Hi for > (Yvalve_TurnOnTm + 1 seconds Where Yvalve_TurnOnTm: Trans Fluid Temp Time -40 15 -30 10 -20 5 -10 0.30 20 0.15 140 0.05	Y Command Y Position	1 0	Fail Conditions met for 4.5 seconds	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Y valve completes Low to High transition without failure		Y command Y Position	1 1 (as indicated by YPSw showing 0 value)	Pass conditions met for 2 seconds	
Shift Solenoid Valve B Stuck On	P0757	This DTC will indicate when Shift Solenoid Valve B (Y Valve) is stuck in the hydraulically hi position This detection only occurs during an Y valve transition	The Y valve is determined to be in a hydraulically Hi state when it has been commanded hydraulically Lo	Y Commanded Lo for > (Yvalve_TurnOffTm + 1) seconds Where Yvalve_TurnOffTm: Trans Fluid Temp Time -40 4 -30 2.7 -20 1.4 -10 .7 20 .2 140 .05	Y Command Y Position	0 1	Fail Conditions met for 4.5 seconds	One Trip, Type A
		DTC Pass	Y valve completes High to Low transition without failure		Y Command Y Position	0 0 (as indicated by YPSw showing 1 value)	Pass conditions met for 2 seconds	
Pressure Control Solenoid Hydraulic Diagnostics								
Pressure Control Solenoid hydraulic diagnostics P0776, P0777, P0796, P0797 P2714, P2715, share these common secondary parameter enable conditions	***				Xvalve transition X Valve Stuck Hi Detection	X valve is not in a transition, and hasn't transitioned in the last 0.275 seconds (0.025 + .25) No fault pending		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					LinePressure Estimate Propulsion System Active	> 325 kpa AND >=325 kpa FOR > 1 seconds =1		
Pressure Control (PC) Solenoid B Stuck Off	P0776	This DTC will determine if Pressure Control Solenoid 2 (B) is stuck in the hydraulically low position. This DTC has two fail cases.	The pressure switch associated with pressure control solenoid B (PCS2) is indicating that the PCS is regulating exhuast when the PCS has been commanded full feed.	**Fail Case 1:** PCS2PS (PSw3) indicates low hydraulic pressure	PCS commanded pressure *** Common Hydraulic Enables	>= 1800 kpa for >= (PSReDelay + 0.1) seconds Where PSReDelay: Fluid Temp Time -50 4.50 -30 1.80 -24 1.2 -17 0.80 4 0.20 40 0.1	Failure exists for 30 seconds (2400 * 0.0125)	Two Trips, Type B
		DTC Pass	Pass when PCS2PS and PCS2Cmnd are in agreement (Full Feed)	PCS2PS (PSw3) indicates hi hydraulic pressure			1.25 seconds ((2500 - 2400) * 0.0125)	
			The warning threshold for Fail Case 1 has been met 5 times in a single key cycle	**Fail Case 2:** Fail case 1 criteria met for at least 0.5 seconds (40 * 0.0125), more than 10 times in a given key cycle	Same as **Fail Case 1.**		N/A	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control (PC) Solenoid B Stuck ON	P0777	This DTC will determine if Pressure Control Solenoid 2 (B) is stuck in the hydraulically hi position. This DTC has two fail cases.	The pressure switch associated with pressure control solenoid B (PCS2) is indicating that the PCS is in the full feed position when the PCS has been commanded regulating exhaust.	**Fail Case 1:** PCS2PS (PSw3) indicates hi hydraulic pressure	PCS commanded pressure *** Common Hydraulic Enables	<= 5 kpa for >= (FFDelay + 0.1) seconds Where FFDelay: Temp Time -50 4.50 -30 1.40 -18 0.80 -4 0.30 13 0.19 40 0.08	Failure exists for 30 seconds (2400 * 0.0125)	One Trip, Type A
		DTC Pass	Pass when PCS2PS and PCS2Cmnd are in agreement (Reg Exhaust)	PCS2PS (PSw3) indicates Low hydraulic pressure			1.25 seconds ((2500 - 2400) * 0.0125)	
			The warning threshold for Fail Case 1 has been met 5 times in a single key cycle	**Fail Case 2:** Fail case 1 criteria met for at least 0.5 seconds (40 * 0.0125), more than 10 times in a given key cycle	Same as **Fail Case 1.**		N/A	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control (PC) Solenoid C Stuck Off	P0796	This DTC will determine if Pressure Control Solenoid 3 (C) is stuck in the hydraulically low position. This DTC has two fail cases.	The pressure switch associated with pressure control solenoid C (PCS3) is indicating that the PCS is regulating exhuast when the PCS has been commanded full feed.	**Fail Case 1:** PCS3PS (PSw1) indicates low hydraulic pressure	PCS commanded pressure *** Common Hydraulic Enables	>= 1800 kpa for >= (PSReDelay + 0.1) seconds Where PSReDelay: Temp Time -50 4.50 -30 1.80 -24 1.2 -17 0.80 4 0.20 40 0.1	Failure exists for 30 seconds (2400 * 0.0125)	Two Trips, Type B
		DTC Pass	Pass when PCS3PS and PCS3Cmnd are in agreement (Full Feed)	PCS3PS (PSw1) indicates hi hydraulic pressure			1.25 seconds ((2500 - 2400) * 0.0125)	
			The warning threshold for Fail Case 1 has been met 5 times in a single key cycle	**Fail Case 2:** Fail case 1 criteria met for at least 1.875 seconds (150 * 0.0125), more than 10 times in a given key cycle	Same as **Fail Case 1.**		N/A	
Pressure Control (PC) Solenoid C Stuck ON	P0797	This DTC will determine if Pressure Control Solenoid 3 (C) is stuck in the hydraulically hi position. This DTC has two fail cases.	The pressure switch associated with pressure control solenoid C (PCS3) is indicating that the PCS is in the full feed position when the PCS has been commanded regulating exhaust.	**Fail Case 1:** PCS3PS (PSw1) indicates hi hydraulic pressure	PCS commanded pressure *** Common Hydraulic Enables	<=5 kpa for >= (FFDelay + 0.1) seconds Where FFDelay: Trans Fluid Temp Time -50 4.50 -30 1.40 -18 0.80 -4 0.30 13 0.19 40 0.08	Failure exists for 30 seconds (2400 * 0.0125)	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Pass when PCS3PS and PCS3Cmnd are in agreement (Reg Exhaust)	PCS3PS (PSw1) indicates Low hydraulic pressure			1.25 seconds ((2500 - 2400) * 0.0125)	
			The warning threshold for Fail Case 1 has been met 5 times in a single key cycle	**Fail Case 2:** Fail case 1 criteria met for at least 0.5 seconds (40 * 0.0125), more than 10 times in a given key cycle	Same as **Fail Case 1.**		N/A	
Pressure Control (PC) Solenoid D Stuck Off	P2714	This DTC will determine if Pressure Control Solenoid 4 (D) is stuck in the hydraulically low position. This DTC has two fail cases.	The pressure switch associated with pressure control solenoidC (PCS4) is indicating that the PCS is regulating exhuast when the PCS has been commanded full feed.	**Fail Case 1:** PCS4PS (PSw4) indicates low hydraulic pressure	PCS commanded pressure *** Common Hydraulic Enables	>= 1800 kpa for >= (PSReDelay + 0.1) seconds Where PSReDelay: Temp Time -50 4.50 -30 1.80 -24 1.2 -17 0.80 4 0.20 40 0.1	Failure exists for 30 seconds (2400 * 0.0125)	Two Trips, Type B
		DTC Pass	Pass when PCS4PS and PCS4Cmnd are in agreement (Full Feed)	PCS4PS (PSw4) indicates hi hydraulic pressure			1.25 seconds ((2500 - 2400) * 0.0125)	
			The warning threshold for Fail Case 1 has been met 5 times in a single key cycle	**Fail Case 2:** Fail case 1 criteria met for at least 0.5 seconds (40 * 0.0125), more than 10 times in a given key cycle	Same as **Fail Case 1.**		N/A	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control (PC) Solenoid D Stuck ON	P2715	This DTC will determine if Pressure Control Solenoid 4 (D) is stuck in the hydraulically hi position. This DTC has two fail cases.	The pressure switch associated with pressure control solenoid D (PCS4) is indicating that the PCS is in the full feed position when the PCS has been commanded regulating exhaust.	**Fail Case 1:** PCS4PS (PSw4) indicates hi hydraulic pressure	PCS commanded pressure *** Common Hydraulic Enables	<= 5 kpa for >= (FFDelay + 0.1) seconds Where FFDelay: Trans Fluid Temp Time -50 4.50 -30 1.40 -18 0.80 -4 0.30 13 0.19 40 0.08	Failure exists for 30 seconds (2400 * 0.0125)	Two Trips, Type B
		DTC Pass	Pass when PCS4PS and PCS4Cmnd are in agreement (Reg Exhaust)	PCS4PS (PSw4) indicates Low hydraulic pressure			1.25 seconds ((2500 - 2400) * 0.0125)	
			The warning threshold for Fail Case 1 has been met 5 times in a single key cycle	**Fail Case 2:** Fail case 1 criteria met for at least 0.2 seconds (16 * 0.0125), more than 5 times in a given key cycle	Same as **Fail Case 1.**		N/A	
Clutch Slip Diagnostics								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Clutch slip diagnostics P079A, P079B, P079C share these common secondary parameter enable conditions	***				LinePressureEstimate	> 235 kpa **AND** > (MinLinePressure - 2) kpa Where MinLinePressure is a lookup table Trans Fluid Temp vs Line Pressure: Temp Kpa -40 1200 -30 1200 -20 1000 -10 700 0 500 10 265		
Clutch 1 Slip	P079A	This DTC sets when excessive slip is observed on C1 while commanded on	Clutch 1 Slip Speed	C1 Slip > 200 RPM	C1 Pressure Command C1 Torq Estimate C1 Fill detected	> = 1800 kpa > = 200 Nm =1 Predicted Mtr A spd Predicted Mtr B spd	63 seconds (3 retries * 1s failtime * 30 seconds between attempts **OR** Instantly if >6300 **OR** >9500	One Trip, Type A
		DTC Pass	Clutch 1 Slip Speed	C1 Slip < 50 RPM	C1 Pressure Command C1 Torq Estimate C1 Fill detected	> = 1800 kpa > = 20 Nm = 1	0.125 seconds (10 * 0.0125)	
Clutch 2 Slip	P079B	This DTC sets when excessive slip is observed on C2 while commanded on	C2 Slip Speed	C2 Slip > 200 RPM	C2 Pressure Command C2 Torq Estimate C2 Fill detected	> = 1800 kpa > = 200 Nm = 1 Predicted Mtr A spd Predicted Mtr B spd	63 seconds (3 retries * 1s failtime * 30 seconds between attempts **OR** Instantly if >6300 **OR** >9500	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	C2 Slip Speed	C2 Slip < 50 RPM	C2 Pressure Command C2 Torq Estimate C2 Fill detected	> = 1800 kpa > = 20 Nm =1	0.125 seconds (10 * 0.0125)	
Clutch 3 Slip	P079C	This DTC sets when excessive slip is observed on C3 while C3 has been commanded on	C3 Slip Speed	C3 Slip > 300 RPM	C3 Pressure Command C3 Torq Estimate C3 Fill detected	> = 1800 kpa > = 200 Nm = 1 Predicted Mtr A spd Predicted Mtr B spd	63 seconds (3 retries * 1s failtime * 30 seconds between attempts **OR** Instantly if >6300 **OR** >9500	One Trip, Type A
		DTC Pass	C3 Slip Speed	C3 Slip < 50 RPM	C3 Pressure Command C3 Torq Estimate C3 Fill detected	> = 1800 kpa > = 20 Nm = 1	0.125 seconds (10 * 0.0125)	
Pressure Control Solenoid Electrical Diagnostics								
All Pressure Control Solenoid electrical diagnostics P0961, P0962, P0963, P0965, P0966, P0967, P0969, P0970, P0971, P2719, P2720, P2721, P2728, P2729, P2730, P0973, P0974, P0976, P0977 share these common secondary parameter enable conditions	***				Ignition voltage Engine Speed Vehicle Speed PropSysActive	> = 11 Volts && <= 16 Volts >= 0 RPM && <= 7500 RPM for >= 5 seconds <= 200 mph for >= 5 seconds =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 System Performance	P0961	This DTC sets when an invalid voltage in PCS1 control circuit has been detected	PCS1 electrical status	HWIO circutry detects out of range error is present	DTC P0961 *** Common Electrical Enables	Not failed this key on	Failure detected for 4 seconds (320 * 0.0125) out of a 5 second (400 * 0.0125) window	Two Trips, Type B
		DTC Pass		HWIO circuitry detects an out of range error is not present			1 second ((400 - 320) * 0.0125)	
Pressure Control (PC) Solenoid A Control Circuit Low Voltage	P0962	This DTC sets when the PCS1 control circuit has been detected to be shorted to ground	PCS1 electrical status	HWIO circuitry detects an electrical low pressure error is present	DTC P0962 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	

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 or open circuited.	PCS1 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P0963 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Pressure Control (PC) Solenoid B System Performance	P0965	This DTC sets when an invalid voltage in PCS2 control circuit has been detected	PCS2 electrical status	HWIO circutry detects out of range error is present.	DTC P0965 *** Common Electrical Enables	Not failed this key on	Failure detected for 4 seconds (320 * 0.0125) out of a 5 second (400 * 0.0125) window	Two Trips, Type B
		DTC Pass		HWIO circuitry detects an out of range error is not present			1 second ((400 - 320) * 0.0125)	
Pressure Control (PC) Solenoid B Control Circuit Low Voltage	P0966	This DTC sets when the PCS2 control circuit has been detected to be shorted to ground	PCS2 electrical status	HWIO circuitry detects an electrical low pressure error is present.	DTC P0966 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	

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 PCS2 has been detected to be shorted to power or open circuited.	PCS2 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P0967 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Pressure Control (PC) Solenoid C System Performance	P0969	This DTC sets when an invalid voltage in PCS3 control circuit has been detected	PCS3 electrical status	HWIO circutry detects out of range error is present.	DTC P0965 *** Common Electrical Enables	Not failed this key on	Failure detected for 4 seconds (320 * 0.0125) out of a 5 second (400 * 0.0125) window	Two Trips, Type B
		DTC Pass		HWIO circuitry detects an out of range error is not present			1 second ((400 - 320) * 0.0125)	
Pressure Control (PC) Solenoid C Control Circuit Low Voltage	P0970	This DTC sets when the PCS3 control circuit has been detected to be shorted to ground	PCS3 electrical status	HWIO circuitry detects an electrical low pressure error is present.	DTC P0966 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	

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 PCS3 has been detected to be shorted to power or open circuited.	PCS3 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P0967 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.2 seconds (16 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 16) * 0.0125)	
Pressure Control (PC) Solenoid D System Performance	P2719	This DTC sets when an invalid voltage in PCS4 control circuit has been detected	PCS4 electrical status	HWIO circutry detects out of range error is present.	DTC P2719 *** Common Electrical Enables	Not failed this key on	Failure detected for 4 seconds (320 * 0.0125) out of a 5 second (400 * 0.0125) window	Two Trips, Type B
		DTC Pass		HWIO circuitry detects an out of range error is not present			1 second ((400 - 320) * 0.0125)	
Pressure Control (PC) Solenoid D Control Circuit Low Voltage	P2720	This DTC sets when the PCS4 control circuit has been detected to be open circuit or shorted to power	PCS4 electrical status	HWIO circuitry detects an electrical low pressure error is present.	DTC P2720 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	

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 PCS4 has been detected to be shorted to ground	PCS4 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P2721 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Pressure Control (PC) Solenoid E System Performance	P2728	This DTC sets when an invalid voltage in PCS5 control circuit has been detected	PCS5 electrical status	HWIO circutry detects out of range error is present.	DTC P2719 *** Common Electrical Enables	Not failed this key on	Failure detected for 4 seconds (320 * 0.0125) out of a 5 second (400 * 0.0125) window	Two Trips, Type B
		DTC Pass		HWIO circuitry detects an out of range error is not present			1 second ((400 - 320) * 0.0125)	
Pressure Control (PC) Solenoid E Control Circuit Low Voltage	P2729	This DTC sets when the PCS5 control circuit has been detected to be open circuit or shorted to power	PCS5 electrical status	HWIO circuitry detects an electrical low pressure error is present.	DTC P2720 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	

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 ground	PCS5 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P2721 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Shift Solenoid A Control Circuit Low	P0973	This DTC detects a short to power or open circuit in the X valve control circuit.	X Valve Electrical Status	HWIO circuitry detects an open circuit or short to power error is present.	DTC P0973 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32*0.0125) out of a 0.5 second (40*0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an open circuit or short to power error is not present.			0.1 seconds ((20 - 16) * 0.025)	
Shift Solenoid A Control Circuit High	P0974	This DTC detects a short to ground in the X valve control circuit.	X Valve Electrical Status	HWIO circuitry detects short to ground error is present.	DTC P0974 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32*0.0125) out of a 0.5 second (40*0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects short to ground error is not present.			0.1 seconds ((20 - 16) * 0.025)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Shift Solenoid B Control Circuit Low	P0976	This DTC detects a short to power or open circuit in the Y valve control circuit.	Y Valve Electrical Status	HWIO circuitry detects an electrical low pressure error is present.	DTC P0976	Not failed this key on	Failure detected for 0.4 seconds (32*0.0125) out of a 0.5 second (40*0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an open circuit or short to power error is not present.	*** Common Electrical Enables		0.1 seconds ((20 - 16) * 0.025)	
Shift Solenoid B Control Circuit High	P0977	This DTC detects a short to ground in the Y valve control circuit.	Y Valve Electrical Status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P0977	Not failed this key on	Failure detected for 0.4 seconds (32*0.0125) out of a 0.5 second (40*0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects short to ground error is not present.	*** Common Electrical Enables		0.1 seconds ((20 - 16) * 0.025)	
Power Moding Diagnostics								
Ignition Switch Run/Start Position Circuit Low	P2534	Detects a run crank relay open circuit	Runk Crank Line voltage	Ignition Run Crank line voltage <= 2 Volts	CAN Communication	enabled	60 seconds (2400 * 0.025) in a 65 second window (2600 * 0.025)	One Trip, Type A
					ECM run crank active data	available and active		
		DTC Pass	Run Crank Line Voltage	Ignition Run Crank line voltage > 2 Volts			5 seconds (200 * 0.025)	

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	Ignition Run Crank line voltage > 5 V	CAN Communication ECM run crank active data	enabled available and false	12 seconds (480 * 0.025) in a 15 second window (600 * 0.025)	One Trip, Type A
		DTC Pass	Run Crank Line Voltage	Ignition Run Crank line voltage < 2V			3 seconds (120 * 0.025)	
Ignition Switch Accessory Position Circuit Low	P2537	Detects an accessory position circuit open	Accessory On	FALSE	P2537	Not Test Failed This Key On and Not Test Passed This Key On	0.2 seconds (8 * 0.025)	One Trip, Type A
					Propulsion System	Active		
					Propulsion System Active Time	> 0.5 seconds		
		DTC Pass	Accessory On	TRUE			0.2 seconds (8 * 0.025)	
TCM Substrate Temp Sensor								
Transmission Control Module (TCM) Internal Temperature Too High	P0634	The DTC detects the electronic circuitry is at high operating temperature.	Transmission Substrate Temperature OR Ignition Voltage AND Substrate Temperature	≥ 142 °C ≥ 18 V ≥ 50 °C	Transmission Substrate Temperature	-50 °C ≤ Transmission Substrate Temperature ≤ 146 °C for 0.25 seconds	≥ 5 seconds ≥ 2 seconds **Pass Conditions** Transm'n Substrate Temp ≤ 142 °C and Ignition Voltage is ≤ 18 V for 10 seconds **OR** Transm'n Substrate Temp	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							≤ 50 °C and Ignition Voltage is ≥ 18 V for 10 seconds	
Transmission Control Module (TCM) Substrate Temperature Sensor Circuit Range/Performance	P0667	The DTC detects the TCM substrate temperature sensor is reporting an incorrect value	Delta between TCM substrate temperature sensor and transmission fluid temperature sensor (TFT)	> Highest of transmission temperature sensors Temp Delta -40.1 256 -40 50 -20 30 0 30 30 30 60 30 100 30 149.0 30 149.1 256	IF vehicle speed is < 5 mph and accelerator position is > 20% for more than 7 seconds, then diagnostic is disabled. Once above conditions are removed > 20 seconds, diagnostic is re-enabled		> 300 seconds (3000 counts at 100ms)	Two Trips, Type B
			AND					
			Delta between TCM substrate temperature sensor and TCM powerup temperature sensor	> Highest of transmission temperature sensors Temp Delta -40.1 256 -40 15 -20 15 0 15 30 15 60 15 100 15 149.0 15 149.1 256	Transmission state Engine Torque Inaccurate Accelerator Position Sensor Failure P0721, P0722, P0723, P215C, P0658, P0668, P0669, P0712, P0713, P06AD, P06AE	NOT in park/neutral Must be FALSE Must be FALSE NOT Fault Active OR Failed This Key On		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Engine Speed Vehicle Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 124 MPH for 5 seconds		
		DTC Pass	Transm'n substrate temp delta between powerup temp sensor AND fluid temp sensor	< value in fail criteria table			> 70 sec (700 counts at 100ms)	
Transmission Control Module (TCM) Substrate Temperature Sensor Circuit Low (Failed at a low temperature - circuit short to ground).	P0668	The DTC detects TCM substrate temperature sensor short to ground error.	TCM Substrate Temperature Sensor	≤ -60 °C	Engine Speed Vehicle Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 124 MPH for 5 seconds	≥ 60 seconds **Pass Conditions** Transm'n Substrate Temp ≥ -55 °C for 4 seconds	Two Trips, Type B
Transmission Control Module (TCM) Substrate Temperature Sensor Circuit High (Failed at a high temperature - circuit open or short to power).	P0669	The DTC detects TCM substrate temperature sensor open or short to power error.	TCM Substrate Temperature Sensor	≥ 160 °C	Engine Speed Vehicle Speed Transmission Output Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 124 MPH for 5 seconds Transmission Output Speed ≥ 200 RPM for 5 seconds cumulative.	≥ 60 seconds	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Estimated Motor Power Loss	Estimated Motor Power Loss ≥ 0.4 kW for 200 seconds cumulative.	**Pass Conditions** Transm'n Substrate Temp ≤ 150 °C for 4 seconds	
TCM Powerup Temp Sensor								
Transmission Control Module (TCM) Powerup Temperature Sensor Circuit Range/Performance	P06AC	The DTC detects the TCM powerup temperature sensor is reporting an incorrect value	Delta between TCM powerup temperature sensor and transmission fluid temperature sensor (TFT)	>Highest of transmission temperature sensors Temp Delta -40.1 256 -40 50 -20 30 0 30 30 30 60 30 100 30 149.0 30 149.1 256	IF vehicle speed is < 5 mph and accelerator position is > 20% for more than 7 seconds, then diagnostic is disabled. Once conditions are removed > 20 seconds, diagnostic re-enabled		> 300 seconds (3000 counts at 100ms)	Two Trips, Type B
			AND					
			Delta between TCM powerup temperature sensor and TCM substrate temperature sensor	> Highest of transmission temperature sensors Temp Delta -40.1 256 -40 15 -20 15 0 15 30 15 60 15	Transmission state Engine Torque Inaccurate Accelerator Position Sensor Failure	NOT in park/neutral Must be FALSE Must be FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				100 15 149.0 15 149.1 256	P0721, P0722, P0723, P215C, P0658, P0668, P0669, P0712, P0713, P06AD, P06AE	NOT Fault Active OR Failed This Key On		
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
					Vehicle Speed	≤ 124 MPH for 5 seconds		
		DTC Pass	Transm'n substrate temp delta between powerup temp sensor AND fluid temp sensor	< value in fail criteria table			> 70 sec (700 counts at 100ms)	
Transmission Control Module (TCM) Powerup Temperature Sensor Low (Failed at a low temperature - circuit short to ground).	P06AD	The DTC detects TCM powerup sensor short to ground error.	TCM Power Up Temperature Sensor	≤ -59 °C	Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds	≥ 60 seconds	Two Trips, Type B
					Vehicle Speed	≤ 124 MPH for 5 seconds		
					Estimated Motor Power Loss	Estimated Motor Power Loss ≥ 0.4 kW for 200 seconds cumulative.		
					NOT Fault Active OR Failed This Key On	P0721, P0722, P0723, P215C		
							Pass Conditions Transm'n Substrate Temp	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							≥ -40 °C for 4 seconds	
Transmission Control Module (TCM) Powerup Temperature Sensor Circuit High (Failed at a high temperature - circuit open or short to power).	P06AE	The DTC detects TCM powerup sensor open or short to power error.	TCM Power Up Temperature Sensor	≥ 164 °C	Engine Speed Vehicle Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 124 MPH for 5 seconds	≥ 60 seconds **Pass Conditions** Transm'n Substrate Temp ≤ 150 °C for 4 seconds	Two Trips, Type B
Transmission Fluid Temp Sensor								
Transmission Fluid Temperature Sensor Circuit Range/Performance	P0711	The DTC detects the transmission fluid temperature is reporting an incorrect value	Delta between transmission fluid temperature (TFT) and TCM powerup temperature sensor AND Delta between transmission fluid temperature (TFT) and TCM substrate	> Highest of transmission temperature sensors Temp Delta -40.1 256 -40 50 -20 30 0 30 30 30 60 30 100 30 149.0 30 149.1 256 > Highest of transmission temperature sensors Temp	IF vehicle speed is < 5 mph and accelerator position is > 20% for more than 7 seconds, then diagnostic is disabled. Once conditions are removed > 20 seconds, diagnostic is re-enabled Transmission state Engine Torque	 NOT in park/neutral Must be FALSE	> 300 seconds (3000 counts at 100ms)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			temperature sensor	Delta -40.1 256 -40 50 -20 30 0 30 30 30 60 30 100 30 149.0 30 149.1 256	Inaccurate Accelerator Position Sensor Failure P0721, P0722, P0723, P215C, P0658, P0668, P0669, P0712, P0713, P06AD, P06AE Engine Speed Vehicle Speed	 Must be FALSE NOT Fault Active OR Failed This Key On 0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 124 MPH for 5 seconds		
		DTC Pass	Transm'n substrate temp delta between powerup temp sensor AND fluid temp sensor	< value in fail criteria table			> 70 sec (700 counts at 100ms)	
Transmission Fluid Temperature Sensor Circuit Low (Failed at a low temperature - circuit short to ground).	P0712	The DTC detects transmission fluid sensor short to ground error.	Transmission Sump Temperature Sensor	≤ -60 °C	P0721, P0722, P0723, P077B, P215C Engine Speed Vehicle Speed Estimated Motor Power Loss	NOT Fault Active OR Failed This Key On 0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 124 MPH for 5 seconds Estimated Motor Power Loss ≥ 0.4 kW for 200	≥ 60 seconds	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						seconds cumulative.	**Pass Conditions** Transm'n Sump Temp ≥ -50 °C for 4 seconds	
Transmission Fluid Temperature Sensor Circuit High (Failed at a high temperature - circuit open or short to power).	P0713	The DTC detects substrate sensor open or short to power error.	Transmission Sump Temperature Sensor	≥ 160 °C	P0721, P0722, P0723, P077B, P215C Engine Speed Vehicle Speed	NOT Fault Active OR Failed This Key On 0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 124 MPH for 5 seconds	≥ 60 seconds **Pass Conditions** Transm'n Substrate Temp ≤ 149 °C for 4 seconds	One Trip, Type A
Transmission Output Speed Sensor								
Transmission Output Speed (TOS) Sensor Wrong Direction	P0721	The DTC detects incorrect TOS direction.	TOS Raw Direction	TOS Direction Raw is not Forward or Reverse	TOS Sample Period	≠ 0	≥ 2.5 seconds (100 counts at 25ms) **Pass Conditions** TOS Direction Raw = Forward or Reverse for 3.125 seconds (125 counts at 25ms)	One Trip, Type A

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 detects if the Transmission Output Speed Sensor Direction is Incorrect by Comparing with Calculated Direction from Motor Speed Sign	Transmission Output Speed Direction Raw	≠ Motor Direction	CAN Communication Lost With Transmission P215C TOS Hardware Input Output Transmission Hybrid Motor Speed based Estimated Output Speed is Valid Transmission Output Speed and Motor Output Speed Difference Motor Estimated Transmission Output Speed	FALSE NOT Fault Active Valid Calculated based on M1 or M2 Speed Equation ≤ 50 RPM ≥ 50 RPM	0.35 seconds (14 counts at 25ms) **Pass Conditions** Opposite as FAIL for 5 seconds (200 counts at 25ms)	One Trip, Type A
Output Shaft Speed (OSS) - Wheel Speed Correlation	P215C	The DTC Correlates the Transmission Output Speed with the ABS Wheel Speed and Motor Speed to Detect any Failures in the Transmission Output Speed Sensor.	Difference between Transmission Output Speed and the Calculated Average of Output Speed from the Motors and Wheel Speed Sensors	≥ 175 RPM	WHEN Output Speed Calculated from Wheel Speeds AND Output Speed Calculated from Motor Speeds Output Speed Calculated from Motor	> 150 RPM ≤ 40 RPM	200 ms (8 counts at 25ms)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Speeds AND Output Speed Calculated from Wheel Speeds Difference		**Pass Conditions** Difference between Transm'n Output Speed and the Calculated Average of Output Speed from the Motors and Wheel Speed Sensors ≤ 125 RPM for 0.5 seconds (20 counts at 25ms)	
					OBD Wheel Speed Sensors	TRUE		
					Driven Wheel Estimated Vehicle Speed Fault	FALSE		
					Propulsion System Active	TRUE		
					Hybrid Motor Speed based Estimated Output Speed is Valid	Calculated based on M1 or M2 Speed Equation		
Transmission Internal Mode Switch								
Internal Mode Switch P Circuit High Voltage	P1824	The DTC monitors if the IMS P Circuit is shorted to a High Voltage	Transmission Direction State	PARK	P1824	NOT Fault Active OR Failed This Key On	2.5 seconds + 1 count at 6.25ms	Two Trips, Type B
			PRNDL P Circuit Sensed	Has Not Been Observed Low	Transmission Direction State Fault Active	FALSE	Pass Conditions PRNDL P Circuit Has Been Observed Low for 1.5875 seconds	
					Ignition Voltage	11V < IGN < 32V		
					Run/Crank Active	TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Vehicle Speed	≤ 124 MPH for 5 seconds		
					Engine Speed	0 ≤ Engine Speed < 7500RPM		
Internal Mode Switch A Circuit Low Voltage	P182A	The DTC monitors if the IMS A Circuit is shorted to a Low Voltage	PRNDL State	Transitional 1	Automatic Transmission Type	EVT	8 seconds + 1 count at 6.25ms	Two Trips, Type B
			Trans Direction State	DRIVE	P182A	NOT Fault Active OR Failed This Key On	**Pass Conditions** PRNDL A Circuit Has Been Observed High for 1.5875 seconds	
					PRNDL State	PARK		
					PRNDL A Circuit Sensed	PRNDL A Circuit Has NOT Been Observed High for 1 second		
					Trans Direction State Fault Active			
					Ignition Voltage	11V < IGN < 32V		
					Run/Crank Active	TRUE		
					Vehicle Speed	< 124 mph for 5 seconds		
					Engine Speed	0 ≤ Engine Speed < 7500RPM		
Internal Mode Switch B Circuit Low Voltage	P182B	The DTC monitors if the IMS B Circuit is shorted to a Low Voltage	Transmission Direction State	PARK	P182B	NOT Fault Active OR Failed This Key On	2.5 seconds + 1 count at 6.25ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			PRNDL B Circuit Sensed	PRNDL B Circuit Has Not Been Observed High	Transmission Direction State Fault Active	FALSE	**Pass Conditions** PRNDL B Circuit Has Been Observed High for 1.5875 seconds	
					Ignition Voltage	11V < IGN < 32V		
					Run/Crank Active	TRUE		
					Vehicle Speed	≤ 124 MPH for 5 seconds		
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
Internal Mode Switch B Circuit High Voltage	P182C	The DTC monitors if the IMS B Circuit is shorted to a High Voltage	PRNDL State	Transitional 13	Automatic Transmission Type	EVT	8 seconds + 1 count at 6.25ms	Two Trips, Type B
							Pass Conditions PRNDL B Circuit Has Been Observed Low for 1.5875 seconds	
			Trans Direction State	DRIVE	P182C	NOT Fault Active OR Failed This Key On		
					PRNDL State	PARK		
					PRNDL B Circuit Sensed	Has Been Observed High for 1 Second		
					Trans Direction State Fault Active	FALSE		
					Ignition Voltage	11V < IGN < 32		
					Run/Crank Active	TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Vehicle Speed	≤ 124 MPH for 5 seconds		
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
Internal Mode Switch P Circuit Low Voltage	P182D	The DTC monitors if the IMS P Circuit is shorted to a Low Voltage	PRNDL State	Transitional 8	Automatic Transmission Type	EVT	8 seconds + 1 count at 6.25ms	Two Trips, Type B
			Trans Direction State	DRIVE	P182D	NOT Fault Active OR Failed This Key On	**Pass Conditions** PRNDL P Circuit Has Been Observed High for 1.5875 seconds	
					PRNDL State	PARK		
					PRNDL P Circuit Sensed	Has Been Observed Low for 1 second		
					Trans Direction State Fault Active	FALSE		
					Ignition Voltage	11V < IGN < 31.99		
					Run/Crank Active	TRUE		
					Vehicle Speed	≤ 124 MPH for 5 seconds		
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
Internal Mode Switch-Invalid Range	P182E	The DTC monitors if the IMS is in an Invalid Range	PRNDL State	Illegal	Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds	5 seconds	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Vehicle Speed	≤ 124 MPH for 5 seconds	**Pass Conditions** PRNDL State is NOT Illegal for 5 seconds	
					P182E	NOT Fault Active OR Failed This Key On		
					Ignition Voltage	11V < IGN < 31.99		
					Run/Crank Active	TRUE		
					Vehicle Speed	< 124 mph for 5 sec		
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
Internal Mode Switch C Circuit High Voltage	P182F	The DTC monitors if the IMS C Circuit is shorted to a High Voltage	Transmission Direction State	DRIVE	Automatic Transmission Type	EVT	2.5 seconds + 1 count at 6.25ms	Two Trips, Type B
			PRNDL C Circuit Sensed	Has Not Been Observed Low	P182F	NOT Fault Active OR Failed This Key On	**Pass Conditions** PRNDL C Circuit Has Been Observed Low for 4 seconds + 1 count at 6.25ms	
					Trans Direction State Fault Active	FALSE		
					Ignition Voltage	11V < IGN < 31.99		
					Run/Crank Active	TRUE		
					TOS Sensor	Not Fault Active		

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	The DTC monitors if the IMS A Circuit is shorted to a High Voltage	Transmission Direction State	PARK	P1838	NOT Fault Active OR Failed This Key On	2.5 seconds + 1 count at 6.25ms	Two Trips, Type B
			PRNDL A Circuit Sensed	Has Not Been Observed Low	Trans Direction State Fault Active	FALSE	**Pass Conditions** PRNDL A Circuit Has Been Observed Low for 1.5875 seconds	
					Ignition Voltage	11V < IGN < 31.99		
					Run/Crank Active	TRUE		
Internal Mode Switch C Circuit Low Voltage	P1839	The DTC monitors if the IMS C Circuit is shorted to a Low Voltage	Transmission Direction State	PARK	P1839	NOT Fault Active OR Failed This Key On	2.5 seconds + 1 count at 6.25ms	Two Trips, Type B
			PRNDL C Circuit Sensed	PRNDL C Circuit Has Not Been Observed High	Trans Direction State Fault Active	FALSE	**Pass Conditions** PRNDL C Circuit Has Been Observed Low for 1.5875 seconds	
					Ignition Voltage	11V < IGN < 31.99		
					Run/Crank Active	TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Controller Diagnostics								
Control Module Read Only Memory (ROM)	P0601	*This Diagnostic tests the checksum on ROM (flash) memory*						One Trip, Type A
		DTC Fail case 1: This DTC will be stored if any check sum in the **boot** is incorrect	Calculated Checksum does not match stored checksum		Ignition Status	= Run or Crank	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5 failures Frequency: Runs continuously in the background	
		DTC Fail case 2: This DTC will be stored if any check sum in the **calibration** is incorrect						
		DTC Fail case 3: This DTC will be stored if any check sum in the **software** is incorrect						
		DTC Pass:		ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false				
Control Module Not Programmed	P0602	*This Diagnostic tests for whether a controller has been programmed*						One Trip, Type A
		DTC Fail case 1: Indicates that the HCP needs to be programmed	Fails if No Start Calibration is set to true which is only available on a new un-programmed HCP		Ignition Status	= Run or Crank	Runs once at power up	
		DTC Pass:		Enable cal = false				

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 for BINVDM errors*						One Trip, Type A
		DTC Fail case 1: Non-volatile memory (**Static**) checksum error at controller power-up	Checksum at power-up does not match checksum at power-down		Ignition Status	= Run or Crank	1 failure Frequency: Once at powerup	
		DTC Fail case 2: Non-volatile memory (**Preserved**) checksum error at controller power-up						
		DTC Fail case 3: Non-volatile memory (**ShutdownFinished**) checksum error at controller power-up						
		DTC Pass:		No ROM memory faults				
Control Module Random Access Memory (RAM) Failure	P0604	*This Diagnostic tests the checksum on RAM memory*						One Trip, Type A
		DTC Fail case 1: Indicates that HCP is unable to correctly write and read data to and from RAM	Data read does not match data written		Ignition Status	Run or Crank	Should finish within 30 seconds at all operating conditions	
Bosch T43 TEHCM Security- Output Disable/IPT Test	P0606	*This Diagnostic tests that the HWIO executes the IPT (Inhibit Path Test) exactly once at every ignition on to test the ability of the external monitoring module (CG122) to shutoff high-side drivers to the transmission hydraulics and reset the main processor.*						One Trip, Type A
		DTC Fail case 1: Abort IPT, because HSD may be short-circuited to ground or to battery voltage	Actuator supply is out of voltage threshold range during more than 40 msec.		IPT test started	end of Initialization	3.125ms loop	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 2: Abort IPT, because HSD may be short-circuited to ground or to battery voltage	Actuator supply is lower than 90% of Batt. voltage or WD(Watch Dog for TCM main processor) error count is greater than 0 during more than 40 msec. AND Output stage is not interlocked AND Actuator supply is out of voltage threshold range.	or > 5.5 volts	IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 3: Abort IPT, because HSD may be short-circuited to ground or to battery voltage	Actuator supply is out of voltage threshold range during more than 40 msec. AND WD error counter is equal or higher than threshold. AND Output stage is interlocked AND Actuator supply is lower than 90% of Batt. Voltage.	- WD error counter: >=5	IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 4: WD error counter doesn't reach its desired level (sdi_Ufet = 1)	WD error count is higher than threshold	- WD error count: 0	IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 5: WD error counter does not reach its desired level (sdi_Ufet = 4)	WD error count is equal or higher than threshold	- WD error count: 4	IPT test started	end of Initialization	3.125ms loop	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 6: WD error counter does not reach its desired level (sdi_Ufet = 6)	WD error count is equal or higher than threshold	- WD error count: 6	IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 7: HSD(High Side Driver) cannot be switched on at WD error counter <= 4	Actuator supply is lower than 90% of Batt. Voltage or WD error count is higher than threshold during more than 40 msec. AND Output stage is not interlocked AND Actuator supply voltage is within range	- WD error counter: > 0 - actuator supply voltage: >1.5 volts and <= 5.5 volts	IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 8: DReset line = low level, HSD cannot be switched on (fgtr_DReset = True)	Actuator supply is lower than 90% of Batt. Voltage or WD error count is higher than 0 during more than 40 msec. AND Output stage is interlocked.		IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 9: HSD cannot be switched off at WD error counter >= 5	Actuator supply voltage is out of range or WD error count is lower than threshold during more than 40 msec. AND Output stage is interlocked AND	- actuator supply voltage: < 1.5 volts or > 5.5 volts -WD error counter:<5	IPT test started	end of Initialization	3.125ms loop	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Actuator supply voltage is equal or higher than 90% of the Batt. Voltage.					
		DTC Fail case 10: DReset line = high level, HSD cannot be switched off (fgtr_DReset = False)	Actuator supply voltage is out of threshold range during more than 40 msec. AND WD error count is equal or higher than threshold AND Output stage is not interlocked	- actuator supply voltage: < 1.5 volts or > 5.5 volts -WD error counter:<5	IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 11: Run time of IPT function too long	IPT execution time is equal or greater than time threshold.	- time threshold : 300ms	IPT test started	end of Initialization	3.125ms loop	
Internal Control Module A/D Processing Performance	P060B	*HWIO executes the A/D converter test. This test checks the Vref voltage at 3 levels.*						One Trip, Type A
		DTC Fail case 1: AtoD converter test result is failed	0 x Vref is higher than voltage threshold	> approx. 0.01467 Volts	Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	6.25ms	
		DTC Fail case 2: AtoD converter test result is failed	0.5 x Vref is out of voltage threshold	< approx. 2.479 Volts OR > approx. 2.518 Volts			6.25ms	
		DTC Fail case 3: AtoD converter test result is failed	1.0 x Vref is out of voltage threshold.	< approx. 4.978 Volts OR > approx. 2.518 Volts			6.25ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Torque Security								
Control Module Long Term Memory Performance	P062F	*This Diagnostic tests for unuseable BINVDM (flash) memory only*						One Trip, Type A
		DTC Fail case 1: Indicates that the NVM Error flag **HWIO Bat Dynamic Write will not succeed** set	Last EEPROM write did not complete		Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up	
		DTC Fail case 2: Indicates that the NVM Error flag **HWIO Bat Static Write will not succeed** set						
		DTC Pass:		Dynamic or static BatwritewillnotsucceeD = fail				
Internal Control Module Redundant Memory Performance	P16F3	*Detect the dual store memory fault by comparing the primary value and the dual store value of the individual variables*						One Trip, Type A
		DTC Fail case 1: Detect the dual store memory fault by comparing the primary Ve signals and the We redundant signals	The primary value and the dual store value are not equal			Runs continuously	Signal DependendantX fail counts out of Y sample counts Executes in a Xms loop Detects in 200ms	
Clutch pressure combination / valve commands do not fit to allowed range state	P16F7	*Detects controller faults such that solenoid commands doesn't match with it's expected associated Range State value.*						One Trip, Type A
		DTC Fail case 1:	Control State Request for Clutch 1 is NOT Active AND X Valve Command is 0 AND Y Valve Command is 0 AND	Clutch 1 Pressure > 153kpa time threshold: 200msec	Ignition switch	in crank or run	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
			Clutch 1 Pressure Command has been corrupted to higher than threshold					
		DTC Fail case 2:	Control State Request for Clutch 2 is NOT Active AND X Valve Command is 0 AND Y Valve Command is 1 AND Clutch 2 Pressure Command has been corrupted to higher than threshold	Clutch 2 Pressure > 178kpa time threshold: 200msec				
		DTC Fail case 3:	Control State Request for Clutch 1 is NOT Active AND X Valve Command is 1 AND Y Valve Command is 0 AND Clutch 1 Pressure Command has been corrupted to higher than threshold	Clutch 1 Pressure > 153kpa time threshold: 200msec				
		DTC Fail case 4:	Control State Request for Clutch 2 is NOT Active AND X Valve Command is 1 AND Y Valve Command is 0 AND	Clutch 2 Pressure > 178kpa time threshold: 200msec				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Clutch 2 Pressure Command has been corrupted to higher than threshold					
		DTC Fail case 5:	Control State Request for Clutch 3 is NOT Active AND X Valve Command is 1 AND Y Valve Command is 0 AND Clutch 3 Pressure Command has been corrupted to higher than threshold	Clutch 3 Pressure > 199kpa time threshold: 200msec				
		DTC Fail case 6:	Control State Request for Clutch 2 is NOT Active AND X Valve Command is 1 AND Y Valve Command is 1 AND Clutch 2 Pressure Command has been corrupted to higher than threshold	Clutch 2 Pressure > 178kpa time threshold: 200msec				
		DTC Fail case 7:	Control State Request for Clutch 3 is NOT Active AND X Valve Command is 1 AND Y Valve Command is 1 AND	Clutch 3 Pressure > 199kpa time threshold: 200msec				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Clutch 3 Pressure Command has been corrupted to higher than threshold					
Alive Rolling Count / Protection Value fault	P179B	*This Diagnostic checks for corruption in signals sent over CAN for the Hybrid Range State*						One Trip, Type A
		DTC Fail case 1: Detect the ARC (Alive Rolling Count) or Protection Value fault by checking the ARC and Protection Value of the Hybrid Range State	Current ARC is not equal to previous ARC + 1 and Primary Value is not equal to protection value		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	14 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		DTC Pass:		No errors in 1000ms				
Communication Diagnostics								
Control Module Comm'n Bus A Off	U0073	*This diagnostic indicates a bus off condition on HSGMLAN (Bus A)*						One Trip, Type A
		DTC Fail case 1: Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.	CAN device driver	= bus-off state.	Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	4 fail counts out of 5 samples counts Executes in a 12.5ms loop Detects in 450 ms	
					Power Mode	=RUN		
					Bus Off Fault Active	=FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With ECM/PCM on Bus A	U0100	*This diagnostic indicates a lost communication between the TCM and the ECM on Bus A*						One Trip, Type A
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the ECM on Bus A	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop	
					Power Mode	=RUN/ACC	Detects in 500 ms	
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Lost Comm'n With Brake System Control Module	U0129	*This diagnostic indicates a lost communication between the TCM and the BSCM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the EBCM on Bus A	Missed EBCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage Power Mode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	> 9.5 Volts =RUN/ACC =FALSE =TRUE =TRUE =FALSE >=3 sec	Executes in a 6.25ms loop Detects in 500 ms	
Lost Communication With Body Control Module	U0140	*This diagnostic indicates a lost communication between the HCP and the BCM on Bus A*						Special Type C
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the BCM on Bus A	Missed BCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage Power Mode Bus Off Fault Active	> 9.5 Volts =RUN/ACC =FALSE	Executes in a 6.25ms loop Detects in 500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Controller	U0293	*This diagnostic indicates a lost communication between the TCM and the HCP*						One Trip, Type A
		Detects that CAN serial data communication has been lost with the HCP	Missed HCP Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Detects within 500 msec at 6.25 msec loop rate	
					Power Mode	=RUN/ACC		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Contactor Diagnostics								
High Voltage System Interlock Circuit Low	P0A0C	DTC monitors the sensed voltage when the commanded voltage is high to determine if the circuit is faulty	HVIL Sensed % of Reference Voltage	< 30%	HVIL Source Status 12V Battery Voltage	Sourced (5V) > 10.2V	2 failures out of 2 samples 12.5 ms /sample	One Trip, Type A
		DTC Pass					25 ms	
High Voltage System Interlock Circuit High	P0A0D	DTC monitors the sensed voltage when the commanded voltage is high and low to determine if the circuit is faulty	HVIL Sensed % of Reference Voltage	> 24%	HVIL Source Status 12V Battery Voltage	Unsourced (0V) > 10.2V	5 failures out of 6 samples 12.5 ms /sample	One Trip, Type A
			OR					
			HVIL Sensed % of Reference Voltage	> 44%	HVIL Source Status 12V Battery Voltage	Sourced (5V) > 10.2V	4 failures out of 6 samples 12.5 ms /sample	
		DTC Pass					75 ms	
Hybrid Battery Positive Contactor Circuit Stuck Closed	P0AA1	This DTC detects when the Positive Contactor is Stuck Closed by comparing the the Bus Voltage to the Battery Voltage.	Bus Voltage / Battery Voltage	> 60%	Bus Voltage Sensor Battery Voltage Sensor Negative Contactor Positive Contactor Precharge FET	Not Failed Not Failed Closed Open for > 8 seconds Off for > 8 seconds	3 failures out of 7 samples 12.5 ms /sample Executed Once Per Precharge Event	One Trip, Type A
		DTC Pass					87.5 ms	

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 high voltage bus and chassis ground Is too low which indicates that the internals of the battery are no longer adequately isolated from chassis ground	Case 1 Active Isolation Resistance OR Case 2 Active Isolation Resistance	< 325 KOhm < 400 KOhm	P0AA6 Positive Contactor Negative Contactor P0AA6 Positive Contactor Negative Contactor	DTC Not Active Open for 10 Seconds Open for 10 Seconds DTC Active Open for 10 Seconds Open for 10 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.	One Trip, Type A
		DTC Pass					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	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Short to Ground Fault	Open Load detected while OFF and output voltage > 4V. Short to VBATT detected while OFF and output voltage is > (VPWR -0.4V) Open while ON detected when current sense feedback < 194 mA	12V Battery Voltage	> 10.2V	40 failures out of 50 samples 12.5 ms /sample Continuous	One Trip, Type A
		DTC Pass					625 ms	
Hybrid Battery Negative Contactor Control Circuit	P0ADD	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Short to Ground Fault	Open Load detected while OFF and output voltage > 4V. Short to VBATT detected while OFF and output voltage is > (VPWR -0.4V) Open while ON detected when current sense feedback < 194 mA	12V Battery Voltage	> 10.2V	40 failures out of 50 samples 12.5 ms /sample Continuous	Two Trips, Type B
		DTC Pass					625 ms	
Hybrid Battery Precharge Contactor Circuit Stuck Closed	P0AE2	This DTC detects when the Precharge FET is Stuck Closed by comparing the the Bus Voltage to the Battery Voltage.	Bus Voltage / Battery Voltage	> 60%	Positive Contactor Precharge FET Bus Voltage Sensor Battery Voltage Sensor Negative Contactor Multipurpose Contactor	Open for > 8 seconds Off for > 8 seconds Not Failed Not Failed Closed Closed	3 failures out of 9 samples 12.5 ms /sample Executed Once Per Precharge Event	One Trip, Type A
		DTC Pass					112.5 ms	

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	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Open Ckt Fault and the Short to Ground Fault	Open Load detected while OFF and output voltage > 4V. Short to VBATT detected while OFF and output volage is > (VPWR -0.4V)	12V Battery Voltage	> 10.2V	40 failures out of 50 samples 12.5 ms /sample Continuous	One Trip, Type A
		DTC Pass					625 ms	
Hybrid Battery System Precharge Time Too Short	P0C77	This DTC sets if Bus Voltage gets too high too fast during contactor precharge.	Bus Voltage / Battery Voltage	> 95% in less than 50 ms from the start of precharge	Battery Current Sensor Bus Voltage Bus Voltage Sensor	Not Failed < 40 Volts before the start of precharge Not Failed	50 ms Executed Once Per Precharge Event	One Trip, Type A
		DTC Pass					50 ms	
Hybrid Battery System Precharge Time Too Long	P0C78	This DTC sets if either the Bus Voltage does not get high enough in 700 ms or battery current remains too high for too long after the contactor status changes from open to precharge	Bus Voltage / Battery Voltage	has not reached 95% in less than 700 ms from the start of contactor precharge	Battery Voltage Sensor Bus Voltage Sensor	Not Failed Not Failed	700 ms Executed Once Per Precharge Event	One Trip, Type A
			or					
			Battery Current	> Battery Voltage/27.63 for longer than 87.5 ms while waiting for Bus Voltage to reach 95% of Battery Voltage	Battery Current Sensor	Not Failed	Executed Once Per Precharge Event	
		DTC Pass					700 ms or less	

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	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Short to Ground Fault	Open Load detected while OFF and output voltage > 4V. Short to VBATT detected while OFF and output voltage is > (VPWR -0.4V) Open while ON detected when current sense feedback < 57 mA	12V Battery Voltage	> 10.2V	40 failures out of 50 samples 12.5 ms /sample Continuous	One Trip, Type A
		DTC Pass					625 ms	
Battery Charging System Negative Contactor Control Circuit/Open	P0D11	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Short to Ground Fault	Open Load detected while OFF and output voltage > 4V. Short to VBATT detected while OFF and output voltage is > (VPWR -0.4V) Open while ON detected when current sense feedback < 57 mA	12V Battery Voltage	> 10.2V	40 failures out of 50 samples 12.5 ms /sample Continuous	One Trip, Type A
		DTC Pass					625 ms	
Battery Charging System High Voltage Interlock Circuit Low	P0D17	DTC monitors the sensed voltage when the commanded voltage is high to determine if the circuit is faulty	Charging HVIL Sensed % of Reference Voltage	< 30%	Charging HVIL Source Status 12V Battery Voltage	Sourced (5V) > 10.2V	2 failures out of 2 samples 12.5 ms /sample	One Trip, Type A
		DTC Pass					25 ms	
Battery Charging System High Voltage Interlock Circuit High	P0D18	DTC monitors the sensed voltage when the commanded voltage is high and low to determine if the circuit is faulty	Charging HVIL Sensed % of Reference Voltage	> 24%	Charging HVIL Source Status	Unsourced (0V)	5 failures out of 6 samples 12.5 ms /sample	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					12V Battery Voltage	> 10.2V		
			OR					
			Charging HVIL Sensed % of Reference Voltage	> 44%	Charging HVIL Source Status 12V Battery Voltage	Sourced (5V) > 10.2V	4 failures out of 6 samples 12.5 ms /sample	
		DTC Pass					75 ms	
Battery Charger Hybrid/EV System Discharge Time Too Long	P0D5E	This DTC stores the result of the OBCM test (refer to OBCM Parameter Page) or when a discharge cannot be confirmed will run an intrusive backup/safety test which checks to see if battery current is flowing through what could be a stuck closed multifunction contactor	Condition A OBCM Status for P0D5E	Fail or Pass reported from OBCM			Executed Once Per Charger Discharge Event	One Trip, Type A
			OR					
			Condition B Battery Current	> 2.5 amps (averaged from 6 to 10 sec after discharge while HFET is commanded on for 2 seconds)	OBCM Status for P0D5E Battery Current Sensor	No Confirmed Pass or Fail from OBCM Not Failed	Executed Once 10 seconds after Charger Discharge Event if Condition A is not met	
		DTC Pass					See OBCM Parm Page	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Battery Multifunction Contactor Control Circuit	P1EBC	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Short to Ground Fault	Open Load detected while OFF and output voltage > 4V. Short to VBATT detected while OFF and output voltage is > (VPWR -0.4V) Open while ON detected when current sense feedback < 57 mA	12V Battery Voltage	> 10.2V	40 failures out of 50 samples 12.5 ms /sample Continuous	Two Trips, Type B
		DTC Pass					625 ms	
Battery Charging System Contactor(s) Stuck Open	P1EBD	This DTC determines if the Charging Contactors are stuck open by commanding the heater on for 2 sec and observing the Charge Current during this time.	Charge Current	< 1 A	12V Battery Voltage	> 10.2V	190 failures out of 250 samples, 12.5 ms /sample Runs once near the beginning of each Charge Cycle	One Trip, Type A
					Battery Current Sensor	No Faults		
					Charger Commanded Current	> 1 A		
					Charger Current Sensor	No Faults		
					Charge Control Mode	Constant Current or Constant Voltage		
					Charge System Mode	Not (Heat Only)		
		DTC Pass					3.125 sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Battery Multifunction Contactor Stuck Open	P1EBE	This DTC determines if the Multipurpose Contactor is Stuck Open by commanding the heater on for 2 sec and observing the accumulated battery current during the Accumulation Time	Accumulated Battery Current	> 100 A	12V Battery Voltage	> 10.2V	Runs once near the beginning of each Charge Cycle	One Trip, Type A
					Battery Current Sensor	No Faults		
					Charger Current Sensor	No Faults		
					Charge Control Mode	Constant Current or Constant Voltage		
					Charge System Mode	Not (Heat Only)		
					Accumulation Time	= 4 sec		
		DTC Pass					4 sec	
Hybrid/EV Battery Multifunction Contactor Stuck Closed	P1EBF	Sets if Charger Voltage is Too High Too Soon After Positive Contactor Closure	Charger Voltage	Average Charger Voltage >= 133 Volts	Positive Charge Contactor	Was open for more than 2 seconds but is closed now	300 ms / Runs once during charger precharge	Two Trips, Type B
					12V Battery Voltage	> 10.2V		
			OR					
		Sets if the Absolute Value of Battery Current is Too High During Heater Only Mode	Battery Current	Absolute Value (Battery Current) > 1 A	Charge System Mode	Heater Only Mode	160 failures out of 240 samples	
					12V Battery Voltage	> 10.2V	12.5 ms / sample	

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 checks for stuck open contactors by comparing Bus Voltage to Battery Voltage after the contactors are closed	Bus Voltage / Battery Voltage	< 80%	Bus Voltage Sensor Battery Voltage Sensor Time since Main Contactors have closed 12V Battery Voltage	No Faults No Faults > 1 sec > 10.2V	6 failures out of 6 samples 12.5 ms /sample Continuous	One Trip, Type A
		DTC Pass					0.5 sec	
Hybrid Battery Pack Heater Transistor Stuck Off	P1EC4	This DTC determines if the Heater FET is Stuck Off by commanding it on for 2 sec and observing the accumulated difference between charger and battery current during the Accumulation Time	Accumulated (Charger Current -Battery Current)	< 200 A	12V Battery Voltage Battery Current Sensor Charger Current Sensor Charge Control Mode Charge System Mode Accumulation Time	> 10.2V No Faults No Faults Constant Current or Constant Voltage Not (Heat Only) = 4 sec	Runs once near the beginning of each Charge Cycle	Two Trips, Type B
		DTC Pass					4 sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Pack Heater Transistor Stuck On	P1EC5	This DTC checks for a stuck on heater transistor by checking for too much Charger Current when the multipurpose contactor and the heater transistor are both commanded off in charger precharge mode.	Charger Current	> 0.4 A	12V Battery Voltage	> 10.2V	4 failures out of 48 samples 12.5 ms /sample Once per Charge Cycle	One Trip, Type A
					Charger Positive Contactor	Closed		
					Charger Negative Contactor	Closed		
					Multipurpose Contactor	Open		
					Heater Commanded Duty Cycle	< 5%		
					Charger Current Sensor	No Faults		
					Battery Current Sensor	No Faults		
					Charge Control Mode	Precharge		
		DTC Pass					600 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charging Voltage System Isolation Fault	P1F0E	This DTC will determine if the measured resistance between the high voltage charging bus and chassis ground is too low which indicates that the integrity of the charging bus and/or battery are no longer adequately isolated from chassis ground	Active Isolation Resistance OR Active Isolation Resistance	< 325 KOhm < 400 KOhm	P1F0E Charge Only Mode P1F0E Charge Only Mode	DTC Not Active 10 seconds DTC Active 10 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.	One Trip, Type A
		DTC Pass					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
System Isolation / Impact Sensor Fault - Hybrid Battery System Contactors Open	P1F17	This DTC will latch when the HPC1 detects a "passive" isolation fault and due to a variety of additional failures it becomes necessary to latch the contactors open until the vehicle is repaired.	Condition 1 Hybrid Battery Voltage System Isolation Fault (P0AA6) in HPC1	Active	Rollover or Airbag or Inertial Sensors	Not working	25 ms	One Trip, Type A
			Condition 2 Hybrid Battery Voltage System Isolation Fault (P0AA6) in HPC1	Active	Lost Communication with Inflatable Restraint Sensing and Diagnostic Module on Bus F (U184E)	Active		
			Condition 3 Lost Comm with HPC1	Active	Lost Communication with Inflatable Restraint Sensing and Diagnostic Module on Bus F (U184E)	Active		
			Condition 4 Lost Comm with HPC1	Active	Rollover or Airbag or Inertial Sensors	Not working		
		DTC Pass					Once set, this DTC cannot pass. DTC passes when latch is not set.	

Battery Pack Coolant Valve Diagnostics

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Battery Pack Coolant Control Valve A Performance/Stuck Off	P0CE0	This performance fault detects if the 4 port valve is not functioning as intended.			System Voltage	>10.2V	1280 fails / 1600 samples at 6.25ms in State B/C	Two Trips, Type B
					No active DTCs	P0CE2, P0CE3, P0CE6, P0CE7, P1EC7, P1EC8		
			State A: IF: Either valve end stop is out of range	30.28% < Low End Stop < 69.52% OR 50.64% < High End Stop < 69.52%		State A has not already run this key cycle.	8 fails / 10 samples at 1s in State D	
			OR IF: End stop span is out of range	15% < Span < 33%				
			OR IF: Feedback spikes out of range during end stop learn procedure	Feedback > 69.52% OR Feedback < 30.28%				
			IF valve does not reach the endstop	<=15s	Propulsion System Active	= True		
			State B: Valve has not reached its commanded position	<=15s	State A is	not running (or has completed)		
			State C: Valve feedback position	>3%	State A is Valve has not moved for	not running (or has completed) >15s		
			State D:					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Valve feedback position signal is erratic and its noise level sum is	>18%	State A is Valve is not	not running (or has completed) moving		
Hybrid/EV Battery Pack Coolant Control Valve A Control Circuit Low	P0CE2	Valve Motor drive 1 has a short to low fault.	Valve Motor Driver 1 State	LOW	System Voltage Valve	>10.2V must be moving in reverse direction	90 fails / 100 samples at 6.25ms	Two Trips, Type B
Hybrid/EV Battery Pack Coolant Control Valve A Control Circuit High	P0CE3	Valve Motor drive 1 has a short to high fault.	Valve Motor Driver 1 State	HIGH	System Voltage Valve	>10.2V must be stopped or moving in forward direction	90 fails / 100 samples at 6.25ms	Two Trips, Type B
Hybrid/EV Battery Pack Coolant Control Valve Position Sensor Circuit Low	P0CE6	Valve Feedback signal has a out of range low circuit fault	Valve feedback voltage	< 28% of reference voltage	System Voltage	>10.2V	40 fails / 50 samples at 100ms	Two Trips, Type B
Hybrid/EV Battery Pack Coolant Control Valve Position Sensor Circuit High	P0CE7	Valve Feedback signal has a out of range high circuit fault	Valve feedback voltage	> 72% of reference voltage	System Voltage	>10.2V	40 fails / 50 samples at 100ms	Two Trips, Type B
Hybrid/EV Battery Pack Coolant Control Valve B Control Circuit Low	P1EC7	Valve Motor drive 2 has a short to low fault.	Valve Motor Driver 2 State	LOW	System Voltage Valve	>10.2V must be moving in forward direction	90 fails / 100 samples at 6.25ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Battery Pack Coolant Control Valve B Control Circuit High	P1EC8	Valve Motor drive 2 has a short to high fault.	Valve Motor Driver 2 State	HIGH	System Voltage Valve	>10.2V must be stopped or moving in reverse direction	90 fails / 100 samples at 6.25ms	Two Trips, Type B
Battery Thermal Controls Diagnostics								
Hybrid Battery Pack Coolant Temperature Sensor Circuit Range/ Performance	P0C43	Coolant Temp. Sensor 1 is not reading a rational value.	IF RESS Thermal conditioning mode = Active Heat then IF: ABS (RESS Inlet Temperature - RESS Outlet Temperature) AND IF: ABS (RESS Inlet Temperature - Battery Cell Average Temperature Sensor)	>=30C >=30C	System Voltage No active DTCs: Coolant Pump speed If RESS Thermal conditioning mode changes then	>10.2V P1F18, P0C44, P0C47, P0C45, P0C4A, P0CD7, P0CD8, P0A9C,P0A9D,P0A9E,U0111 >= 20% for more than 1 min >= 70 sec has elapsed since the change	80 fails / 100 samples at 100ms	Two Trips, Type B
			IF RESS Thermal conditioning mode = Active Cool or Bypass then IF: ABS (RESS Inlet Temperature - RESS Outlet Temperature) AND	>= 30C	System Voltage	>10.2V		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			IF: ABS (RESS Inlet Temperature - Battery Cell Average Temperature Sensor)	>= 30C				
					No active DTCs:	P1F18, P0C44, P0C47, P0C45, P0C4A, P0CD7, P0CD8, P0A9C,P0A9D,P0A9E,U0111		
					Coolant Pump speed	>= 20% for more than 1 min		
					If RESS Thermal conditioning mode changes then	>= 70 sec has elapsed since the change		
			IF RESS Thermal conditioning mode = Passive Cool then IF: ABS (RESS Inlet Temperature - RESS Outlet Temperature) AND	>= 55C	System Voltage	>10.2V		
			IF: ABS (RESS Inlet Temperature - Battery Cell Average Temperature Sensor)	>= 55C				
					No active DTCs:	P1F18, P0C44, P0C47, P0C45, P0C4A, P0CD7, P0CD8, P0A9C,P0A9D,P0A9E,U0111		
					Coolant Pump speed	>= 20% for more than 1 min		
					If RESS Thermal conditioning mode changes then	>= 70sec has elapsed since the change		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Battery Pack Coolant Temperature Sensor B Circuit Range/ Performance	P0CD6	Coolant Temp. Sensor 2 is not reading a rational value.	IF: ABS (RESS Outlet Temperature - RESS Inlet Temperature) AND IF: ABS (RESS Outlet Temperature - Battery Cell Average Temperature Sensor)	>=20C >=20C	System Voltage No active DTCs: Coolant Pump speed	>10.2V P1F18, P0C44, P0C47, P0C45, P0C4A, P0CD7, P0CD8,P0A9C,P0A9D,P0A9E, U0111 >=20% for more than 1 min	32 fails / 40 samples at 250ms	Two Trips, Type B
Hybrid Battery Pack Coolant Pump Control Circuit/Open	P0C47	Coolant Pump Control line has a circuit fault	Coolant Pump Control line is open, shorted to voltage or shorted to ground	Board Support Package returns coolant pump control line fault = True	System Voltage Coolant Pump Enable	>10.2V = High	40 fails / 50 samples at 100ms	Two Trips, Type B
Hybrid Battery Pack Coolant Pump Control Performance	P0C4A	Coolant Pump is not performing as intended	Turn pump on IF: RESS Inlet Coolant Temperature rate of temperature decrease	90% DC < 0.3°C/s	System Voltage Propulsion System Active Diagnostic has completed: No active DTCs:	>10.2V TRUE P1EC6 P1EC6, P0C47, P1F18, P0C44, P0C45, U0111	18s	Two Trips, Type B
Hybrid Battery Pack Coolant Pump Enable Circuit/Open	P1F18	Coolant Pump Enable has a circuit fault	Coolant Pump Enable line is open, shorted to voltage or shorted to ground		System Voltage	>10.2V	40 fails / 50 samples at 100ms	Two Trips, Type B

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	Heater Transistor Control Circuit has a circuit fault	Heater Transistor Control Circuit is open, shorted to voltage or shorted to ground		System Voltage	>10.2V	40 fails / 50 samples at 100ms	Two Trips, Type B
Hybrid Battery Pack Heater Performance	P1EC6	Battery Heater is not performing as intended	Turn heater on Turn heater off IF: RESS Inlet Coolant Temperature rate of temperature rise	90% DC for 20s < 0.5°C/s	System Voltage Propulsion System Active No Test Failed This Key On: No active DTCs:	>10.2V TRUE P1EC3 P1EC4, P1EC5, P0C44, P0C45, P1F18, P0C47, U0111	40s	Two Trips, Type B
Hybrid Battery Cooling System Performance	P0C32	RESS Thermal Conditioning System not performing as intended indicated by Battery Average Temperature exceeding a limit	When System is in Active Cooling mode, Battery Average Temperature	> 40C	System Voltage	> 10.2 V	4200 sec (Active Cooling) 9000 sec (Active Heating)	One Trips, Type A
			When System is in Active Heating mode, Battery Average Temperature	< -17C	Diagnostic has completed:	P1EC6, P0C4A		
					Diagnostic is not running:	P0534		
					Power Mode	Propulsion System Active or Plug-In Charging active		
					Above conditions are met	> 60s		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs:	P1EC6, P0C4A, P1F18, P0C47,P0534, P0CE0, P0CE2, P0CE3,P0CE6,P0CE7, P1EC7, P1EC8, P0A9C,P0A9D,P0A9E, U0111		
Outside Air Temperature Sensor Diagnostics								
Ambient Air Temperature Sensor Range/ Performance	P0071	Outside Air Temperature sensor is not performing as intended	ABS (Outside Air Temperature - Inlet Air Temperature)	> 30°C	System Voltage Power mode Test Complete this trip No active DTCs: ABS(Power Up IAT - Power Up ECT) Propulsion Off Timer Power Electronic Pump off soak time before Enable Compressor Off soak time	>10.2V = Run for less than 20 seconds = FALSE P0111, P0112, P0113, P0114, P0116, P0117, P0118, P0119, P0CED, P0072, P0073, U0100 < 10 degC >21600 seconds >3600 seconds >3600 seconds	32 fails / 40 samples at 250ms	Two Trips, Type B
Ambient Air Temperature Sensor Circuit Low Input	P0072	Outside Air Temperature sensor has an out of range low circuit fault	Sensor voltage	< 2% (0.1V) of reference voltage	System Voltage	>10.2V	16 fails / 20 samples at 250ms	Two Trips, Type B
Ambient Air Temperature Sensor Circuit High Input	P0073	Outside Air Temperature sensor has an out of range high circuit fault	Sensor voltage	> 98% (4.9V) of reference voltage	System Voltage	>10.2V	16 fails / 20 samples at 250ms	Two Trips, Type B
Cooling Fan Diagnostics								

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	Engine Cooling Fan has a circuit fault	Engine Cooling Fan line is open, shorted to voltage or shorted to ground		System Voltage	>10.2V	16 fails / 20 samples at 250ms	Two Trips, Type B
Cooling Fan Signal Circuit Performance	P148A	Engine Cooling fan signal is not performing as intended	IF ABS (Hardware I/O Radiator fan period from ECM - 7.8125)	> 0.15625	System Voltage	>10.2V	32 fails / 40 samples at 250ms	Two Trips, Type B
					Power mode	≠ crank		
					No active DTCs:	P148B, P148C, U0293		
			OR		If ABS(Current Engine Cooling Fan Speed - Previoius Engine Cooling Fan Speed)	>30%		
					Then wait for	40sec before Enable		
					AND			
			ABS (Hardware I/O Radiator fan duty cycle from ECM - Engine Cooling Fan Speed from CAN bus)	> 30%	Propulsion system active	= True for longer than 10 seconds		
					OR			
					(Propulsion system active	= False		
					AND			
					Energy storage system thermal condition request	= ActiveCool		
					AND			
					Engine Cooling fan operation enable)	= True for longer than 10 seconds		

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	Engine Cooling fan signal has a out of range low circuit fault	HWIO duty cycle (from ECM)	< 3%	System Voltage	>10.2V	16 fails / 20 samples at 250ms	Two Trips, Type B
Cooling Fan Signal Circuit High	P148C	Engine Cooling fan signal has a out of range high circuit fault	HWIO duty cycle (from ECM)	> 97%	System Voltage Propulsion system active OR (Propulsion system active AND Energy storage system thermal condition request AND Engine Cooling fan operation enable)	>10.2V = True for longer than 10 seconds = False = ActiveCool = True for longer than 10 seconds	16 fails / 20 samples at 250ms	Two Trips, Type B
Power Electronics Cooling Diagnostics								
Hybrid/EV Electronics Coolant Pump Control Circuit/Open	P0CE9	Coolant Pump Control line has a circuit fault	Coolant Pump Control line is open, shorted to voltage or shorted to ground		System Voltage HWIO Pump Control Circuit Status Coolant Pump Enable	>10.2V ≠ Indeterminate = True	16 fails / 20 samples at 250ms	Two Trips, Type B

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	P0CED	Coolant Pump Enable signal has a circuit fault	Coolant Pump Enable line is open, shorted to voltage or shorted to ground		System Voltage HWIO Pump Enable Circuit Status	>10.2V ≠ Indeterminate	16 fails / 20 samples at 250ms	Two Trips, Type B
Hybrid/EV Electronics Coolant Temperature Sensor Circuit Low	P0CF0	Power Electronics Coolant Temp Sensor has a out of range low circuit fault	Sensor voltage	< 2% (0.1V) of reference voltage	System Voltage	>10.2V	16 fails / 20 samples at 250ms	Two Trips, Type B
Hybrid/EV Electronics Coolant Temperature Sensor Circuit High	P0CF1	Power Electronics Coolant Temp Sensor has a out of range high circuit fault	Sensor voltage	> 98% (4.9V) of reference voltage	System Voltage	>10.2V	16 fails / 20 samples at 250ms	Two Trips, Type B
Hybrid/EV Electronics Coolant Temperature Sensor Circuit Range/ Performance	P0CEF	Power Electronics Coolant Temp Sensor is not functioning as intended			System Voltage	>10.2V	32 fails / 40 samples at 250ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			IF Power Inverter Module request pump speed, Then ABS (Power Electronics Coolant temperature sensor - High Voltage Charger temperature), Else ABS (Power Electronics Coolant temperature sensor - High Voltage Charger temperature)	 >35°C >35°C				
					No active DTCs: Power Electronics Coolant pump speed AND Power Electronics Coolant pump enabled High Voltage Charger Temperature	P0CF1, P0CF0, P0CE9, P0CED, P1ED7, P1ED6, P1ED8, >30% to Enable AND <25% to Disable (Hysterisis) >300 s >-40C		
Engine Coolant Bypass Valve Diagnostics								
Engine Coolant Bypass Valve Control Circuit / Open	P2681	Valve Drive (control) Circuit has a circuit fault	Valve Deive Circuit is open, shorted to voltage or shorted to ground		System Voltage HWIO Valve Drive Circuit Status	>10.2V ≠ Indeterminate	40 fails / 50 samples at 100ms	Two Trips, Type B
Engine Coolant Bypass Valve Range/ Performance	P26A3	Valve is stuck or end position learn failed					1 fails / 1 samples at 100ms (15s)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			State A: Valve end postion learn request	=FAIL	System Voltage No active DTCs: Engine Coolant Temperature Propulsion system active	>10.2V P2681, P26A6, P26A7, P0119; P0118, P0117, P0116, >50C = True		
			State B: Valve has not reached its commanded position	<=15s	System Voltage No active DTCs: Propulsion system active	>10.2V P2681, P26A6, P26A7 = True		
Engine Coolant Bypass Valve Position Sensor Circuit Low	P26A6	Valve Feedback signal has a out of range low circuit fault	Valve feedback percentage	< 5% of reference voltage	System Voltage	>10.2V	40 fails / 50 samples at 100ms	Two Trips, Type B
Engine Coolant Bypass Valve Position Sensor Circuit High	P26A7	Valve Feedback signal has a out of range high circuit fault	Valve feedback percentage	> 95% of reference voltage	System Voltage	>10.2V	40 fails / 50 samples at 100ms	Two Trips, Type B
Engine Coolant Bypass Valve Position Sensor Stop/Minimum Stop Performance	P26A9	This performance fault detects if the Engine Coolant ByPass valve is not functioning as intended.						
			State A: IF Valve feedback percentage is OR IF Valve feedback percentage is	5% < Feedback percentage < 30% 70% < Feedback percentage < 95%	System Voltage No active DTCs: Propulsion system active	>10.2V P2681, P26A6, P26A7 = True	3 fails / 5 samples at 100ms	Two Trips, Type B
			State B:					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			IF ∑ABS(Valve Feedback n - Valve Feedback n-1) where n = 10	>12%	System Voltage	>10.2V	8 fails / 10 samples at 100ms	
					No active DTCs:	P2681, P26A6, P26A7		
					Propulsion system active	= True		
			State C:					
			Valve feedback Drift	>3%	System Voltage	>10.2V	80 fails / 100 samples at 100ms	
					No active DTCs:	P2681, P26A6, P26A7		
					Propulsion system active	= True		
Air Conditioning Compressor and Rationality Diagnostics								
Air Conditioner (A/C) Refrigerant Charge Loss	P0534	Cooling performance not adequate/Low charge/Plugged refrigerant line.	CASE 1		System Voltage	>10.2V		Two Trips, Type B
			IF Power mode AND Pump Performance diagnostic OR Power mode THEN	=Run Mode AND =Complete = Not Run Mode				
			Start Timer if Energy Storage System Thermal conditioning request = Active Cooling	>2s				
			THEN					
			Start Total Run Timer THEN	=491s	No active DTCs:	P0CE0; P0CE2; P0CE3; P0CE6; P0CE7; P1CE7; P1CE8		
			Override Flag THEN	=TRUE				
			RESS Thermal Valve Position THEN	=100% Chill				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			For Secondary Run Timer Coolant Pump Duty Cycle AND For Secondary Run Timer Coolant Pump Duty Cycle AND	<= 180 =35% > 180 =53%	No active DTCs:	P0c47; P0c4a; P1f18		
			For this Active Cooling cycle, one time check if Compressor RPM has been	>2200				
			Continuous Compressor RPM check	>2250RPM to Enable <2200RPM to Disable (Hysterisis)	No active DTCs:	P0c44, P0c45, P0c43		
			Start Secondary Run Timer THEN	=300s	Inlet Temperature sensor validity	= Valid		
			RESS Coolant Outlet Temperature Sensor - RESS Coolant Inlet Temperature Sensor	< P0534 Fail Threshold Table 1 if the compressor is on for cabin & RESS cooling OR < P0534 Fail Threshold Table 2 if the compressor is on for RESS cooling only	No active DTCs:	P0cd7, p0cd8, P0cd6		
					Outlet Temp Sensor Status Complete Flag Compressor On No active DTCs: OAT Arb Status	= Valid =False >2s P0073; P0072; P0071 = valid or unitialized		
			CASE 2		CASE 2			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			IF Low Side Refrigerant Pressure based on OAT Arb AND	<150Kpa when OAT >=20C OR 0Kpa when OAT <=15C (Linear Interoplation between 20C and 15C)	System Voltage	>10.2V		
			Low Side Pressure Time	>30s	No active DTCs: No active DTCs: No active DTCs: OAT Arb Status Compressor Off Time	P2517; P2518; P2516 P0606 P0073; P0072; P0071 = Valid or uninitalized >240s		
			CASE 3		CASE 3			
			IF Low Side Refrigerant Pressure based on OAT Arb AND	< 150Kpa when OAT >=5C OR 0Kpa when OAT <5C	System Voltage	>10.2V		
			Low Side Pressure Time	>30s	No active DTCs: No active DTCs: OAT Arb Status Compressor running flag	P2517; P2518; P2516 P0073; P0072; P0071 = Valid or uninitalized = ON		
			CASE 4		CASE 4			
			IF High Side Refrigerant Pressure AND	>5000Kpa	System Voltage	>10.2V		
			High Side Pressure Time	>30s	No active DTCs: HSRP Status No active DTCs: No active DTCs: OAT Arb Status	P0533; P0532; P0531 = Valid P0606 P0073; P0072; P0071 = Valid or uninitalized		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Compressor Off Time	>240s		
A/C Evaporator Temperature Sensor Circuit Low	P0537	Signal has a out of range low circuit fault	Sensor voltage	< 2% (0.1V) of reference voltage	System Voltage	>10.2V	40 fails / 50 samples at 100ms	Two Trips, Type B
A/C Evaporator Temperature Sensor Circuit High	P0538	Signal has a out of range high circuit fault	Sensor voltage	> 98% (4.9V) of reference voltage	System Voltage	>10.2V	40 fails / 50 samples at 100ms	Two Trips, Type B
A/C Compressor Motor Voltage Sensor Performance	P0D69	ACCM Motor Voltage Sensor is not performing as intended	ABS (Compressor Input Voltage - VITM Battery Cell Voltage)	>15V	System Voltage No active DTCs: Compressor High Voltage Status No active DTCs: Battery Cell Voltage Status No active DTCs: Power mode High Voltage Battery Contactor	>10.2V P0D6A; P0D6B = Valid P0ABC, P0ABD, P0ABB, P0AF8, P1A07, (U1111 AND U185A) = Valid P0AE4, P0AD9, P0AA1, P0ADD, P1EBC, P0AE2 ≠ Crank = Closed	35 fails / 40 samples at 250ms	Two Trips, Type B
Electric A/C Compressor Control Module Internal Temperature Sensor Performance	P0D71	ACCM CPU Temp. Sensor is not performing as intended	IF ABS (Compressor CPU Temperature Sensor - Intake Air Temperature Sensor) AND IF ABS (Compressor CPU Temperature Sensor - Compressor IGBT Sensor)	>10C >10C	System Voltage No active DTCs: IGBT Status	>10.2V P0D77; P0D78 = Valid	35 fails / 40 samples at 250ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs: No active DTCs: OAT_Filtd Status OAT_Filtd No active DTCs: No active DTCs: ECT Status No active DTCs: CPU Temp Status Power mode Engine Coolant Temp - Outside Air Temperature Filtered Compressor Off Time	P0606 P0073; P0072; P0071 = Valid or uninitalized >-7C P0113, P0112, P0111, P0114 P0119; P0118; P0117; P0116 = Valid P0D72; P0D73 = Valid ≠ Crank < 15C > 21600s		
Electric A/C Compressor Control Module Output Driver Temperature Sensor Performance	P0D76	ACCM IGBT Temp. Sensor is not performing as intended	IF ABS (Compressor IGBT Temperature Sensor - OAT_Raw Temperature Sensor) AND IF ABS (Compressor CPU Temperature Sensor - Intake Air Temperature Sensor)	>15C >10C	System Voltage No active DTCs: IGBT Status No active DTCs: No active DTCs: OAT_Filtd Status OAT_Filtd	>10.2V P0D77; P0D78 = Valid P0606 P0073; P0072; P0071 = Valid or uninitalized >-7C	35 fails / 40 samples at 250ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs: OAT_Raw Status	P0073; P0072; P0071 = Valid or uninitalized		
					No active DTCs:	P0113, P0112, P0111, P0114		
					No active DTCs:	P0119; P0118; P0117; P0116		
					ECT Status	= Valid		
					Power mode	≠ Crank		
					Engine Coolant Temp - Outside Ambient Temperature Filtered	< 15C		
					Compressor Off Time	> 21600s		
A/C Refrigerant Pressure Sensor B Rationality	P151C	Low Side Refrigerant Pressure Sensor is not functioning as intended	ABS (Low Side Refrigerant Pressure - Low Side Refrg Temperature converted to pressure)	>200kpa	System Voltage	>10.2V	32 fails / 40 samples at 250ms	Two Trips, Type B
			ABS (Low Side Refrigerant Pressure - High Side Refrigerant pressure)	>200kpa	No active DTCs:	P2517; P2518		
					Power mode	≠ Crank		
					No active DTCs: OAT Raw/Filtd Status	P0073; P0072; P0071 = Valid		
					No active DTCs:	P0119; P0118; P0117; P0116		
					ECT Status	= Valid		
					Outside Air Temp raw reading	0C < OAT_raw < 25C		
					Engine Coolant Temp - Outside Ambient Temperature Filtered	< 15C		
					No active DTCs: HSRP Status	P0533; P0532; P0531 = Valid		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs:	P0537;P0538;P153B		
					No active DTCs:	P0606		
					Compressor Off Time	> 3600s		
A/C Evaporator Temperature Sensor Rationality	P153B	Low Side Refrigerant Temp Sensor is not functioning as intended	IF ABS (Low Side Refrigerant Temperature - OAT Raw Temperature Value) AND	>10C	System Voltage	>10.2V	32 fails / 40 samples at 250ms	Two Trips, Type B
			ABS (Low Side Refrigerant Temperature - High Side Refrigerant Pressure Sensor Data converted to temperature)	>10C	No active DTCs:	P0537;P0538		
					Power mode	≠ Crank		
					No active DTCs:	P0073; P0072; P0071		
					No active DTCs:	P0119; P0118; P0117; P0116		
					Engine Coolant Tempeature Status	= Valid		
					Engine Coolant Temp - Outside Air Temperature	< 15C		
					No active DTCs:	P0606		
					No active DTCs:	P0533; P0532; P0531		
					High Side Refrigrant Pressure Status	= Valid		
					OAT_Raw Sensor Data	0C < OAT_raw < 55C		
					Compressor off flag	>3600s		
					OAT Raw/Filtd 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 Stuck Performance	P2516	Low Side Refrigerant Pressure Sensor is not functioning as intended	IF Low Side Refrigerant Pressure Start Of Diag - Low Side Refrigerant Pressure End of Diag	<10kpa after 45s	System Voltage No active DTCs: Power mode No active DTCs: OAT_Filtd Status No active DTCs: Engine Coolant Tempeature Status Engine Coolant Temp - Outside Air Temperature No active DTCs: Compressor Off Time Compressor Running Flag TRUE for Compressor Running Flag	>10.2V P2517;P2518 ≠ Crank P0073; P0072; P0071 = Valid or uninitalized P0119; P0118; P0117; P0116 = Valid < 15C P0606 >3600s >50 s TRUE		Two Trips, Type B
A/C Refrigerant Pressure Sensor B Circuit Low Input	P2517	Signal has a out of range low circuit fault	Sensor voltage	< 2% (0.1V) of reference voltage	System Voltage	>10.2V	40 fails / 50 samples at 100ms	Two Trips, Type B
A/C Refrigerant Pressure Sensor B Circuit High Input	P2518	Signal has a out of range high circuit fault	Sensor voltage	> 98% (4.9V) of reference voltage	System Voltage	>10.2V	40 fails / 50 samples at 100ms	One Trip, Type A
High Voltage Battery Diagnostics								
Hybrid Battery Voltage Sense A Circuit Range/ Performance	P0B3C	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement	= FALSE > 0.006V	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense B Circuit Range/ Performance	P0B41	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense C Circuit Range/ Performance	P0B46	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense D Circuit Range/ Performance	P0B4B	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense E Circuit Range/ Performance	P0B50	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense F Circuit Range/ Performance	P0B55	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement	= FALSE > 0.006V	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense G Circuit Range/ Performance	P0B5A	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense H Circuit Range/ Performance	P0B5F	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense I Circuit Range/ Performance	P0B64	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense J Circuit Range/ Performance	P0B69	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense K Circuit Range/ Performance	P0B6E	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement	= FALSE > 0.006V	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense L Circuit Range/ Performance	P0B73	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense M Circuit Range/ Performance	P0B78	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense N Circuit Range/ Performance	P0B7D	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense O Circuit Range/ Performance	P0B82	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense P Circuit Range/ Performance	P0B87	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement	= FALSE > 0.006V	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense Q Circuit Range/ Performance	P0B8C	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense R Circuit Range/ Performance	P0B91	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense S Circuit Range/ Performance	P0B96	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense T Circuit Range/ Performance	P0B9B	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense U Circuit Range/ Performance	P0BA0	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement	= FALSE > 0.006V	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense V Circuit Range/ Performance	P0BA5	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense W Circuit Range/ Performance	P0BAA	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense X Circuit Range/ Performance	P0BAF	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense Y Circuit Range/ Performance	P0BB4	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense Z Circuit Range/ Performance	P0BB9	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement	= FALSE > 0.006V	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense AA Circuit Range/ Performance	P1B16	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AB Circuit Range/ Performance	P1B19	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AC Circuit Range/ Performance	P1B1C	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AD Circuit Range/ Performance	P1B1F	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

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	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AF Circuit Range/ Performance	P1B25	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AG Circuit Range/ Performance	P1B45	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AH Circuit Range/ Performance	P1B48	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AI Circuit Range/ Performance	P1B4B	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement	= FALSE > 0.006V	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense AJ Circuit Range/ Performance	P1B4E	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AK Circuit Range/ Performance	P1B51	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AL Circuit Range/ Performance	P1B54	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AM Circuit Range/ Performance	P1B57	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AN Circuit Range/ Performance	P1B5A	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Average Cell Voltage Movement No active DTCs:	> 0.006V U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense AO Circuit Range/ Performance	P1B5D	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AP Circuit Range/ Performance	P1B60	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AQ Circuit Range/ Performance	P1B63	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AR Circuit Range/ Performance	P1B66	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

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	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AT Circuit Range/ Performance	P1B6C	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AU Circuit Range/ Performance	P1B6F	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AV Circuit Range/ Performance	P1B72	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AW Circuit Range/ Performance	P1B75	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement	= FALSE > 0.006V	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense AX Circuit Range/ Performance	P1B78	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AY Circuit Range/ Performance	P1B7B	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AZ Circuit Range/ Performance	P1B7E	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BA Circuit Range/ Performance	P1B81	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BB Circuit Range/ Performance	P1B84	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Average Cell Voltage Movement No active DTCs:	> 0.006V U185A	 Frequency: 200ms	
Hybrid Battery Voltage Sense BC Circuit Range/ Performance	P1B87	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BD Circuit Range/ Performance	P1B8A	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BE Circuit Range/ Performance	P1B8D	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BF Circuit Range/ Performance	P1B90	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

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	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BH Circuit Range/ Performance	P1B96	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BI Circuit Range/ Performance	P1B99	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BJ Circuit Range/ Performance	P1B9C	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BK Circuit Range/ Performance	P1B9F	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement	= FALSE > 0.006V	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense BL Circuit Range/ Performance	P1BA2	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense BM Circuit Range/ Performance	P1BA5	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense BN Circuit Range/ Performance	P1BA8	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense BO Circuit Range/ Performance	P1BAB	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	

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	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BQ Circuit Range/ Performance	P1BB1	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BR Circuit Range/ Performance	P1BB4	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BS Circuit Range/ Performance	P1BB7	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BT Circuit Range/ Performance	P1BBA	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Average Cell Voltage Movement No active DTCs:	> 0.006V U185A	 Frequency: 200ms	
Hybrid Battery Voltage Sense BU Circuit Range/ Performance	P1BBD	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BV Circuit Range/ Performance	P1BC0	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BW Circuit Range/ Performance	P1BC3	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BX Circuit Range/ Performance	P1BC6	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

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	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BZ Circuit Range/ Performance	P1BCC	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CA Circuit Range/ Performance	P1BCF	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CB Circuit Range/ Performance	P1BD2	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CC Circuit Range/ Performance	P1BD5	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Average Cell Voltage Movement No active DTCs:	> 0.006V U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense CD Circuit Range/ Performance	P1BD8	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CE Circuit Range/ Performance	P1BDB	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CF Circuit Range/ Performance	P1BDE	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CG Circuit Range/ Performance	P1BE1	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

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	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CI Circuit Range/ Performance	P1BE7	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CJ Circuit Range/ Performance	P1BEA	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CK Circuit Range/ Performance	P1BED	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CL Circuit Range/ Performance	P1BF0	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Average Cell Voltage Movement No active DTCs:	> 0.006V U185A	 Frequency: 200ms	
Hybrid Battery Voltage Sense CM Circuit Range/ Performance	P1BF3	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CN Circuit Range/ Performance	P1BF6	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CO Circuit Range/ Performance	P1BF9	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CP Circuit Range/ Performance	P1BFC	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

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	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CR Circuit Range/ Performance	P1E04	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Pack Voltage Sense Circuit Rationality	P0ABB	Rationality compares pack voltage sensor to average cell voltage * 96	|Average cell voltage * 96 - Battery Pack voltage|	> 10 V	VICMVoltageFA (see Fault Bundle Page) No active DTCs:	= FALSE U0111 U185A	20 Failures out of 100 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Pack Voltage Sense Circuit Correlation	P0AF8	Correlation compares pack voltage sensor to either TPIM Bus Voltage or Charger Bus Voltage	|Battery Pack voltage - TPIM Bus Voltage |	> 12 V	Main Contactor Status No active DTCs:	= Closed P0ABC P0ABD P1A07 P0ABB P1AEC P1AED P1E28 P1AE9	400 Failures out of 1995 Samples Frequency: 25ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						P1AEB P1AE21 P1AE8 P1AEA P1AE20 U1817		
			OR					
			|Battery Pack voltage - Charger Bus Voltage |	> 12 V	Charger and Multipurpose Contactor Status No active DTCs:	= Closed P0ABC P0ABD P1A07 P0ABB P0D4E P0D4F P1EEB P1EEC P0D5C P1ECE P16C5 U1838	400 Failures out of 1995 Samples Frequency: 25ms	
Hybrid Battery System Voltage High	P0AFB	Voltage too high	High Voltage Battery Pack Voltage	> KtBSED_U_BOV_PackVoltThresh (V) (see VICM Supporting Tables)	No active DTCs:	P0ABC P0ABD P1A07 P0AF8 P0ABB U0111 U185A	320 Failures out of 1595 Samples Frequency: 25ms	One Trip, Type A
			OR					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Any Cell Voltage	> KtBSED_U_BOV_CellVoltThresh (V) (see VICM Supporting Tables)	VICMVoltageFA (see Fault Bundle Page) No active DTCs:	= FALSE U0111 U185A	40 Failures out of 195 Samples Frequency: 25ms	
Battery Energy Control Module Hybrid/EV Battery Cell Overvoltage	P1EAB	Voltage too high	Cell Voltage	> 4.5 V	No active DTC's:	P1EAC U185A	80 Failures out of 80 Samples Frequency: 25ms	One Trip, Type A
Hybrid/EV Battery Cell Overvoltage Signal/Circuit Performance	P1EAC	Over voltage circuit 2nd protection - Fault Flag Test - Test Active Stuck On - Test Active Stuck Off	Circuit Key Off Test counts (Hardware line send 13 pulses from VTSMs and the VICM counts the rising and falling edges to determine the circuit key off test counts)	≠ 26	RUN/CRANK Transitions to	= OFF	1 Failures out of 1 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							Frequency: 25ms	
			OR					
			Test active Bit	= 1	RUN/CRANK Transitions to	= OFF for > 320 samples	40 Failures out of 50 Samples Frequency: 25ms	
			OR					
			Test active Bit	= 0	RUN/CRANK Transitions to	= OFF for < 320 samples	1 Failures out of 1 Samples Frequency: 25ms	
Hybrid Battery System Voltage Low	P0AFA	Voltage too low	High Voltage Battery Pack Voltage	< KtBSED_U_BLF_PackVoltThresh (V) (see VICM Supporting Tables)	No active DTCs:	P0ABC P0ABD P1A07 P0AF8 P0ABB U0111 U185A	320 Failures out of 1595 Samples Frequency: 25ms	One Trip, Type A
			OR					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Any Cell Voltage	< KtBSED_U_BLF_CellVoltThresh (V) (see VICM Supporting Tables)	VICMVoltageFA (see Fault Bundle Page) No active DTCs:	= FALSE U0111 U185A	40 Failures out of 195 Samples Frequency: 25ms	
Hybrid Battery Pack Voltage Variation	P0BBE	Cell Voltage deviation	Maximum Cell Voltage - Minimum Cell Voltage	> 0.3 V	CellVoltageRationalityFA No active DTCs:	= FALSE U0111 U185A	50 Failures out of 245 Samples Frequency: 100ms	One Trip, Type A
Hybrid Battery Pack Current Sensor A/B Correlation	P0B13	Checks for deviation between Fine and Coarse current sensors	| Fine Current - Coarse Current |	> 10 A	Fine Current measured	Between -20A and 20A	400 Failures out of 1995 Samples	One Trip, Type A
					OR			
					Coarse Current measured No active DTCs:	Between -20A and 20A P0AC1 P0AC2 P1EBA P1A07 P0B13 P0B10 P0B11 P1EBB U0111 U185A	Frequency: 25ms	
Hybrid Battery Temperature Sensor Range/ Performance	P0A9C	Rationality compares temperature with the other sensor values read	Temperature input deviates from the average battery temperature	> 25.3 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					VePPEI_t_PropSysOffTime VePPEI_e_PropSysOffTime_S VeBCCR_t_OffBrdChrgOffTme VeBCCR_e_OffBrdChrgOffTme_S VeESTR_t_BattThrmlCondOffTme VeESTR_e_BattThrmlCondOffTme_S	> 21600 sec = Valid > 21600 sec = Valid > 21600 sec = Valid	Frequency: 100ms	
Hybrid Battery 2 Temperature Sensor Performance	P0AC6	Rationality compares temperature with the other sensor values read	Temperature input deviates from the average battery temperature	> 25.3 ºC	TempRationalityFA (see Fault Bundle Page) VePPEI_t_PropSysOffTime VePPEI_e_PropSysOffTime_S VeBCCR_t_OffBrdChrgOffTme VeBCCR_e_OffBrdChrgOffTme_S VeESTR_t_BattThrmlCondOffTme VeESTR_e_BattThrmlCondOffTme_S	= FALSE > 21600 sec = Valid > 21600 sec = Valid > 21600 sec = Valid	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery 3 Temperature Sensor Performance	P0ACB	Rationality compares temperature with the other sensor values read	Temperature input deviates from the average battery temperature	> 25.3 ºC	TempRationalityFA (see Fault Bundle Page) VePPEI_t_PropSysOffTime	= FALSE > 21600 sec	50 Failures out of 67 Samples	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					VePPEI_e_PropSysOffTime_S VeBCCR_t_OffBrdChrgOffTme VeBCCR_e_OffBrdChrgOffTme_S VeESTR_t_BattThrmlCondOffTme VeESTR_e_BattThrmlCondOffTme_S	= Valid > 21600 sec = Valid > 21600 sec = Valid	Frequency: 100ms	
Hybrid Battery 4 Temperature Sensor Performance	P0AE9	Rationality compares temperature with the other sensor values read	Temperature input deviates from the average battery temperature	> 25.3 ºC	TempRationalityFA (see Fault Bundle Page) VePPEI_t_PropSysOffTime VePPEI_e_PropSysOffTime_S VeBCCR_t_OffBrdChrgOffTme VeBCCR_e_OffBrdChrgOffTme_S VeESTR_t_BattThrmlCondOffTme VeESTR_e_BattThrmlCondOffTme_S	= FALSE > 21600 sec = Valid > 21600 sec = Valid > 21600 sec = Valid	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery Temperature Sensor E Circuit Range/ Performance	P0BC3	Rationality compares temperature with the other sensor values read	Temperature input deviates from the average battery temperature	> 25.3 ºC	TempRationalityFA (see Fault Bundle Page) VePPEI_t_PropSysOffTime VePPEI_e_PropSysOffTime_S	= FALSE > 21600 sec = Valid	50 Failures out of 67 Samples	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					VeBCCR_t_OffBrdChrgOffTme	> 21600 sec		
					VeBCCR_e_OffBrdChrgOffTme_S	= Valid		
					VeESTR_t_BattThrmlCondOffTme	> 21600 sec		
					VeESTR_e_BattThrmlCondOffTme_S	= Valid	Frequency: 100ms	
Hybrid Battery Temperature Sensor F Range/ Performance	P0C34	Rationality compares temperature with the other sensor values read	Temperature input deviates from the average battery temperature	> 25.3 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples	Two Trips, Type B
					VePPEI_t_PropSysOffTime	> 21600 sec		
					VePPEI_e_PropSysOffTime_S	= Valid		
					VeBCCR_t_OffBrdChrgOffTme	> 21600 sec		
					VeBCCR_e_OffBrdChrgOffTme_S	= Valid		
					VeESTR_t_BattThrmlCondOffTme	> 21600 sec		
					VeESTR_e_BattThrmlCondOffTme_S	= Valid	Frequency: 100ms	
Hybrid Battery Temperature Sensor G Circuit Range/ Performance	P0C7D	Rationality compares temperature with the other sensor values read	Temperature input deviates from the average battery temperature	> 25.3 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples	Two Trips, Type B
					VePPEI_t_PropSysOffTime	> 21600 sec		
					VePPEI_e_PropSysOffTime_S	= Valid		
					VeBCCR_t_OffBrdChrgOffTme	> 21600 sec		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					VeBCCR_e_OffBrdChrgOffTme_S VeESTR_t_BattThrmlCondOffTme VeESTR_e_BattThrmlCondOffTme_S	= Valid > 21600 sec = Valid	Frequency: 100ms	
Hybrid Battery Temperature Sensor H Circuit Range/ Performance	P0C82	Rationality compares temperature with the other sensor values read	Temperature input deviates from the average battery temperature	> 25.3 ºC	TempRationalityFA (see Fault Bundle Page) VePPEI_t_PropSysOffTime VePPEI_e_PropSysOffTime_S VeBCCR_t_OffBrdChrgOffTme VeBCCR_e_OffBrdChrgOffTme_S VeESTR_t_BattThrmlCondOffTme VeESTR_e_BattThrmlCondOffTme_S	= FALSE > 21600 sec = Valid > 21600 sec = Valid > 21600 sec = Valid	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery Temperature Sensor I Circuit Range/ Performance	P0C89	Rationality compares temperature with the other sensor values read	Temperature input deviates from the average battery temperature	> 25.3 ºC	TempRationalityFA (see Fault Bundle Page) VePPEI_t_PropSysOffTime VePPEI_e_PropSysOffTime_S VeBCCR_t_OffBrdChrgOffTme VeBCCR_e_OffBrdChrgOffTme_S	= FALSE > 21600 sec = Valid > 21600 sec = Valid	50 Failures out of 67 Samples	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					VeESTR_t_BattThrmlCondOffTme VeESTR_e_BattThrmlCondOffTme_S	> 21600 sec = Valid	Frequency: 100ms	
Hybrid Battery Temperature Sensor J Circuit Range/ Performance	P0C8E	Rationality compares temperature with the other sensor values read	Temperature input deviates from the average battery temperature	> 25.3 ºC	TempRationalityFA (see Fault Bundle Page) VePPEI_t_PropSysOffTime VePPEI_e_PropSysOffTime_S VeBCCR_t_OffBrdChrgOffTme VeBCCR_e_OffBrdChrgOffTme_S VeESTR_t_BattThrmlCondOffTme VeESTR_e_BattThrmlCondOffTme_S	= FALSE > 21600 sec = Valid > 21600 sec = Valid > 21600 sec = Valid	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery Temperature Sensor K Circuit Range/ Performance	P0C93	Rationality compares temperature with the other sensor values read	Temperature input deviates from the average battery temperature	> 25.3 ºC	TempRationalityFA (see Fault Bundle Page) VePPEI_t_PropSysOffTime VePPEI_e_PropSysOffTime_S VeBCCR_t_OffBrdChrgOffTme VeBCCR_e_OffBrdChrgOffTme_S VeESTR_t_BattThrmlCondOffTme	= FALSE > 21600 sec = Valid > 21600 sec = Valid > 21600 sec	50 Failures out of 67 Samples	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					VeESTR_e_BattThrmlCondOffTme_S	= Valid	Frequency: 100ms	
Hybrid Battery Temperature Sensor L Circuit Range/ Performance	P0C98	Rationality compares temperature with the other sensor values read	Temperature input deviates from the average battery temperature	> 25.3 ºC	TempRationalityFA (see Fault Bundle Page) VePPEI_t_PropSysOffTime VePPEI_e_PropSysOffTime_S VeBCCR_t_OffBrdChrgOffTme VeBCCR_e_OffBrdChrgOffTme_S VeESTR_t_BattThrmlCondOffTme VeESTR_e_BattThrmlCondOffTme_S	= FALSE > 21600 sec = Valid > 21600 sec = Valid > 21600 sec = Valid	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery Temperature Sensor M Circuit Range/ Performance	P0CA9	Rationality compares temperature with the other sensor values read	Temperature input deviates from the average battery temperature	> 25.3 ºC	TempRationalityFA (see Fault Bundle Page) VePPEI_t_PropSysOffTime VePPEI_e_PropSysOffTime_S VeBCCR_t_OffBrdChrgOffTme VeBCCR_e_OffBrdChrgOffTme_S VeESTR_t_BattThrmlCondOffTme VeESTR_e_BattThrmlCondOffTme_S	= FALSE > 21600 sec = Valid > 21600 sec = Valid > 21600 sec = Valid	50 Failures out of 67 Samples	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							Frequency: 100ms	
Hybrid Battery Temperature Sensor N Circuit Range/ Performance	P0CAE	Rationality compares temperature with the other sensor values read	Temperature input deviates from the average battery temperature	> 25.3 ºC	TempRationalityFA (see Fault Bundle Page) VePPEI_t_PropSysOffTime VePPEI_e_PropSysOffTime_S VeBCCR_t_OffBrdChrgOffTme VeBCCR_e_OffBrdChrgOffTme_S VeESTR_t_BattThrmlCondOffTme VeESTR_e_BattThrmlCondOffTme_S	= FALSE > 21600 sec = Valid > 21600 sec = Valid > 21600 sec = Valid	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery Temperature Sensor O Circuit Range/ Performance	P0CB3	Rationality compares temperature with the other sensor values read	Temperature input deviates from the average battery temperature	> 25.3 ºC	TempRationalityFA (see Fault Bundle Page) VePPEI_t_PropSysOffTime VePPEI_e_PropSysOffTime_S VeBCCR_t_OffBrdChrgOffTme VeBCCR_e_OffBrdChrgOffTme_S VeESTR_t_BattThrmlCondOffTme VeESTR_e_BattThrmlCondOffTme_S	= FALSE > 21600 sec = Valid > 21600 sec = Valid > 21600 sec = Valid	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Temperature Sensor P Circuit Range/ Performance	P0CB8	Rationality compares temperature with the other sensor values read	Temperature input deviates from the average battery temperature	> 25.3 ºC	TempRationalityFA (see Fault Bundle Page) VePPEI_t_PropSysOffTime VePPEI_e_PropSysOffTime_S VeBCCR_t_OffBrdChrgOffTme VeBCCR_e_OffBrdChrgOffTme_S VeESTR_t_BattThrmlCondOffTme VeESTR_e_BattThrmlCondOffTme_S	= FALSE > 21600 sec = Valid > 21600 sec = Valid > 21600 sec = Valid	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Replace Hybrid Battery Pack	P0A80	High Pack Resistance	Pack Resistance	> KtBSED_R_SOH_ResistanceThresh (ohm) - see VICM Supporting Tables	Average Battery Temperature Battery State Estimator Battery State of Charge (SOC) TempRationalityFA (see fault bundle page)	> 10 ºC = ACTIVE > 20 % < 80 % = FALSE	4000 Failures out of 5000 Samples	One Trip, Type A

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	Battery temp. too high	Battery Module Temperature	> 73.5 ºC	TempRationalityFA (see fault bundle page)	= FALSE	50 Failures out of 60 Samples Frequency: 100ms	One Trip, Type A
Control Module Calculated Hybrid Performance	P1E3D	Redundant Voltage monitor	Pack Voltage - Redundant Pack Voltage	> 1 V			50 Failures out of 60 Samples Frequency: 100ms	One Trip, Type A
Miscellaneous Diagnostics								
Engine Hood Switch Performance	P257D	Rationality Check for the Vehicle Hood Switch	Hood Switch Position Sensor reading within an invalid range	Within the following ranges: 86.9% - 87.9% 63% - 64% 22.8% - 23.8%	Diagnostic Enabled Propulsion System Active	=TRUE =TRUE	6 failed samples within 8 samples 1 sample every 12.5ms	Two Trips, Type B
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	<22.8%	Diagnostic Enabled Propulsion System Active	=TRUE =TRUE	6 failed samples within 8 samples 1 sample every 12.5ms	Two Trips, Type B
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	>87.9%	Diagnostic Enabled Propulsion System Active	=TRUE =TRUE	6 failed samples within 8 samples 1 sample every 12.5ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Pilot Indicator Control Circuit	P0D2B	Detects a fault with the Control Pilot LED Output Driver Control Circuit	Case 1: Short to Ground		Diagnostic Enabled LED Commanded On Charge Cord Plugged In	=TRUE =TRUE =TRUE	12 failed samples within 15 samples 1 sample every 100 ms	Two Trips, Type B
			Case 2: Short to Battery or Open Circuit		Diagnostic Enabled LED Commanded On Charge Cord Plugged In	=TRUE =FALSE =FALSE	40 failed samples within 50 samples 1 sample every 100 ms	
Charge Status Indicator Control Circuit	P0D2C	Detects a fault with the Charge Status LED Output Driver Control Circuit	Case 1: Short to Ground		Diagnostic Enabled LED Commanded On Charge Cord Plugged In	= TRUE =TRUE =TRUE	40 failed samples within 50 samples; 1 sample every 100ms	Two Trips, Type B
			Case 2: Short to Battery or Open Circuit		Diagnostic Enabled LED Commanded On Charge Cord Plugged In	=TRUE = FALSE =FALSE		

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 aboslute value of the difference between the Control Module 'Off' Timer and Control Module 'On' Timer (both timers operating during Controller 'On') exceeds a threshold	Difference > 5.6%	Diagnostic Enabled Controller 'On' Time RunCrank DTCs Not Active	=TRUE > 60 seconds =TRUE P0601, P0602, P0603, P062F, P0604 and P0606	Runs once per drive cycle (when Run/Crank transitions from TRUE to FALSE).	Two Trips, Type B
High Voltage Energy Management Communication Bus Enable Circuit	P1EB9	Detects a fault in the High Voltage Energy Management Communication (HVEM) Bus Enable Circuit	Case 1: Short to Ground		Diagnostic Enabled HVEM Bus Enabled	=TRUE =TRUE	480 failed samples within 560 samples 1 sample every 12.5ms	One Trip, Type A
			Case 2: Short to Battery or open circuit		Diagnostic Enabled HVEM Bus Enabled	=TRUE =FALSE		
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 Control Module Output Wake-Up Circuit Enabled	=TRUE =TRUE	480 failed samples within 560 samples 1 sample every 12.5ms	One Trip, Type A
			Case 2:Short to Battery or Open circuit		Diagnostic Enabled Control Module Output Wake-Up Circuit Enabled	=TRUE =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 if the Run/Crank input circuit is low	Short to Ground or Open condition	<2volts	Diagnostic Enabled CAN Communication ECM Run/Crank Active Data	=TRUE Enabled Available and Active	10 failed samples within 20 samples 1 sample every 250ms	One Trip, Type A
Ignition Switch Run/Start Position Circuit High	P2535	Detects if the Run/Crank input circuit is high	Short to Battery	>5volts	Diagnostic Enabled CAN Communication ECM Run/Crank Active Data	=TRUE Enabled Available and False	10 failed samples within 20 samples 1 sample every 250ms	One Trip, Type A
System Voltage Low	P0562	Detects if Battery input voltage is below a threshold	Battery voltage is below a threshold	≤ 10.2volts		Continuous	1 failed sample for 500ms below Threshold value	Special Type C
Control Module Read Only Memory (Rom)	P0601	This DTC will be stored if any software or calibration checksum is incorrect	Calculated Checksum does not match stored checksum				Runs once per powerup	One Trip, Type A
		Flash ECC Circuit Test	Failed validation of test data written to ECC			Continuous	1s loop, 3 failures in powerup cycle	
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	One Trip, Type A

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	One Trip, Type A
Control Module Random Access Memory (RAM) Failure	P0604	Control Module is unable to correctly write and read data to and from RAM	Data read does not match data written				Runs at controller shutdown	One Trip, Type A
		RAM ECC Circuit Test	Failed validation of test data written to ECC			Continuous	1s loop, 3 failures in powerup cycle	
Control Module Internal Performance	P0606	ALU and Register Test	Control Module fails to execute a diagnostic test algorithm			Continuous	1s loop, 3 failures in powerup cycle	One Trip, Type A
		Configuration Registers Test	Comparison of current configuration register settings with predefined values fails			Continuous	1s loop, 3 failures in powerup cycle	
		MMU Test	Test of memory management related instructions fails	Fails MMU instruction		Continuous	1s loop, 3 failures in powerup cycle	
		MMU Configuration Fault	Verifies MMU TLB's are properly configured for the application	TLB set incorrectly		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
		Stack Limits Test	Verifies stack usage does not exceed maximum stack size	Stack usage exceeds 100%		Continuous	1s loop, 3 failures in powerup cycle	
		Clock Status	Checks for loss of lock/clock, forces a reset if failed			Continuous	1s loop, 3 failures in powerup cycle	
		Auxiliary ALU Test	Auxiliary microprocessor fails to run a defined diagnostic algorithm			Continuous	100ms loop, 3 failures in powerup cycle	
		Auxiliary RAM Test	Auxiliary microprocessor fails a write/read data diagnostic RAM test			Continuous	1s loop, 3 failures in powerup cycle	
		Auxiliary ROM Test	Auxiliary microprocessor ROM checksum error			Continuous	2.5s loop, 3 failures in powerup cycle	
		Auxiliary Register Configuration Test	Configuration register values do not match expected pre-configured values			Continuous	100ms loop, 3 failures in powerup cycle	
		Auxiliary Stack Test	Auxiliary microprocessor stack underflow or overflow			Continuous	100ms loop, 3 failures in powerup cycle	
		Seed and Key Test	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	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 Seed	Seed and key test failed - main microprocessor received an unknown seed			Continuous	100ms loop, 3 failures in powerup cycle	
		Internal IO Diagnostic (BVREF)	5V reference voltages out of range	2% above or below		Continuous	1s loop, 3 failures in powerup cycle	
		Internal IO Diagnostic (IVPWR)	IVPWR voltage out of range	IVPWR less than 9V or greater than 18V		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
		Internal IO Diagnostic (IVBAT)	IVBAT voltage out of range	IVBAT less than 9V or greater than 18V		Continuous	1s loop, 3 failures in powerup cycle	
		Internal IO Diagnostic (Analog 25% reference line)	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)	75% reference line out of range	Reference less than 72% or greater than 78%		Continuous	1s loop, 3 failures in powerup cycle	
		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 Self-Wakeup Requested	=TRUE =TRUE	Runs once at powerup if a Self-Wakeup request was active last power down	
		SPI Fault Detection Test	SPI B, C, or D fault detected			Continuous	1s loop, 3 failures in powerup cycle	
		SPI B Fault Detection Test	Fault detected via echo test on SPI bus B			Continuous	1s loop, 3 failures in powerup cycle	
		SPI C Fault Detection Test	Fault detected via echo test on SPI bus C			Continuous	1s loop, 3 failures in powerup cycle	
		SPI D Fault Detection Test	Fault detected via echo test on SPI bus D			Continuous	1s loop, 3 failures in powerup cycle	
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 255 seconds) 2 consecutive failed samples	One Trip, Type A
Communication Faults								

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.			Controller On Bus A Communication Enabled	=TRUE > 2 seconds	5 failures out of 5 samples 1 s loop	Two Trips, Type B
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.			Controller On Bus B Communication Enabled	=TRUE > 2 seconds	5 failures out of 5 samples 1 s loop	One Trip, Type A
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.			Controller On Bus H Communication Enabled	=TRUE > 2 seconds	5 failures out of 5 samples 1 s loop	One Trip, Type A
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 Battery Voltage	=TRUE > 2 seconds >10.2V	Runs in 10ms loop	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass					10ms after receiving any message from the supervised source	
Lost Communication with Transmission Control Module	U0101	Detects that CAN serial data communication has been lost with the TCM on Bus A	Messages have not been received from the TCM for a specified time	≥ 500ms	Controller On Bus A Communication Enabled Battery Voltage	=TRUE > 2 seconds >10.2V	Runs in 10ms loop	Two Trips, Type B
		DTC Pass					10ms after receiving any message from the supervised source	
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 Battery Voltage	=TRUE > 2 seconds >10.2V	Runs in 10ms loop	Two Trips, Type B
		DTC Pass					10ms after receiving any message from the supervised source	

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 Battery Voltage	=TRUE > 2 seconds >10.2V	Runs in 10ms loop	Two Trips, Type B
		DTC Pass					10ms after receiving any message from the supervised source	
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 Battery Voltage	=TRUE > 2 seconds >10.2V	Runs in 10ms loop	Two Trips, Type B
		DTC Pass					10ms after receiving any message from the supervised source	
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	=TRUE	Runs in 10ms loop	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Bus A Communication Enabled	> 2 seconds		
					Battery Voltage	>10.2V		
		DTC Pass					10ms after receiving any message from the supervised source	
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	=TRUE	Runs in 10ms loop	One Trip, Type A
					Bus B Communication Enabled	> 2 seconds		
					Battery Voltage	>10.2V		
		DTC Pass					10ms after receiving any message from the supervised source	
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	=TRUE	Runs in 10ms loop	Two Trips, Type B
					Bus B Communication Enabled	> 2 seconds		
					Battery Voltage	>10.2V		
		DTC Pass					10ms after receiving any message from the supervised source	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Lost Communication with Battery Charger Control Module on Bus H	U1838	Detects that CAN serial data communication has been lost with the Battery Charger Control Module on Bus H	Messages have not been received from the Battery Charger Module for a specified time	≥ 500ms	Controller On Bus H Communication Enabled Battery Voltage	=TRUE > 2 seconds >10.2V	Runs in 10ms loop	One Trip, Type A
		DTC Pass					10ms after receiving any message from the supervised source	
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 Battery Voltage	=TRUE > 2 seconds >10.2V	Runs in 10ms loop	One Trip, Type A
		DTC Pass					10ms after receiving any message from the supervised source	
Fuel Door Diagnostics								
Fuel Fill Door Switch Stuck Closed	P04B6	Fuel Door Position Rationality	Fuel door opened	FALSE	Fuel Fill Door Switch Stuck Closed Diagnostic Enable Calibration	=TRUE	50ms	Two Trips, Type B
			AND refuel request	TRUE				
			AND refuel detected	TRUE				

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	65.9%< Reported Position <=81.6%	Fuel Fill Door Position Sensor/Switch Circuit Diagnostic calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
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<22.9%	Fuel Fill Door Position Sensor/Switch Circuit Low Diagnostic Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
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 > 94.5%	Fuel Fill Door Position Sensor/Switch Circuit High Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
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% of total number samples @ 50ms per sample (<5sec)	One Trip, Type A
			OR		The Hardware reported test result, for an open circuit or short to power condition	≠ INDETERMINANT		
			Hardware Reported Test Result for SHORT Circuit to Battery		The door lock driver circuit must be active to assert an Unlock	=ASSERT UNLOCK		
					OR			
					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 out of 80 samples @ 50ms per sample	
					The Hardware reported test result is for short circuit condition	≠ INDETERMINANT		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					The door lock driver circuit is NOT be active	=ASSERT NONE		
Fuel Fill Door Lock Control Range/ Performance	P04BC	Performance for the Fuel Fill Door Lock Control	Fuel Door Does NOT transition Unlocked to Locked		Fuel Fill Door Lock Control Range/ Performance Diagnostic Enable Calibration	=TRUE	600ms	Two Trips, Type B
					No active DTCs:	P04BB, P04BD, P04BE, P04BF, P04C1, P04C2, P04C3, P04C5, P04C6,		
					The Fuel Fill Door Lock is comanded to the Lock position	=ASSERTLOCK		
					The Fuel Fill Door is not already in the Lock postion	=TRUE		
Fuel Fill Door Unlock Control Range/ Performance	P04C0	Performance for the Fuel Fill Door Unlock Control	Fuel Door Lock state does NOT transition from Locked to Unlock		Fuel Fill Door Unlock Control Range/ Performance Diagnostic Enable Calibration	=TRUE	600ms	Two Trips, Type B
					No active DTCs:	P04BB, P04BD, P04BE, P04BF, P04C1, P04C2, P04C3, P04C5, P04C6,		
					The Fuel Fill Door Lock is commanded to the unlock position	=ASSERTUNLOCK		
					The Fuel Fill Door is not already in the Unlock postion	=TRUE		
Fuel Fill Door Lock Position Sensor/Switch Circuit	P04C3	Detects if the circuit resistance is incorrect	Switch sensor reading within invalid range	65.9%> Reported Positon <=81.6%	Fuel Fill Door Lock Position Sensor/Switch Circuit Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Lock Position Sensor/Switch Circuit Range/ Performance	P04C4	Performance for the Fuel Fill Door Lock Position Sensor/Switch Circuit	The current Fuel Fill Door position is determined to be	NOT LOCKED	Fuel Fill Door Lock Position Sensor/Switch Circuit Diagnostic Enable Calibration	=TRUE	6s	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			AND the previous lock position is	LOCKED	No active DTCs:	P04BB, P04BD, P04BE, P04BF, P04C1, P04C2, P04C3, P04C5, P04C6,		
			AND the Fuel Fill Door lock has NOT been commanded to UNLOCK	≠ASSERT UNLOCK				
Fuel Fill Door Lock Position Sensor/Switch Circuit Low	P04C5	Detects if the circuit is shorted to ground	Switch sensor reading less than threshold	Reported Position<22.9%	Fuel Fill Door Lock Position Sensor/Switch Circuit Low Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Lock Position Sensor/Switch Circuit High	P04C6	Detects if the circuit is shorted to battery or open	Switch sensor reading greater than threshold	Reported Position > 94.5%	Fuel Fill Door Lock Position Sensor/Switch Circuit High Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Open Request Sensor/Switch Circuit	P04C8	Detects if the circuit resistance is incorrect	Switch sensor reading within invalid range	65.9%< Reported Position <=81.6%	Fuel Fill Door Open Request Sensor/Switch Circuit Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
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<22.9%	Fuel Fill Door Open Request Sensor/Switch Circuit Low Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
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 > 94.5%	Fuel Fill Door Open Request Sensor/Switch Circuit High Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
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 >= .623 Kpa OR Fuel Tank Vapor Pressure < -.623 Kpa	Evaporative Emission (EVAP) System Pressure Incorrect During Fuel Fill Door Open Request Diagnostic Enable Calibration	=TRUE	30sec	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					A request to refuel the vehicle has been detected	=TRUE		
Charge Port Door Diagnostics								
Charge Port Door Open Request Switch Circuit	P0CC7	Detects if the circuit resistance is incorrect	Switch sensor reading within INVALID range	65.9%< Reported Position <=81.6%	Charge Port Door Open Request Switch Circuit Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 50ms per sample	Two Trips, Type B
Charge Port Door Open Request Switch Circuit Low	P0CC9	Detects if the circuit is shorted to ground	Switch sensor reading less than threshold	Reported Positon <22.9%	Charge Port Door Open Request Switch Circuit Low Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 50ms per sample	Two Trips, Type B
Charge Port Door Open Request Switch Circuit High	P0CCA	Detects if the circuit is shorted to battery	Switch sensor reading greater than threshold	Reported Positon > 94.5%	Charge Port Door Open Request Switch Circuit High Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 50ms per sample	Two Trips, Type B
Charge Port Door Position Sensor Circuit	P0CCC	Detects if the circuit resistance is incorrect	Position sensor reading within INVALID range	65.9%< Reported Position <=81.6%	Charge Port Door Position Sensor Circuit Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 50ms per sample	Two Trips, Type B
Charge Port Door Position Sensor Circuit Low	P0CCE	Detects if the circuit is shorted to ground	Position sensor reading less than threshold	Reported Positon <22.9%	Charge Port Door Position Sensor Circuit Low Diagnostic Enable calibration	=TRUE	6 out of 8 samples @ 50ms per sample	Two Trips, Type B
Charge Port Door Position Sensor Circuit High	P0CCF	Detects if the circuit is shorted to battery	Position sensor reading greater than threshold	Reported Positon > 94.5%	Charge Port Door Position Sensor Circuit High Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 50ms per sample	Two Trips, Type B
Charge Port Door Unlock Control Circuit	P0CD1	Detects a circuit fault			Charge Port Door Unlock Control Circuit Diagnostic Enable Calibration	=TRUE		Two Trips, Type B
					The hardware reported circuit fault staus is	≠ INDETERMINANT		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Case 1: Short to Ground	=TRUE	Charge Port Door Unlock Command	=TRUE	7 out of 9 samples @ 50ms per sample	
			Case 2: Short to Battery or Open	=TRUE	Charge Port Door Unlock Command	=FALSE	64 out of 80 samples @ 50ms per sample	
Charge Port Door Unlock Control Circuit Performance	P0CD2	Performance test for the unlock control circuit	Charge Door Position OPEN not Detected in time less than threshold	5 seconds	Charge Port Door Unlock Control Circuit Performance Diagnostic Enable Calibration	=TRUE	13 seconds	Two Trips, Type B
					No active DTCs:	P0CCC, P0CCE, P0CCF, P0CD1		
Charging Diagnostics								
Control Pilot Circuit High	P0CF6	Sets when % control pilot signal (voltage/system) is above a threshold	% Control Pilot Signal	> 0.58	System Voltage Vehicle Speed Charge Cord State	> 10.2V > = 5 mph Not Connected	30 failures out of 50 samples 100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	
Control Pilot Circuit Low	P0CF5	Sets when % control pilot signal (voltage/system) is below a threshold	% Control Pilot Signal	< 0.03	System Voltage Vehicle Speed Control Pilot Diag Switch Charge Cord State No active DTCs:	> 10.2V > 15.5 mph On Not Connected P0CD1,P0CCF,P0CCE, P0CCC,P0CCA,P0CC9, P0CC7,P0CC6	30 failures out of 50 samples 100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	

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.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: Control Pilot Percent Voltage is above a High Threshold OR Control Pilot Percent Voltage is below a Low Threshold	% Control Pilot Signal Aux Micro Logic State Main Micro Logic State % Control Pilot Signal % Control Pilot Signal Aux Micro Logic State Main Micro Logic State	> 0.03 High Low > 0.46 < 0.30 Low High	Part A: CPDIAG Switch State Vehicle Speed System Voltage Charge Port Door Charge Cord State Part B: CPDIAG Switch State Control Pilot Charging Switch State Charging Ventilation Switch State Charge Cord State System Voltage	 Not Asserted (see Definitions) > = 5 mph > 10.2V Closed Not Connected Asserted Open Open Not Connected > 10.2V	30 failures out of 50 samples 100 ms rate	One Trip, Type A
		OR Aux Micro Logic State is in LOW state OR Main Micro Logic State is in HIGH state						
		DTC Pass					5 seconds	

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	> 4.8 V.	System Voltage [Charge Port Door No Active DTCs on Charge Port Door Position OR Vehicle Speed Shift Lever Position No Faults on Vehicle Speed	> 10.2V Closed P0CCF,P0CCE, P0CCC > 12.4 mph Not in Park	30 failures out of 50 samples 100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	
Proximity Detection Circuit Low	P0D58	Sets when Proximity Detection Circuit Voltage is below a threshold	Proximity Detection Circuit Voltage	< 4.2 V.	System Voltage [Charge Port Door No Active DTCs on Charge Port Door Position OR Vehicle Speed Shift Lever Position No Faults on Vehicle Speed]	> 10.2V Closed P0CCF,P0CCE, P0CCC > 12.4 mph Not in Park	30 failures out of 50 samples 100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger System Precharge Time Too Long	P0D26	This diagnostic tests whether precharge has occurred in the appropriate amount of time in a characteristic way. The target voltage is battery pack voltage. A deviation or deadband around pack voltage is calculated in the form of a percentage deviation. To have a successful or passing precharge, the bus voltage must rise and be within the calculated deadband window for a continuous time of at least 0.25 seconds and before 10 seconds has elapsed since the beginning of precharge.	Not Passing (see pass criteria below)	>= 10 seconds	System Voltage AND Multi-Purpose Contactor OR Charger Contactor State Precharge Too Long Time	> 10.2V open Precharge < = 10 sec.	10 sec	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	abs({[Charger Bus Voltage / Battery Pack Voltage] - 1}x 100) AND Precharge Complete Window Time	< 5% >= 0.25 seconds			0.25 sec	
Battery Charger Output Shorted	P0D23	Sets Charger Bus Current is above a threshold	Bus Current	> .35 A	System Voltage Multi-Purpose Contactor Charger Contactor State No Active DTCs on HV output current sensor signal No Active Cooling No Active Heating	> 10.2V Open Precharge P0D53, P0D54, P1EEB, P1EEC, P1ECE, P0D5C, P16C5, P1EFD, P1F16 (See Definitions tab)	4 failures out of 5 samples 100 ms rate	One Trip, Type A
		DTC Pass					0.5 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Input Current Too High	P0D2A	Sets when Charger AC Input Current is above a threshold If AC Input Voltage >= 185 V If AC Input Voltage < 185 V	AC input current AC input current	> 17 A > 13 A	No Active DTCs on AC Input Voltage No Active DTCs on AC Input Current Signal Control Pilot Charging Switch State	P0D3F, P0D40, P1EE7, P1EE8, P0D3E, P1ECE, P0D5C, P0D5B, P16C4, P1EFD P0D3A, P0D3B, P1EE7, P1EE8, P1ECE, P0D5C, P0D5B, P16C4, P1EFD, P1F14 Closed	240 failures out of 300 samples 100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	
Battery Charger Output Current Performance	P0D22	This DTC sets when current control degrades to the point where actual current exceeds an acceptable deviation (threshold) from the target or desired current.	abs(Charger HV Output Current Deviation) Note:	>=Table F(Desired Current) See Supporting Tables	Charge Control Mode Desired Current Delay Time after start of constant current control	Constant Current >0.5 A 10 sec	290 failures out of 300 samples 100 ms rate	One Trip, Type A
		DTC Pass					30 seconds	
Battery Charger Output Voltage Performance	P0D20	This DTC sets when the percent of voltage deviation while in constant voltage control modeis greater than a threshold.	Charger HV Output Voltage Percent Deviation	>= 15%	System Voltage Charge Control Mode	> 10.2V Constant Voltage	30 failures out of 50 samples 100 ms rate	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass					5 seconds	
Battery Charger Output Voltage Too Low	P0D21	This DTC sets when the Battery Chargers output voltage is too low. It is conducted in distinct parts. Part A: Not in Charger Heat Only Mode Part B: In Charger Heat Only Mode	Bus Voltage Actual Charger Bus Voltage /Expected Charger Bus Voltage Note: Expected Charger Bus Voltage = HV Charger Current x 70 Ohms	< 150 V < .75	Part A: [Charge Control Mode or Charge Control Mode] No Active DTCs on HV Output Voltage Sensor Charge System Mode Part B: Charge Control Mode Thermal Condition Request Multi-Purpose Contactor State System Voltage	Constant Current Constant Voltage P0D4E, P0D4F, P1EEB, P1EEC, P1ECE, P0D5C P16C5, P1EFD Not in Heat Only Mode Constant Current Active Heat Open > 9 V	8 failures out of 10 samples 100 ms rate	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Charger HV Out Current No Active DTCs on HV Output Current Sensor Charger Contactor Control Status System Voltage No faults on HV Output Voltage Sensor Charge System Mode	> 0.5 A P0D53, P0D54, P1EEB, P1EEC, P1ECE, P0D5C, P16C5, P1EFD, P1F16 Closed > 10.2 V P0D4E, P0D4F, P1EEB, P1EEC, P1ECE, P0D5C P16C5, P1EFD Heat Only Mode		
Battery Charger AC Voltage Not Present	P1EE6	Sets when Charger AC input Voltage is below a threshold	Charger AC Input Voltage	<= 5 V	System Voltage AC On Requested No Active DTCs on AC Input Voltage Sensor Control Pilot State	> 10.2V >= 4 Sec. P0D3F, P0D40, P1EE7, P1EE8, P0D3E, P1ECE, P0D5C, P0D5B, P16C4, P1EFD Connected Ready (In/Out)	8 failures out of 10 samples 100 ms rate	

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 Control Pilot % voltage is below a threshold or if it is above a threshold	Control Pilot Normalized Voltage OR Control Pilot Normalized Voltage Note: Control Pilot Normalized Voltage=Charging System Control Pilot Voltage / Battery Voltage	> 28 % < 14 %	System Voltage Control Pilot Charging Switch State CPDIAG Switch State Charge Cord State Control Pilot Circuit and Performance Diagnostics	> 10.2V Closed Asserted Not Connected Completed this Key-Cycle	30 failures out of 50 samples 100 ms rate	One Trip, Type A
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 OR Control Pilot Normalized Voltage	> 10 % < 5 %	System Voltage Charging Ventilation Switch State CPDIAG Switch State Charge Cord State Control Pilot Circuit and Performance Diagnostics Control Pilot Charging Switch Performance	> 10.2V Closed Asserted Not Connected Completed this Key-Cycle Completed this Key-Cycle	30 failures out of 50 samples 100 ms rate	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Note: Control Pilot Normalized Voltage=Charging System Control Pilot Voltage / Battery Voltage					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel Rail Pressure (FRP) Sensor Performance (rationality)	P018B	This DTC detects a fuel pressure sensor response stuck within the normal operating range	Absolute value of fuel pressure change as sensed during intrusive test.	<= 30 kPa	1. FRP Circuit Low DTC (P018C)	Not active	Frequency: Continuous; 12.5 ms loop. 60 seconds between intrusive tests that pass Intrusive test requested if fuel system is clamped for >= 5	DTC Type A 1 trip
					2. FRP Circuit High DTC (P018D)	Not active	seconds or fuel pressure error variance <= typically (0.3 to 0.6) (calculated over a 2.5sec period); otherwise report pass	
					3. FuelPump Circuit Low DTC (P0231)	Not active	Duration of intrusive test is fueling related (5 to 12 seconds).	
					4. FuelPump Circuit High DTC (P0232)	Not active		
					5. FuelPump Circuit Open DTC (P023F)	Not active	Intrusive test is run when fuel flow is below Max allowed fuel flow rate (Typical values in the range of 11 to 50 g/s)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					6. Reference Voltage DTC (P0641) 7. Fuel Pump Control Module Driver Over-temperature DTC (P064A) 8. Control Module Internal Performance DTC (P0606) 9. Engine run time 10. Emissions fuel level (PPEI $3FB) 11. Fuel pump control 12. Fuel pump control state 13. Engine fuel flow 14. ECM fuel control system failure (PPEI $1ED)	Not active Not active Not active >=5 seconds Not low Enabled Normal or FRP rationality control > 0.047 g/s Not failed		
Fuel Rail Pressure (FRP) Sensor Circuit Low Voltage	P018C	This DTC detects if the fuel pressure sensor circuit is shorted low	FRP sensor voltage	< 0.14 V	Ignition	Run or Crank	72 failures out of 80 samples 1 sample/12.5 ms	DTC Type A 1 trip
Fuel Rail Pressure (FRP) Sensor Circuit High Voltage	P018D	This DTC detects if the fuel pressure sensor circuit is shorted high	FRP sensor voltage	> 4.86 V	Ignition	Run or Crank	72 failures out of 80 samples 1 sample/12.5 ms	DTC Type A 1 trip
Fuel Pump Control Circuit Low Voltage	P0231	This DTC detects if the fuel pump control circuit is shorted to low	Fuel Pump Current	> 14.48A	Ignition OR	Run or Crank	72 test failures in 80 test samples if Fuel Pump Current <100A	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HS Comm OR Fuel Pump Control AND Ignition Run/Crank Voltage	enabled enabled 9V < voltage < 32V	1 sample/12.5 ms	
Fuel Pump Control Circuit High Voltage	P0232	This DTC detects if the fuel pump control circuit is shorted to high	Voltage measured at fuel pump circuit	> 3.86 V	Commanded fuel pump output Fuel pump control enable Time that above conditions are met	0% duty cycle (off) False >=4.0 seconds	36 test failures in 40 test samples; 1 sample/12.5ms Pass/Fail determination made only once per trip	DTC Type A 1 trip
Fuel Pump Control Circuit (Open)	P023F	This DTC detects if the fuel pump control circuit is open	Fuel Pump Current AND Fuel Pump Duty Cycle	<=0.5A >20%	Ignition OR HS Comm OR Fuel Pump Control AND Ignition Run/Crank Voltage	Run or Crank enabled enabled 9V < voltage < 32V	72 test failures in 80 test samples; 1 sample/12.5ms	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel System Control Module Enable Control Circuit	P025A	This DTC detects if there is a fault in the fuel pump control enable circuit	PPEI (PPEI (Powertrain Platform Electrical Interface) Fuel System Request ($1ED)	≠ Fuel Pump Control Module Enable Control Circuit	Ignition AND PPEI Fuel System Request ($1ED)	Run or Crank valid	72 failures out of 80 samples 1 sample/12.5 ms	DTC Type A 1 trip
Control Module Read Only Memory (ROM)	P0601	This DTC will be stored if any software or calibration check sum is incorrect	Calculated Checksum (CRC16)	≠ stored checksum for any of the parts (boot, software, application calibration, system calibration)	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	1 failure if it occurs during the first ROM test of the ignition cycle, otherwise 5 failures Frequency: Runs continuously in the background	DTC Type A 1 trip
Control Module Not Programmed	P0602	Indicates that the FSCM needs to be programmed	This DTC is set via calibration, when KeMEMD_b_NoStartCal	= TRUE	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	Runs once at power up	DTC Type A 1 trip
Control Module Long Term Memory Reset	P0603	Non-volatile memory checksum error at controller power-up	Checksum at power-up	≠ checksum at power-down	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	1 failure Frequency: Once at power-up	DTC 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 Random Access Memory (RAM)	P0604	Indicates that control module is unable to correctly write and read data to and from RAM	Data read	≠ Data written	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	1 failure if it occurs during the first RAM test of the ignition cycle, otherwise 5 failures Frequency: Runs continuously in the background.	DTC Type A 1 trip
Control Module Internal Performance 1. Main Processor Configuration Register Test 2. Processor clock test	P0606	This DTC indicates the FSCM has detected an internal processor fault or external watchdog fault (PID 2032 discriminates the source of the fault)	1. For all I/O configuration register faults: •Register contents 2. For Processor Clock Fault: •EE latch flag in EEPROM. OR • RAM latch flag.	Incorrect value. 0x5A5A 0x5A	Ignition OR HS Comm OR Fuel Pump Control 1. For all I/O configuration register faults: •KeMEMD_b_ProcFltCfgRegEnbl 2. For Processor Clock Fault: •KeMEMD_b_ProcFltCLKDiagEnbl	Run or Crank enabled enabled TRUE TRUE	Tests 1 and 2 1 failure Frequency: Continuously (12.5ms) Test 3 3 failures out of 15 samples 1 sample/12.5 ms	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
3. External watchdog test			3. For External Watchdog Fault: • Software control of fuel pump driver	Control Lost	3. For External Watchdog Fault: •KeFRPD_b_FPExtWDogDiagEnbl 3. For External Watchdog Fault: •Control Module ROM(P0601) 3. For External Watchdog Fault: •Control Module RAM(P0604)	TRUE not active not active		
Control Module Long Term Memory (EEPROM) Performance	P062F	Indicates that the NVM Error flag has not been cleared	Last EEPROM write	Did not complete	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	1 test failure Once on controller power-up	DTC Type A 1 trip
5Volt Reference Circuit (Short High/Low/Out of Range)	P0641	Detects continuous short or out of range on the #1 5V sensor reference circuit	Reference voltage AND Output OR Reference voltage AND Output OR Reference voltage AND Output	>= 0.5V inactive >= 5.5V active <= 4.5V active	Ignition	Run or Crank	15 failures out of 20 samples 1 sample/12.5 ms	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			OR Reference voltage	 > 102.5% nominal (i.e., 5.125V) OR <97.5% nominal (i.e., 4.875V)				
Fuel Pump Control Module - Driver Over-temperature 1	P064A	This DTC detects if an internal fuel pump driver overtemperature condition exists under normal operating conditions	Pump Driver Temp	> 150C	Ignition OR HS Comm OR Fuel Pump Control KeFRPD_b_FPOverTem Ignition Run/Crank	Run or Crank Enabled Enabled TRUE 9V<voltage<32V	3 failures out of 15 samples 1 sample/12.5 ms	DTC Type B 2 trips
Ignition 1 Switch Circuit Low Voltage	P2534	This DTC detects if the Ignition1 Switch circuit is shorted to low or open	Ignition 1 voltage	<= 6 V	Engine	Running	180 failures out of 200 samples 1 sample/25.0 ms	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel Pump Flow Performance (rationality)	P2635	This DTC detects degradation in the performance of the SIDI electronic return-less fuel system	Filtered fuel rail pressure error	<= Low Threshold (function of desired fuel rail pressure and fuel flow rate. 15% of resultant Target Pressure) OR >= High Threshold (function of desired fuel rail pressure and fuel flow rate. 15% of resultant Target Pressure) **(See Supporting Tables tab)**	1. FRP Circuit Low DTC (P018C)	Not active	Filtered fuel rail pressure error Time Constant = 12.5 seconds Frequency: Continuous 12.5 ms loop	DTC Type B 2 trips
					2. FRP Circuit High DTC (P018D)	Not active .		
					3. Fuel Rail Pressure Sensor Performance DTC (P018B)	Not active		
					4. FuelPump Circuit Low DTC (P0231)	Not active		
					5. FuelPump Circuit High DTC (P0232)	Not active		
					6. FuelPump Circuit Open DTC (P023F)	Not active		
					7. Reference Voltage DTC (P0641)	Not active		
					8. Fuel Pump Control Module Driver Over-temperature DTC's (P064A)	Not active		
					9. Control Module Internal Performance DTC (P0606)	Not active		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					10. An ECM fuel control system failure (PPEI $1ED)	Not occurred		
					11. The Barometric pressure (PPEI $4C1) signal	Valid (for absolute fuel pressure sensor)		
					12. Engine run time	>= 30 seconds		
					13. Emissions fuel level (PPEI $3FB)	Not low		
					14. Fuel pump control	Enabled		
					15. Fuel pump control state	Normal		
					16. Battery Voltage	11V<=voltage=<32V		
					17. Fuel flow rate **(See Supporting Tables tab)**	> 0.047 g/s **AND** <= Max allowed fuel flow rate as a function of desired rail pressure & Vbatt (Typical values in the range of 11 to 50 g/s)		
					18. Fuel Pressure Control System	Is not responding to an over-pressurization due to pressure build during DFCO or a decreasing desired pressure command.		
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	Bus Status	Off	Power mode	Run/Crank	5 failures out of 5 samples (5 seconds)	DTC 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 ECM/PCM “A”	U0100	Detects that CAN serial data communication has been lost with the ECM	Message $0C9	Undetected	1. Power mode 2. Ignition Run/Crank Voltage 3. U0073	Run/Crank 11V<voltage<32V not active	12 failures out of 12 samples (12 seconds)	DTC Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Wheel Speed Sensor Diagnostics								
Left Front Wheel Speed Sensor Circuit Low	C1232	The left front wheel speed sensor (WSS) is open.	WSS feedback voltage < Threshold Pass Threshold: > 0.20v	0.20v Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled No Active DTCs	> 9.0 < 19.5 True (Note 1) C1207	> 100ms	two trips
Right Front Wheel Speed Sensor Circuit Low	C1233	The right front wheel speed sensor is open.	WSS feedback voltage < Threshold Pass Threshold: > 0.20v	0.20v Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled No Active DTCs	> 9.0 < 19.5 True (Note 1) C1208	> 100ms	two trips
Left Rear Wheel Speed Sensor Circuit Low	C1234	The left rear wheel speed sensor is open.	WSS feedback voltage < Threshold Pass Threshold: > 0.20v	0.20v Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled No Active DTCs	> 9.0 < 19.5 True (Note 1) C1209	> 100ms	two trips
Right Rear Wheel Speed Sensor Circuit Low	C1235	The right rear wheel speed sensor is open.	WSS feedback voltage < Threshold Pass Threshold: > 0.20v	0.20v Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled No Active DTCs	> 9.0 < 19.5 True (Note 1) C1210	> 100ms	two trips
Left Front Wheel Speed Sensor Circuit High	C1207	The left front wheel speed sensor is shorted.	WSS feedback voltage > Threshold1 OR ORION ASIC detects current > Threshold2 Pass Threshold: < 2.2v	Threshold1 = 2.20v Threshold2 = 35ma Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled	> 9.0 < 19.5 True (Note 1)	> 100ms	two trips
Right Front Wheel Speed Sensor Circuit High	C1208	The right front wheel speed sensor is shorted.	WSS feedback voltage > Threshold1 OR ORION ASIC detects current > Threshold2 Pass Threshold: < 2.2v	Threshold1 = 2.20v Threshold2 = 35ma Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled	> 9.0 < 19.5 True (Note 1)	> 100ms	two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Left Rear Wheel Speed Sensor Circuit High	C1209	The left rear wheel speed sensor is shorted.	WSS feedback voltage > Threshold1 OR ORION ASIC detects current > Threshold2 Pass Threshold: < 2.2v	Threshold1 = 2.20v Threshold2 = 35ma Nominal Range: 0.20v < WSS voltage range < 2.20v	Sys Voltage Sys Voltage Processing_Enabled	> 9.0 < 19.5 True (Note 1)		two trips
Right Rear Wheel Speed Sensor Circuit High	C1210	The right rear wheel speed sensor is shorted.	WSS feedback voltage > Threshold1 OR ORION ASIC detects current > Threshold2 Pass Threshold: < 2.2v	Threshold1 = 2.20v Threshold2 = 35ma Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled	> 9.0 < 19.5 True (Note 1)	> 100ms	two trips
Left Front Wheel Speed Sensor Circuit	C1221	The left front WSS signal has dropped out. It has stopped producing edges.	Number of detected edges = 0	0 edges Nominal Range: (N/A)	Veh Vel System Voltage Processing_Enabled No Active DTCs	> 8 mph < 19.5 True (Note 1) C1207	70ms	two trips
		Missing signal. The left front wheel speed sensor is no longer being detected.	For Single Missing, TC Active, and Multiple Missing WSS's: Missing Threshold = Larger of: (0.2 x Max)m/s or 1.8m/s Max is the maximum filtered velocity from the other 3 wheels Pass Threshold: WSS signal is detected	See Malfunction Criteria Nominal Range: (0.6kph < WSS vel range < 240kph)	Accel (on all wheels) Veh Vel (largest from all 4 wheels) Processing_Enabled No Active DTCs	< 17.16m/s/s > 12.8kph True (Note 1) C1207	Single: Time > 5s Single TC Active: Time > 60s Multiple: Time > 2minutes / > 15 ms	
Right Front Wheel Speed Sensor Circuit	C1222	The right front WSS signal has dropped out. It has stopped producing edges.	Number of detected edges = 0	0 edges Nominal Range: (N/A)	Veh Vel System Voltage Processing_Enabled No Active DTCs	> 8 mph < 19.5 True (Note 1) C1208	70ms	two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Missing signal. The right front wheel speed sensor is no longer being detected.	For Single Missing, TC Active, and Multiple Missing WSS's: Missing Threshold = Larger of: (0.2 x Max)m/s or 1.8m/s Max is the maximum filtered velocity from the other 3 wheels Pass Threshold: WSS signal is detected	See Malfunction Criteria Nominal Range: (0.6kph < WSS vel range < 240kph)	Accel (on all wheels) Veh Vel (largest from all 4 wheels) Processing_Enabled No Active DTCs	< 17.16m/s/s > 12.8kph True (Note 1) C1208	Single: Time > 5s Single TC Active: Time > 60s Multiple: Time > 2minutes / > 15 ms	
Left Rear Wheel Speed Sensor Circuit	C1223	The left rear WSS signal has dropped out. It has stopped producing edges.	Number of detected edges = 0	0 edges Nominal Range: (N/A)	Veh Vel System Voltage Processing_Enabled No Active DTCs	> 8 mph < 19.5 True (Note 1) C1209	70ms	two trips
		Missing signal. The left rear wheel speed sensor is no longer being detected.	For Single Missing, TC Active, and Multiple Missing WSS's: Missing Threshold = Larger of: (0.2 x Max)m/s or 1.8m/s Max is the maximum filtered velocity from the other 3 wheels Pass Threshold: WSS signal is detected	See Malfunction Criteria Nominal Range: (0.6kph < WSS vel range < 240kph)	Accel (on all wheels) Veh Vel (largest from all 4 wheels) Processing_Enabled No Active DTCs	< 17.16m/s/s > 12.8kph True (Note 1) C1209	Single: Time > 5s Single TC Active: Time > 60s Multiple: Time > 2minutes / > 15 ms	
Right Rear Wheel Speed Sensor Circuit	C1224	The right rear WSS signal has dropped out. It has stopped producing edges.	Number of detected edges = 0	0 edges Nominal Range: (N/A)	Veh Vel System Voltage Processing_Enabled No Active DTCs	> 8 mph < 19.5 True (Note 1) C1210	70ms	two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Missing signal. The right rear wheel speed sensor is no longer being detected.	For Single Missing, TC Active, and Multiple Missing WSS's: Missing Threshold = Larger of: (0.2 x Max)m/s or 1.8m/s Max is the maximum filtered velocity from the other 3 wheels Pass Threshold: WSS signal is detected	See Malfunction Criteria Nominal Range: (0.6kph < WSS vel range < 240kph)	Accel (on all wheels) Veh Vel (largest from all 4 wheels) Processing_Enabled No Active DTCs	< 17.16m/s/s > 8 mph True (Note 1) C1210	Single: Time > 5s Single TC Active: Time > 60s Multiple: Time > 2minutes / > 15ms	
Left Front Wheel Speed Sensor Circuit Range/ Performance	C1225	Erratic signal. The left front WSS is exhibiting erratic behavior with a large acceleration.	WSS Accel > Threshold Pass Threshold: < 491m/s/s	491m/s/s Nominal Range: (N/A)	Veh Vel Processing_Enabled No Active DTCs	> 8 mph True (Note 1) C1207	280ms Pass >30s	two trips
Right Front Wheel Speed Sensor Circuit Range/ Performance	C1226	Erratic signal. The right front WSS is exhibiting erratic behavior with a large acceleration.	WSS Accel > Threshold Pass Threshold: < 491m/s/s	491m/s/s Nominal Range: (N/A)	Veh Vel Processing_Enabled No Active DTCs	> 8 mph True (Note 1) C1208	280ms Pass >30s	two trips
Left Rear Wheel Speed Sensor Circuit Range/ Performance	C1227	Erratic signal. The left rear WSS is exhibiting erratic behavior with a large acceleration.	WSS Accel > Threshold Pass Threshold: < 491m/s/s	491m/s/s Nominal Range: (N/A)	Veh Vel Processing_Enabled No Active DTCs	> 8 mph True (Note 1) C1209	280ms Pass >30s	two trips
Right Rear Wheel Speed Sensor Circuit Range/ Performance	C1228	Erratic signal. The right rear WSS is exhibiting erratic behavior with a large acceleration.	WSS Accel > Threshold Pass Threshold: < 491m/s/s	491m/s/s Nominal Range: (N/A)	Veh Vel Processing_Enabled No Active DTCs	> 8 mph True (Note 1) C1210	280ms Pass >30s	two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Tire Size Mismatch	C122E	This detects that there may be mismatched sized tires on the vehicle	|WSS (one wheel) – WSS(other 3)| / Wheel Vel(other 3) > Threshold	20% Nominal Range: N/A	Vehicle Velocity Cornering Wheel Slip Brake Pedal Apply Detected Processing_Enabled No Active DTCs	>4m/s < 3% (Note 10) Not Detected (Note 10) True (Note 2) True (Note 1) C1207 C1208 C1209 C1210	30ms	two trips
Pedal Travel								
Brake Pedal Position Sensor Power Circuit Low	C120F	The supply to the pedal position sensor is shorted to ground.	Pedal supply voltage < Threshold Pass Threshold > 0.5v	0.5v	Processing_Enabled	True (Note 1)	30ms	Two trips
Brake Pedal Position Sensor Reference Circuit	C12E5	Determines if the voltage supply to the pedal sensor is out of range.	Pedal supply voltage < Threshold Low Pedal supply voltage > Threshold High Pass Threshold 4.75 < Volt <5.25	Low = 4.75v High = 5.25v Nominal Range: (N/A)	Processing_Enabled	True (Note 1)	30ms	Two trips
Brake Pedal Position Sensor 3 Circuit Low	C129A	Brake pedal position 3 input signal voltage is low.	Brake Ped Pos 3 Voltage < Threshold Pass Threshold > 5% of sensor supply voltage	5% of sensor supply voltage Nominal Range: 4.75v - 5.25v - Supply	Sensor Supply Voltage Sensor Supply Voltage Processing_Enabled No Active DTCs	> 4.75v < 5.25 True (Note 1) C120F	75ms	two trips
Brake Pedal Position Sensor 3 Circuit High	C129B	Brake pedal position 3 input signal voltage is high.	Brake Ped Pos 3 Voltage > Threshold Pass Threshold > 95% of sensor supply voltage	95% of sensor supply voltage Nominal Range: 4.75v - 5.25v - Supply	Sensor Supply Voltage Sensor Supply Voltage Processing_Enabled No Active DTCs	> 4.75v < 5.25 True (Note 1) C120F	75ms	two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Brake Pedal Position Sensor 3 Circuit Offset Error	C129C	The brake pedal position 3 input signal offset voltage is out of range	Brake Ped Pos 3 input offset > Threshold Pass Threshold Brake Ped Pos 3 input offset < Threshold	33 mm Nominal Range: 4.75v - 5.25v - Supply	Brake Pedal Apply Detected OR Pressure Zeroing Enable AND Processing_Enabled No Active DTCs	True (Note 2) True (Note 3) True (Note 1) C120F C127D C129A C129B C12E5 C12F8	15ms	two trips
		Base brake pedal travel sensor 3 offset error	Brake Pedal Travel Sensor 3 > Max Threshold	Max Threshold = 33 mm	Brake Pedal Apply Detected	True (Note 2)	7ms	
Brake Pedal Position Sensor 3 Plausibility	C12F8	The difference of the two travel sensor inputs is greater than a predefined threshold.	|(%Input 1 - %Input 2)| >= Threshold	10%	Pedal Supply Voltage Failure Brake Pedal Sensor is enabled Sensor Supply Voltage Sensor Supply Voltage Brake Pedal Position Sensor 1 Input = Valid Brake Pedal Position Sensor 2 Input = Valid	False True > 4.75v < 5.25 True True	30ms	two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Brake Pedal Position Sensor 4 Circuit Low	C129D	Brake pedal position 4 input signal voltage is low.	Brake Ped Pos 4 Voltage < Threshold Pass Threshold >5% of sensor voltage	5% of sensor supply voltage Nominal Range: 4.75v - 5.25v - Supply	Sensor Supply Voltage Sensor Supply Voltage Processing_Enabled No Active DTCs	> 4.75v < 5.25 True (Note 1) C120F	75ms	two trips
Brake Pedal Position Sensor 4 Circuit High	C129E	Brake pedal position 4 input signal voltage is high.	Brake Ped Pos 4 Voltage > Threshold Pass Threshold <95% of sensor supply voltage	95% of sensor supply voltage Nominal Range: 4.75v - 5.25v - Supply	Sensor Supply Voltage Sensor Supply Voltage Processing_Enabled No Active DTCs	> 4.75v < 5.25 True (Note 1) C120F	75ms	two trips
Brake Pedal Position Sensor 4 Circuit Offset Error	C129F	The brake pedal position 2 input signal offset voltage is out of range	Brake Ped Pos 4 input offset > Threshold Pass Thresold Brake Ped Pos 4 input offset <Threshold	33 mm Nominal Range: 4.75v - 5.25v - Supply	Brake Pedal Apply Detected OR Pressure Zeroing Enable AND Processing_Enabled No Active DTCs	True (Note 2) True (Note 3) True (Note 1) C120F C127D C129D C129E C12E5 C120C	15ms	two trips
		Base brake pedal travel sensor 4 offset error	Brake Pedal Travel Sensor 4 > Max Threshold	Max Threshold = 33 mm	Brake Pedal Apply Detected	True (Note 2)	7 ms	
Pressure Sensors								
ABS Sensor Reference Output Circuit	C12E4	Determines if the internal 5v voltage supply is out of range.	Internal supply voltage < Threshold Low Internal supply voltage > Threshold High Pass Threshold 4.75 < Volt <5.25	Low = 4.75v High = 5.25v Nominal Range: (N/A)	Processing_Enabled	True (Note 1)	30ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS **Master Cylinder** Pressure Sensor and Brake Pedal Position Sensor Correlation	C12B1	The Master Cylinder Pressure sensor reading does not correlate with the pedal travel sensor readings.	M/C pressure input outside correlation table with Brake Ped Pos x inputs M/C Pressure has not changed by more than Threshold 1 while pedal travel inputs have changed more than Threshold 2	Outside acceptance table (Note 4) Threshold 1 = 50.0 kPa Threshold 2 =2.0 mm (rod)	Processing_Enabled System self test complete One brake apply M/C Pressure signal stable No Active DTCs	True (Note 1) True True True (Note 5) C120C C120F C12B2 C12B3 C12B4 C128B C128E C127D C129A C129B C129C C129D C129E C129F C12E5 C12F8	150ms (condition 1) 100ms (condition 2)	Two trips
ABS **Master Cylinder** Pressure Sensor Circuit Open or Shorted Low	C12B2	Out of range Low The MCP sensor is either open or shorted to ground.	MCP Voltage < Threshold Pass Threshold: > 5%	5% Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled	True (Note 1)	100ms	two trips
ABS **Master Cylinder** Pressure Sensor Circuit Shorted High	C12B3	The MCP sensor signal is shorted high.	MCP Voltage > Supply Threshold Pass Threshold: < 95%	95% Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled	True (Note 1)	100ms	two trips
ABS **Master Cylinder** Pressure Sensor Performance	C12B4	An MCP erratic condition exist if the ohmic fault status has changed since the last time the ohmic check was performed.	Transitions from Valid to Open/Shorted State Pass Threshold: Transitions do not occur.	Successive Loops Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled No active DTCs:	True (Note 1) C12B2 C12B3	100ms Pass =150ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS **Master Cylinder** Pressure Sensor Offset Error	C128B	The MCP sensor's input signal offset is out of range.	MCP Offset > Threshold	800 kPa (0.7v typically) Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	(Brake Switch Veh Accel Pump Motor) or Brake Pedal Apply Detected AND Processing_Enabled No active DTCs:	False > 0.4m/s2 Not Active True (Note 2) True (Note 1) C12B2 C12B3 C128E	20ms	Two trips
		Emulator pressure offset is out of range.	Emulator Pressure Offset > Max Threshold	800 kPa	Emulator Pressure Detected	TRUE	7 ms	
ABS **Master Cylinder** Pressure Sensor Raw Offset Error	C128E	The MCP sensor's raw offset is out of range.	MCP Raw Offset > Threshold	5000 kPa (1.64v typical) Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Brake Control Vehicle Acceleration Vehicle Velocity Accelerator Pedal Position Brake Switch Processing_Enabled No active DTCs:	False (Note 6) > -0.5m/s/s > 2.0m/s < 10% False True (Note 1) C12B2 C12B3 C128E	1s	Two trips
ABS **HPA** Pressure Sensor Circuit Open or Shorted Low	C12B6	Out of range low. The HPA pressure sensor is either open or shorted to ground.	HPA Voltage < Threshold Pass Threshold: > 5%	5% Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled	True (Note 1)	100ms	Two trips
ABS **HPA** Pressure Sensor Circuit Shorted High	C12B7	The HPA pressure sensor signal is shorted high.	HPA Voltage > Supply Threshold Pass Threshold: < 95%	95% Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled	True (Note 1)	100ms	Two trips
ABS **HPA** Pressure Sensor Erratic	C12B8	An HPA pressure sensor erratic condition exist if the ohmic fault status has changed since the last time the ohmic check was performed	Transitions from Valid to Open/Shorted State Pass Threshold: Transitions do not occur.	Successive Loops Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled No active DTCs:	True (Note 1) C12B6 C12B7	100ms Pass = 150ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS **Boost** Pressure Sensor Circuit Open or Shorted Low	C12BC	The boost pressure sensor is either open or shorted to ground.	Boost Voltage < Threshold Pass Threshold: > 5%	5% Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled	True (Note 1)	100ms	Two trips
ABS **Boost** Pressure Sensor Circuit Shorted High	C12BD	The boost pressure sensor signal is shorted high.	Boost Voltage > Supply Threshold Pass Threshold: < 95%	95% Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled	True (Note 1)	100ms	Two trips
ABS **Boost** Pressure Sensor Erratic	C12BE	A boost pressure sensor erratic condition exist if the ohmic fault status has changed since the last time the ohmic check was performed	Transitions from Valid to Open/Shorted State Pass Threshold: Transitions do not occur.	Successive Loops Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled No active DTCs:	True (Note 1) C12BC C12BD	100ms Pass = 150ms	Two trips
ABS **Boost** Pressure Sensor Raw Offset Error	C128D	The boost pressure sensor's raw offset is out of range.	Boost Signal Raw Offset > Threshold	5000 kPa (1.64v typical) Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Brake Control Vehicle Acceleration Vehicle Velocity Accelerator Pedal Position Brake Switch Processing_Enabled No active DTCs:	False (Note 6) > -0.5m/s/s > 2.0m/s < 10% False True (Note 1) C12BC C12BD C12BE	1s	Two trips
ABS **Boost** Pressure Sensor Offset Error	C128A	The boost pressure sensor's input signal offset is out of range.	Boost Signal Offset > Threshold Pass Threshold: < 800 kPa	800 kPa (0.7v typically) Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Brake Switch Vehicle Acceleration Pump Motor Processing_Enabled No active DTCs:	False > 0.4m/s2 Not Active True (Note 1) C12BC C12BD C12BE	20ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS **Boost** Pressure Performance	C120A	Determines if the boost pressure being commanded is being achieved or not.	Boost Pres Diff(BPD) = |Boost Pres(filtered, zeroed) – test command| With VSC or TC or ABS active: BPD > Thrshld1 Without VSC and TC and ABS active: BPD > Thrshld2	Thrshld1 = 3000 kPa Thrshld2 = 1500 kPa Nominal Range: (N/A)	Processing_Enabled No active DTCs:	True (Note 1) C12B6 C12B7 C12B8 C12BC C12BD C12BE C128A C128D C127D C12E4	500ms	two trips
ABS **Boost** Pressure Loss	C12FE	The Boost Loss Fault is used to allow the boost control function to keep operating, despite motor failures or other failures and conditions that cause the boost pressure to be limited to less than commanded. The boost control will continue, applying as much pressure as possible, until the boost pressure available is no greater than the master cylinder pressure the driver is applying, at which time a fault will be set and the system will revert to 'push through'.	Boost Press(slow filtered) < Threshold1 AND MC Press Greater Than Boost Press Time >= Time1 AND Accum Pres Filtered > Threshold2 OR Boost Loss First Apply Time > Time2	Threshold1 = 7000 kPa Time1 = 250msec Threshold2 = 16000 kPa Time2 = 250msec	Boost Pressure Valid Boost Loss Condition MC Press Greater Than Boost Press Time Incremented When: Boost Pressure Commanded > (Boost Press + 1500 kPa) AND MC Pressure > (Boost Press – 2 bar) No active DTCs	True False C12BC C12BD C12BE C128A C128D C127D C12E4	250 ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		This diagnostic is set when the boost loss condition described in the “Boost Loss Fault” is a result of certain situations such as the Engine Run Active being low. This diagnostic is used to effect the proper system reaction without indicating a hardware fault.	Boost Press < Threshold1 AND MCP Greater Than Boost Press Time >= Time1 AND Accum Pres Filtered > Threshold2 OR Boost Loss First Apply Time > Time2	Threshold1 = 7000 kPa Time1 = 250msec Threshold2 = 16000 kPa Time2 = 250msec	Boost Pressure Valid Boost Loss Condition Boost Loss Condition Fault	True True False	250 ms	
BB Solenoids								
ABS **Power Switch** Circuit Open	C12E6	When the power switch has been commanded on the voltage level is monitored for proper operation.	Voltage Level (switched battery) < Threshold Pass Threshold > 80% bat volt	80% bat voltage Nominal Range: (N/A)	Power Switch Base Brake Enabled Power Switch Command	True (Note 8) On	50ms	Two trips
ABS **Power Switch** Circuit Shorted	C12E7	The Base Brake Power switch voltage decay is monitored after the power switch is turned off. Voltage too high indicates a shorted switch. Voltage too low indicates a missing filter capacitor.	Power Switch Short Fault: Power switch feedback > Threshold1 Power Switch Short FSM Capacitor Fault: Power switch feedback < Threshold2 Pass Threshold 80% < fdbk <50%	Threshold1 = 80% bat volt Threshold2 = 50% bat volt Nominal Range: (N/A)	Power Switch Command Motor	Off != Running	50ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS **Base Brake Open** Solenoid **Circuit Open**	C12D6	Whenever the Power Switch **Base Brake** is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high.**	Solenoid feedback voltage < Threshold Solenoid feedback voltage > Threshold Pass Threshold >80% Pass Threshold <30%	80% battery 30% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	Two trips
		Whenever the Power Switch **Base Brake** is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high.**	Solenoid feedback voltage < Threshold Pass Threshold >65.23%	65.23% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	21ms (Solenoid in PWM Mode)	
ABS **Base Brake Open** Solenoid **Circuit Shorted**	C12D7	Whenever the Power Switch **Base Brake** is closed and the driver transistor is turned on (solenoid commanded on) the feedback voltage should be **low.**	Solenoid feedback voltage > Threshold Pass Threshold: < Threshold	30% of battey (Solenoid in ON/OFF Mode)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v On	15ms (Solenoid in ON/OFF Mode)	Two trips
		Whenever the Power Switch **Base Brake** is closed and the driver transistor is turned on (solenoid commanded on) the feedback voltage should be **low.**	Solenoid feedback voltage > Threshold Pass Threshold: < 85%	85% of batter (Solenoid in PWM Mode) Nominal Range: (8v > 16v)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v On	21ms (Solenoid in PWM Mode)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS **Base Brake Open** Solenoid **Driver Shorted**	C12D8	Whenever the Power Switch **Base Brake** is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high.**	Solenoid feedback voltage < Threshold Pass Threshold >30%	30% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	Two trips
		Whenever the Power Switch Base Brake is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high**.	Solenoid feedback voltage < Threshold Pass Pass Threshold > 43.49%	43.49% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	21ms (Solenoid in PWM Mode)	
ABS **Base Brake Closed** Solenoid **Circuit Open**	C12D9	Whenever the Power Switch Base Brake is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high**.	Solenoid feedback voltage < Threshold Solenoid feedback voltage > Threshold Pass Threshold >80% Pass Threshold <30%	80% battery 30% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	Two trips
		Whenever the Power Switch Base Brake is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high.**	Solenoid feedback voltage < Threshold Pass Threshold >65.23%	65.23% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	21ms (Solenoid in PWM Mode)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS **Base Brake Closed** Solenoid **Circuit Shorted**	C12DA	Whenever the Power Switch **Base Brake** is closed and the driver transistor is turned on (solenoid commanded on) the feedback voltage should be **low.**	Solenoid feedback voltage > Threshold Pass Threshold: < Threshold	30% of battey (Solenoid in ON/OFF Mode)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v On	15ms (Solenoid in ON/OFF Mode)	Two trips
		Whenever the Power Switch **Base Brake** is closed and the driver transistor is turned on (solenoid commanded on) the feedback voltage should be **low.**	Solenoid feedback voltage > Threshold Pass Threshold: < Threshold	85% of batter (Solenoid in PWM Mode) Nominal Range: (8v > 16v)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v On	21ms (Solenoid in PWM Mode)	
ABS **Base Brake Closed** Solenoid **Driver Shorted**	C12DB	Whenever the Power Switch **Base Brake** is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high.**	Solenoid feedback voltage < Threshold Pass Threshold >30%	30% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	Two trips
		Whenever the Power Switch **Slip Control** is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high.**	Solenoid feedback voltage < Threshold Pass Pass Threshold > 43.49%	43.49% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	21ms (Solenoid in PWM Mode)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS Boost Valve Solenoid Circuit **Shorted**	C12DD	This failsafe is for shorted coil detection for HW CLC coils	Current Feedback > Threshold Pass Threshold: < 150% of requested current	150% of requested current Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Commanded Current Commanded Current	True (Note 8) > 8v < 16v > 0.25a < 0.35a	15ms	Two trips
ABS Boost Valve Solenoid **Circuit Performance**	C12A7	The current from the closed loop current controlled valve coil is diagnosed by checking if the difference of the measured current feedback and the commanded current is within a tolerance range.	Coil Feedback Current > Threshold Pass Threshold: < 25% of commanded current	25% of Commanded Current Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Commanded Current Commanded Current	True (Note 8) > 8v < 16v > 0.44a < 1.5a	100ms	Two trips
		Whenever the Power Switch Base Brake is closed and the driver transistor is not turned on (solenoid commanded off) the feedback current should be 0 amps.	Current feedback > Threshold Pass Threshold < 0.10amp	0.10amp Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	
FSM Pump Motor								
ABS Pump Motor Run On	C12E9	This fault occurs if the Motor is continuously on for greater than 60s for 5 consecutive run times during an ignition cycle.	FSM Run-On Fault counter > Threshold Pass Threshold < 5	5 Nominal Range: (10v > 16v)	Motor_Enabled Motor_ON	True (Note 9) > 60s	15 ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS Pump Motor Locked	C12E8	This fault is set when the motor control micro communicates to the system micro that the motor is unable or will not rotate.	FS_Motor_No_Edge_Counter < Threshold	50 Nominal Range: (10v > 16v)	Motor_Enabled	True (Note 9)	15 ms	Two trips
		This fault is set when the motor control micro communicates to the system micro that the motor is unable or will not rotate. 150 PWM cycles are applied to the FS motor during motor start. If a turning point is not recognized during those 150 PWM cycles the fault counter will be incremented by one. If the fault count increase to 5 the fault will set The turning point fault is monitored during motor start (not during motor spinning state).	Motor start PWM cycles > Threshold (without a recognized turning point)	750 cycles	Motor_Enabled	True (Note 9)	4.75 s	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		This fault is set when the motor control micro communicates to the system micro that the motor is unable or will not rotate. The interrupt order fault is set, if the calls of the requested interrupt-services are not in the correct order. The interrupt order fault is monitored during motor start and motor spinning state.	Requested "interrupt-services" order = Value	Value = Incorrect order	Motor_Enabled	True (Note 9)	Interrupt frequency is tied to motor speed, so it is speed dependent.	Two trips
ABS Pump Motor Performance	C12E0	This fault checks to see if a condition exists in which the accumulator is not charging	Accumulator Pressure < Threshold Pass Threshold > 12000 kPa	11000 kPa Nominal Range: (10v > 16v)	Brake Pedal Apply Detected Motor_Enabled Boost_Pressure < Command + 150 kPa No active DTCs: 	True (Note 2) True (Note 9) True C12B6 C12B7 C12B8 C127D C12E4	100ms	Two trips
Power Inputs								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Device Voltage Low	C12E1	System voltage is too low for certain operations. **If the vehicle is not moving or if the vehicle is in park and the park signal is valid, the fault maturation time will be 20 sec. Otherwise the fault maturation time will be 100msec.**	System voltage < Threshold Pass Threshold Volt >9.3v	9v Nominal Range: (N/A)	Ignition **Vehicle Moving** **PRNDL** **OR** **PRNDL_P Signal Valid** **Wheel Speeds Valid**	!= Crank **!= TRUE** **!= Park** **False** **False**	**20s** 100ms	Special C
EBCM Device Voltage High	C12E2	System voltage is too high for certain operations.	System voltage > Threshold Pass Threshold Volt <15.7v	16v Nominal Range: (N/A)	Ignition	!= Crank	100ms	Two trips
Wake Inputs								
Ignition Circuit Low	C1240	Ignition voltage is too Low	Ignition Voltage < Threshold Pass Threshold > 6v	6v	EngRunCrankTerminal Status EngRunCrankTerminal StatusValid	!= False = True	5s	Two trips
Ignition Circuit High	C1241	Ignition voltage is too High	Ignition Voltage > Threshold Pass Threshold < 6v	6v	EngRunCrankTerminal Status EngRunCrankTerminal StatusValid	= False = True	5s	Two trips
ACC Wake Up Circuit Low	C1242	Wakeup voltage is too Low at startup	Vakeup voltage < Threshold Pass Threshold > 6v	6v	Engine run flag active Diagnostic ran this ignition cycle Normal Communiction Enabled	= True for 3s = False = True	5s	Two trips
Controller								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Self Test Failed	C127C	The Built In Self Test (BIST) is responsible for testing the internal functionality of the core within the main microprocessor	Fail Consecutive Times = Threshold	2 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip
EBCM Processor Performance	C127B	**Normal Operation:** The micro sends a watchdog enable command(WEC) via the SPI to the Orion ASIC every schedule loop. If the ASIC does not receive this message, the external watchdog circuit inhibits the power switches. **Ignition Self-Test:** The external watchdog circuit is tested by not sending the WEC via the SPI to the ASIC so that the external watchdog is off and then commanding the power switch to on.	Power Switch Slip Control Voltage Feedback > Threshold Pass Threshold < 80% bat volt	80% bat volt Nominal Range: (N/A)		Run during Start-up	30ms	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Random Access Memory (RAM)	C1255	The following tests are continuously ran: 1. Read/write of the micro's RAM registers. 2. Address check of the RAM address lines. 3. Verify that the RAM location used to store the persistent address line test address (offset) advances to the next address line address. 4. Perform data check on a RAM address that includes a dependency check against another RAM location that is address adjacent to the RAM location being tested. 5. Verify that the RAM location used to store the persistent data test address advances to the next test address.	If any of the tests fail, the system is forced into a reset by writing an invalid watchdog key to the system registers. If the RAM failure is NOT detected by the bootloader static RAM check algorithm then a fault code is set and the exact type of RAM failure is written to NVRAM.	See Malfunction Criteria Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Read Only Memory (ROM)	C1256	This check is called from the scheduler each loop. Each ROM section is check-summed by byte. Each byte will be added to the current checksum for a section. If the byte being checked is the last byte of a section, then the section is verified for a correct checksum.	ROM Section's Checksum != Threshold	0 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	Immediate	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Stack Overrun	C126E	To detect underflow and overflow of the system stacks, a word of RAM is reserved at the end of each of the system stacks. A word of RAM is also reserved at the upper-most address of the stack section. The contents of these reserved words will be monitored periodically to determine if they have been modified. To detect cases where the application could be pushing a value onto the stack that matches the test value, the test value that is stored at these reserved addresses will be changed each update.	End of Stack != Threshold	Set value changed every software release Nominal Range: (N/A)		Upon Starting Scheduler in the Application	Immediate	one trip
EBCM Processor Overrun	C121D	Processor did not perform a proper shutdown. NVRAM blocks written at shutdown do not match expected values upon startup. Processing interrupt occurred.	The contents of the two NVRAM blocks are compared upon start-up with expected values from shutdown process.	Blocks do not compare	Vehicle moving On Brake	True True Upon Starting Scheduler in the Application	15ms	two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Unimplemented Interrupt	C121E	This fault is set if an interrupt occurs that has no explicit interrupt handler defined.	Interrupt Set = Threshold	Not Defined Interrupt Handler Nominal Range: (N/A)		**Upon Starting Scheduler in the Application**	6 interrupts	Two trips
EBCM Unexpected Exception	C121F	This fault is set if an exception that is not supported in our system has been generated.	Exception Not Supported = Condition	N/A Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	Two trips
EBCM A/D Conversion Timeout	C127D	If the Analog to digital converter does not complete its conversion in a set amount of time then this fault is set.	A/D Conversion Counter = Threshold	0 (Counts down from 100) Nominal Range: (N/A)		Upon Starting Scheduler in the Application	100 clock cycles	one trip
EBCM Non-Volatile Random Access Memory (NVRAM) / Non-volatile RAM	C12FF	Checksum Error Fault	NVRAM status bit sent out by core software reports a failed NVRAM	NVRAMDiagstat > 0 Fault Counts > 0 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	Two trips
EBCM Non-Volatile Random Access Memory (NVRAM) / Software Learn ID		Software ID held in NVRAM does not match ID hard coded in software	BB NVRAM SW BLOCK ID ~=Software ID	SwVerIDStat > 0 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	
EBCM High End Timer Performance	C127A	Execution of the High End Timer (HET) program is limited to the actual instructions of the HET program. Execution of default instructions indicates program execution error.	Default Instructions = Threshold	Executed Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM High End Timer Program Overflow	C123B	If the HET program does not complete execution time within one HET loop time, the current HET program is aborted and the next program execution is started and a fault code is set.	HET Program Exectution Time > Threshold	HET Loop Time Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip
EBCM High End Timer (HET) RAM Fault	C123C	The following tests are continuously ran: 1. Read/write of the micro's HET RAM registers. 2. Address check of the HET RAM address lines. 3. Verify that the HET RAM location used to store the persistent address line test address (offset) advances to the next address line address. 4. Perform data check on a HET RAM address that includes a	If any of the tests fail, the system is forced into a reset by writing an invalid watchdog key to the system registers. If the RAM failure is NOT detected by the bootloader static RAM check algorithm then a fault code is set and the exact type of RAM failure is written to NVRAM.	See Malfunction Criteria Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		dependency check against another HET RAM location that is address adjacent to the HET RAM location being tested. 5. Verify that the HET RAM location used to store the persistent data test address advances to the next test address. The following test is run at power up and reset 1. CAN device RAM check on the mailbox area.						
EBCM High End Timer (HET) Watchdog	C123A	If the HET monitor task is not executed within the allowed time frame, a counter is decremented. When the counter decrements to zero, an interrupt is generated and this fault is set.	Counter = Threshold	0 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip
EBCM High End Timer Periodic Interrupt	C123E	This failsafe verifies that a solenoid feedback interrupt generates a high end timer(HET) interrupt every loop cycle.	Solenoid Feedback Interrupt from the HET = Threshold	Calculated based on Solenoid activity Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Solenoid Timeout	C123D	Each solenoid in the system should generate a HET interrupt. At the completion of the System Self-Test, the number of valid HET interrupts is expected to be equal to the number of solenoids in the system.	Number of Valid HET Interrupts != Number	12 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip
CAN / Communications								
EBCM Internal Communication Error	C121C	The periodic Internal Processor Communication (IPC) packet transmission service checks for previous transmission request completion before the new request is made. If the previous transmission was not completed, then the IPC handler declares an IPC packe	Slave micro has not sent a packet for 3.5 sec	Time Nominal Range: (N/A)	3.5 sec	Upon Starting Scheduler in the Application	15 ms	two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		The periodic Internal Processor Communication (IPC) packet transmission service checks for previous transmission request completion before the new request is made. If the previous transmission was not completed, then the IPC handler declares an IPC packe	Secondary micro-processor communication packet does not re-synchonize with expected start-up sequence and with in set time.	Time Nominal Range: (N/A)	100msec	Upon Starting Scheduler in the Application	15 ms	
EBCM Serial Peripheral Interface Performance	C126F	2 data bytes are sent to the Orion ASIC. The Orion sends back the first byte.	Received Data != Sent Data for Threshold # of attempts	3 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	20 ms	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Serial Peripheral Interface Inoperative	C123F	Each time data is sent out from the SPI port, a counter is loaded. The counter is decremented each check that the micro polls the SPI status to see if the data transfer is complete. The counter should never reach zero before the data transfer is complete. If the counter reaches zero, it means that the peripheral, NVRAM, appears to be non-functional.	Counter = Threshold	0 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15 ms	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Communication Bus E Off	U180D	The hardware confirmation timeout condition is monitored every time the CAN driver initialization service is called. The CAN driver init service is called after power up, in Bus Off, or in transmit acknowledgement recovery. The number of counts the CAN driver is allowed to wait for hardware confirmation is 11. If the confirmation is not received by this number then the fault is set.	# of initialization attempts > threshold	11		Upon Starting Scheduler in the Application	15 ms	two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		The CAN peripheral monitors CAN bus activity and increments an error counter if the following errors are present: 1) BIT ERROR: If the bit sent does not match what was expected to be sent, increment the counter. 2) STUFF ERROR: This error has to be detected at the bit time of the 6th consecutive equal bit level in a message field that should be coded by the method of bit stuffing. 3) CRC ERROR: This error is detected if the calculated result of the receiver is not the same as that received from the transmitter. 4) FORM ERROR: This error is detected when a fixed-form bit field contains one or more illegal bits. 5) ACKNOWLEDGMENT ERROR: This error is detected by a transmitter whenever it	CAN Hardware Transmit Error Counter > Threshold	256 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		The CAN frame does not receive acknowledgement for predefined amount of time. If this fault is enabled in the node supervisor then transmit confirmation is expected within 200 ms.Transmit request sets the timeout timer and successful transmission resets the timeout timer.	CAN Frame acknowledgement not received	Not Received Nominal Range: (N/A)		Upon Starting Scheduler in the Application	200ms	
Antilock Brake System Control Module Lost Communication With Hybrid Powertrain Control Module on Bus E	U1858	MISSING_PRV_CTRL_RGN_BRK_TRQ_CE Communication message is missing.	The specified input packet with consistent data was not received by COMMS for a predefined time. Every periodic input packet is monitored for input deadline timeout. The deadline timeout is reset each time new packet data is received. The deadline timeout is either set in DBC file or during the configuration of the COMMS subsystem.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		PRIV_REGEN_BRAKE_ARC_ERROR	Out of the 16 received frames, 4 ARC values do not match the calculated values.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	
		PRIV_REGEN_BRAKE_PROT_ERROR	Out of the 16 received frames, 4 protection values do not match the calculated values.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	
Antilock Brake System Control Module Lost Communication With Engine Control Module on Bus E	U186A	MISSING_PTEI_AXLE_TORQUE_CMD Communication message is missing.	The specified input packet with consistent data was not received by COMMS for a predefined time. Every periodic input packet is monitored for input deadline timeout. The deadline timeout is reset each time new packet data is received. The deadline timeout is either set in DBC file or during the configuration of the COMMS subsystem.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	two trips
		GMLAN_CMD_AXLE_TRQ_ARC_ERROR	Out of the 16 received frames, 4 ARC values do not match the calculated values.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	
		GMLAN_CMD_AXLE_TRQ_PROT_ERROR	Out of the 16 received frames, 4 protection values do not match the calculated values.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Antilock Brake System Control Module Lost Communication With Transmission Control Module	U186B	PPEI_TRANS_GEN_STAT_2 Communication message is missing.	The specified input packet with consistent data was not received by COMMS for a predefined time. Every periodic input packet is monitored for input deadline timeout. The deadline timeout is reset each time new packet data is received. The deadline timeout is either set in DBC file or during the configuration of the COMMS subsystem.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	175msec	two trips

Note #1 - Processing_Enable is set to FALSE when the following DTCs are set to 'Fault': C1255, C1256, C126E, C123C, C127C

Note #2 - Brake Pedal Apply Detected is the determination that the driver has applied the brake pedal. It is a combination of indications from the 4 driver inputs: Brake Switch, Master Cylinder Pressure, Brake Pedal Position 3 and Brake Pedal Position 4. Typically, 2 out of 4 sensors indicating Brake Apply will set the Brake Pedal Apply Detected flag.

Note #3 - Pressure Zeroing Enable. When the vehicle is in a known state that the driver brake pedal should be released, the Pressure Zeroing Enable is set. Typical vehicle conditions are:
1) There is no vehicle brake control active
2) Vehicle acceleration > -0.5m/s² (not decelerating)
3) Vehicle velocity > 2.0m/s
4) Accelerator pedal position < 10%
5) Brake switch is not pressed

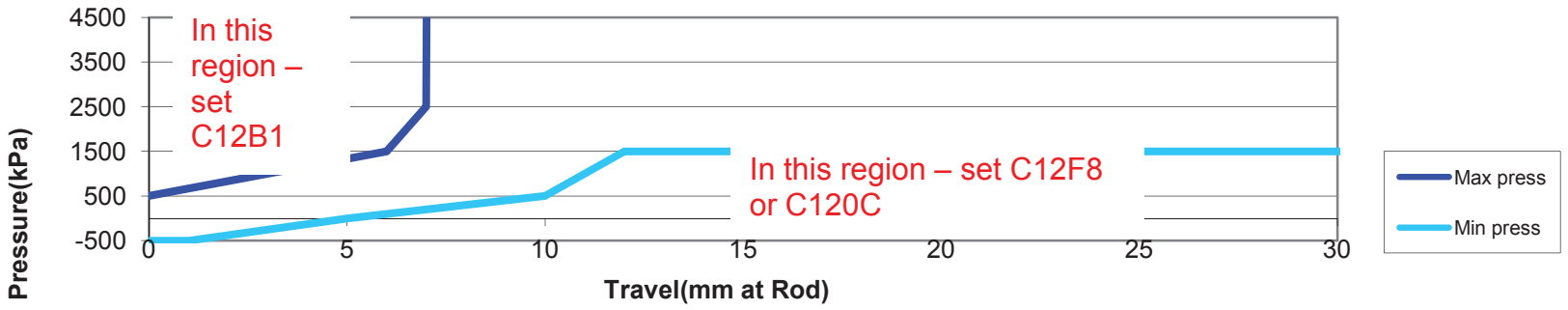
Note #4 - See Correlation Table below

Note #5 - M/C Pressure Sensor stable is a comparision of the raw M/C pressure reading against 2 filtered versions of the reading (0.5 Hz and 5 Hz.) If all 3 values are within a small tolerance (7 kpa) then the driver's input is considered stable.

Note #6 - Brake Control is considered 'False' when there is no activity being performed by the hydaulic modulator - no wheel control valves are being commanded and the motor is not being commanded.

Note #7 - Power Switch Slip Control Enable is used to open the power control FET in the electronics as a safety mechanism for the brake controller. It is set to FALSE when the following DTCs are set to 'Fault': C12C2, C12C5, C12D2, C12D5, C12CC, C12CF, C12C6, C12C8, C12DE, C12D8, C12D2, C1256, C1255, C126E, C123C, C127C, C121E, C121F, C120D, C127B
Note #8 - Power Switch Base Brake Control Enable is used to open the Base Brake power control FET in the electronics as a safety mechanism for the brake controller. It is set to FALSE when the following DTCs are set to 'Fault': C12DB, C12DC, C12D8, C12D3, C1256, C1255, C126E, C123C, C127C, C121E, C121F, C12E6, C127B
Note #9 - Motor_Enable is used to indicate when the motor is allowed to be commanded on. Motor_Enable is set to FALSE when the following DTCs are set to 'Fault': C12B7, C12B6, C12B8, C12D8, C12DB, C12DC, C12E9, C12E8, C1256, C1255, C126E, C123C, C123E, C123A, C127A, C123B, C127C, C121E, C121F, C123D, C126F, C121C, C120C, C12E6, C12E7, C127B
Note #10 - Cornering determination is a comparison of the 4 wheel speeds to estimate the percentage of road wheel angle of the drive wheels relative to their full amount of articulation. Wheel slip is the calculated ratio of individual wheel velocities to the calculated average vehicle velocity. Vehicle velocity is calculated from the 4 wheel speed sensors.

Note 4:
Correlation 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	1.4second in a 2 second window	One Trip
Hybrid Battery Voltage Sense B Circuit Low	P0B42		Cell Voltage B	<= 0.2V	Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE		
Hybrid Battery Voltage Sense C Circuit Low	P0B47		Cell Voltage C	<= 0.2V	No Active DTCs associated with VTSM Loss of Comm	U2603, U2604, U2605, U2606		
Hybrid Battery Voltage Sense D Circuit Low	P0B4C		Cell Voltage D	<= 0.2V	No Active DTCs associated with VTSM 5V Ref Diagnostic	P1E93, P1E99, P1E9F, P1EA5		
Hybrid Battery Voltage Sense E Circuit Low	P0B51			<= 0.2V	No Active DTCs associated with Open Sense Line	P0B3B, P0B40, P0B45, P0B4A, P0B4F, P0B54, P0B59, P0B5E, P0B63, P0B68, P0B6D, P0B77, P0B7C, P0B81, P0B86, P0B8B, P0B95, P0B9A, P0B9F, P0BA4, P0BA9, P0BAE, P0BB3, P0BB8, P1B28, P1B29, P1B2A, P1B2B, P1B2C, P1B2D, P1E4C, P1E4D, P1E4E, P1E4F, P1E50, P1E51, P1E52, P1E53, P1E54, P1E56, P1E57, P1E58, P1E59, P1E5A, P1E5B, P1E5C, P1E5D, P1E5E, P1E5F, P1E60, P1E61, P1E62, P1E63, P1E64,		
Hybrid Battery Voltage Sense F Circuit Low	P0B56		Cell Voltage F	<= 0.2V				
Hybrid Battery Voltage Sense G Circuit Low	P0B5B		Cell Voltage G	<= 0.2V				
Hybrid Battery Voltage Sense H Circuit Low	P0B60		Cell Voltage H	<= 0.2V				
Hybrid Battery Voltage Sense I Circuit Low	P0B65		Cell Voltage I	<= 0.2V				
Hybrid Battery Voltage Sense J Circuit Low	P0B6A		Cell Voltage J	<= 0.2V				
Hybrid Battery Voltage Sense K Circuit Low	P0B6F		Cell Voltage K	<= 0.2V	2nd Protection Self Test Diagnostic	Not Running		
Hybrid Battery Voltage Sense L Circuit Low	P0B74		Cell Voltage L	<= 0.2V	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 Battery Voltage Sense M Circuit Low	P0B79		Cell Voltage M	<= 0.2V	No Active DTCs associated with VTSM Cell Balancing Fault	P1E92, P1E98, P1E9E, P1EA4		
Hybrid Battery Voltage Sense N Circuit Low	P0B7E		Cell Voltage N	<= 0.2V	No Active DTCs associated with VTSM Internal Performance	P1E8E, P1E94, P1E9A, P1EA0		
Hybrid Battery Voltage Sense O Circuit Low	P0B83		Cell Voltage O	<= 0.2V	No Active DTCs on VITM RESS Bus Off	U2401		
Hybrid Battery Voltage Sense P Circuit Low	P0B88		Cell Voltage P	<= 0.2V				
Hybrid Battery Voltage Sense Q Circuit Low	P0B8D		Cell Voltage Q	<= 0.2V				
Hybrid Battery Voltage Sense R Circuit Low	P0B92		Cell Voltage R	<= 0.2V				
Hybrid Battery Voltage Sense S Circuit Low	P0B97		Cell Voltage S	<= 0.2V				
Hybrid Battery Voltage Sense T Circuit Low	P0B9C		Cell Voltage T	<= 0.2V				
Hybrid Battery Voltage Sense U Circuit Low	P0BA1		Cell Voltage U	<= 0.2V				
Hybrid Battery Voltage Sense V Circuit Low	P0BA6		Cell Voltage V	<= 0.2V				
Hybrid Battery Voltage Sense W Circuit Low	P0BAB		Cell Voltage W	<= 0.2V				
Hybrid Battery Voltage Sense X Circuit Low	P0BB0		Cell Voltage X	<= 0.2V				
Hybrid Battery Voltage Sense Y Circuit Low	P0BB5		Cell Voltage Y	<= 0.2V				

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		Cell Voltage Z	<= 0.2V				
Hybrid Battery Voltage Sense AA Circuit Low	P1B17		Cell Voltage AA	<= 0.2V				
Hybrid Battery Voltage Sense AB Circuit Low	P1B1A		Cell Voltage AB	<= 0.2V				
Hybrid Battery Voltage Sense AC Circuit Low	P1B1D		Cell Voltage AC	<= 0.2V				
Hybrid Battery Voltage Sense AD Circuit Low	P1B20		Cell Voltage AD	<= 0.2V				
Hybrid Battery Voltage Sense AE Circuit Low	P1B23		Cell Voltage AE	<= 0.2V				
Hybrid Battery Voltage Sense AF Circuit Low	P1B26		Cell Voltage AF	<= 0.2V				
Hybrid Battery Voltage Sense AG Circuit Low	P1B46		Cell Voltage AG	<= 0.2V				
Hybrid Battery Voltage Sense AH Circuit Low	P1B49		Cell Voltage AH	<= 0.2V				
Hybrid Battery Voltage Sense AI Circuit Low	P1B4C		Cell Voltage AI	<= 0.2V				
Hybrid Battery Voltage Sense AJ Circuit Low	P1B4F		Cell Voltage AJ	<= 0.2V				
Hybrid Battery Voltage Sense AK Circuit Low	P1B52		Cell Voltage AK	<= 0.2V				
Hybrid Battery Voltage Sense AL Circuit Low	P1B55		Cell Voltage AL	<= 0.2V				
Hybrid Battery Voltage Sense AM Circuit Low	P1B58		Cell Voltage AM	<= 0.2V				

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		Cell Voltage AN	<= 0.2V				
Hybrid Battery Voltage Sense AO Circuit Low	P1B5E		Cell Voltage AO	<= 0.2V				
Hybrid Battery Voltage Sense AP Circuit Low	P1B61		Cell Voltage AP	<= 0.2V				
Hybrid Battery Voltage Sense AQ Circuit Low	P1B64		Cell Voltage AQ	<= 0.2V				
Hybrid Battery Voltage Sense AR Circuit Low	P1B67		Cell Voltage AR	<= 0.2V				
Hybrid Battery Voltage Sense AS Circuit Low	P1B6A		Cell Voltage AS	<= 0.2V				
Hybrid Battery Voltage Sense AT Circuit Low	P1B6D		Cell Voltage AT	<= 0.2V				
Hybrid Battery Voltage Sense AU Circuit Low	P1B70		Cell Voltage AU	<= 0.2V				
Hybrid Battery Voltage Sense AV Circuit Low	P1B73		Cell Voltage AV	<= 0.2V				
Hybrid Battery Voltage Sense AW Circuit Low	P1B76		Cell Voltage AW	<= 0.2V				
Hybrid Battery Voltage Sense AX Circuit Low	P1B79		Cell Voltage AX	<= 0.2V				
Hybrid Battery Voltage Sense AY Circuit Low	P1B7C		Cell Voltage AY	<= 0.2V				
Hybrid Battery Voltage Sense AZ Circuit Low	P1B7F		Cell Voltage AZ	<= 0.2V				
Hybrid Battery Voltage Sense BA Circuit Low	P1B82		Cell Voltage BA	<= 0.2V				

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		Cell Voltage BB	<= 0.2V				
Hybrid Battery Voltage Sense BC Circuit Low	P1B88		Cell Voltage BC	<= 0.2V				
Hybrid Battery Voltage Sense BD Circuit Low	P1B8B		Cell Voltage BD	<= 0.2V				
Hybrid Battery Voltage Sense BE Circuit Low	P1B8E		Cell Voltage BE	<= 0.2V				
Hybrid Battery Voltage Sense BF Circuit Low	P1B91		Cell Voltage BF	<= 0.2V				
Hybrid Battery Voltage Sense BG Circuit Low	P1B94		Cell Voltage BG	<= 0.2V				
Hybrid Battery Voltage Sense BH Circuit Low	P1B97		Cell Voltage BH	<= 0.2V				
Hybrid Battery Voltage Sense BI Circuit Low	P1B9A		Cell Voltage BI	<= 0.2V				
Hybrid Battery Voltage Sense BJ Circuit Low	P1B9D		Cell Voltage BJ	<= 0.2V				
Hybrid Battery Voltage Sense BK Circuit Low	P1BA0		Cell Voltage BK	<= 0.2V				
Hybrid Battery Voltage Sense BL Circuit Low	P1BA3		Cell Voltage BL	<= 0.2V				
Hybrid Battery Voltage Sense BM Circuit Low	P1BA6		Cell Voltage BM	<= 0.2V				
Hybrid Battery Voltage Sense BN Circuit Low	P1BA9		Cell Voltage BN	<= 0.2V				
Hybrid Battery Voltage Sense BO Circuit Low	P1BAC		Cell Voltage BO	<= 0.2V				

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		Cell Voltage BP	<= 0.2V				
Hybrid Battery Voltage Sense BQ Circuit Low	P1BB2		Cell Voltage BQ	<= 0.2V				
Hybrid Battery Voltage Sense BR Circuit Low	P1BB5		Cell Voltage BR	<= 0.2V				
Hybrid Battery Voltage Sense BS Circuit Low	P1BB8		Cell Voltage BS	<= 0.2V				
Hybrid Battery Voltage Sense BT Circuit Low	P1BBB		Cell Voltage BT	<= 0.2V				
Hybrid Battery Voltage Sense BU Circuit Low	P1BBE		Cell Voltage BU	<= 0.2V				
Hybrid Battery Voltage Sense BV Circuit Low	P1BC1		Cell Voltage BV	<= 0.2V				
Hybrid Battery Voltage Sense BW Circuit Low	P1BC4		Cell Voltage BW	<= 0.2V				
Hybrid Battery Voltage Sense BX Circuit Low	P1BC7		Cell Voltage BX	<= 0.2V				
Hybrid Battery Voltage Sense BY Circuit Low	P1BCA		Cell Voltage BY	<= 0.2V				
Hybrid Battery Voltage Sense BZ Circuit Low	P1BCD		Cell Voltage BZ	<= 0.2V				
Hybrid Battery Voltage Sense CA Circuit Low	P1BD0		Cell Voltage CA	<= 0.2V				
Hybrid Battery Voltage Sense CB Circuit Low	P1BD3		Cell Voltage CB	<= 0.2V				
Hybrid Battery Voltage Sense CC Circuit Low	P1BD6		Cell Voltage CC	<= 0.2V				

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		Cell Voltage CD	<= 0.2V				
Hybrid Battery Voltage Sense CE Circuit Low	P1BDC		Cell Voltage CE	<= 0.2V				
Hybrid Battery Voltage Sense CF Circuit Low	P1BDF		Cell Voltage CF	<= 0.2V				
Hybrid Battery Voltage Sense CG Circuit Low	P1BE2		Cell Voltage CG	<= 0.2V				
Hybrid Battery Voltage Sense CH Circuit Low	P1BE5		Cell Voltage CH	<= 0.2V				
Hybrid Battery Voltage Sense CI Circuit Low	P1BE8		Cell Voltage CI	<= 0.2V				
Hybrid Battery Voltage Sense CJ Circuit Low	P1BEB		Cell Voltage CJ	<= 0.2V				
Hybrid Battery Voltage Sense CK Circuit Low	P1BEE		Cell Voltage CK	<= 0.2V				
Hybrid Battery Voltage Sense CL Circuit Low	P1BF1		Cell Voltage CL	<= 0.2V				
Hybrid Battery Voltage Sense CM Circuit Low	P1BF4		Cell Voltage CM	<= 0.2V				
Hybrid Battery Voltage Sense CN Circuit Low	P1BF7		Cell Voltage CN	<= 0.2V				
Hybrid Battery Voltage Sense CO Circuit Low	P1BFA		Cell Voltage CO	<= 0.2V				
Hybrid Battery Voltage Sense CP Circuit Low	P1BFD		Cell Voltage CP	<= 0.2V				
Hybrid Battery Voltage Sense CQ Circuit Low	P1E02		Cell Voltage CQ	<= 0.2V				

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		Cell Voltage CR	<= 0.2V				
Hybrid Battery Voltage Sense A Circuit High	P0B3E	Sets when cell voltage is detected above threshold	Cell Voltage A	>= 4.8V	Diagnostic Enable	TRUE	1.4second in a 2 second window	One Trip
Hybrid Battery Voltage Sense B Circuit High	P0B43		Cell Voltage B	>= 4.8V	Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE		
Hybrid Battery Voltage Sense C Circuit High	P0B48		Cell Voltage C	>= 4.8V	No Active DTCs associated with VTSM Loss of Comm	U2603, U2604, U2605, U2606		
Hybrid Battery Voltage Sense D Circuit High	P0B4D		Cell Voltage D	>= 4.8V	No Active DTCs associated with VTSM 5V Ref Diagnostic	P1E93, P1E99, P1E9F, P1EA5		
Hybrid Battery Voltage Sense E Circuit High	P0B52		Cell Voltage E	>= 4.8V	No Active DTCs associated with Open Sense Line	P0B3B, P0B40, P0B45, P0B4A, P0B4F, P0B54, P0B59, P0B5E, P0B63, P0B68, P0B6D, P0B77, P0B7C, P0B81, P0B86, P0B8B, P0B95, P0B9A, P0B9F, P0BA4, P0BA9, P0BAE, P0BB3, P0BB8, P1B28, P1B29, P1B2A, P1B2B, P1B2C, P1B2D, P1E4C, P1E4D, P1E4E, P1E4F, P1E50, P1E51, P1E52, P1E53, P1E54, P1E56, P1E57, P1E58, P1E59, P1E5A, P1E5B, P1E5C, P1E5D, P1E5E, P1E5F, P1E60, P1E61, P1E62, P1E63, P1E64, P1E65, P1E66, P1E67, P1E68,		
Hybrid Battery Voltage Sense F Circuit High	P0B57		Cell Voltage F	>= 4.8V				
Hybrid Battery Voltage Sense G Circuit High	P0B5C		Cell Voltage G	>= 4.8V				
Hybrid Battery Voltage Sense H Circuit High	P0B61		Cell Voltage H	>= 4.8V				
Hybrid Battery Voltage Sense I Circuit High	P0B66		Cell Voltage I	>= 4.8V				
Hybrid Battery Voltage Sense J Circuit High	P0B6B		Cell Voltage J	>= 4.8V				

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		Cell Voltage K	>= 4.8V		P1E69, P1E6A, P1E6B, P1E6C, P1E6E, P1E6F, P1E70, P1E71, P1E72, P1E73, P1E74, P1E75, P1E76, P1E77, P1E78, P1E79, P1E7A, P1E7B, P1E7C, P1E7D, P1E7E, P1E7F, P1E80, P1E81, P1E82, P1E83, P1E84, P1E86, P1E87, P1E88, P1E89, P1E8A		
Hybrid Battery Voltage Sense L Circuit High	P0B75		Cell Voltage L	>= 4.8V				
Hybrid Battery Voltage Sense M Circuit High	P0B7A		Cell Voltage M	>= 4.8V				
Hybrid Battery Voltage Sense N Circuit High	P0B7F		Cell Voltage N	>= 4.8V				
Hybrid Battery Voltage Sense O Circuit High	P0B84		Cell Voltage O	>= 4.8V	2nd Protection Self Test Diagnostic	Not Running		
Hybrid Battery Voltage Sense P Circuit High	P0B89		Cell Voltage P	>= 4.8V	No Active DTCs associated with VTSM Cell Balancing Fault	P1E92, P1E98, P1E9E, P1EA4		
Hybrid Battery Voltage Sense Q Circuit High	P0B8E		Cell Voltage Q	>= 4.8V	No Active DTCs associated with VTSM Internal Performance	P1E8E, P1E94, P1E9A, P1EA0		
Hybrid Battery Voltage Sense R Circuit High	P0B93		Cell Voltage R	>= 4.8V	No Active DTCs on VITM RESS Bus Off	U2401		
Hybrid Battery Voltage Sense S Circuit High	P0B98		Cell Voltage S	>= 4.8V				
Hybrid Battery Voltage Sense T Circuit High	P0B9D		Cell Voltage T	>= 4.8V				
Hybrid Battery Voltage Sense U Circuit High	P0BA2		Cell Voltage U	>= 4.8V				
Hybrid Battery Voltage Sense V Circuit High	P0BA7		Cell Voltage V	>= 4.8V				

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		Cell Voltage W	>= 4.8V				
Hybrid Battery Voltage Sense X Circuit High	P0BB1		Cell Voltage X	>= 4.8V				
Hybrid Battery Voltage Sense Y Circuit High	P0BB6		Cell Voltage Y	>= 4.8V				
Hybrid Battery Voltage Sense Z Circuit High	P0BBB		Cell Voltage Z	>= 4.8V				
Hybrid Battery Voltage Sense AA Circuit High	P1B18		Cell Voltage AA	>= 4.8V				
Hybrid Battery Voltage Sense AB Circuit High	P1B1B		Cell Voltage AB	>= 4.8V				
Hybrid Battery Voltage Sense AC Circuit High	P1B1E		Cell Voltage AC	>= 4.8V				
Hybrid Battery Voltage Sense AD Circuit High	P1B21		Cell Voltage AD	>= 4.8V				
Hybrid Battery Voltage Sense AE Circuit High	P1B24		Cell Voltage AE	>= 4.8V				
Hybrid Battery Voltage Sense AF Circuit High	P1B27		Cell Voltage AF	>= 4.8V				
Hybrid Battery Voltage Sense AG Circuit High	P1B47		Cell Voltage AG	>= 4.8V				
Hybrid Battery Voltage Sense AH Circuit High	P1B4A		Cell Voltage AH	>= 4.8V				
Hybrid Battery Voltage Sense AI Circuit High	P1B4D		Cell Voltage AI	>= 4.8V				
Hybrid Battery Voltage Sense AJ Circuit High	P1B50		Cell Voltage AJ	>= 4.8V				

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		Cell Voltage AK	>= 4.8V				
Hybrid Battery Voltage Sense AL Circuit High	P1B56		Cell Voltage AL	>= 4.8V				
Hybrid Battery Voltage Sense AM Circuit High	P1B59		Cell Voltage AM	>= 4.8V				
Hybrid Battery Voltage Sense AN Circuit High	P1B5C		Cell Voltage AN	>= 4.8V				
Hybrid Battery Voltage Sense AO Circuit High	P1B5F		Cell Voltage AO	>= 4.8V				
Hybrid Battery Voltage Sense AP Circuit High	P1B62		Cell Voltage AP	>= 4.8V				
Hybrid Battery Voltage Sense AQ Circuit High	P1B65		Cell Voltage AQ	>= 4.8V				
Hybrid Battery Voltage Sense AR Circuit High	P1B68		Cell Voltage AR	>= 4.8V				
Hybrid Battery Voltage Sense AS Circuit High	P1B6B		Cell Voltage AS	>= 4.8V				
Hybrid Battery Voltage Sense AT Circuit High	P1B6E		Cell Voltage AT	>= 4.8V				
Hybrid Battery Voltage Sense AU Circuit High	P1B71		Cell Voltage AU	>= 4.8V				
Hybrid Battery Voltage Sense AV Circuit High	P1B74		Cell Voltage AV	>= 4.8V				
Hybrid Battery Voltage Sense AW Circuit High	P1B77		Cell Voltage AW	>= 4.8V				
Hybrid Battery Voltage Sense AX Circuit High	P1B7A		Cell Voltage AX	>= 4.8V				

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		Cell Voltage AY	>= 4.8V				
Hybrid Battery Voltage Sense AZ Circuit High	P1B80		Cell Voltage AZ	>= 4.8V				
Hybrid Battery Voltage Sense BA Circuit High	P1B83		Cell Voltage BA	>= 4.8V				
Hybrid Battery Voltage Sense BB Circuit High	P1B86		Cell Voltage BB	>= 4.8V				
Hybrid Battery Voltage Sense BC Circuit High	P1B89		Cell Voltage BC	>= 4.8V				
Hybrid Battery Voltage Sense BD Circuit High	P1B8C		Cell Voltage BD	>= 4.8V				
Hybrid Battery Voltage Sense BE Circuit High	P1B8F		Cell Voltage BE	>= 4.8V				
Hybrid Battery Voltage Sense BF Circuit High	P1B92		Cell Voltage BF	>= 4.8V				
Hybrid Battery Voltage Sense BG Circuit High	P1B95		Cell Voltage BG	>= 4.8V				
Hybrid Battery Voltage Sense BH Circuit High	P1B98		Cell Voltage BH	>= 4.8V				
Hybrid Battery Voltage Sense BI Circuit High	P1B9B		Cell Voltage BI	>= 4.8V				
Hybrid Battery Voltage Sense BJ Circuit High	P1B9E		Cell Voltage BJ	>= 4.8V				
Hybrid Battery Voltage Sense BK Circuit High	P1BA1		Cell Voltage BK	>= 4.8V				
Hybrid Battery Voltage Sense BL Circuit High	P1BA4		Cell Voltage BL	>= 4.8V				

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		Cell Voltage BM	>= 4.8V				
Hybrid Battery Voltage Sense BN Circuit High	P1BAA		Cell Voltage BN	>= 4.8V				
Hybrid Battery Voltage Sense BO Circuit High	P1BAD		Cell Voltage BO	>= 4.8V				
Hybrid Battery Voltage Sense BP Circuit High	P1BB0		Cell Voltage BP	>= 4.8V				
Hybrid Battery Voltage Sense BQ Circuit High	P1BB3		Cell Voltage BQ	>= 4.8V				
Hybrid Battery Voltage Sense BR Circuit High	P1BB6		Cell Voltage BR	>= 4.8V				
Hybrid Battery Voltage Sense BS Circuit High	P1BB9		Cell Voltage BS	>= 4.8V				
Hybrid Battery Voltage Sense BT Circuit High	P1BBC		Cell Voltage BT	>= 4.8V				
Hybrid Battery Voltage Sense BU Circuit High	P1BBF		Cell Voltage BU	>= 4.8V				
Hybrid Battery Voltage Sense BV Circuit High	P1BC2		Cell Voltage BV	>= 4.8V				
Hybrid Battery Voltage Sense BW Circuit High	P1BC5		Cell Voltage BW	>= 4.8V				
Hybrid Battery Voltage Sense BX Circuit High	P1BC8		Cell Voltage BX	>= 4.8V				
Hybrid Battery Voltage Sense BY Circuit High	P1BCB		Cell Voltage BY	>= 4.8V				
Hybrid Battery Voltage Sense BZ Circuit High	P1BCE		Cell Voltage BZ	>= 4.8V				

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		Cell Voltage CA	>= 4.8V				
Hybrid Battery Voltage Sense CB Circuit High	P1BD4		Cell Voltage CB	>= 4.8V				
Hybrid Battery Voltage Sense CC Circuit High	P1BD7		Cell Voltage CC	>= 4.8V				
Hybrid Battery Voltage Sense CD Circuit High	P1BDA		Cell Voltage CD	>= 4.8V				
Hybrid Battery Voltage Sense CE Circuit High	P1BDD		Cell Voltage CE	>= 4.8V				
Hybrid Battery Voltage Sense CF Circuit High	P1BE0		Cell Voltage CF	>= 4.8V				
Hybrid Battery Voltage Sense CG Circuit High	P1BE3		Cell Voltage CG	>= 4.8V				
Hybrid Battery Voltage Sense CH Circuit High	P1BE6		Cell Voltage CH	>= 4.8V				
Hybrid Battery Voltage Sense CI Circuit High	P1BE9		Cell Voltage CI	>= 4.8V				
Hybrid Battery Voltage Sense CJ Circuit High	P1BEC		Cell Voltage CJ	>= 4.8V				
Hybrid Battery Voltage Sense CK Circuit High	P1BEF		Cell Voltage CK	>= 4.8V				
Hybrid Battery Voltage Sense CL Circuit High	P1BF2		Cell Voltage CL	>= 4.8V				
Hybrid Battery Voltage Sense CM Circuit High	P1BF5		Cell Voltage CM	>= 4.8V				
Hybrid Battery Voltage Sense CN Circuit High	P1BF8		Cell Voltage CN	>= 4.8V				

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		Cell Voltage CO	>= 4.8V				
Hybrid Battery Voltage Sense CP Circuit High	P1BFE		Cell Voltage CP	>= 4.8V				
Hybrid Battery Voltage Sense CQ Circuit High	P1E03		Cell Voltage CQ	>= 4.8V				
Hybrid Battery Voltage Sense CR Circuit High	P1E06		Cell Voltage CR	>= 4.8V				
Hybrid Battery Voltage Sense A Circuit	P0B3B	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V|	Case 2 : |1st Cell V – 2nd Cell V| > 1V	Diagnostic Enable	TRUE	600 ms out of a 600 ms window	One Trip
Hybrid Battery Voltage Sense B Circuit	P0B40		**Case 2: General Cell Voltage Sensing Line** Affected Cell Voltage- Adjacent Cell		Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE	Frequency- 200 ms	
Hybrid Battery Voltage Sense C Circuit	P0B45		**Case 3: Bus Bar (+) Side Sensing Line** Affected Cell Voltage- One Cell	Case 3 : Busbar Cap Voltage > 0.7V **&** Busbar + Side Cell Voltage < 2.5V	No Active DTCs associated with VTSM Loss of Comm	U2603, U2604, U2605, U2606		
Hybrid Battery Voltage Sense D Circuit	P0B4A		**Case 4: Bus Bar (-) Side Sensing Line** Affected Cell Voltage- One Cell		No Active DTCs associated with VTSM 5V Ref Diagnostic	P1E93, P1E99, P1E9F, P1EA5		
			Case 5: Common Power Line					

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		Affected Cell Voltage-Adjacent Cells (No Power Off) *Note- **Case 1: Single Power Line** Case 1 causes the slave ASIC to not be powered resulting in all affected cell voltages = 0V	Case 4 : Busbar Cap Voltage > 0.7V **&** Busbar + Side Cell Voltage > 2.5V Case 5 : |1st Cell V – 2nd Cell V| > 0.5V	No Active DTCs associated with Open Sense Line	P0B3B, P0B40, P0B45, P0B4A, P0B4F, P0B54, P0B59, P0B5E, P0B63, P0B68, P0B6D, P0B77, P0B7C, P0B81, P0B86, P0B8B, P0B95, P0B9A, P0B9F, P0BA4, P0BA9, P0BAE, P0BB3, P0BB8, P1B28, P1B29, P1B2A, P1B2B, P1B2C, P1B2D, P1E4C, P1E4D, P1E4E, P1E4F, P1E50, P1E51, P1E52, P1E53, P1E54, P1E56, P1E57, P1E58, P1E59, P1E5A, P1E5B, P1E5C, P1E5D, P1E5E, P1E5F, P1E60, P1E61, P1E62, P1E63, P1E64, P1E65, P1E66,		
Hybrid Battery Voltage Sense F Circuit	P0B54							
Hybrid Battery Voltage Sense G Circuit	P0B59							
Hybrid Battery Voltage Sense H Circuit	P0B5E							
Hybrid Battery Voltage Sense I Circuit	P0B63					P1E67, P1E68, P1E69, P1E6A, P1E6B, P1E6C, P1E6E, P1E6F, P1E70, P1E71, P1E72, P1E73, P1E74, P1E75, P1E76, P1E77, P1E78, P1E79, P1E7A, P1E7B, P1E7C, P1E7D, P1E7E, P1E7F, P1E80, P1E81, P1E82, P1E83, P1E84, P1E86, P1E87, P1E88, P1E89, P1E8A		
Hybrid Battery Voltage Sense J Circuit	P0B68							
Hybrid Battery Voltage Sense K Circuit	P0B6D							
Hybrid Battery Voltage Sense M Circuit	P0B77							

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							
Hybrid Battery Voltage Sense O Circuit	P0B81				2nd Protection Self Test Diagnostic	Not Running		
Hybrid Battery Voltage Sense P Circuit	P0B86				No Active DTCs associated with VTSM Cell Balancing Fault	P1E92, P1E98, P1E9E, P1EA4		
Hybrid Battery Voltage Sense Q Circuit	P0B8B				No Active DTCs associated with VTSM Internal Performance	P1E8E, P1E94, P1E9A, P1EA0		
Hybrid Battery Voltage Sense S Circuit	P0B95				No Active DTCs on VITM RESS Bus Off	U2401		
Hybrid Battery Voltage Sense T Circuit	P0B9A							
Hybrid Battery Voltage Sense U Circuit	P0B9F							
Hybrid Battery Voltage Sense V Circuit	P0BA4							
Hybrid Battery Voltage Sense W Circuit	P0BA9							
Hybrid Battery Voltage Sense X Circuit	P0BAE							
Hybrid Battery Voltage Sense Y Circuit	P0BB3							
Hybrid Battery Voltage Sense Z Circuit	P0BB8							
Hybrid Battery Voltage Sense AA Circuit	P1B28							

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							
Hybrid Battery Voltage Sense AC Circuit	P1B2A							
Hybrid Battery Voltage Sense AD Circuit	P1B2B							
Hybrid Battery Voltage Sense AE Circuit	P1B2C							
Hybrid Battery Voltage Sense AF Circuit	P1B2D							
Hybrid Battery Voltage Sense AG Circuit	P1E4C							
Hybrid Battery Voltage Sense AH Circuit	P1E4D							
Hybrid Battery Voltage Sense AI Circuit	P1E4E							
Hybrid Battery Voltage Sense AJ Circuit	P1E4F							
Hybrid Battery Voltage Sense AK Circuit	P1E50							
Hybrid Battery Voltage Sense AL Circuit	P1E51							
Hybrid Battery Voltage Sense AM Circuit	P1E52							
Hybrid Battery Voltage Sense AN Circuit	P1E53							
Hybrid Battery Voltage Sense AO Circuit	P1E54							

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							
Hybrid Battery Voltage Sense AR Circuit	P1E57							
Hybrid Battery Voltage Sense AS Circuit	P1E58							
Hybrid Battery Voltage Sense AT Circuit	P1E59							
Hybrid Battery Voltage Sense AU Circuit	P1E5A							
Hybrid Battery Voltage Sense AV Circuit	P1E5B							
Hybrid Battery Voltage Sense AW Circuit	P1E5C							
Hybrid Battery Voltage Sense AX Circuit	P1E5D							
Hybrid Battery Voltage Sense AY Circuit	P1E5E							
Hybrid Battery Voltage Sense AZ Circuit	P1E5F							
Hybrid Battery Voltage Sense BA Circuit	P1E60							
Hybrid Battery Voltage Sense BB Circuit	P1E61							
Hybrid Battery Voltage Sense BC Circuit	P1E62							
Hybrid Battery Voltage Sense BD Circuit	P1E63							

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							
Hybrid Battery Voltage Sense BF Circuit	P1E65							
Hybrid Battery Voltage Sense BG Circuit	P1E66							
Hybrid Battery Voltage Sense BH Circuit	P1E67							
Hybrid Battery Voltage Sense BI Circuit	P1E68							
Hybrid Battery Voltage Sense BJ Circuit	P1E69							
Hybrid Battery Voltage Sense BK Circuit	P1E6A							
Hybrid Battery Voltage Sense BL Circuit	P1E6B							
Hybrid Battery Voltage Sense BM Circuit	P1E6C							
Hybrid Battery Voltage Sense BO Circuit	P1E6E							
Hybrid Battery Voltage Sense BP Circuit	P1E6F							
Hybrid Battery Voltage Sense BQ Circuit	P1E70							
Hybrid Battery Voltage Sense BR Circuit	P1E71							
Hybrid Battery Voltage Sense BS Circuit	P1E72							

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							
Hybrid Battery Voltage Sense BU Circuit	P1E74							
Hybrid Battery Voltage Sense BV Circuit	P1E75							
Hybrid Battery Voltage Sense BW Circuit	P1E76							
Hybrid Battery Voltage Sense BX Circuit	P1E77							
Hybrid Battery Voltage Sense BY Circuit	P1E78							
Hybrid Battery Voltage Sense BZ Circuit	P1E79							
Hybrid Battery Voltage Sense CA Circuit	P1E7A							
Hybrid Battery Voltage Sense CB Circuit	P1E7B							
Hybrid Battery Voltage Sense CC Circuit	P1E7C	DTC Pass		Case 2 : |1st Cell V – 2nd Cell V| <= 1V			600 ms	
Hybrid Battery Voltage Sense CD Circuit	P1E7D							
Hybrid Battery Voltage Sense CE Circuit	P1E7E			Case 3 : Busbar Cap Volt <= 0.7V				
Hybrid Battery Voltage Sense CF Circuit	P1E7F							

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			Case 4 : Busbar Cap Volt > 0.7V				
Hybrid Battery Voltage Sense CH Circuit	P1E81							
Hybrid Battery Voltage Sense CI Circuit	P1E82			Case 5: |1st Cell V - 2nd Cell V| <= 0.5V				
Hybrid Battery Voltage Sense CJ Circuit	P1E83							
Hybrid Battery Voltage Sense CK Circuit	P1E84							
Hybrid Battery Voltage Sense CM Circuit	P1E86							
Hybrid Battery Voltage Sense CN Circuit	P1E87							
Hybrid Battery Voltage Sense CO Circuit	P1E88							
Hybrid Battery Voltage Sense CP Circuit	P1E89							
Hybrid Battery Voltage Sense CQ Circuit	P1E8A							
Hybrid Battery Temperature Sensor Circuit Low	P0A9D	Sets when Temperature Sensor X falls below a Threshold	Temperature Sensor X	Temperature Sensor X > 87.5C (ADC Count < 680)	Diagnostic Enable	TRUE	1.4 seconds in a 2 second window	Two Trips
Hybrid Battery 2 Temperature Sensor Circuit Low Voltage	P0AC7				Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE	Frequency- 200 ms	

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				No Active DTCs associated with VTSM Loss of Comm	U2603, U2604, U2605, U2606		
Hybrid Battery 4 Temperature Sensor Circuit Low Voltage	P0AEA				No Active DTCs associated with VTSM 5V Ref Diagnostic	P1E93, P1E99, P1E9F, P1EA5		
Hybrid Battery Temperature Sensor E Circuit Low	P0BC4				No Active DTCs associated with Open Sense Line	P0B3B, P0B40, P0B45, P0B4A, P0B4F, P0B54, P0B59, P0B5E, P0B63, P0B68, P0B6D, P0B77, P0B7C, P0B81, P0B86, P0B8B, P0B95, P0B9A, P0B9F, P0BA4, P0BA9, P0BAE, P0BB3, P0BB8, P1B28, P1B29, P1B2A, P1B2B, P1B2C, P1B2D, P1E4C, P1E4D, P1E4E, P1E4F, P1E50, P1E51, P1E52, P1E53, P1E54, P1E56, P1E57, P1E58, P1E59, P1E5A, P1E5B, P1E5C, P1E5D, P1E5E, P1E5F, P1E60, P1E61, P1E62, P1E63, P1E64,		
Hybrid Battery Temperature Sensor F Circuit Low	P0C35					P1E65, P1E66, P1E67, P1E68, P1E69, P1E6A, P1E6B, P1E6C, P1E6E, P1E6F, P1E70, P1E71, P1E72, P1E73, P1E74, P1E75, P1E76, P1E77, P1E78, P1E79, P1E7A, P1E7B, P1E7C, P1E7D, P1E7E, P1E7F, P1E80, P1E81, P1E82, P1E83, P1E84, P1E86, P1E87, P1E88, P1E89, P1E8A		
Hybrid Battery Temperature Sensor G Circuit Low	P0C7E				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 Battery Temperature Sensor H Circuit Low	P0C83				No Active DTCs associated with VTSM Cell Balancing Fault	P1E92, P1E98, P1E9E, P1EA4		
Hybrid Battery Temperature Sensor I Circuit Low	P0C8A				No Active DTCs associated with VTSM Internal Performance	P1E8E, P1E94, P1E9A, P1EA0		
Hybrid Battery Temperature Sensor J Circuit Low	P0C8F				No Active DTCs on VITM RESS Bus Off	U2401		
Hybrid Battery Temperature Sensor K Circuit Low	P0C94							
Hybrid Battery Temperature Sensor L Circuit Low	P0C99							
Hybrid Battery Temperature Sensor M Circuit Low	P0CAA	DTC Pass		Temperature Sensor X <= 87.5C (ADC Count >= 680)			2 Seconds	
Hybrid Battery Temperature Sensor N Circuit Low	P0CAF							
Hybrid Battery Temperature Sensor O Circuit Low	P0CB4							
Hybrid Battery Temperature Sensor P Circuit Low	P0CB9							
Hybrid Battery Temperature Sensor Circuit	P0A9E	Sets when Temperature Sensor X falls above a Threshold	Temperature Sensor X	Temperature Sensor X < -40C	Diagnostic Enable	TRUE	1.4 seconds in a 2 second window	Two 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	[illegible] above a Threshold		[illegible] (ADC Count > 4000)	Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE	Frequency-200 ms	
Hybrid Battery 3 Temperature Sensor Circuit High Voltage	P0ACD				No Active DTCs associated with VTSM Loss of Comm	U2603, U2604, U2605, U2606		
Hybrid Battery 4 Temperature Sensor Circuit High Voltage	P0AEB				No Active DTCs associated with VTSM 5V Ref Diagnostic	P1E93, P1E99, P1E9F, P1EA5		
Hybrid Battery Temperature Sensor E Circuit High	P0BC5				No Active DTCs associated with Open Sense Line	P0B3B, P0B40, P0B45, P0B4A, P0B4F, P0B54, P0B59, P0B5E, P0B63, P0B68, P0B6D, P0B77, P0B7C, P0B81, P0B86, P0B8B, P0B95, P0B9A, P0B9F, P0BA4, P0BA9, P0BAE, P0BB3, P0BB8, P1B28, P1B29, P1B2A, P1B2B, P1B2C, P1B2D, P1E4C, P1E4D, P1E4E, P1E4F, P1E50, P1E51, P1E52, P1E53, P1E54, P1E56, P1E57, P1E58, P1E59, P1E5A, P1E5B, P1E5C, P1E5D, P1E5E, P1E5F, P1E60, P1E61, P1E62, P1E63, P1E64,		
Hybrid Battery Temperature Sensor F Circuit High	P0C36					P1E65, P1E66, P1E67, P1E68, P1E69, P1E6A, P1E6B, P1E6C, P1E6E, P1E6F, P1E70, P1E71, P1E72, P1E73, P1E74, P1E75, P1E76, P1E77, P1E78, P1E79, P1E7A, P1E7B, P1E7C, P1E7D, P1E7E, P1E7F, P1E80, P1E81, P1E82, P1E83, P1E84, P1E86, P1E87, P1E88, P1E89, P1E8A		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Temperature Sensor G Circuit High	P0C7F				2nd Protection Self Test Diagnostic	Not Running		
Hybrid Battery Temperature Sensor H Circuit High	P0C84				No Active DTCs associated with VTSM Cell Balancing Fault	P1E92, P1E98, P1E9E, P1EA4		
Hybrid Battery Temperature Sensor I Circuit High	P0C8B				No Active DTCs associated with VTSM Internal Performance	P1E8E, P1E94, P1E9A, P1EA0		
Hybrid Battery Temperature Sensor J Circuit High	P0C90				No Active DTCs on VITM RESS Bus Off	U2401		
Hybrid Battery Temperature Sensor K Circuit High	P0C95							
Hybrid Battery Temperature Sensor L Circuit High	P0C9A							
Hybrid Battery Temperature Sensor M Circuit High	P0CAB	DTC Pass		Temperature Sensor X >= -40C (ADC Count <= 4000)			2 Seconds	
Hybrid Battery Temperature Sensor N Circuit High	P0CB0							
Hybrid Battery Temperature Sensor O Circuit High	P0CB5							
Hybrid Battery Temperature Sensor P Circuit High	P0CBA							
Battery Energy	P1AE6	Sets when AC	AC (alternating current)	If there is no return	Diagnostic Enable	TRUE	1.4 seconds in a	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Hybrid Battery Voltage Isolation Sensor Circuit		(alternating current) Isolation Circuit is detected Faulted	Isolation Circuit	signal for isolation test signal (sine-wave)	Run/Crank, Accessory/Run or HVEM EB Comm Enable VICM Isolation Start Request VITM System Voltage No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H High Voltage Contactor Status	TRUE TRUE > 11V U185B Open	2 second window Frequency-200 ms	
		DTC Pass		If there is return signal for isolation test signal (sine-wave)			2 Seconds	
Hybrid Battery Pack Coolant Temperature Sensor Circuit Low	P0C44	Sets when Inlet Coolant Temp Sensor falls below a Threshold	Inlet Temp	Inlet Temp >= 87.9C (ADC Count <= 130)	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit VITM System Voltage	TRUE TRUE P1A07 >= 9V	1.75 seconds in a 2.5 seconds window Frequency-250 ms	Two Trips
		DTC Pass		Inlet Temp < 87.9C (ADC Count > 130)			2.5 Seconds	
Hybrid Battery	P0C45	Sets when Inlet	Inlet Temp	Inlet Temp <	Diagnostic Enable	TRUE	1.75 seconds in	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pack Coolant Temperature Sensor Circuit High		Coolant Temp Sensor goes above a Threshold		-40C (ADC Count > 3823)	Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit VITM System Voltage	TRUE P1A07 >= 9V	a 2.5 seconds window Frequency-250 ms	
		DTC Pass		Inlet Temp >= -40C (ADC Count <= 3823)			2.5 Seconds	
Hybrid/EV Battery Pack Coolant Temperature Sensor B Circuit Low	P0CD7	Sets when Outlet Coolant Temp Sensor falls below a Threshold	Outlet Temp	Inlet Temp >= 87.9C (ADC Count <= 130)	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit VITM System Voltage	TRUE TRUE P1A07 >= 9V	1.75 seconds in a 2.5 seconds window Frequency-250 ms	Two Trips
		DTC Pass		Inlet Temp < 87.9C (ADC Count > 130)			2.5 Seconds	
Hybrid/EV Battery Pack Coolant Temperature Sensor B Circuit High	P0CD8	Sets when Outlet Coolant Temp Sensor goes above a Threshold	Outlet Temp	Outlet Temp < -40C (ADC Count > 3823)	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit VITM System Voltage	TRUE TRUE P1A07 >= 9V	1.75 seconds in a 2.5 seconds window Frequency-250 ms	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass		Outlet Temp >= -40C (ADC Count <= 3823)			2.5 Seconds	
Hybrid Battery Pack Voltage Sense Circuit Low	P0ABC	If Pack side Voltage is below Threshold	Pack Voltage	< 24V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit VITM System Voltage	TRUE TRUE P1A07 >= 9V	175 ms in a 250 ms window Frequency- 25 ms	One Trip
		DTC Pass		Pack Voltage >= 24V			250 ms	
Hybrid Battery Pack Voltage Sense Circuit High	P0ABD	If Pack side Voltage is above Threshold	Pack Voltage	> 456V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit VITM System Voltage	TRUE TRUE P1A07 >= 9V	175 ms in a 250 ms window Frequency- 25 ms	One Trip
		DTC Pass		Pack Voltage <= 456V			250 ms	
Hybrid Battery Pack Current Sensor B Circuit Low	P0B10	If Fine Current is below Threshold	Fine Current	< -23A	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	175 ms in a 250 ms window Frequency- 25 ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit	P1A07		
					VITM System Voltage	>= 9V		
		DTC Pass		Fine Current >= -23A			250 ms	
Hybrid Battery Pack Current Sensor B Circuit High	P0B11	If Fine Current is above Threshold	Fine Current	> 23A	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	175 ms in a 250 ms window Frequency-25 ms	One Trip
					No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit	P1A07		
					VITM System Voltage	>= 9V		
		DTC Pass		Fine Current <= 23A			250 ms	
Hybrid Battery Pack Current Sensor Circuit Low	P0AC1	If Coarse Current is below Threshold	Coarse Current	< -470A	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	175 ms in a 250 ms window Frequency-25 ms	One Trip
					No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit	P1A07		
					VITM System Voltage	>= 9V		
		DTC Pass		Coarse Current >= -470A			250 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	> 280A	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	175 ms in a 250 ms window Frequency-25ms	One Trip
					No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit	P1A07		
					VITM System Voltage	>= 9V		
		DTC Pass		Coarse Current <= 280A			250 ms	
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 Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	At power up - 185 ms	One Trip
					High Voltage Contactor Status	Open		
					Charger Contactor Status	Open		
					5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	2.8V to 3.2V *Please note that this is not the 5v Ref. diagnostic, but a reading taken at the point when the Offset diagnostic is about to start		
					VITM System Voltage	>= 9V		
					VITM Initalization Status Extended	Initializing		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					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	
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 Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	At power up - 185 ms	One Trip
					High Voltage Contactor Status	Open		
					Charger Contactor Status	Open		
					5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	2.8V to 3.2V *Please note that this is not the 5v Ref. diagnostic, but a reading taken at the point when the Offset diagnostic is about to start		
					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		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass		|Pack Current Fine Offset| <= 2.5A			At power up - 185 ms	
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 Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	600 ms in a 1 second window Frequency- 25 ms	One Trip
		DTC Pass		2.8V <= 5V Reference Value <= 3.2V			1 Second	
Battery Energy Control Module System Voltage Low	P1A0C	If 12V System Voltage is below Threshold	12V System Voltage	< 9.0V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit	TRUE TRUE P1A07	5 seconds in a 6 seconds window Frequency: 1 Second	Special Type C
		DTC Pass		12V System Voltage >= 9.0V			6 Seconds	
Battery Energy Control Module System Voltage High	P1A0D	If 12V System Voltage is above Threshold	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 Frequency: 1 Second	Special Type C

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit	P1A07		
		DTC Pass		12V System Voltage >= 18.5V			6 Seconds	
Battery Energy Control Module Communication Bus A Off	U180B	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 Frequency- 200 ms	Two Trips
		DTC Pass		TEC < 255			2 Seconds	
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 Frequency- 200 ms	Two Trips
		DTC Pass		TEC < 255			2 Seconds	
Battery Energy Control Module Lost Communication with Hybrid Powertrain Control Module B on Bus H	U185B	If message $20A is not Received by VITM	Loss of Supervision with VICM module on Charger CAN bus	# of consecutive $20A message not received > 5	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	700 ms in a 1 second window Frequency- 100 ms	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass		1			1 Second	
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 $20A message not received > 10	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module Communication Bus A Off VITM System Voltage Flashing Programming Session (Other Modules or itself) Mode $28 Executed on HS Bus	TRUE TRUE U180B >= 9V Completed TRUE	1.75 seconds in a 2 second window Frequency-250 ms	Two Trips
		DTC Pass		1			2 Seconds	
Battery Energy Control Module Random Accessoryess Memory (RAM)	P1A05	RAM Read Write function Failed	RAM Read not Equal to RAM Written	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM Initalization Status Extended VITM System Voltage	TRUE TRUE Initializing >= 9V	At power up - 10 ms	One Trip
		DTC Pass		1			At power up - 10 ms	

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 Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM Initalization Status Extended VITM System Voltage	TRUE TRUE Initializing >= 9V	At power up - 5 ms up to 400 ms	One Trip
		DTC Pass		1			At power up - 5 ms up to 400	
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	One Trip
		DTC Pass		1				
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 Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module Communication Bus H Bus Off VITM System Voltage	TRUE TRUE U1806 >= 9V	5 seconds in a 6 second window Frequency-1000 ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit	P1A07		
					No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H	U185B		
		DTC Pass		RunCrank Input >= 5V			6 seconds	
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 Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	5 seconds in a 6 second window Frequency-1000 ms	One Trip
					No Active DTC for Battery Energy Control Module Communication Bus H Bus Off	U1806		
					VITM System Voltage	>= 9V		
					No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit	P1A07		
					No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H	U185B		
		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	Accessory Hardwire Input and Serial Data signal	RunCrank Input < 5V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module Communication Bus A Off No Active DTC for Battery Energy Control Module Lost Communication With with HCP (TPIM) on Bus A (HS GMLAN Bus) VITM System Voltage No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit Run/Crank Propulsion System Active Accessory Diagnostic Delay	TRUE TRUE U180B U1885 >= 9V P1A07 Transitions: False to True TRUE Expired	100 ms in a 125 ms window	Two Trips
		DTC Pass		RunCrank Input >= 5V			100 ms in a 125 ms window	
Battery Energy	U2603	If associated message	Loss of Supervision with	# of consecutive	Diagnostic Enable	TRUE	2.8 seconds in a	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Lost Communication with Hybrid Batterry Interface Control Module X	U2604 U2605 U2606	from Slave is not received	VTSMx on Private CAN bus	serial data message from VTSMx not received > 7	Run/Crank, Accessory/Run or HVEM EB Comm Enable 2nd Protection Self Test Diagnostic VITM System Voltage	TRUE Not Running >= 9V	4 second window Frequency-400 ms	
		DTC Pass		1			4 Seconds	
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 Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module Communication Bus A Off VITM System Voltage No Active DTC for Battery Energy Control Module System Voltage Low No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus A (HS)	TRUE TRUE U180B >= 9V P1A0C P1A07 U2602	7 seconds in a 10 second window Frequency-1000 ms	One Trip
		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
Battery Energy Control Module Dedicated Bus 1 Off	U2401	If Bus Off is Detected	Transmit Error Counter (TEC)	TEC > 255	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	1.4 seconds in a 2 second window Frequency- 200 ms	One Trip
		DTC Pass		TEC < 255			2 Seconds	
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 Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module Communication Bus A Off VITM System Voltage Flashing Programming Session (Other Modules or itself) Mode $28 Executed on HS Bus	TRUE TRUE U180B >= 9V Completed TRUE	2.8 seconds in a 4 second window Frequency- 100 ms	Two Trips
		DTC Pass		1			4 Seconds	
Hybrid Battery	P1E92	Cell Balance switch	Cell Balance switch is	4.0V < Cell Voltage <	Diagnostic Enable	TRUE	14 seconds in a	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Interface Control Module x Cell Balancing Circuit	P1E98 P1E9E P1EA4	output	below threshold	5.0V Threshold = 66mV 3.5V < Cell Voltage < 4.0V Threshold = 41mV 3.0V < Cell Voltage < 3.5V Threshold = 22mV	Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTCs associated with VTSM Loss of Comm 2nd Protection Self Test Diagnostic No Active DTCs associated with VTSM Internal Performance No Active DTCs on VITM RESS Bus Off	TRUE U2603, U2604, U2605, U2606 Not Running P1E8E, P1E94, P1E9A, P1EA0 U2401	20 seconds window Frequency- 200 ms	
		DTC Pass		Threshold is above values specified for Cell Voltage specified			20 Seconds	
Hybrid Battery Interface Control Module x ROM	P1E90 P1E96 P1E9C P1EA2	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 VTSM Loss of Comm	TRUE Transitions: TRUE to FALSE (During VTSMx Power down) U2603, U2604, U2605, U2606	At power down- Total of 824 ms for all slaves	One Trip
		DTC Pass		1			At power down- Total of	
Hybrid Battery Interface Control Module x RAM	P1E8F P1E95	RAM Read Write function Failed	RAM Read not Equal to RAM Written	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE Transitions: TRUE to FALSE (During VTSMx Power down)	At power up- Total of 58 ms for all slaves	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P1E9B P1EA1				No Active DTCs associated with VTSM Loss of Comm	U2603, U2604, U2605, U2606		
		DTC Pass		1			At power up- Total of 58 ms for	
Hybrid Battery Interface Control Module x KAM	P1E91 P1E97 P1E9D 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 VTSM Loss of Comm	TRUE Transitions: TRUE to FALSE (During VTSMx Power down) U2603, U2604, U2605, U2606	At power down- Total of 26 ms for all Slaves	One Trip
		DTC Pass		1			At power down- Total of 26 ms for	
Hybrid Battery Interface Control Module x Performance	P1E8E P1E94 P1E9A P1EA0	VTSMx Software Watchdog OR SPI Bus Malfunction (Read Value from Register Not Equal to Written Value)	If Watchdog resets controller OR Wrong value Read	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	N/A instantaneous - Watchdog Reset 500us - SPI Bus	One Trip
		DTC Pass		Both should pass			500 us in 200ms window	
Hybrid Battery	P1E93	Sets when 5V VTSM	5V Reference Value	5V Reference Value	Diagnostic Enable	TRUE	1.4 seconds in a	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Interface Control Module x 5V Ref	P1E99 P1E9F P1EA5	reference voltage is out of range	(Circuit for Reference Diagnostic, Shunt Regulator)	< 2.8V or 5V Reference Value > 3.5V	Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTCs associated with VTSM Loss of Comm 2nd Protection Self Test Diagnostic	TRUE U2603, U2604, U2605, U2606 Not Running	2.0 seconds window Frequency-200ms	
		DTC Pass		2.8V <= 5V Reference Value <= 3.5V			2.0 seconds	
Hybrid/EV Battery Interface Control Module Software IncompatibleBatter y Energy Control Module Lost Communication with Hybrid Processor Control Module B on HS	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 VTSM Loss of Comm No Active DTCs on VITM RESS Bus Off	TRUE TRUE >= 9V U2603, U2604, U2605, U2606 U2401	At power up-200 ms	One Trip
		DTC Pass		1			At power up-200 ms	
Hybrid/EV Battery Interface Control Module x Not Programmed	P1EB2 P1EB3 P1EB4	If VTSMx 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	 TRUE TRUE	As soon as Programming session ends	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P1EB5				VITM System Voltage	>= 9V		
		DTC Pass		1			As soon as Programming session ends	
Hybrid/EV Battery Interface Control Module x Processor Performance	P1F06	Compare VTSMx Reported Value with Expected Value in VITM	Reported Key Value by VTSMx is not correct	5	Diagnostic Enable	TRUE	1 second in a 1.4 second window Frequency-200 ms	One Trip
	P1F07				Seed and Key Algorithm Calibration	TRUE		
	P1F08				Run/Crank, Accessory or HVEM EB Comm Enable	TRUE		
	P1F09				No Active DTCs associated with VTSM Loss of Comm	U2603, U2604, U2605, U2606		
					No Active DTCs on VITM RESS Bus Off	U2401		
					2nd Protection Self Test Diagnostic	Not Running		
		DTC Pass		5			1.4 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
MCP A Phase Current Diagnostics								
Drive Motor "A" Phase U-V-W Correlation	P0BFD	To detect electrical failure of phase current sensor.	Sum of 3 phase currents	>156 A	Wakeup Signal	On	X: 160 ct Y: 190 ct R: 0.11 - 0.5 ms T: 17.6 - 80 ms	One Trip, Type A
Drive Motor "A" Phase U-V-W Current Sensor Overcurrent	P0C01	**Fail Case 1**: To detect fast, repeated 3 Phase over currents and to protect IGBT.	U, V, or W Phase current sensor	> 725 A	Wakeup Signal	On	X: 2 cts Y: 10 cts R: 2.08 ms T: 4.2 ms	One Trip, Type A
		Fail Case 2: To detect slow, intermittent 3 Phase over currents and to protect IGBT.					X: 5 cts Y: 50 cts R: 2.08 ms T: 10.4 ms	
Drive Motor "A" Phase U-V-W Circuit/Open	P0C05	Drive Motor "A" Missing Motor Current checks for minimum current in each phase when rotor position is near that peak's phase axis. Each phase is checked individually as rotor turns.	ABS(Peak Phase Axis Current)	< 9 A	Inverter State Inverter Voltage Rotor Position Current Commanded	RUN > 35 V -30 deg < Phase Axis < +30 deg >= 23 A	X: 200 ct Y: N/A R: 0.11-0.5 ms T: 22 - 100 ms	One Trip, Type A
Drive Motor "A" Phase U Current Sensor Circuit Low	P0BE7	Circuit Low monitor to detect the failure of U-phase current sensor circuit below valid range	U Phase current sensor output at highside	< -800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "A" Phase U Current Sensor Circuit High	P0BE8	Circuit High monitor to detect the failure of U-phase current sensor circuit above valid range	U Phase current sensor output at highside	> 800 A	Wakeup Signal	On	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					PWM Output Enable	FALSE		
Drive Motor "A" Phase U Current Sensor Offset Out-of Range	P0BE6	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	U Phase offset current output at highside	>30 A	Wakeup Signal Power Stage No Active DTCs:	On OPEN P0BE7/P0BE8	X: 8 cts Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Drive Motor "A" Phase V Current Sensor Circuit Low	P0BEB	Circuit Low monitor to detect the failure of V-phase current sensor circuit below valid range	V Phase current sensor output at highside	< -800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "A" Phase V Current Sensor Circuit High	P0BEC	Circuit High monitor to detect the failure of V-phase current sensor circuit above valid range	V Phase current sensor output current at highside	> 800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "A" Phase V Current Sensor Offset Out-of Range	P0BEA	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	V Phase offset current output at highside	>30 A	Wakeup Signal Power Stage No Active DTCs:	On OPEN P0BEB/P0BEC	X: 8 cts Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Drive Motor "A" Phase W Current Sensor Circuit Low	P0BEF	Circuit Low monitor to detect the failure of W-phase current sensor circuit below valid range	W Phase current sensor output at highside	< -800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "A" Phase W Current Sensor Circuit High	P0BF0	Circuit High monitor to detect the failure of W-phase current sensor circuit above valid range	W Phase current sensor output at highside	> 800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A

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	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	W Phase offset current output at highside	>30 A	Wakeup Signal Power Stage No Active DTCs:	On OPEN P0BEF/P0BF0	X: 8 cts Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
MCP A IGBT Diagnostics								
Drive Motor "A" Inverter Performance	P0A78	Detects IGBT Desaturation Faults Monitors hw status line to detect internal overcurrent faults, shoot through, or loss of switching control events	Phase A, B, or C High or Low Side Devices	OVERDRIVEN (Status Fault Bit)	Wakeup Signal High Voltage	On > 100V	X: 1 ct Y: N/A R: 2.08ms T: 2.08ms	One Trip, Type A
Drive Motor "A" Inverter Power Supply Circuit/Open	P0C0B	Detects IGBT Bias Faults Monitors hw status line to detect loss of power supply to gate drive board	Phase A, B, or C Power Supply	FAILED (Status Fault Bit)	Inverter State High Voltage	Initialization Complete > 100V	X: 1 ct Y: N/A R: 2.08ms T: 2.08ms	One Trip, Type A
MCP A High Voltage (HV) Diagnostics								
Drive Motor "A" Hybrid Battery System Voltage High	P1AEE	To detect over voltage and to protect TPIM HV Circuit	HV Sensor Voltage	> 425V	Controller Initialization	Complete	X: 3 cts Y: N/A R: 0.1 - 0.5 ms T: 0.3 - 1.50 ms	One Trip, Type A
Drive Motor "A" Control Module Hybrid Battery Voltage Sense Circuit Low Voltage	P1AE8	Circuit Low monitor of HV output voltage sensor	HV Sensor Voltage	<30V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A

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 Sense Circuit High Voltage	P1AE9	Circuit High monitor of HV output voltage sensor	HV Sensor Voltage	>500 V	Controller Initialization Run/Crank	Complete Active	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A
Drive Motor "A" Control Module Hybrid Battery System Voltage	P1AEC	To check correlation of HV with sum of mid-pack voltages and HV_Battery.	ABS(HV - HV_Battery) AND ABS(HV - sum of mid-pack voltages)	>= 40 V >= 50 V	No Active DTCs: Controller Initialization Contactors	P1AE8, P1AE9 Closed	X: 18 cts Y: 30 cts R: 10.4ms T: 187ms	Two Trips, Type B
Drive Motor "A" Control Module Hybrid Battery Voltage System Isolation Fault	P1AF0	Isolation Lost between mid-pack voltage and chassis	Isolation Ratio (Neg mid-pack voltage / Pos mid-pack voltage)	>4.53	No Active DTCs: Controller Initialization	P1AE8, P1AE9, P1AEC Complete	X: 240 cts Y: 480 cts R: 10.4 ms T: 2496 ms	Two Trips, Type B
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 1 Circuit Low	P1AF4	Circuit 1 Low monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage	<20V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 1 Circuit High	P1AF5	Circuit 1 High monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage - HV	>40 V	No Active DTCs: Controller Initialization Run/Crank	P1AE8, P1AE9 Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B

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	Circuit 2 Low monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage	<20V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit High	P1B0C	Circuit 2 High monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage - HV	>40 V	No Active DTCs: Controller Initialization Run/Crank	P1AE8, P1AE9 Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensing Performance	P1B41	To check correlation of sum of mid-pack voltages against HV and HV_Battery	ABS(Pos mid-pack - Neg mid-pack - HV_Battery) and ABS(Pos mid-pack - Neg mid-pack - HV)	>= 40 V >= 50 V	No Active DTCs: Controller Initialization Run/Crank	P1AE8, P1AE9, P1B0B, P1B0C Complete Active	X: 100 cts Y: 150 cts R: 10.4ms T: 1040ms	Two Trips, Type B
Motor A Temp Sensor Diagnostics								
Drive Motor "A" Control Module Temperature Sensor Performance	P0A2B	Motor A Temperature Sensor In-Range Rationality Check	ABS(Motor Thermistor Temperature - the average of (Power Electronic Coolant Temperature and Transmission Fluid	> 20 deg C	Wake Up Signal Propulsion System Inactive Time Thermal Conditioning Off Time Charge Off Time	On >=21600s >=7200s >=7200s	300 cts Start Delay PLUS X: 550 cts Y: 700 cts	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Cold Start Average Temperature	> -20C	R: 10.4ms T: 2080ms =8.84 sec total	
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Tranmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		
					Battery Thermal Conditioning Inactive Fault Active	FALSE		
					Battery Thermal Conditioning Inactive Mask	Use Data		
					Plug In Charging Present	TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active Motor Temp Out Of Range Faults:	P0A2C, P0A2D		
Drive Motor "A" Control Module Temperature Sensor Circuit Out of Range High	P0A2D	To detect temperature sensor voltage Out of Range high.	Motor Temp	< -41 deg C (near 5V)	Warmup Time Warmup Torque	Controller Initialization Complete >=90s >=ABS(20 Nm)	X: 900 cts Y:1800cts R: 10.4ms T: 9378ms	One Trip, Type A
Drive Motor "A" Control Module Temperature Sensor Circuit Out of Range Low	P0A2C	To detect temperature sensor voltage Out of Range low.	Motor Temp	> 184 degC (near 0V)		Controller Initialization Complete	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor "A" Over Temperature	P0A2F	To detect a sustained motor overtemperature condition	Motor Temperature exceeds inital fault threshold	> 163 deg C initial fault	Motor Temperature Temp Performance Fault; P0A2B	IN RANGE NOT ACTIVE	X: 700 cts Y: 1500 cts R: 10.4ms T: 7280ms	One Trip, Type A
Motor Control Processor Voltage Diagnostics								
Sensor Power Supply "A" Circuit Low	P06B1	Detects Sensor Power Supply (15V) below an acceptable threshold.	Scaled 15V Supply Voltage	< 12.0V	Wakeup Signal	On	X: 40 cts Y: 50 cts R: 10.4ms T: 416 ms OR continuous fail time > 300 ms	One Trip, Type A
Sensor Power Supply "A" Circuit High	P06B2	Detects Sensor Power Supply (15V) above an acceptable threshold.	Scaled 15V Supply Voltage	> 18.0V	Wakeup Signal	On	X: 40 cts Y: 50 cts R: 10.4ms T: 416 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							OR continuous fail time > 300 ms	
System Voltage Low	P1ADE	*This is the 12V system voltage low diagnostic*						Special Type C
		DTC Fail case 1: Sets when the ignition voltage is below a threshold	Ignition Voltage	<= 10 Volts	Enable Cal RunCrankActive Engine Speed	= true = true >= 0 RPM	5 fail counts out of 6 sample counts Executes in a 1000ms loop Detects in 6 sec	
		DTC Pass:		Ignition Voltage > 10 Volts			1 second	
System Voltage Hi	P1ADF	*This is the 12V system voltage Hi diagnostic*						Special Type C
		DTC Fail case 1: Sets when the ignition voltage is above a threshold	Ignition Voltage	>= 18 Volts	Enable Cal RunCrankActive	= true = true	5 fail counts out of 6 sample counts Executes in a 1000ms loop Detects in 6 sec	
		DTC Pass:		Ignition Voltage < 18 Volts			1 second	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Motor A Inverter Temp Sensor Diagnostics								
Drive Motor Inverter Temperature Sensor A Circuit Range/ Performance	P0AEE	Inverter A Temperature Sensor #1 In-Range Rationality Check	ABS (Inverter Temp A - Average of (Power Electronics Coolant Temp and Transmission Fluid Temp))	>20 deg C	Wake Up Signal Propulsion System Inactive Time Thermal Conditioning Off Time Charge Off Time Cold Start Average Temperature Power Electronics Coolant Temperature Available Power Electronics Coolant Temperature Fault Active Tranmission Fluid Temperature Valid Propulsion System Inactive Timer Fault Active Propulsion System Inactive Timer Mask Off Board Charging Inactive Timer Fault Active	On >=21600s >=7200s >=7200s > -40C TRUE FALSE TRUE FALSE Use Data FALSE	700 cts Start Delay PLUS X: 200 cts Y: 300 cts R: 10.4ms T: 2080ms =9.36 sec total	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Off Board Charging Inactive Timer Mask Battery Thermal Conditioning Inactive Fault Active Battery Thermal Conditioning Inactive Mask Plug In Charging Present No Active Power Inverter Temp Out Of Range Faults:	Use Data FALSE Use Data TRUE P0AF0 and P0AEF		
Drive Motor Inverter Temperature Sensor A Circuit High	P0AF0	To detect Inverter A Temperature Sensor #1 voltage Out of Range high	PIM Temp A	< -58 deg C (near 5V)	Wakeup Signal When malfunction present at start of trip: Cumulative Inverter Warmup Time at or above Inverter Warmup Torque Threshold	ON >=90s >=ABS(20 Nm)	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor Inverter Temperature Sensor A Circuit Low	P0AEF	To detect Inverter A Temperature Sensor #1 Out of Range low (voltage)	PIM Temp A	> 130 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A

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	Inverter A Temperature Sensor #2 In-Range Rationality Check	ABS(PIM Temp C - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	>20 deg C	Wake Up Signal	On	300 cts Start Delay	One Trip, Type A
					Propulsion System Inactive Time	>=21600s		
					Thermal Conditioning Off Time	>=7200s	PLUS	
					Charge Off Time	>=7200s	X: 550 cts Y: 700 cts	
					Cold Start Average Temperature	> -20C	R: 10.4ms T: 2080ms =8.84 sec total	
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Tranmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Battery Thermal Conditioning Inactive Fault Active Battery Thermal Conditioning Inactive Mask Plug In Charging Present No Active Power Inverter Temp Out Of Range Faults:	FALSE Use Data TRUE P0BD4 and P0BD3		
Drive Motor Inverter Temperature Sensor C Circuit High	P0BD4	To detect Inverter A Temperature Sensor #2 Out of Range high (voltage)	PIM Temp C Temperature	< -58 deg C (near 5V)	Wakeup Signal When malfunction present at start of trip: Cumulative Inverter Warmup Time at or above Inverter Warmup Torque Threshold	ON >=90s >=ABS(20 Nm)	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor Inverter Temperature Sensor C Circuit Low	P0BD3	To detect Inverter A Temperature Sensor #2 Out of Range low (voltage)	PIM Temp C Temperature	> 130 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A

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	Inverter A Temperature Sensor #3 In-Range Rationality Check	ABS(PIM Temp E - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	>20 deg C	Wake Up Signal	On	300 cts Start Delay	One Trip, Type A
					Propulsion System Inactive Time	>=21600s		
					Thermal Conditioning Off Time	>=7200s	PLUS	
					Charge Off Time	>=7200s	X: 550 cts Y: 700 cts	
					Cold Start Average Temperature	> -20C	R: 10.4ms T: 2080ms =8.84 sec total	
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Tranmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Battery Thermal Conditioning Inactive Fault Active Battery Thermal Conditioning Inactive Mask Plug In Charging Present No Active Power Inverter Temp Out Of Range Faults:	FALSE Use Data TRUE P0BDE and P0BDD		
Drive Motor Inverter Temperature Sensor E Circuit High	P0BDE	To detect Inverter A Temperature Sensor #3 Out of Range high (voltage).	PIM Temp E Temperature	< -58 deg C (near 5V)	Wakeup Signal When malfunction present at start of trip: Cumulative Inverter Warmup Time at or above Inverter Warmup Torque Threshold	ON >=90s >=ABS(20 Nm)	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor Inverter Temperature Sensor E Circuit Low	P0BDD	To detect Inverter A Temperature Sensor #3 Out of Range low (voltage).	PIM Temp E Temperature	> 130 degC (near 0V)	Wakeup Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor "A" Inverter Phase U Over Temperature	P0C11	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp A Temperature	> 98 deg C	PIM Temperature No Active DTCs:	IN RANGE P0AEE	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A

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	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp C Temperature	> 98 deg C	PIM Temperature No Perf Fault; P0BDC	IN RANGE NOT ACTIVE	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
Drive Motor "A" Inverter Phase W Over Temperature	P0C13	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp E Temperature	> 98 deg C	PIM Temperature No Active DTCs:	IN RANGE P0BD2	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
Motor A Resolver Sensors - Discrete Diagnostics								
Drive Motor "A" Position Sensor Circuit	P0A3F	To detect Loss of Signal or converter error (line open, short) in the Motor Resolver circuit	Sin or Cos Signal	<2.3V	Wakeup Signal Resolver Initialization Delay	On 2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	One Trip, Type A
Drive Motor "A" Position Sensor Circuit Range/ Performance	P0A40	To detect a Degradation of Signal fault in the angle data read by the Motor Resolver circuit.	Sin or Cos Signal	>4.0V	Wakeup Signal Resolver Initialization Delay	On 2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	One Trip, Type A

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	To detect a Loss of Tracking fault in the Motor Resolver circuit.	Internal Tracking Error	> 5 deg	Wakeup Signal Resolver Initialization Delay	On 2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	One Trip, Type A
Drive Motor "A" Position Sensor Circuit Overspeed	P1B0D	To detect when Motor A has exceeded operational maximum speed	ABS(Motor speed)	>6300 rpm	Wakeup Signal	On	X: 10 cts Y: 12 cts R: 10.4ms T: 104ms	One Trip, Type A
Drive Motor "A" Position Sensor Not Learned	P0C17	To detect an unvalidated Resolver Offset Learn Value AND No Stored Previously Valid Value	Offset Learn DIDN'T complete because: ABS(Motor Speed) OR Filtered DC OR ALL Phase Current OR TimeOut	 >50 rpm < 192 V <15 A > 1.4 second for 1 Timeout	Key Off Wakeup Signal ABS(Motor Speed) High Voltage Valid Stored Offset	TRUE ON < 20 rpm > 192 V FALSE	300 ms learn time	One Trip, Type A
Drive Motor "A" Position Exceeded Learning Limit	P0C4E	**Fail Case 1:**To detect an OOR Offset Learn Value	Offset Learn Completes AND ABS(Offset Correction Angle)	> 30 degrees	ABS(Motor Speed) High Voltage	< 20 rpm > 192V	300 ms learn time	One Trip, Type A
		Fail Case 2: To detect a sudden jump from previously stored offset learn value	Offset Learn Completes AND ABS(Offset Correction Angle - prevoiusly stored value)	> 10 degrees				

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	To detect an unvalidated Resolver Offset Learn Value AND a Stored Previously Valid Value	Offset Learn DIDN'T complete because: ABS(Motor Speed)	> 50 rpm	Key Off	TRUE	300 ms learn time	Two Trips, Type B
			OR Filtered DC Voltage	< 192V	Wakeup Signal	TRUE		
			OR ALL Phase Current Max-Min Delta	< 15A	ABS(Motor Speed)	< 20 rpm	X: 30 ct Y: N/A R: 2.08ms T: 62.4ms	
			OR TimeOut waiting for entry conditions	> 1.4 second for 1 Timeouts	Valid Stored Offset	TRUE		
					High Voltage	> 192 V		
Motor A Resolver Sensors - Circuit Diagnostics								
Drive Motor "A" Position Sensor Circuit "A" Low	P0C52	To detect Resolver Circuit S1/3 Out of Range Low	Resolver S13 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms T: 520ms	One Trip, Type A
Drive Motor "A" Position Sensor Circuit "A" High	P0C53	To detect Resolver Circuit S1/3 Out of Range High	Resolver S13 Circuit Reference Voltage	> 4.5 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	One Trip, Type A
Drive Motor "A" Position Sensor Circuit "B" Low	P0C5C	To detect Resolver Circuit S2/4 Out of Range Low	Resolver S24 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms T: 520ms	One Trip, Type A
Drive Motor "A" Position Sensor Circuit "B" High	P0C5D	To detect Resolver Circuit S2/4 Out of Range High	Resolver S24 Circuit Reference Voltage	> 4.5 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
MCPA Controller Fault Diagnostics								
Control Module Read Only Memory (ROM)	P1A51	*This Diagnostic tests the checksum on ROM (flash) memory*						One Trip, Type A
		DTC Fail case 1: This DTC will be stored if any check sum in the **boot** is incorrect	Calculated Checksum does not match stored checksum		Ignition Status	= Run or Crank	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5 failures Frequency: Runs continuously in the background	
		DTC Fail case 2: This DTC will be stored if any check sum in the **calibration** is incorrect						
		DTC Fail case 3: This DTC will be stored if any check sum in the **software** is incorrect						
		DTC Pass:		ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false				
Control Module Long Term Memory Reset	P1EB6	*This Diagnostic tests for BINVDM errors*						One Trip, Type A
		DTC Fail case 1: Non-volatile memory (**Static**) checksum error at controller power-up	Checksum at power-up does not match checksum at power-down		Ignition Status	= Run or Crank	1 failure Frequency: Once at powerup	
		DTC Fail case 2: Non-volatile memory (**Preserved**) checksum error at controller power-up						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 3: Non-volatile memory (**BINVDM**) checksum error at controller power-up						
		DTC Fail case 4: Non-volatile memory (**ShutdownFinished**) checksum error at controller power-up						
		DTC Pass:		No ROM memory faults				
Control Module Random Access Memory (RAM) Failure	P1A50	*This Diagnostic tests the checksum on RAM memory*						One Trip, Type A
		DTC Fail case 1: Indicates that HCP is unable to correctly write and read data to and from **Dual Store** RAM	Data read	does not match data written	Ignition Status	= Run or Crank	Should finish within 30 seconds at all operating conditions	
		DTC Fail case 2: Indicates that HCP is unable to correctly write and read data to and from **Write Protect** RAM						
		DTC Fail case 3: Indicates that HCP is unable to correctly write and read data to and from **2nd SOH** RAM						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 4: Indicates that HCP is unable to correctly write and read data to and from **Main SOH** RAM						
		DTC Fail case 5: Indicates that HCP is unable to correctly write and read data to and from **System** RAM						
		DTC Fail case 6: Indicates that HCP is unable to correctly write and read data to and from **Cache** RAM						
		DTC Fail case 7: Indicates that HCP is unable to correctly write and read data to and from **eTPU** RAM						
		DTC Pass:		No errors in 1000ms MainSOH RAM faults = false CommFlts = false System RAM faults = false CacheRam faults = false eTPU RAM faults = false				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Internal Performance	P0A1B	*This Diagnostic tests all the internal processor integrity subsystems*						One Trip, Type A
		DTC Fail case 1: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctd SPI_Flt	HWIO detects Fault	= true (in SPI Hardware)	Run/Crank Voltage OR Powertrain Relay Voltage Diagnostic System Enable Powermoding	> 9.5 Volts = true = Accesory or Off	28 fail counts out of 32 sample counts Executes in a 6.25ms loop Detects in 200ms	
		DTC Fail case 2: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndNotRunningSeedKyTst	Key Value	= Calibration Value	SRAR shutdowns SPI Fault RunCrank Active Ram or ROM fault 12V battery Seed received in wrong order fault Vehicle Speed Seed/Key Timeout Powermode	= False =False = False = False >11V = False <= 0 MPH = False = off for less than 5 seconds	Detects in 150ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 3: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndFailsToTakeRmdlActn	IPT Detects faulty harware in Inhibit path IPT feedback	≠ calibration Value	HV Bat contactor Staus Available MMDR HPMR HV Battery Contactors Motor Faults Motor Speed SRAR shutdowns SPI Fault RunCrank Active Ram or ROM fault	= True = Powerdown Wait State = Eval BP Open State >= 80 V = Closed = False <= 10 RPM = False =False = False = false	Up down counter = 3	
					12V battery Seed received in wrong order fault Vehicle Speed Seed/Key Timeout Powermode	>11V = false <= 0 MPH = False = off for less than 5 seconds		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 4: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndRxIncorrectKeys	Key Value	≠ Calibration Value	1. Number Of Mains 2. IPT status	1. > 0 2. = Not running for > 0.075s	Detects in 150ms or two consecutive faulty keys	
		DTC Fail case 5: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSdKeyTimeout	seed does not update	within Calibration threshold	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	Detects in 1 sec	
		DTC Fail case 6: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSdRxWrongOrdr	Seed sequence	≠ expected order	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	12 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 7: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainSequenceFlt	Seed timeout PSW Fault	> 200 ms = True	1. Seed Update Key StoreFault Enable OR 2. Program Sequence Watch Enable	1. = True 2. = True	3 fail counts out of 4 sample counts Executes in a 50ms loop Detects in 200ms	
		DTC Fail case 8: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainALU_Flt	HWIO detects Fault	=2 (ina row)	1. ALU Test Enabled 2. Diagnostic system status 3. Code clear active 4. PMDI Low voltage clear diag enable conditons met	1. = TRUE 2. = Enabled 3. >= 0.15s 4. = True	runs continuously in 12.5ms loop Detects in 12.5ms	
		DTC Fail case 9: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainCfgRegFlt	HWIO detects Fault	=2 (in arow)	1. Diagnostic Test Enabled 2. Diagnostic system status 3. Code clear active 4. PMDI Low voltage clear diag enable conditons met	1. = TRUE 2. = Enabled 3. >= 0.15s 4. = True	runs continuously in 12.5ms loop Detects in 12.5ms	
		DTC Fail case 10: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainStackFlt	HWIO detects Fault	= 5 (Since Powerup)	Diagnostic Test Enabled Diagnostic System Enables	= True =True	Runs Continuously in 100ms loop Detects in 500ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 11: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainADC_Flt	Continuous Fault	> 200ms	1. A2D Converter Test Enabled 2. PT Relay Voltage 3. Run Crank Voltage	1. = TRUE 2. > -1 3. > 7	5 fail counts out of 8 sample counts Executes in a 50ms loop Detects in 200ms	
		DTC Fail case 12: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RunCrankCorrFlt	Run Crank on Seconday Processor	≠ Run Crank Active	1. Run Crank Discrete Diagnostic Enable 2. SPI Faults	1. = True 2. = False	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		DTC Fail case 13: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_FlashECC_CktTest	HWIO detects Fault	= 3 /10 5/10	1. Flash ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 14: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RAM_ECC_CktTest	HWIO detects Fault	= 3 /10 5/10	1. RAM ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	
		DTC Fail case 15: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_DMA_Xfer Test	HWIO detects Fault or Memory Copy Error	= True or =True	Diagnostic Test Enabled	= TRUE		
MCPA Torque Security Diagnostics								
Control Module Long Term Memory Performance	P1ADC	*This Diagnostic tests for unuseable BINVDM (flash) memory only*						One Trip, Type A
		DTC Fail case 1: Indicates that the NVM Error flag **HWIO Bat Write will not succeed** set	Last EEPROM write did not complete		Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up	
		DTC Fail case 2: Indicates that the NVM Error flag **HWIO Assembly Cal** set						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass:		NV write will not succeed = fail Assembly cal fail = false				
Drive Motor A Torque Delivered Performance	P0C19	*This Diagnostic tests that the difference between the motor A torque command slew and the motor torque achieved is greater than a threshold.*						One Trip, Type A
		DTC Fail case 1: The slewed MCP torque command is different by the MCP torque achieved	the commanded torque - the achieved torque	< 138	Ignition switch	in crank or run		
Drive Motor A Control Module Not Programmed	P1A4F	*This diagnostic prevents flashing different MCP software into MCP A that does not match its ID*						One Trip, Type A
		DTC Fail case 1: The MCP ID hardware does not match the calibration for the specific MCP	MCP ID Hardware	*≠ Calibration*				
Drive Motor A Control Module Internal Control Module Torque Calculation Performance	P1E0A	*This diagnostic detects the torque command path calculation errors*						One Trip, Type A
		DTC Fail case 1: If the difference between the Torque achieved primary path signal and the redundant path signal is greater than a threshold (MTQR)	Difference between Primary and Redundant signals	> 164Nm	Fault Active TPTKO Torque Mon Fail	= True = False = True	30 fail counts out of 32 sample counts Executes in a 6.25 ms Loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 2: If the difference between the Torque Commanded primary path signal and the redundant path signal is greater than a threshold (MTDR)	Difference between Primary and Redundant signals	> 164Nm				
		DTC Fail case 3: Compares the ISSD primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCUR)	Difference between Primary and Redundant signals	> 50A				
		DTC Fail case 4: Compares the ISSQ primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCUR)	Difference between Primary and Redundant signals	> 50A				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 5: Compares the ISSCmd primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCDR)	Difference between Primary and Redundant signals	> 50A				
		DTC Fail case 6: Compares the BEMF Dec primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCDR)	Difference between Primary and Redundant signals	> .001Nm				
		DTC Fail case 7: Compares the Usdq Limited primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCCR)	Difference between Primary and Redundant signals	> .5V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 8: Compares the Duty ABC primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (SVMR)	**For OverMod:** Mod Index Square or PerfSqr **For Linear:** Mod Index Square or PerfSqr	> .2Nm > 1Nm > .1Nm > .15Nm				
		DTC Fail case 9: Compares the Power Input Watts primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (HVTR)	Difference between Primary and Redundant signals	>4000				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 10: Compares the VDC Adapt primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (HVTR)	Difference between Primary and Redundant signals	> .03V				
		DTC Fail case 11: Compares the Qest primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (HVTR)	Difference between Primary and Redundant signals	> 0Nm				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 12: Compares the Motor Speed primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MSPR)	Difference between Primary and Redundant signals	>116 RadPerSec				
Communication Diagnostics								
Lost Comm'n With ECM/PCM on Bus A	U1876	*This diagnostic indicates a lost communication between the MCPA and the ECM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the ECM on Bus A	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Lost Comm'n With TCM	U1849	*This diagnostic indicates a lost communication between the MCPA and the TCM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the TCM on Bus A	Missed TCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Controller	U1845	*This diagnostic indicates a lost communication between the MCPA and the HCP*						Two Trips, Type B
		Detects that CAN serial data communication has been lost with the HCP	Missed HCP Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Detects within 500 msec at 6.25 msec loop rate	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Controller B on Bus B	U182E	*This diagnostic indicates a lost communication between the MCPA and the VICM on Bus B*						Two Trips, Type B
		DTC Fail case 1: Lost Communication with Hybrid Powertrain Control Module B on Bus A (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		

APPENDIX

ALU= Arithmetic Logic Unit
BPCM= Batt Pack Ctrl Module
HWIO= Hardware Input/Output
IGBT= Insulated Gate Bipolar Transistors (Phase Current Controllers)
OOR= Out of Range

EREV Inverter Temperature Sensor Mapping Grid				SAE
Drive Motor A	Phase U	PIM_A	PIM_0	A
	Phase V	PIM_C	PIM_2	E
	Phase W	PIM_B	PIM_1	C
Drive Motor B	Phase U	PIM_C	PIM_2	F
	Phase V	PIM_A	PIM_0	B
	Phase W	PIM_B	PIM_1	D

Time Required Legend:	
X: Fail Counts R: Loop Time T: Fault Detect Time	Y: Sample Counts (N/A if no XofY structure)

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
MCP B Phase Current Diagnostics								
Drive Motor "B" Phase U-V-W Correlation	P0BFE	To detect electrical failure of phase current sensor.	Sum of 3 phase currents	> 156 A	Wakeup Signal	On	X: 160 ct Y: 190 ct R: 0.11 - 0.5 ms T: 17.6 - 80 ms	One Trip, Type A
Drive Motor "B" Phase U-V-W Current Sensor Overcurrent	P0C04	**Fail Case 1**: To detect fast, repeated 3 Phase over currents and to protect IGBT.	U, V, or W Phase current sensor	> 725 A	Wakeup Signal	On	X: 2 cts Y: 10 cts R: 2.08 ms T: 4.2 ms	One Trip, Type A
		Fail Case 2: To detect slow, intermittent 3 Phase over currents and to protect IGBT.					X: 5 cts Y: 50 cts R: 2.08 ms T: 10.4 ms	
Drive Motor "B" Phase U-V-W Circuit/Open	P0C08	Drive Motor "A" Missing Motor Current checks for minimum current in each phase when rotor position is near that peak's phase axis. Each phase is checked individually as rotor turns.	ABS(Peak Phase Axis Current)	< 9 A	Inverter State Inverter Voltage Rotor Position Current Commanded	RUN > 35 V -30 deg < Phase Axis < +30 deg >= 23 A	X: 200 ct Y: N/A R: 0.11-0.5 ms T: 22 - 100 ms	One Trip, Type A
Drive Motor "B" Phase U Current Sensor Circuit Low	P0BF3	Circuit Low monitor to detect the failure of U-phase current sensor circuit below valid range	U Phase current sensor output at highside	< -800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "B" Phase U Current Sensor Circuit High	P0BF4	Circuit High monitor to detect the failure of U-phase current sensor circuit above valid range	U Phase current sensor output at highside	> 800 A	Wakeup Signal	On	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					PWM Output Enable	FALSE		
Drive Motor "B" Phase U Current Sensor Offset Out-of Range	P0BF2	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	U Phase offset current output at highside	>30 A	Wakeup Signal Power Stage No Active DTCs:	On OPEN P0BE7/P0BE8	X: 8 cts Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Drive Motor "B" Phase V Current Sensor Circuit Low	P0BF7	Circuit Low monitor to detect the failure of V-phase current sensor circuit below valid range	V Phase current sensor output at highside	< -800 A	 Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "B" Phase V Current Sensor Circuit High	P0BF8	Circuit High monitor to detect the failure of V-phase current sensor circuit above valid range	V Phase current sensor output current at highside	> 800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "B" Phase V Current Sensor Offset Out-of Range	P0BF6	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	V Phase offset current output at highside	>30 A	Wakeup Signal Power Stage No Active DTCs:	On OPEN P0BEB/P0BEC	X: 8 cts Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Drive Motor "B" Phase W Current Sensor Circuit Low	P0BFB	Circuit Low monitor to detect the failure of W-phase current sensor circuit below valid range	W Phase current sensor output at highside	< -800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "B" Phase W Current Sensor Circuit High	P0BFC	Circuit High monitor to detect the failure of W-phase current sensor circuit above valid range	W Phase current sensor output at highside	> 800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A

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	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	W Phase offset current output at highside	>30 A	Wakeup Signal Power Stage No Active DTCs:	On OPEN P0BEF/P0BF0	X: 8 cts Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
MCP B IGBT Diagnostics								
Drive Motor "B" Inverter Performance	P0A79	Detects IGBT Desaturation Faults Monitors hw status line to detect internal overcurrent faults, shoot through, or loss of switching control events	Phase A, B, or C High or Low Side Devices	OVERDRIVEN (Status Fault Bit)	Wakeup Signal High Voltage	On > 100V	X: 1 ct Y: N/A R: 2.08ms T: 2.08ms	One Trip, Type A
Drive Motor "B" Inverter Power Supply Circuit/Open	P0C0E	Detects IGBT Bias Faults Monitors hw status line to detect loss of power supply to gate drive board	Phase A, B, or C Power Supply	FAILED (Status Fault Bit)	Inverter State High Voltage	Initialization Complete > 100V	X: 1 ct Y: N/A R: 2.08ms T: 2.08ms	One Trip, Type A
MCP B High Voltage (HV) Diagnostics								
Drive Motor "B" Hybrid Battery System Voltage High	P1AEF	To detect over voltage and to protect TPIM HV Circuit	HV Sensor Voltage	> 425V	Controller Initialization	Complete	X: 3 cts Y: N/A R: 0.1 - 0.5 ms T: 0.3 - 1.50 ms	One Trip, Type A
Drive Motor "B" Control Module Hybrid Battery Voltage Sense Circuit Low Voltage	P1AEA	Circuit Low monitor of HV output voltage sensor	HV Sensor Voltage	<30V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A

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 Sense Circuit High Voltage	P1AEB	Circuit High monitor of HV output voltage sensor	HV Sensor Voltage	>500 V	Controller Initialization Run/Crank	Complete Active	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A
Drive Motor "B" Control Module Hybrid Battery System Voltage	P1AED	To check correlation of HV with sum of mid-pack voltages and HV_Battery.	ABS(HV - HV_Battery) AND ABS(HV - sum of mid-pack voltages)	>= 40 V >= 50 V	No Active DTCs: Controller Initialization Contactors	P1AEA, P1AEB Complete Closed	X: 18 cts Y: 30 cts R: 10.4ms T: 187ms	Two Trips, Type B
Drive Motor "B" Control Module Hybrid Battery Voltage System Isolation Fault	P1AF2	Isolation Lost between mid-pack voltage and chassis	Isolation Ratio (Neg mid-pack voltage / Pos mid-pack voltage)	>4.53	No Active DTCs: Controller Initialization	P1AEA, P1AEB, P1AED Complete	X: 250 cts Y: 300 cts R: 10.4ms T: 2600ms	Two Trips, Type B
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensor Circuit Low	P1AF6	Circuit 1 Low monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage	<20V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensor Circuit High	P1AF7	Circuit 1 High monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage - HV	>40 V	No Active DTCs: Controller Initialization Run/Crank	P1AEA, P1AEB Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 728ms	Two Trips, Type B

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	Circuit 2 Low monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage	<20V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit High	P1B44	Circuit 2 High monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage - HV	>40 V	No Active DTCs: Controller Initialization Run/Crank	P1AEA, P1AEB Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 728ms	Two Trips, Type B
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensing Performance	P1B42	To check correlation of sum of mid-pack voltages against HV and HV_Battery	ABS(Pos mid-pack - Neg mid-pack - HV_Battery) and ABS(Pos mid-pack - Neg mid-pack - HV)	>= 40 V >= 50 V	No Active DTCs: Run/Crank Controller Initialization	P1AEA, P1AEB, P1B43, P1B44 Active Complete	X: 100 cts Y: 150 cts R: 10.4ms T: 1040ms	Two Trips, Type B
Motor B Temp Sensor Diagnostics								
Drive Motor "B" Control Module Temperature Sensor Performance	P0A31	Motor B Temperature Sensor In-Range Rationality Check	ABS(Motor Thermistor Temperature - the average of (Power Electronic Coolant Temperature and Transmission Fluid	> 20 deg C	Wake Up Signal Propulsion System Inactive Time Thermal Conditioning Off Time	On >=21600s >=7200s	300 cts Start Delay PLUS	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Charge Off Time	>=7200s	X: 550 cts Y: 700 cts R: 10.4ms T: 2080ms =8.84 sec total	
					Cold Start Average Temperature	> -20C		
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Tranmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Battery Thermal Conditioning Inactive Fault Active Battery Thermal Conditioning Inactive Mask Plug In Charging Present No Active Motor Temp Out Of Range Faults:	FALSE Use Data TRUE P0A32 and P0A33		
Drive Motor "B" Control Module Temperature Sensor Circuit Out of Range High	P0A33	To detect temperature sensor voltage Out of Range high.	Motor Temp	< -41 deg C (near 5V)	 Warmup Time Warmup Torque	Init Complete >=90s >=ABS(20 Nm)	X: 900 cts Y:1800cts R: 10.4ms T: 9378ms	One Trip, Type A
Drive Motor "B" Control Module Temperature Sensor Circuit Out of Range Low	P0A32	To detect temperature sensor voltage Out of Range low.	Motor Temp	> 184 degC (near 0V)		Init Complete	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor "B" Over Temperature	P0A35	To detect a sustained motor overtemperature condition	Motor Temperature exceeds inital fault threshold AND Does not decrease below reset threshold	> 149 deg C	Motor Temperature No Active Temp Performance Fault	IN RANGE P0A31	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
Motor Control Processor Voltage Diagnostics								

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	Detects Sensor Power Supply (15V) below an acceptable threshold.	Scaled 15V Supply Voltage	< 12.0V	Wakeup Signal	On	X: 40 cts Y: 50 cts R: 10.4ms T: 416 ms OR continuous fail time > 300 ms	One Trip, Type A
Sensor Power Supply "B" Circuit High	P06B5	Detects Sensor Power Supply (15V) above an acceptable threshold.	Scaled 15V Supply Voltage	> 18.0V	Wakeup Signal	On	X: 40 cts Y: 50 cts R: 10.4ms T: 416 ms OR continuous fail time > 300 ms	One Trip, Type A
System Voltage Low	P1AE0	*This is the 12V system voltage low diagnostic*						Special Type C
		DTC Fail case 1: Sets when the ignition voltage is below a threshold	Ignition Voltage	<= 10 Volts	Enable Cal RunCrankActive Engine Speed	= true = true >= 0 RPM	5 fail counts out of 6 sample counts Executes in a 1000ms loop Detects in 6 sec	
		DTC Pass:		Ignition Voltage > 10 Volts			1 second	
System Voltage Hi	P1AE1	*This is the 12V system voltage Hi diagnostic*						Special Type C

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 1: Sets when the ignition voltage is above a threshold	Ignition Voltage	>= 18 Volts	Enable Cal RunCrankActive	= true = true	5 fail counts out of 6 sample counts Executes in a 1000ms loop Detects in 6 sec	
		DTC Pass:		Ignition Voltage < 18 Volts			1 second	
Motor B Inverter Temp Sensor Diagnostics								
Drive Motor Inverter Temperature Sensor B Circuit Range/ Performance	P0AF3	Inverter B Temperature Sensor #1 In-Range Rationality Check	ABS(PIM Temp B - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	>20 deg C	Wake Up Signal Propulsion System Inactive Time Thermal Conditioning Off Time Charge Off Time Cold Start Average Temperature Power Electronics Coolant Temperature Available Power Electronics Coolant Temperature Fault Active	On >=21600s >=7200s >=7200s > -20C TRUE FALSE	300 cts Start Delay PLUS X: 550 cts Y: 700 cts R: 10.4ms T: 2080ms =8.84 sec total	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Tranmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		
					Battery Thermal Conditioning Inactive Fault Active	FALSE		
					Battery Thermal Conditioning Inactive Mask	Use Data		
					Plug In Charging Present	TRUE		
					No Active Power Inverter Temp Out Of Range Faults:	P0AF4 and P0AF5		
Drive Motor Inverter Temperature Sensor B Circuit High	P0AF5	To detect Inverter B Temperature Sensor #1 voltage out of range high	PIM Temp B Temperature	< -58 deg C (near 5V)	Wakeup Signal	ON	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
					When malfunction present at start of trip: Cumulative Inverter Warmup Time	>=90s		
					at or above Inverter			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Warmup Torque Threshold	>=ABS(20 Nm)		
Drive Motor Inverter Temperature Sensor B Circuit Low	P0AF4	To detect Inverter B Temperature Sensor #1 Out of Range low (voltage)	PIM Temp B Temperature	> 130 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor Inverter Temperature Sensor D Circuit Range/ Performance	P0BD7	Inverter B Temperature Sensor #2 In-Range Rationality Check	ABS(PIM Temp D - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	>20 deg C	Wake Up Signal Propulsion System Inactive Time Thermal Conditioning Off Time Charge Off Time Cold Start Average Temperature Power Electronics Coolant Temperature Available Power Electronics Coolant Temperature Fault Active Tranmission Fluid Temperature Valid Propulsion System Inactive Timer Fault Active	On >=21600s >=7200s >=7200s > -20C TRUE FALSE TRUE FALSE	300 cts Start Delay PLUS X: 550 cts Y: 700 cts R: 10.4ms T: 2080ms =8.84 sec total	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		
					Battery Thermal Conditioning Inactive Fault Active	FALSE		
					Battery Thermal Conditioning Inactive Mask	Use Data		
					Plug In Charging Present	TRUE		
					No Active Power Inverter Temp Out Of Range Faults:	P0BD8 and P0BD9		
Drive Motor Inverter Temperature Sensor D Circuit High	P0BD9	To detect Inverter B Temperature Sensor #2 Out of Range high (voltage)	PIM Temp D Temperature	< -58 deg C (near 5V)	Wakeup Signal	ON	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
					When malfunction present at start of trip: Cumulative Inverter Warmup Time	>=90s		
					at or above Inverter Warmup Torque Threshold	>=ABS(20 Nm)		
Drive Motor Inverter Temperature	P0BD8	To detect Inverter B Temperature Sensor #2 Out of Range low	PIM Temp D Temperature	> 130 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Sensor D Circuit Low		(voltage)					T: 2600ms	
Drive Motor Inverter Temperature Sensor F Circuit Range/ Performance	P0BE1	Inverter B Temperature Sensor #3 In-Range Rationality Check	ABS(PIM Temp F - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	>20 deg C	Wake Up Signal Propulsion System Inactive Time Thermal Conditioning Off Time Charge Off Time Cold Start Average Temperature Power Electronics Coolant Temperature Available Power Electronics Coolant Temperature Fault Active Tranmission Fluid Temperature Valid Propulsion System Inactive Timer Fault Active	On >=21600s >=7200s >=7200s > -40C TRUE FALSE TRUE FALSE	700 cts Start Delay PLUS X: 200 cts Y: 300 cts R: 10.4ms T: 2080ms =9.36 sec total	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		
					Battery Thermal Conditioning Inactive Fault Active	FALSE		
					Battery Thermal Conditioning Inactive Mask	Use Data		
					Plug In Charging Present	TRUE		
					No Active Power Inverter Temp Out Of Range Faults:	P0BE2 and P0BE3		
Drive Motor Inverter Temperature Sensor F Circuit High	P0BE3	To detect Inverter B Temperature Sensor #3 Out of Range high (voltage).	PIM Temp F Temperature	< -58 deg C (near 5V)	Wakeup Signal	ON	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
					When malfunction present at start of trip: Cumulative Inverter Warmup Time	>=90s		
					at or above Inverter Warmup Torque Threshold	>=ABS(20 Nm)		
Drive Motor Inverter Temperature	P0BE2	To detect Inverter B Temperature Sensor #3 Out of Range low	PIM Temp F Temperature	> 130 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Sensor F Circuit Low		(voltage).					T: 2600ms	
Drive Motor "B" Inverter Phase U Over Temperature	P0C14	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp B Temperature	> 98 deg C initial fault	PIM Temperature No Active DTCs:	IN RANGE P0A3F	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
Drive Motor "B" Inverter Phase V Over Temperature	P0C15	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp D Temperature	> 98 deg C initial fault	PIM Temperature No Active DTCs:	IN RANGE P0BD7	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
Drive Motor "B" Inverter Phase W Over Temperature	P0C16	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp F Temperature	> 98 deg C initial fault	PIM Temperature No Active DTCs:	IN RANGE P0BE1	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
Motor B Resolver Sensors - Discrete Diagnostics								
Drive Motor "B" Position Sensor Circuit	P0A45	To detect Loss of Signal or converter error (line open, short) in the Motor Resolver circuit	Sin or Cos signal	<2.3v	Wakeup Signal Resolver Initialization Delay	On 2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	One Trip, Type A

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	To detect a Degradation of Signal fault in the angle data read by the Motor Resolver circuit.	Sin or Cos Signal	> 4.0v	Wakeup Signal Resolver Initialization Delay	On 2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	One Trip, Type A
Drive Motor "B" Position Sensor Circuit Loss of Tracking	P1B04	To detect a Loss of Tracking fault in the Motor Resolver circuit.	Internal tracking Error	>5deg	Wakeup Signal Resolver Initialization Delay	On 2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	One Trip, Type A
Drive Motor "B" Position Sensor Circuit Overspeed	P1B0E	To detect when Motor B has exceeded operational maximum speed	ABS(Motor speed)	>9500 rpm	Wakeup Signal	On	X: 10 cts Y: 12 cts R: 10.4ms T: 104ms	One Trip, Type A
Drive Motor "B" Position Sensor Not Learned	P0C18	To detect an unvalidated Resolver Offset Learn Value AND No Stored Previously Valid Value	Offset Learn DIDN'T complete because: ABS(Motor Speed) OR Filtered DC Voltage	 >50 rpm < 192 V	Key Off Wakeup Signal ABS(Motor Speed)	TRUE ON < 20 rpm	300 ms learn time	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			OR ALL Phase Current Max-Min Delta OR TimeOut waiting for entry conditions	<100 A > 1.4 second for 1 timeout	High Voltage Valid Stored Offset	> 192 V FALSE		
Drive Motor B Position Exceeded Learning Limit	P0C4F	**Fail Case 1:** To detect an Oor Offset Learn Value	Offset Learn Completes AND ABS(Offset Correction Angle)	> 30 degrees	ABS(Motor Speed) High Voltage	< 20 rpm > 192V	300 ms learn time	One Trip, Type A
		Fail Case 2: To detect a sudden jump from previously stored offset learn value	Offset Learn Completes AND ABS(Offset Correction Angle - prevoiusly stored value)	> 10 degrees				
Drive Motor "A" Position Sensor Learn Incorrect	P1B10	To detect an unvalidated Resolver Offset Learn Value AND a Stored Previously Valid Value	Offset Learn DIDN'T complete because: ABS(Motor Speed)	> 50 rpm	Key Off	TRUE	300 ms learn time	Two Trips, Type B
			OR Filtered DC Voltage	< 192V	Wakeup Signal	TRUE		
			OR ALL Phase Current Max-Min Delta	< 15A	ABS(Motor Speed)	< 20 rpm	X: 30 ct Y: N/A R: 2.08ms T: 62.4ms	
			OR TimeOut waiting for entry conditions	> 1.4 second for 1 timeout	Valid Stored Offset	TRUE		
					High Voltage	> 192 V		
Motor B Resolver Sensors - Circuit Diagnostics								
Drive Motor "B" Position Sensor Circuit "A" Low	P0C57	To detect Resolver Circuit S1/3 Out of Range Low	Resolver S13 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms T: 520ms	One Trip, Type A
Drive Motor "B" Position Sensor Circuit "A" High	P0C58	To detect Resolver Circuit S1/3 Out of Range High	Resolver S13 Circuit Reference Voltage	> 4.5 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	One Trip, Type A
Drive Motor "B" Position Sensor Circuit "B" Low	P0C61	To detect Resolver Circuit S2/4 Out of Range Low	Resolver S24 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							T: 520ms	
Drive Motor "B" Position Sensor Circuit "B" High	P0C62	To detect Resolver Circuit S2/4 Out of Range High	Resolver S24 Circuit Reference Voltage	> 4.5 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	One Trip, Type A
MCP B Controller Fault Diagnostics								
Control Module Read Only Memory (ROM)	P1A54	*This Diagnostic tests the checksum on ROM (flash) memory*						One Trip, Type A
		DTC Fail case 1: This DTC will be stored if any check sum in the **boot** is incorrect	Calculated Checksum does not match stored checksum		Ignition Status	= Run or Crank	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5 failures Frequency: Runs continuously in the background	
		DTC Fail case 2: This DTC will be stored if any check sum in the **calibration** is incorrect						
		DTC Fail case 3: This DTC will be stored if any check sum in the **software** is incorrect						
		DTC Pass:		ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false				

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	P1EB7	*This Diagnostic tests for BINVDM errors*						One Trip, Type A
		DTC Fail case 1: Non-volatile memory (**Static**) checksum error at controller power-up	Checksum at power-up does not match checksum at power-down		Ignition Status	= Run or Crank	1 failure Frequency: Once at powerup	
		DTC Fail case 2: Non-volatile memory (**Preserved**) checksum error at controller power-up						
		DTC Fail case 3: Non-volatile memory (**BINVDM**) checksum error at controller power-up						
		DTC Fail case 4: Non-volatile memory (**ShutdownFinished**) checksum error at controller power-up						
		DTC Pass:		No ROM memory faults				
Control Module Random Access Memory (RAM) Failure	P1A53	*This Diagnostic tests the checksum on RAM memory*						One Trip, Type A
		DTC Fail case 1: Indicates that HCP is unable to correctly write and read data to and from **Dual Store** RAM	Data read	does not match data written	Ignition Status	= Run or Crank	Should finish within 30 seconds at all operating conditions	
		DTC Fail case 2: Indicates that HCP is unable to correctly write and read data to and from **Write Protect** RAM						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 3: Indicates that HCP is unable to correctly write and read data to and from **2nd SOH** RAM						
		DTC Fail case 4: Indicates that HCP is unable to correctly write and read data to and from **Main SOH** RAM						
		DTC Fail case 5: Indicates that HCP is unable to correctly write and read data to and from **System** RAM						
		DTC Fail case 6: Indicates that HCP is unable to correctly write and read data to and from **Cache** RAM						
		DTC Fail case 7: Indicates that HCP is unable to correctly write and read data to and from **eTPU** RAM						
		DTC Pass:		No errors in 1000ms MainSOH RAM faults = false CommFlts = false System RAM faults = false CacheRam faults = false eTPU RAM faults = false				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Internal Performance	P0A1C	*This Diagnostic tests all the internal processor integrity subsystems*						One Trip, Type A
		DTC Fail case 1: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctd SPI_Flt	HWIO detects Fault	= true (in SPI Hardware)	Run/Crank Voltage OR Powertrain Relay Voltage Diagnostic System Enable Powermoding	> 9.5 Volts = true = Accesory or Off	28 fail counts out of 32 sample counts Executes in a 6.25ms loop Detects in 200ms	
		DTC Fail case 2: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndNotRunningSeedKyTst	Key Value	= Calibration Value	SRAR shutdowns SPI Fault RunCrank Active Ram or ROM fault 12V battery Seed received in wrong order fault Vehicle Speed Seed/Key Timeout Powermode	= False =False = False = false >11V = false <= 0 MPH = False = off for less than 5 seconds	Detects in 150ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 3: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndFailsToTakeRmdlActn	IPT Detects faulty harware in Inhibit path IPT feedback	≠ calibration Value	HV Bat contactor Staus Available MMDR HPMR HV Battery Contactors Motor Faults Motor Speed SRAR shutdowns	= True = Powerdown Wait State = Eval BP Open State >= 80 V = Closed = False <= 10 RPM = False	Up down counter = 3	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					SPI Fault RunCrank Active Ram or ROM fault 12V battery Seed received in wrong order fault Vehicle Speed Seed/Key Timeout Powermode	=False = False = false >11V = false <= 0 MPH = False = off for less than 5 seconds		
		DTC Fail case 4: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndRxIncorrectKeys	Key Value	≠ Calibration Value	1. Number Of Mains 2. IPT status	1. > 0 2. = Not running for > 0.075s	Detects in 150ms or two consecutive faulty keys	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 5: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSdKeyTimeout	seed does not update	within Calibration threshold	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	Detects in 1 sec	
		DTC Fail case 6: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSdRxWrongOrdr	Seed sequence	≠ expected order	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	12 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		DTC Fail case 7: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainSequenceFlt	Seed timeout PSW Fault	> 200 ms = True	1. Seed Update Key StoreFault Enable OR 2. Program Sequence Watch Enable	1. = True 2. = True	3 fail counts out of 4 sample counts Executes in a 50ms loop Detects in 200ms	
		DTC Fail case 8: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainALU_Flt	HWIO detects Fault	=2 (ina row)	1. ALU Test Enabled 2. Diagnostic system status 3. Code clear active 4. PMDI Low voltage clear diag enable conditons met	1. = TRUE 2. = Enabled 3. >= 0.15s 4. = True	runs continuously in 12.5ms loop Detects in 12.5ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 9: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainCfgRegFlt	HWIO detects Fault	=2 (in arow)	1. Diagnostic Test Enabled 2. Diagnostic system status 3. Code clear active 4. PMDI Low voltage clear diag enable conditons met	1. = TRUE 2. = Enabled 3. >= 0.15s 4. = True	runs continuously in 12.5ms loop Detects in 12.5ms	
		DTC Fail case 10: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainStackFlt	HWIO detects Fault	= 5 (Since Powerup)	Diagnostic Test Enabled Diagnostic System Enables	= True =True	Runs Continuously in 100ms loop Detects in 500ms	
		DTC Fail case 11: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainADC_Flt	Continuous Fault	> 200ms	1. A2D Converter Test Enabled 2. PT Relay Voltage 3. Run Crank Voltage	1. = TRUE 2. > -1 3. > 7	5 fail counts out of 8 sample counts Executes in a 50ms loop Detects in 200ms	
		DTC Fail case 12: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RunCrankCorrFlt	Run Crank on Seconday Processor	≠ Run Crank Active	1. Run Crank Discrete Diagnostic Enable 2. SPI Faults	1. = True 2. = False	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 13: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_FlashECC_CktTest	HWIO detects Fault	= 3 /10 5/10	1. Flash ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	
		DTC Fail case 14: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RAM_ECC_CktTest	HWIO detects Fault	= 3 /10 5/10	1. RAM ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	
		DTC Fail case 15: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_DMA_Xfer Test	HWIO detects Fault or Memory Copy Error	= True or =True	Diagnostic Test Enabled	= TRUE		

MCPB Torque Security Diagnostics

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	P1ADD	*This Diagnostic tests for unuseable BINVDM (flash) memory only*						One Trip, Type A
		DTC Fail case 1: Indicates that the NVM Error flag **HWIO Bat Write will not succeed** set	Last EEPROM write did not complete		Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up	
		DTC Fail case 2: Indicates that the NVM Error flag **HWIO Assembly Cal** set						
		DTC Pass:		NV writewillnotsucceed = fail Assemblycalfail = false				
Drive Motor B Torque Delivered Performance	P0C1A	*This Diagnostic tests that the difference between the motor B torque command slew and the motor torque achieved is greater than a threshold.*						One Trip, Type A
		DTC Fail case 1: The slewed MCP torque command is different by the MCP torque achieved	the commanded torque - the achieved torque	< 138	Ignition switch	in crank or run		
Drive Motor B Control Module Not Programmed	P1A52	*This diagnostic prevents flashing different MCP software into MCP B that does not match its ID*						One Trip, Type A
		DTC Fail case 1: The MCP ID hardware does not match the calibration for the specific MCP	MCP ID Hardware	*≠ Calibration*				
Drive Motor B Control Module Internal Control	P1E0B	*This diagnostic detects the torque command path calculation errors*						One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Module Torque Calculation Performance		**DTC Fail case 1:** If the difference between the Torque achieved primary path signal and the redundant path signal is greater than a threshold (MTQR)	Difference between Primary and Redundant signals	> 164Nm	Fault Active TPTKO Torque Mon Fail	= True = False = True	30 fail counts out of 32 sample counts Executes in a 6.25 ms Loop Detects in 200ms	
		DTC Fail case 2: If the difference between the Torque Commanded primary path signal and the redundant path signal is greater than a threshold (MTDR)	Difference between Primary and Redundant signals	> 164Nm				
		DTC Fail case 3: Compares the ISSD primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCUR)	Difference between Primary and Redundant signals	> 50A				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 4: Compares the ISSQ primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCUR)	Difference between Primary and Redundant signals	> 50A				
		DTC Fail case 5: Compares the ISSCmd primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCDR)	Difference between Primary and Redundant signals	> 50A				
		DTC Fail case 6: Compares the BEMF Dec primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCDR)	Difference between Primary and Redundant signals	> .001Nm				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 7: Compares the Usdq Limited primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCCR)	Difference between Primary and Redundant signals	> .5V				
		DTC Fail case 8: Compares the Duty ABC primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (SVMR)	**For OverMod:** Mod Index Square or PerfSqr **For Linear:** Mod Index Square or PerfSqr	> .2Nm > 1Nm > .1Nm > .15Nm				
		DTC Fail case 9: Compares the Power Input Watts primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (HVTR)	Difference between Primary and Redundant signals	>4000				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 10: Compares the VDC Adapt primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (HVTR)	Difference between Primary and Redundant signals	> .03V				
		DTC Fail case 11: Compares the Qest primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (HVTR)	Difference between Primary and Redundant signals	> 0Nm				
		DTC Fail case 12: Compares the Motor Speed primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MSPR)	Difference between Primary and Redundant signals	>116 RadPerSec				
Communication Diagnostics								
Lost Comm'n With ECM/PCM on Bus A	U1879	*This diagnostic indicates a lost communication between the MCPB and the ECM on Bus A*						Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
^		**DTC Fail case 1:** Detects that CAN serial data communication has been lost with the ECM on Bus A	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Communication With TCM	U1850	*This diagnostic indicates a lost communication between the MCPB and the TCM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the TCM on Bus A	Missed TCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Controller	U1846	*This diagnostic indicates a lost communication between the MCPB and the HCP*						Two Trips, Type B
		Detects that CAN serial data communication has been lost with the HCP	Missed HCP Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Detects within 500 msec at 6.25 msec loop rate	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Controller B on Bus B	U182F	*This diagnostic indicates a lost communication between the MCPB and the VICM on Bus B*						Two Trips, Type B
		DTC Fail case 1: Lost Communication with Hybrid Powertrain Control Module B on Bus A (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		

APPENDIX

ALU= Arithmetic Logic Unit
BPCM= Batt Pack Ctrl Module
HWIO= Hardware Input/Output
IGBT= Insulated Gate Bipolar Transistors (Phase Current Controllers)
OOR= Out of Range

EREV Inverter Temperature Sensor Mapping Grid				SAE
Drive Motor A	Phase U	PIM_A	PIM_0	A
	Phase V	PIM_C	PIM_2	E
	Phase W	PIM_B	PIM_1	C
Drive Motor B	Phase U	PIM_C	PIM_2	F
	Phase V	PIM_A	PIM_0	B
	Phase W	PIM_B	PIM_1	D

Time Required Legend:	
X: Fail Counts R: Loop Time T: Fault Detect Time	Y: Sample Counts (N/A if no XofY structure)

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ATPC Voltage Diagnostics								
Sensor Power Supply C Circuit Low	P06E7	Detects Sensor Power Supply (15V) below an acceptable threshold.	Scaled 15V Supply Voltage	< 12.0 V	Wakeup Signal	ON	X: 40 ct Y: 50 ct R: 10.4 ms T: 416 ms OR 300 ms continuous fail time	One Trip, Type A
Sensor Power Supply C Circuit High	P06E8	Detects Sensor Power Supply (15V) above an acceptable threshold.	Scaled 15V Supply Voltage	> 18.0 V	Wakeup Signal	ON	X: 40 ct Y: 50 ct R: 10.4 ms T: 416 ms OR 300 ms continuous fail time	One Trip, Type A
Auxiliary Transmission Fluid Pump Control Module System Voltage Low	P1E19	*This is the 12V system voltage low diagnostic*						Special Type C
		DTC Fail case: Sets when the ignition voltage is below a threshold	Ignition Voltage	<= 10 Volts	Enable Cal RunCrankActive Engine Speed	= true = true >= 0 RPM	5 fail counts out of 6 sample counts Executes in a 1000ms loop Detects in 6 sec	
		DTC Pass:		Ignition Voltage > 10 Volts			1 second	
Auxiliary Transmission Fluid Pump Control Module System Voltage High	P1E1A	*This is the 12V system voltage Hi diagnostic*						Special Type C
		DTC Fail case: Sets when the ignition voltage is above a threshold	Ignition Voltage	>= 18 Volts	Enable Cal RunCrankActive	= true = true		
		DTC Pass:		Ignition Voltage < 18 Volts			1 second	
ATPC Phase Current Diagnostics								

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-V-W Circuit/Open	P0C20	Drive Motor "A" Missing Motor Current checks for minimum current in each phase when rotor position is near that peak's phase axis. Each phase is checked individually as rotor turns.	ABS(Peak Phase Axis Current)	< 1A	Inverter State	Run	X: 200 ct Y: N/A R: 0.11 ms T: 22 ms	One Trip, Type A
					High Voltage	> 35V		
					Rotor Position	-30 deg < Phase Axis < +30 deg		
					Current Command	>= 3A		
Auxiliary Transmission Fluid Pump Motor Current High	P0C28	**Fail Case 1**: To detect fast, repeated 3 Phase over currents and to protect IGBT.	U, V, or W Phase current sensor	> 35 A	Wakeup Signal	On	X: 2 cts Y: 30 cts R: 2.08 ms T: 4.2 ms	One Trip, Type A
		Fail Case 2: To detect slow, intermittent 3 Phase over currents and to protect IGBT.					X: 5 cts Y: 50 cts R: 2.08 ms T: 10.4 ms	
Auxiliary Transmission Fluid Pump Motor Phase U Current Sensor Circuit Low	P1E2A	Circuit Low monitor to detect the failure of U-phase current sensor circuit below valid range	U Phase current sensor output at highside	< -30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 8 ct Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase U Current Sensor Circuit High	P1E2B	Circuit High monitor to detect the failure of U-phase current sensor circuit above valid range	U Phase current sensor output at highside	> 30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 4 ct Y: 6 ct R: 10.4 ms T: 42 ms	One Trip, Type A

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	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	U Phase offset current output at highside	> 2A	Wakeup Signal PowerStage No Active DTCs:	ON OPEN P1E2A/P1E2B	X: 8 ct Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase V Current Sensor Circuit Low	P1E2D	Circuit Low monitor to detect the failure of V-phase current sensor circuit below valid range	V Phase current sensor output at highside	< -30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 4 ct Y: 6 ct R: 10.4 ms T: 42 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase V Current Sensor Circuit High	P1E2E	Circuit High monitor to detect the failure of V-phase current sensor circuit above valid range	V Phase current sensor output at highside	> 30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 4 ct Y: 6 ct R: 10.4 ms T: 42 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase V Current Sensor Circuit Range/ Performance	P1E2F	Offset Circuit monitor to detect the failure of V-phase offset current above valid range	V Phase offset current output at highside	> 2A	Wakeup Signal PowerStage No Active DTCs:	ON OPEN P1E2D/P1E2E	X: 8 ct Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase W Current Sensor Circuit Low	P1E30	Circuit Low monitor to detect the failure of W-phase current sensor circuit below valid range	W Phase current sensor output at highside	< -30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 4 ct Y: 6 ct R: 10.4 ms T: 42 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase W Current Sensor Circuit High	P1E31	Circuit High monitor to detect the failure of W-phase current sensor circuit above valid range	W Phase current sensor output at highside	> 30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 4 ct Y: 6 ct R: 10.4 ms T: 42 ms	One Trip, Type A

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 W Current Sensor Circuit Range/ Performance	P1E32	Offset Circuit monitor to detect the failure of W-phase offset current above valid range	W Phase offset current output at highside	> 2A	Wakeup Signal PowerStage No Active DTCs:	ON OPEN P1E30/P1E31	X: 8 ct Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase U-V-W Current Sensor Correlation	P1E33	To detect electrical failure of phase current sensor.	Sum of 3 phase currents	> 5A	Wakeup Signal	ON	X: 160 ct Y: 190 ct R: 0.11 ms T: 17.6 ms	One Trip, Type A
ATPC IGBT Diagnostics								
Auxiliary Transmission Fluid Pump Motor Inverter Power Supply Circuit/Open	P1E38	Detects IGBT Bias Faults	Phase A, B, or C Power Supply	FAILED (Status Fault Bit)	Wakeup Signal	ON	X: 1 ct Y: N/A R: 2.08 ms T: 2.08ms	One Trip, Type A
		Monitors hw line to detect loss of power supply to gate drive board.			High Voltage	> 100V		
Auxiliary Transmission Fluid Pump Motor Inverter Performance	P1E39	Detects IGBT Desaturation Faults	Phase A, B, or C High or Low Side Devices	OVERDRIVEN (Status Fault Bit)	Inverter State	Initialization Complete	X: 1 ct Y: N/A R: 2.08 ms T: 2.08ms	One Trip, Type A
		Monitors hw status line to detect internal overcurrent faults, shoot through or loss of switching control events			High Voltage	> 100V		
ATPC Sensorless Controls Diagnostics								
Auxiliary Transmission Fluid Pump Torque Performance	P1E3A	Detects Sensorless Stall of Aux Fluid Pump	Commanded speed - Actual speed	> 200 rpm	Torque command	> 6.8 Nm	X: 400 ct Y:2500 R: 2.08 ms T: 832 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Auxiliary Transmission Fluid Pump Overspeed	P179A	To detect when Motor A has exceeded operational maximum speed	ABS(Motor speed) initially	>6500 rpm	Wake up signal	On	X: 10 cts Y: 12 cts R: 10.4ms T: 104ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Control Module Calculated Motor Position Performance	P1E29	Loss of Sensorless Control OR Polarity Detection Fault	Motor Speed Speed Command OR Rotor Speed ERS	< -500 r/min > 0 > 62.8 rad/s	Wake up signal	On	X: 3 cts Y: 5 cts R: 2ms T: 6ms X:100 cts Y:N/A R:2ms Retries: 5 T:1s	One Trip, Type A
ATPC High Voltage (HV) Diagnostics								
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery System Voltage High	P1E27	To detect over voltage and to protect TPIM HV Circuit	HV Sensor Voltage	> 425V	Controller Initialization	Complete	X: 3 cts Y: N/A R: 0.0001 - 0.0005 ms T: 0.0003 - 0.00150 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Sense Circuit Low Voltage	P1E20	Circuit Low monitor of HV output voltage sensor	HV Sensor Voltage	<30V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A

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 Sense Circuit High Voltage	P1E21	Circuit High monitor of HV output voltage sensor	HV Sensor Voltage	>500 V	Controller Initialization Run/Crank	Complete Active	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery System Voltage	P1E28	To check correlation of HV with sum of mid-pack voltages and HV_Battery.	ABS(HV - HV_Battery) AND ABS(HV - sum of mid-pack voltages)	>= 40 V >= 50 V	No Active DTCs: Contactors	P1E20, P1E21 Closed	X: 18 cts Y: 30 cts R: 10.4ms T: 187ms	Two Trips, Type B
ATPC Isolation Diagnostics								
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage System Isolation Fault	P1E22	Isolation Lost between mid-pack voltage and chassis	Isolation Ratio (Neg mid-pack voltage / Pos mid-pack voltage)	>4.53	No Active DTCs: Controller Initialization	P1E20, P1E21, P1E28 Complete	X: 250 cts Y: 300 cts R: 10.4ms T: 2600ms	Two Trips, Type B
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensor Circuit 1 Low	P1E1C	Circuit 1 Low monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage	<20V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B

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 Circuit 1 High	P1E1D	Circuit 1 High monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage - HV	>40 V	No Active DTCs: Controller Initialization Run/Crank	P1E20, P1E21 Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensor Circuit 2 Low	P1E1E	Circuit 2 Low monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage	<20V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensor Circuit 2 High	P1E1F	Circuit 2 High monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage - HV	>40 V	No Active DTCs: Controller Initialization Run/Crank	P1E20, P1E21 Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensing Performance	P1E1B	To check correlation of sum of mid-pack voltages against HV and HV_Battery	ABS(Pos mid-pack - Neg mid-pack - HV_Battery) and	>= 40 V	No Active DTCs: Controller Initialization	P1E20, P1E21, P1E1E, P1E1F Complete	X: 100 cts Y: 150 cts R: 10.4ms T: 1040 ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			ABS(Pos mid-pack - Neg mid-pack - HV)	>= 50 V	Run/Crank	Active		
ATPC Temp Sensor Diagnostics								
Auxiliary Transmission Fluid Pump Motor Inverter Temperature Sensor Circuit High	P1E34	To detect Inverter A Temperature Sensor #1 voltage out of range high	PIM Temp A Temperature	< -58 deg C (near 5V)	Wakeup Signal When malfunction present at start of trip: Cumulative Inverter Warmup Time at or above Inverter Warmup Torque Threshold	ON >=600s >=ABS(1 Nm)	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	Two Trips, Type B
Auxiliary Transmission Fluid Pump Motor Inverter Temperature Sensor Circuit Low	P1E35	To detect Inverter A Temperature Sensor #1 Out of Range low (voltage)	PIM Temp B Temperature	> 130 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	Two Trips, Type B
Auxiliary Transmission Fluid Pump Motor Inverter Temperature Sensor Circuit Range/ Performance	P1E36	Inverter A Temperature Sensor #1 In-Range Rationality Check	ABS(PIMTemp - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	> 20 deg C	Wake Up Signal Propulsion System Inactive Time Thermal Conditioning Off Time Charge Off Time Cold Start Average Temperature	On >=21600s >=7200s >=7200s > -20C	300 cts Start Delay PLUS X: 550 cts Y: 700 cts R: 10.4ms T: 2080ms =8.84 sec total	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Tranmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		
					Battery Thermal Conditioning Inactive Fault Active	FALSE		
					Battery Thermal Conditioning Inactive Mask	Use Data		
					Plug In Charging Present	TRUE		
					No Active Power Inverter Temp Out Of Range Faults:	P1E34 and P1E35		

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	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp A Temperature	> 98 deg C initial fault	PIM Temperature No Active DTCs:	IN RANGE P1E36	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	Two Trips, Type B
ATPC Controller Diagnostics								
Auxiliary Transmission Fluid Pump Control Module Read Only Memory (ROM)	P1E25	*This Diagnostic tests the checksum on ROM (flash) memory*						One Trip, Type A
		DTC Fail case 1: This DTC will be stored if any check sum in the **boot** is incorrect	Calculated Checksum does not match stored checksum		Ignition Status	= Run or Crank	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5 failures Frequency: Runs continuously in the background	
		DTC Fail case 2: This DTC will be stored if any check sum in the **calibration** is incorrect						
		DTC Fail case 3: This DTC will be stored if any check sum in the **software** is incorrect						
		DTC Pass:		ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false				

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 Long Term Memory Performance	P1E24	*This Diagnostic tests for BINVDM errors*						One Trip, Type A
		DTC Fail case 1: Non-volatile memory (**Static**) checksum error at controller power-up	Checksum at power-up does not match checksum at power-down		Ignition Status	= Run or Crank	1 failure Frequency: Once at powerup	
		DTC Fail case 2: Non-volatile memory (**Preserved**) checksum error at controller power-up						
		DTC Fail case 3: Non-volatile memory (**BINVDM**) checksum error at controller power-up						
		DTC Fail case 4: Non-volatile memory (**ShutdownFinished**) checksum error at controller power-up						
		DTC Pass:		No ROM memory faults				
Auxiliary Transmission Fluid Pump Control Module Random Access Memory (RAM)	P1E23	*This Diagnostic tests the checksum on RAM memory*						One Trip, Type A
		DTC Fail case 1: Indicates that HCP is unable to correctly write and read data to and from **Dual Store** RAM			Ignition Status	= Run or Crank	Should finish within 30 seconds at all operating conditions	
		DTC Fail case 2: Indicates that HCP is unable to correctly write and read data to and from **Write Protect** RAM						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 3: Indicates that HCP is unable to correctly write and read data to and from **2nd SOH** RAM	Data read	does not match data written				
		DTC Fail case 4: Indicates that HCP is unable to correctly write and read data to and from **Main SOH** RAM						
		DTC Fail case 5: Indicates that HCP is unable to correctly write and read data to and from **System** RAM						
		DTC Fail case 6: Indicates that HCP is unable to correctly write and read data to and from **Cache** RAM						
		DTC Fail case 7: Indicates that HCP is unable to correctly write and read data to and from **eTPU** RAM						
		DTC Pass:		No errors in 1000ms MainSOH RAM faults = false CommFlts = false System RAM faults = false CacheRam faults = false eTPU RAM faults = false				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Auxiliary Transmission Fluid Pump Motor Control Module	P0B0D	*This Diagnostic tests all the internal processor integrity subsystems*						One Trip, Type A
		DTC Fail case 1: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctd SPI_Flt	HWIO detects Fault	= true (in SPI Hardware)	Run/Crank Voltage OR Powertrain Relay Voltage Diagnostic System Enable Powermoding	> 9.5 Volts = true = Accesory or Off	28 fail counts out of 32 sample counts Executes in a 6.25ms loop Detects in 200ms	
		DTC Fail case 2: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndNotRunningSeedKyTst	Key Value	= Calibration Value	SRAR shutdowns SPI Fault RunCrank Active Ram or ROM fault 12V battery Seed received in wrong order fault Vehicle Speed Seed/Key Timeout Powermode	= False =False = False = false >11V = false <= 0 MPH = False = off for less than 5 seconds	Detects in 150ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 3: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndFailsToTakeRmdlActn	IPT Detects faulty harware in Inhibit path IPT feedback	≠ calibration Value	HV Bat contactor Staus Available MMDR HPMR HV Battery Contactors Motor Faults Motor Speed SRAR shutdowns SPI Fault RunCrank Active Ram or ROM fault	= True = Powerdown Wait State = Eval BP Open State >= 80 V = Closed = False <= 10 RPM = False =False = False = False	Up down counter = 3	
					12V battery Seed received in wrong order fault Vehicle Speed Seed/Key Timeout Powermode	>11V = False <= 0 MPH = False = off for less than 5 seconds		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 4: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndRxIncorrectKeys	Key Value	≠ Calibration Value	1. Number Of Mains 2. IPT status	1. > 0 2. = Not running for > 0.075s	Detects in 150ms or two consecutive faulty keys	
		DTC Fail case 5: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSdKeyTimeout	seed does not update	within Calibration threshold	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	Detects in 1 sec	
		DTC Fail case 6: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSdRxWrongOrdr	Seed sequence	≠ expected order	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	12 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		DTC Fail case 7: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainSequenceFlt	Seed timeout PSW Fault	> 200 ms = True	1. Seed Update Key StoreFault Enable OR 2. Program Sequence Watch Enable	1. = True 2. = True	3 fail counts out of 4 sample counts Executes in a 50ms loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 8: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainALU_Flt	HWIO detects Fault	=2 (ina row)	1. ALU Test Enabled 2. Diagnostic system status 3. Code clear active 4. PMDI Low voltage clear diag enable conditons met	1. = TRUE 2. = Enabled 3. >= 0.15s 4. = True	runs continuously in 12.5ms loop Detects in 12.5ms	
		DTC Fail case 9: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainCfgRegFlt	HWIO detects Fault	=2 (in arow)	1. Diagnostic Test Enabled 2. Diagnostic system status 3. Code clear active 4. PMDI Low voltage clear diag enable conditons met	1. = TRUE 2. = Enabled 3. >= 0.15s 4. = True	runs continuously in 12.5ms loop Detects in 12.5ms	
		DTC Fail case 10: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainStackFlt	HWIO detects Fault	= 5 (Since Powerup)	Diagnostic Test Enabled Diagnostic System Enables	= True =True	Runs Continuously in 100ms loop Detects in 500ms	
		DTC Fail case 11: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainADC_Flt	Continuous Fault	> 200ms	1. A2D Converter Test Enabled 2. PT Relay Voltage 3. Run Crank Voltage	1. = TRUE 2. > -1 3. > 7	5 fail counts out of 8 sample counts Executes in a 50ms loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 12: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RunCrank CorrFlt	Run Crank on Seconday Processor	≠ Run Crank Active	1. Run Crank Discrete Diagnostic Enable 2. SPI Faults	1. = True 2. = False	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		DTC Fail case 13: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_FlashECC _CktTest	HWIO detects Fault	= 3 /10 5/10	1. Flash ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	
		DTC Fail case 14: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RAM_ECC _CktTest	HWIO detects Fault	= 3 /10 5/10	1. RAM ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 15: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_DMA_Xfer Test	HWIO detects Fault or Memory Copy Error	= True or =True	Diagnostic Test Enabled	= TRUE		
Auxiliary Transmission Fluid Pump Control Module Long Term Memory Reset	P1EB8	*This Diagnostic tests for unuseable BINVDM (flash) memory only*						One Trip, Type A
		DTC Fail case 1: Indicates that the NVM Error flag **HWIO Bat Write will not succeed** set	Last EEPROM write did not complete		Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up	
		DTC Fail case 2: Indicates that the NVM Error flag **HWIO Assembly Cal** set			Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up	
		DTC Pass:		NV writewillnotsucceed = fail Assemblycalfail = false				
Auxiliary Transmission Fluid Pump Motor Control Module Not Programmed	P1BFF	*This diagnostic prevents flashing different MCP software into MCP C that does not match its ID*						One Trip, Type A
		DTC Fail case 1: The MCP ID hardware does not match the calibration for the specific MCP	MCP ID Hardware	≠ *Calibration*				

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	P1EB8	*This Diagnostic tests for BINVDM errors*						One Trip, Type A
		DTC Fail case 1: Non-volatile memory (**Static**) checksum error at controller power-up	Checksum at power-up does not match checksum at power-down		Ignition Status	= Run or Crank	1 failure Frequency: Once at powerup	
		DTC Fail case 2: Non-volatile memory (**Preserved**) checksum error at controller power-up						
		DTC Fail case 3: Non-volatile memory (**BINVDM**) checksum error at controller power-up						
		DTC Fail case 4: Non-volatile memory (**ShutdownFinished**) checksum error at controller power-up						
		DTC Pass:		No ROM memory faults				
ATPC Comm'n								
Lost Comm'n With ECM/PCM on Bus A	U1839	*This diagnostic indicates a lost communication between the ATPC and the ECM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the ECM on Bus A	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage PowerMode Bus Off Fault Active	> 9.5 Volts =RUN =FALSE	Executes in a 6.25ms loop Detects in 500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With TCM	U183B	*This diagnostic indicates a lost communication between the ATPC and the TCM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the TCM on Bus A	Missed TCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Lost Comm'n With Hybrid Controller	U2611	*This diagnostic indicates a lost communication between the ATPC and the HCP*						Two Trips, Type B
		Detects that CAN serial data communication has been lost with the HCP	Missed HCP Messages		Run/Crank Voltage OR Powertrain Relay Voltage PowerMode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	> 9.5 Volts =RUN =FALSE =TRUE =TRUE =FALSE >=3 sec	Detects within 500 msec at 6.25 msec loop rate	
Lost Comm'n With Hybrid Controller B	U183C	*This diagnostic indicates a lost communication between the ATPC and the VICM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Lost Communication with Hybrid Powertrain Control Module B on Bus A (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage PowerMode Bus Off Fault Active Normal Communication Enabled	> 9.5 Volts =RUN =FALSE =TRUE	Executes in a 6.25ms loop Detects in 500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		

Time Required Legend:	
X: Fail Counts R: Loop Time T: Fault Detect Time	Y: Sample Counts (N/A if no XofY structure)

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	Run/Crank circuit is stuck on	Run/Crank input	ON	System Voltage	12V System Status > 10.25 V	5 fails out of 10 samples. Continuous sampling at 50 msec/sample	One Trip, Type A
			AND		Comm with VICM	Message $236 recd.		
			GMLAN Signal "VICM Run Crank Terminal Status"	INACTIVE				
		Status Pass	Run/Crank input	ON	System Voltage	12V System Status > 10.25 V	5 passes out of 10 samples. Continuous sampling at 50 msec/sample	
			AND		HW Inputs	Accessory		
			GMLAN Signal "VICM Run Crank Terminal Status"	ACTIVE	Comm with VICM	Message $236 recd.		
			OR					
			Run/Crank input	OFF				
			AND					
			GMLAN Signal "VICM Run Crank Terminal Status"	INACTIVE				
			OR					
			Run/Crank input	OFF				
			AND					
			GMLAN Signal "VICM Run Crank Terminal Status"	INACTIVE				
A/C Compressor Control Module Ignition Switch Run/Start Position Circuit Low	P15B9	Run/Crank circuit is stuck off	Run/Crank input =OFF & GMLAN Signal "VICM Run Crank Terminal Status"=ACTIVE"		System Voltage	12V System Status > 10.25 V	5 fails out of 10 samples. Continuous sampling at 50 msec/sample	One Trip, Type A
					HW Inputs	Accessory		
					Comm with VICM	Message $236 recd.		
		Status Pass	Run/Crank input =ON & GMLAN Signal "VICM Run Crank Terminal Status"=ACTIVE" OR Run/Crank input =OFF & GMLAN Signal "VICM Run Crank Terminal Status"=INACTIVE" OR Run/Crank input =ON & GMLAN Signal "VICM Run		System Voltage	12V System Status > 10.25 V	5 passes out of 10 samples. Continuous sampling at 50 msec/sample	
					HW Inputs	Accessory		
					Comm with VICM	Message $236 recd.		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Crank Terminal Status"=INACTIVE"					
A/C Compressor Motor Voltage Sensor Circuit High	P0D6A	Monitor High Voltage input to ACCM	Sets when HV >= Threshold	450V	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					HV Battery Normal Operation	Battery Cell Voltage Fault Active is FALSE		
						Compressor Input Voltage reading within 15 V of Battery Cell Voltage reading		
		Status Pass	HV <= Threshold	440V	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.		
A/C Compressor Motor Voltage Sensor Circuit Low	P0D6B	Monitor High Voltage input to ACCM	Sets when HV <= Threshold	190V	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Contactors Closed with no faults	High Voltage Battery Contactor is CLOSED for > 1 sec AND High Voltage Battery Contactor Fault Active is FALSE		
					HV Battery Normal Operation	Battery Cell Voltage Fault Active is FALSE		
						Compressor Input Voltage reading within 15 V of Battery Cell Voltage reading		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Status Pass	HV >= Threshold	200V	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.		
A/C Compressor Motor Instantaneous Voltage High	P1ECA	Monitor High Voltage input to ACCM	Sets when HV >= Threshold	480V	System Voltage	12V System Status > 10.25 V	1 fail out of 1 sample Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	HV <= Threshold	440V	System Voltage	12V System Status > 10.25 V	1 pass out of 1 sample Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.		
A/C Compressor Motor Phase U Current Low	P0D7A	Monitor U-phase motor current	U-phase Input >= Threshold	68 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		
		Status Pass	U-phase Input < Threshold	68 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Motor Phase U Current High	P0D7B	Monitor U-phase motor current	U-phase Input <= Threshold	-68 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Status Pass	U-phase Input > Threshold	-68 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Motor Phase V Current Low	P0D7C	Monitor V-phase motor current	V-phase Input >= Threshold	68 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		
		Status Pass	V-phase Input < Threshold	68 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Motor Phase V Current High	P0D7D	Monitor V-phase motor current	V-phase Input <= Threshold	-68 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		
		Status Pass	V-phase Input > Threshold	-68 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Motor Phase W Current Low	P0D7E	Monitor W-phase motor current	W-phase Input >= Threshold	68 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Status Pass	W-phase Input < Threshold	68 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Motor Phase W Current High	P0D7F	Monitor W-phase motor current	W-phase Input <= Threshold	-68 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		
		Status Pass	W-phase Input > Threshold	-68 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Motor Instantaneous Current High	P1EC9	Monitor DC Link current	Sets when DC Link > Threshold	60A	System Voltage	12V System Status > 10.25 V	1 fail out of 1 sample Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	DC Link <= Threshold	60A	System Voltage	12V System Status > 10.25 V	1 pass out of 1 sample Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Motor Running	Motor Spinning and reaching Speed Request (Thermal Refrigerant Compressor Speed Request > 0 RPM)		
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.		
					Clear Codes	After 10 fails, need clear code from VICM		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
A/C Compressor Motor Current High	P0D6F	Monitor DC Link current	Sets when DC Link > Threshold	27A	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM		
		Status Pass	Input <= Threshold	27A	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Motor Running	Motor Spinning and reaching Speed Request (Thermal Refrigerant Compressor Speed Request > 0 RPM)		
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.		
A/C Compressor Control Module Random Access Memory (RAM) Error	P16B8	RAM memory read/write check	Sets on read/write fault to RAM		System Voltage	12V System Status > 10.25 V	< 250 msec after boot	One Trip, Type A
					HW Inputs	Accessory OR Run/Crank		
					Start up	Upon CPU boot (Run/Crank or ACC transition high)		
		Status Pass			System Voltage	12V System Status > 10.25 V		
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Control Module Read Only Memory (ROM) Error	P16B9	ROM memory check sum	Sets on check sum error with ROM		System Voltage	12V System Status > 10.25 V	< 250 msec after boot	One Trip, Type A
					HW Inputs	Accessory OR Run/Crank		
					Start up	Upon CPU boot (Run/Crank or ACC transition high)		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Status Pass			System Voltage	12V System Status > 10.25 V		
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Control Module Keep Alive Memory (KAM) Error	P16BA	EEPROM memory check sum	Sets on check sum error with EEPROM		System Voltage	12V System Status > 10.25 V	< 250 msec after boot	One Trip, Type A
					HW Inputs	Accessory OR Run/Crank		
					Start up	Upon CPU boot (Run/Crank or ACC transition high)		
		Status Pass			System Voltage	12V System Status > 10.25 V		
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
Electric A/C Compressor Control Module Lost Communication with Hybrid Powertrain Control Module B	U1860	Loss of communication with VICM ECU	Message $236 missed	30 times	System Voltage	12V System Status > 10.25 V	3 sec	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	Message $236 detected	1 time	System Voltage	12V System Status > 10.25 V	< 110 msec. 10 msec scan rate	
					HW Inputs	Accessory OR Run/Crank		
Electric A/C Compressor Control Module Lost Communication with Hybrid Powertrain Control Module 1	U2608	Loss of communication with HCP ECU	Message $1DF missed	30 times	System Voltage	12V System Status > 10.25 V	3 sec	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	Message $1DF detected	1 time	System Voltage	12V System Status > 10.25 V	< 110 msec. 10 msec scan rate	
					HW Inputs	Accessory OR Run/Crank		

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	Monitor ACCM CPU temperature	Tcpu input < Threshold	-40 deg C	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Outside Air Temperature	OAT > -7 deg C		
		Status Pass	Tcpu input >= Threshold	-40 deg C	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
					Outside Air Temperature	OAT > -7 deg C		
Electric A/C Compressor Control Module Internal Temperature Sensor Circuit Low	P0D73	Monitor ACCM CPU temperature	Tcpu input > Threshold	274 deg C	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	Tcpu input <= Threshold	274 deg C	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
Electric A/C Compressor Control Module Output Driver Temperature Sensor Circuit High	P0D77	Monitor ACCM IGBT temperature	Tigbt input = Threshold	-40 deg C	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Speed Request	Compressor speed request > 0 rpm		
					Outside Air Temperature	OAT > -7 deg C		
		Status Pass	Tigbt input >= Threshold	-40 deg C	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Outside Air Temperature	OAT > -7 deg C		
Electric A/C Compressor Control Module Output Driver Temperature Sensor Circuit Low	P0D78	Monitor ACCM IGBT temperature	Tigbt input > Threshold	274 deg C	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	Tigbt input <= Threshold	274 deg C	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Control Module Wake-up Circuit Performance	P16B7	ACC circuit is stuck off	Accessory	OFF	System Voltage	12V System Status > 10.25 V	500 msec	Two Trips, Type B
					HW Inputs	Run/Crank		
					Prop Sys Active	Propulsion System Active = True		
					Timer	500 msec		
		Status Pass	Accessory	ON	System Voltage	12V System Status > 10.25 V	500 msec	
					HW Inputs	Run/Crank		
					Prop Sys Active	Propulsion System Active = True		
					Timer	500msec		
A/C Compressor Motor Start-Up Current Performance	P1F0B	Monitor Inverter Phase Currents	During driver circuit check for all U/V/W Phases, if any current < Threshold	1 A	System Voltage	12V System Status > 10.25 V	< 50 msec	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Startup			
					Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM		
		Status Pass	During driver circuit check for all U/V/W Phases, all currents >= Threshold	1 A	System Voltage	12V System Status > 10.25 V	1 pass out of 1 sample Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM		
Electric A/C Compressor Control Module A/C Compressor Motor Current Feedback Circuit High	P1F0D	Monitor ACCM DC Link Current	Current input >= Threshold	36.7 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		
		Status Pass	Current input < Threshold	36.7 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		
Electric A/C Compressor Control Module A/C Compressor Motor Current Feedback Circuit Low	P1F0C	Monitor ACCM DC Link Current	Current input <= Threshold	-2.5 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM		
					Peak Motor Current	Exceeds threshold specified in Appendix A for 50 ms		
		Status Pass	Current input > Threshold	-2.5 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Motor Running	$236 Speed Request > 0		
A/C Compressor Motor Speed Performance	P1F0A	Monitor ACCM Motor Speed	Motor Speed < Threshold	1800 rpm	System Voltage	12V System Status > 10.25 V	20 sec	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Startup	Motor Spinning but not reaching 1800 RPM		
					IGBT Temp	Tigbt < 85 degC		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Timer	> 20 sec after motor starts spinning		
					OR			
					System Voltage	12V System Status > 10.25 V	1 min	
					HW Inputs	Accessory OR Run/Crank		
					Motor Startup	Motor Spinning but not reaching 1800 RPM		
					IGBT Temp	Tigbt > 85 degC		
					Increase in IGBT Temp	ΔTigbt >= 10 degC		
					Timer	> 1 min after motor starts spinning and IGBT Temp increases 10 deg		
		Status Pass	Motor Speed >= Threshold	1800 rpm	System Voltage	12V System Status > 10.25 V	15min	
					HW Inputs	Accessory OR Run/Crank		
					Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM		
					ECU Reset	after a FAIL a 12V reset and 15 minutes is required to re-try the compressor.		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger 14 Volt Output Current Sensor Circuit Low (12VC)	P0D49	DTC Fail Sets when the LV Current raw data, (12VC _AD_READ), is less than or equal to a threshold	Low Voltage DC Current (sensor reading)	<= 0.293 Amps	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Low Voltage DC Current (sensor reading)	> 0.293 Amps			500 ms	
Battery Charger 14 Volt Output Current Sensor Circuit High (12VC)	P0D4A	DTC Fail Sets when the LV Current raw data, (12VC _AD_READ), is greater than or equal to a threshold	Low Voltage DC Current (sensor reading)	>= 54 Amps	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Low Voltage DC Current (sensor reading)	< 54 Amps			500 ms	
Battery Charger 14 Volt Output Voltage Sensor Circuit Low (LVS)	P0D44	DTC Fail Sets when the LV Voltage raw data, (LVS _AD_READ), is less than or equal to a threshold	Low Voltage DC Voltage (sensor reading)	<= 1.87 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Low Voltage DC Voltage (sensor reading)	> 1.87 Volts			500 ms	
Battery Charger 14 Volt Output Voltage Sensor Circuit High (LVS)	P0D45	DTC Fail Sets when the LV Voltage raw data, (LVS _AD_READ), is greater than or equal to a threshold	Low Voltage DC Voltage (sensor reading)	>= 16.88 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	Two Trips, Type B
		DTC Pass	Low Voltage DC Voltage (sensor reading)	< 16.88 Volts			500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Cold Plate Temperature Sensor Circuit Low (THCP)	P1ED6	DTC Fail Sets when the Cold Plate Temperature raw data, (THCP _AD_READ), is less than or equal to a threshold	Cold Plate Temperature (sensor reading)	<= -49.5 ℃	Low Voltage DC (Secondary) micro status	is AWAKE*	1000 ms in a 1275 ms window	One Trip, Type A
		DTC Pass	Cold Plate Temperature (sensor reading)	> -49.5 ℃			1275 ms	
Battery Charger Cold Plate Temperature Sensor Circuit High (THCP)	P1ED7	DTC Fail Sets when the Cold Plate Temperature raw data, (THCP _AD_READ), is greater than or equal to a threshold	Cold Plate Temperature (sensor reading)	>= 135 ℃	Low Voltage DC (Secondary) micro status	is AWAKE*	1000 ms in a 1275 ms window	One Trip, Type A
		DTC Pass	Cold Plate Temperature (sensor reading)	< 135 ℃			1275 ms	
Battery Charger Control Module Reference Voltage "B" Circuit Low (Sec Reference Voltage)	P1EE9	DTC Fail Sets when the SEC Reference Voltage raw data,(SecVref _AD_READ), is less than or equal to a threshold	Low Voltage DC (Secondary) Micro Reference Voltage	<= 0.782 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Low Voltage DC (Secondary) Micro Reference Voltage	> 0.782 Volts			500 ms	
Battery Charger Control Module Reference Voltage "B" Circuit High (Sec Reference Voltage)	P1EEA	DTC Fail Sets when the Sec Reference Voltage raw data,(SecVref _AD_READ), is greater than or equal to a threshold	Low Voltage DC (Secondary) Micro Reference Voltage	>= 1.407 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Low Voltage DC (Secondary) Micro Reference Voltage	< 1.407 Volts			500 ms	
Battery Charger Hybrid/EV Battery Output Voltage Sensor Circuit Low (HVS)	P0D4E	DTC Fail Sets when the HV Voltage raw data,(HVS _AD_READ), is less than or equal to a threshold	High Voltage DC Voltage (sensor reading)	<= 2.62 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
					High Voltage DC (HV) micro status	is AWAKE*		
		DTC Pass	High Voltage DC Voltage (sensor reading)	> 2.62 Volts			500 ms	
Battery Charger Hybrid/EV Battery Output Voltage Sensor Circuit High (HVS)	P0D4F	DTC Fail Sets when the HV Voltage raw data,(HVS _AD_READ), is greater than or equal to a threshold	High Voltage DC Voltage (sensor reading)	>= 482 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
					High Voltage DC (HV) micro status	is AWAKE*		
		DTC Pass	High Voltage DC Voltage (sensor reading)	< 482 Volts			500 ms	
Battery Charger Hybrid/EV Battery Output Current Sensor Circuit Low (HVC)	P0D53	DTC Fail Sets when the HV Current raw data,(HVC_AD_READ), is less than or equal to a threshold	High Voltage DC Current (sensor reading)	<= 0.098 Amps	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
					High Voltage DC (HV) micro status	is AWAKE*		
		DTC Pass	High Voltage DC Current (sensor reading)	> 0.098 Amps			500 ms	

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 Current Sensor Circuit High (HVC)	P0D54	DTC Fail Sets when the HV Current raw data,(HVC_AD_READ), is greater than or equal to a threshold	High Voltage DC Current (sensor reading)	>= 17.7 Amps	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
					High Voltage DC (HV) micro status	is AWAKE*		
		DTC Pass	High Voltage DC Current (sensor reading)	< 17.7 Amps			500 ms	
Battery Charger Control Module Reference Voltage "C" Circuit Low (HV Reference Voltage)	P1EEB	DTC Fail Sets when the HV Reference Voltage raw data,(HVVref_AD_READ), is less than or equal to a threshold	High Voltage DC (HV) Micro Reference Voltage	<= 0.782 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
					High Voltage DC (HV) micro status	is AWAKE*		
		DTC Pass	High Voltage DC (HV) Micro Reference Voltage	> 0.782 Volts			500 ms	
Battery Charger Control Module Reference Voltage "C" Circuit High (HV Reference Voltage)	P1EEC	DTC Fail Sets when the HV Reference Voltage raw data,(HVVref_AD_READ), is greater than or equal to a threshold	High Voltage DC (HV) Micro Reference Voltage	>= 1.407 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
					High Voltage DC (HV) micro status	is AWAKE*		
		DTC Pass	High Voltage DC (HV) Micro Reference Voltage	< 1.407 Volts			500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Control Module Ignition Switch Run/Start Position Circuit Low(PROG)	P1EF6	DTC Fail Sets if Run/Crank hardwire input state is low when Run/Crank Terminal Status serial data signal indicates hardwire state should be high	Run/Crank hardwire input state VICM Run/Crank Terminal Status signal (CC)	<= 2.0 Volts = HIGH	Low Voltage DC (Secondary) micro status Loss of Comm on HVEM	is AWAKE* U185C not set	1200 ms in a 1500 ms window	One Trip, Type A
		DTC Pass	Run/Crank hardwire input state VICM Run/Crank Terminal Status signal (CC)	>= 5.5 Volts = HIGH/LOW			1500 ms	
Battery Charger Control Module Ignition Switch Run/Start Position Circuit High(PROG)	P1EF7	DTC Fail Sets if Run/Crank hardwire input state is high when Run/Crank Terminal Status serial data signal indicates hardwire state should be low	Run/Crank hardwire input state VICM Run/Crank Terminal Status signal (CC)	>= 5.5 Volts = LOW	Low Voltage DC (Secondary) micro status Loss of Comm on HVEM	is AWAKE* U185C not set	1200 ms in a 1500 ms window	One Trip, Type A
		DTC Pass	Run/Crank hardwire input state VICM Run/Crank Terminal Status signal (CC)	<= 2.0 Volts = HIGH/LOW			1500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Control Module High Voltage Energy Management Communication Bus Enable Circuit Low (HVCEN)	P1EF8	DTC Fail Sets if HVEM Comm Enable hardwire input state is low when HVEM Comm Enable Terminal Status serial data signal indicates hardwire state should be high	HVEM Comm Enable hardwire input state VICM HVEM Comm Enable Terminal Status signal (HS)	<= 2.0 Volts = HIGH	Low Voltage DC (Secondary) micro status Loss of Comm VICM on HS	is AWAKE* U2612 not set	1200 ms in a 1500 ms window	One Trip, Type A
		DTC Pass	HVEM Comm Enable hardwire input state VICM HVEM Comm Enable Terminal Status signal (HS)	>= 5.5 Volts = HIGH/LOW			1500 ms	
On Board Charger Control Module Lost Communication with Hybrid Powertrain Control Module 2 on Bus H	U185C	DTC Fail Sets if signal supervision timeout detected while the OBCM is in communication with the VICM on the HVEM Expansion Bus.	Supervised signal timeout detected: Supervised signal	 HVChrgrBsOutCrntCmd Message ID - $304 Message - High_V_Control_Energy_Mgmt_CC	Low Voltage DC (Secondary) micro status Charger CAN Bus State	is AWAKE* is ACTIVE	250 ms	One Trip, Type A
		DTC Pass	Supervised signal received within timeout window				< 250 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
On Board Charger Control Module Lost Communication with Engine Control Module	U1861	DTC Fail Sets if signal supervision timeout detected while the OBCM is in communication with the ECM on the HSGMLAN bus.	Supervised signal timeout detected: Supervised signal	LegDiagStndCndMet Message ID - $4C1 Message - PPEI_Engine_General_Status_4	Low Voltage DC (Secondary) micro status HSGMLAN bus State	is AWAKE* is ACTIVE	1250 ms	Two Trips, Type B
		DTC Pass	Supervised signal received within timeout window				< 1250 ms	
Battery Charger Control Module Lost Communication with Hybrid Powertrain Control Module 2	U2612	DTC Fail Sets if signal supervision timeout detected while the OBCM is in communication with the VICM on the HSGMLAN bus.	Supervised signal timeout detected: Supervised signal	VICMHVEnMgCmEnTrS Message ID - $236 Message - VICM_Status_HS	Low Voltage DC (Secondary) micro status HSGMLAN bus State	is AWAKE* is ACTIVE	250 ms	Two Trips, Type B
		DTC Pass	Supervised signal received within timeout window				< 250 ms	
Battery Charger Control Module Lost Communication with Hybrid Powertrain Control Module 1	U2609	DTC Fail Sets if signal supervision timeout detected while the OBCM is in communication with the HCP on the HSGMLAN bus.	Supervised signal timeout detected: Supervised signal	PrplsnSysAtv Message ID - $1DF Message - PTEI_Propulsion_General_Status_1	Low Voltage DC (Secondary) micro status HSGMLAN bus State	is AWAKE* is ACTIVE	250 ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Supervised signal received within timeout window				< 250 ms	
On Board Charger Control Module Communications Bus H Off	U1807	DTC Fail Sets if HVEM Expansion Bus off error is detected	HVEM Expansion Bus off error	= TRUE	Low Voltage DC (Secondary) micro status	is AWAKE*	40 ms in a 40 ms window	One Trip, Type A
		DTC Pass	HVEM Expansion Bus off error	= FALSE			40ms	
Battery Charger Control Module System Voltage Low (LV System Voltage exceeds operating Range)	P1EFC	Sub-Test 1 of 2 LV Voltage System Check DTC Fail Sets if Low Voltage Output voltage is less than a voltage threshold - two test cases: 1) LV output is OFF, but is requested to turn ON 2) LV output is ON	Case 1: Low Voltage Output voltage Case 2: Low Voltage Output voltage	<= 9 Volts < 8 Volts, for greater than 2 sec	Diagnostic enable calibration Low Voltage DC (Secondary) micro status Low Voltage DC (Secondary) micro status	is Enabled is AWAKE* is not going to IDLE state	400 ms in a 500 ms window	Special Type C
		DTC Pass	Case 1: Low Voltage Output voltage Case 2: Low Voltage Output voltage	> 9 Volts >= 8 Volts and never falls below 8 Volts for more than 2 sec			500ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 2 of 2 CAN Voltage Limit System Check DTC Fail Sets when Low Voltage voltage is beyond CAN voltage limits.	Low Voltage voltage	< 7 Volts OR > 18 Volts	Diagnostic enable calibration Low Voltage DC (Secondary) micro status	is Enabled is AWAKE*	5 ms in a 5 ms window	
		DTC Pass	Low Voltage voltage	>= 7 Volts AND <= 18 Volts			5ms	
Battery Charger Control Module Random Access Memory (RAM) Error	P16C2	DTC Fail Each RAM location is written with a predefined value and verified. Sets when verfication on any RAM location fails.	Secondary RAM test result HV or Primary micor SPI Verify Command	= FAIL OR Negative Acknowledgement	Low Voltage DC (Secondary) micro status High Voltage DC (HV) micro status High Voltage AC (Primary) micro status	is AWAKE* is AWAKE* is AWAKE*	10 ms in a 10 ms window, only execute after power up reset	One Trip, Type A
		DTC Pass	Secondary RAM test result HV or Primary micor SPI Verify Command	= PASS AND Positive Acknowledgment			10ms	
Battery Charger Control Module Read Only Memory (ROM) Error	P16C1	DTC Fail Sets When checksum verification on application/calibration area fails	Secondary ROM test result HV or Primary micor SPI Verify Command	= FAIL OR Negative Acknowledgement	Low Voltage DC (Secondary) micro status	is AWAKE*	20 ms in a 20 ms window, only execute after power up reset	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Secondary ROM test result HV or Primary micor SPI Verify Command	= PASS AND Positive Acknowledgment			20ms	
Battery Charger Control Module SPI Bus 1 (SPI Communication Fault - Primary)	P16C4	Sub-Test 1 of 5 SPI Primary Mico Message Checksum Error DTC Fail Sets when any Primary SPI checksum error count for a SPI Message is greater than or equal to the counter threshold	MessageChkSumErrCntr[AC Meas Msg], OR MessageChkSumErrCntr[OBD Msg], OR MessageChkSumErrCntr[Primary Status], OR MessageChkSumErrCntr[T emperature Msg]	>= 2 >= 2 >= 2 >= 2	Low Voltage DC (Secondary) micro status SPI mode	is AWAKE* = NORMAL	44 ms in a 44 ms window	One Trip, Type A
		DTC Pass	MessageChkSumErrCntr[AC Meas Msg], AND MessageChkSumErrCntr[OBD Msg], AND MessageChkSumErrCntr[Primary Status], AND MessageChkSumErrCntr[T emperature Msg]	< 2 < 2 < 2 < 2			22 ms (message trans rate)	
		Sub-Test 2 of 5 SPI Primary Micro Message Timeout Error DTC Fail Sets when any Primary SPI Message is not received within an expected time window	MessageTimer[AC Meas Msg], OR MessageTimer[OBD Msg], OR MessageTimer[Primary Status], OR MessageTimer[Temperatu re Msg]	>= 65 ms >= 65 ms >= 65 ms >= 65 ms	Low Voltage DC (Secondary) micro status SPI mode	is AWAKE* = NORMAL	65 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	MessageTimer[AC Meas Msg], AND MessageTimer[OBD Msg], AND MessageTimer[Primary Status], AND MessageTimer[Temperature Msg]	< 65 ms < 65 ms < 65 ms < 65 ms			< 65 ms	
		Sub-Test 3 of 5 SPI Primary Micro Node Timeout Error DTC Fail Sets when Primary SPI Resynch Error Counter is greater than or equal to the counter threshold	SpiResynchErrorCounter[PRI]	>= 1	Low Voltage DC (Secondary) micro status SPI mode	is AWAKE* = NORMAL OR SYNCH	3 - 5 ms	
		DTC Pass	SpiResynchErrorCounter[PRI]	< 1			< 3 - 5 ms (depends on message received)	
		Sub-Test 4 of 5 SPI Primary Micro Channel Rationality Error DTC Fail Sets when Primary Channel SPI Mode takes longer than a timer threshold to reach Normal Mode	SpiChannelRationalityTimerInst[PRI]	>= 1000 ms	Low Voltage DC (Secondary) micro status SPI mode HV channel SPI mode Primary channel	is AWAKE* = NORMAL = SYNCH OR VERIFY	1000 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	SpiChannelRationalityTimerInst[PRI]	< 1000 ms			< 1000 ms	
		Sub-Test 5 of 5 SPI Primary Micro Driver Hardware Error DTC Fail Sets when Primary SPI hardware driver errors received	spi_ResultStatus	Failed	Low Voltage DC (Secondary) micro status	is AWAKE*	1 ms	
		DTC Pass	spi_ResultStatus	Passed			1 ms	
Battery Charger Control Module SPI Bus 1 (SPI Communication Fault - HV DC)	P16C5	Sub-Test 1 of 5 SPI HV DC Micro Message Checksum Error DTC Fail Sets when any HV DC SPI checksum error count for a SPI Message is greater than or equal to the counter threshold	MessageChkSumErrCntr[HV DC Meas Msg]	>= 2	Low Voltage DC (Secondary) micro status SPI mode	is AWAKE* = NORMAL	44 ms in a 44 ms window	One Trip, Type A
		DTC Pass	MessageChkSumErrCntr[HV DC Meas Msg]	< 2			22 ms (message trans rate)	
		Sub-Test 2 of 5 SPI HV DC Micro Message Timeout Error DTC Fail Sets when any HV DC SPI Message is not received within an expected time window	MessageTimer[HV DC Meas]	>= 65 ms	Low Voltage DC (Secondary) micro status	is AWAKE*	65 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					SPI mode	= NORMAL		
		DTC Pass	MessageTimer[HV DC Meas]	< 65 ms			< 65 ms	
		Sub-Test 3 of 5 SPI HV DC Micro Node Timeout Error DTC Fail Sets when HV DC SPI Resynch Error Counter is greater than or equal to the counter threshold	SpiResynchErrorCounter[PRI]	>= 1	Low Voltage DC (Secondary) micro status SPI mode	is AWAKE* = NORMAL OR SYNCH	3 - 5 ms	
		DTC Pass	SpiResynchErrorCounter[PRI]	< 1			< 3 - 5 ms (depends on message received)	
		Sub-Test 4 of 5 SPI HV DC Micro Channel Rationality Error DTC Fail Sets when HV DC Channel SPI Mode takes longer than a timer threshold to reach Normal Mode	SpiChannelRationalityTimerInst[PRI]	>= 1000 ms	Low Voltage DC (Secondary) micro status SPI mode Primary channel SPI mode HV channel	is AWAKE* = NORMAL = SYNCH OR VERIFY	1000 ms	
		DTC Pass	SpiChannelRationalityTimerInst[PRI]	< 1000 ms			< 1000 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 5 of 5 SPI HV DC Micro Driver Hardware Error DTC Fail Sets when HV DC SPI hardware driver errors received	spi_ResultStatus	Failed	Low Voltage DC (Secondary) micro status	is AWAKE*	1 ms	
		DTC Pass	spi_ResultStatus	Passed			1 ms	
Battery Charger Hybrid/EV Battery Output Power Performance (HV Output Power Rationality)	P0D5C	DTC Fail Sets when the measured High Voltage output power exceeds the theoretical power available (calculated as charger real AC input power X charger efficiency + offset)	High Voltage Power (HV Voltage x HV Current)	> AC Power x 1.99951171875 + 120 Watts	HV Current Sensor faults HV Voltage Sensor faults High Voltage DC (HV) Micro Ref Voltage faults AC Input Power Status	P0D53 or P0D54 not set P0D4E or P0D4F not set P1EEB or P1EEC not set not FAILED	1.6 seconds in a 2 seconds window	One Trip, Type A
		DTC Pass	High Voltage Power (HV Voltage x HV Current)	<= AC Power x 1.99951171875 + 120 Watts			2 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger 14 Volt Output Power Performance (LV Output Power Rationality)	P0D5B	DTC Fail Sets when the measured Low Voltage output power exceeds the theoretical power available (calculated as charger real AC input power X charger efficiency + offset)	Low Voltage Power (LV Voltage x LV Current)	> AC Power x 1.99951171875 + 125 Watts	LV Current Sensor faults LV Voltage Sensor faults Low Voltage DC (Secondary) Micro Ref Voltage faults AC Input Power Status	P0D49 or P0D4A not set P0D44 or P0D45 not set P1EE9 or P1EEA not set not FAILED	1.6 seconds in a 2 seconds window	One Trip, Type A
		DTC Pass	Low Voltage Power (LV Voltage x LV Current)	<= AC Power x 1.99951171875 + 125 Watts			2 seconds	
Battery Charger Total Output Power Performance(Total Output Power Rationality)	P1ECE	DTC Fail Sets when the sum of the measured High Voltage output power and Low Voltage output power exceeds the theoretical power available (calculated as charger real AC input power X charger efficiency + offset)	High Voltage Power (HV Voltage x HV Current) + Low Voltage Power (LV Voltage x LV Current)	> AC Power x 1.99951171875 + 130 Watts	HV Current Sensor faults HV Voltage Sensor faults LV Current Sensor faults	P0D53 or P0D54 not set P0D4E or P0D4F not set P0D49 or P0D4A not set	1.6 seconds in a 2 seconds window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					LV Voltage Sensor faults High Voltage DC (HV) Micro Ref Voltage faults Low Voltage DC (Secondary) Micro Ref Voltage faults AC Input Power Status	P0D44 or P0D45 not set P1EEB or P1EEC not set P1EE9 or P1EEA not set not FAILED		
		DTC Pass	High Voltage Power (HV Voltage x HV Current) + Low Voltage Power (LV Voltage x LV Current)	<= AC Power x 1.99951171875 + 130 Watts	AC Input Power Status	is Updated via SPI bus	2 seconds	
Battery Charger 14 Volt Output Voltage Comparator Circuit(12Volt Alarm Rationality)	P1EED	DTC Fail Monitors for an irrational combination of states consisting of: LV Converter Over/Under voltage input = HIGH, with a non-zero LV Current output.	12V Alarm hardware detection (triggered) AND Low Voltage Current	= High > 1.0 Amps	Low Voltage DC (Secondary) micro status LV Current Sensor faults LV ON Command from Primary LV Hardware Shutdown (12V Alarm)	is AWAKE* P0D49 or P0D4A not set = ON = Shutdown	1.6sec in a 2sec window	One Trip, Type A
		DTC Pass	12V Alarm hardware detection (triggered) AND Low Voltage Current	= High <= 1.0 Amps			2 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Input Voltage Conditioner Temperature Sensor Performance (PFC Temperature Sensor-Rationality)	P1EE1	Sub-Test 1 of 2 Exessively Large Rate of Change (Noisy Sensor) DTC Fail Sets when the absolute rate of change of measured temperature is greater than or equal to a temperature change rate threshold - temperature changes are normally relatively slow	ABS(PFC temperature current cycle - PFC temperature previous cycle)	>= 2℃	Low Voltage DC (Secondary) micro status PFC Temperature Sensor faults Primary MCU normal mode run time	is AWAKE* P1EDF or P1EE0 not set > 1 second	640ms in a 800ms window	One Trip, Type A
		DTC Pass	ABS(PFC temperature current cycle - PFC temperature previous cycle)	< 2℃			800ms	
		DTC Pass	PFC temperature max - PFC temperature min	>= 0.03125℃			40ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 2 of 2 Zero Offset Check DTC Fail Charger contains multiple temperature sensors. After a sufficient charger off time to allow sensor normalization, temperature sensor values are compared at start up to detect sensor reading offset errors. All sensors should report within a deadband. Diagnostic fails if any one or more of below test conditions is true. 1 Sensor has 3 failures 2 All sensors have 2 failures 3 Sensor has 2 failures and at least one other sensor has only one failure one other sensor has only one failure. Sensor failure means the absolute difference of sensors is great or equal the threshold	Pfc_Failures==3 ||(Pfc_Failures==2&&(Min_failures=2&&Max_failures=2)||Min_failures<=1) the variables are calculate in following way: Temperature ABS(PFC - HV1), Pfc_Failures++,Hv1_Failures++; Temperature ABS(PFC - HV2), Pfc_Failures++,Hv2_Failures++; Temperature ABS(PFC - Case), Pfc_Failures++,Case_Failures++; Temperature ABS(HV1 - HV2), Hv1_Failures++,Hv2_Failures++; Temperature ABS(HV1 - Case), Hv1_Failures++++,Case_Failures++; Temperature ABS(HV2 - Case), Hv2_Failures++++,Case_Failures++; Min_failures=MIN(PFC,HV1,HV2,Case); Max_failures=MAX(PFC,HV1,HV2,Case);	>=20℃ >=20℃ >=20℃ >=20℃ >=20℃ >=20℃	Low Voltage DC (Secondary) micro status PFC Temperature Sensor faults HV 1kW Temperature Sensor faults HV 2kW Temperature Sensor faults	is AWAKE* P1EDF or P1EE0 not set P1ECB or P1ECC not set P1ED0 or P1ED1 not set	640ms in a 800ms window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Cold Plate Temperature Sensor faults Charger Off Time Charger Off Time V Charger Off Time M Charger Off Time Charger Off Time V Charger Off Time M The test only run as long as the module has not yet charged or precharged. After (pre)charge has been started the algorithm is allowed to run a a delay time. Secondary micro has to run	P1ED6 or P1ED7 not set >20 minutes ==use Data ==Valid ==Valid is true is true 10 seconds 1 second		
		DTC Pass	Compliment of fail conditions					
Battery Charger High Voltage Converter "A" Temparature Sensor Performance(1kW HV Converter Temperature Sensor-Rationality)	P1ECD	Sub-Test 1 of 2 Exessively Large Rate of Change (Noisy Sensor) DTC Fail Sets when the absolute rate of change of measured temperature is greater than or equal to a temperature change rate threshold - temperature changes are normally relatively slow	ABS(HV 1kW temperature current cycle - HV 1kW temperature previous cycle)	>= 2℃	Low Voltage DC (Secondary) micro status	is AWAKE*	640ms in a 800ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HV 1kW Temperature Sensor faults Primary MCU normal mode run time	P1ECB or P1ECC not set > 1 second		
		DTC Pass	ABS(HV 1kW temperature current cycle - HV 1kW temperature previous cycle)	< 2℃			800ms	
		Sub-Test 2 of 2 Zero Offset Check DTC Fail Charger contains multiple temperature sensors. After a sufficient charger off time to allow sensor normalization, temperature sensor values are compared at start up to detect sensor reading offset errors. All sensors should report within a deadband. Diagnostic fails	HV1_Failures==3 ||(HV1_Failures==2&&(Min_failures=2&&Max_failures=2)||Min_failures<=1) the variables are calculate in following way: Temperature ABS(PFC - HV1), Pfc_Failures++,Hv1_Failures++; Temperature ABS(PFC - HV2), Pfc_Failures++,Hv2_Failures++; Temperature ABS(PFC - Case), Pfc_Failures++,Case_Failures++; Temperature ABS(HV1 - HV2), Hv1_Failures++,Hv2_Failures++; Temperature ABS(HV1 - Case), Hv1_Failures++++,Case_Failures++; Temperature ABS(HV2 - Case), Hv2_Failures++++,Case_Failures++; Min_failures=MIN(PFC,HV1,HV2,Case);	>=20℃ >=20℃ >=20℃ >=20℃ >=20℃ >=20℃	Low Voltage DC (Secondary) micro status	is AWAKE*	640ms in a 800ms window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		if any one or more of below test conditions is true. 1 Sensor has 3 failures 2 All sensors have 2 failures 3 Sensor has 2 failures and at least one other sensor has only one failure one other sensor has only one failure. Sensor failure means the absolute difference of sensors is great or equal the threshold	Max_failures=MAX(PFC,HV1,HV2,Case);		PFC Temperature Sensor faults	P1EDF or P1EE0 not set		
					HV 1kW Temperature Sensor faults	P1ECB or P1ECC not set		
					HV 2kW Temperature Sensor faults	P1ED0 or P1ED1 not set		
					Cold Plate Temperature Sensor faults	P1ED6 or P1ED7 not set		
					Charger Off Time	>20 minutes		
					Charger Off Time V	==use Data		
					Charger Off Time M	==Valid		
					Charger Off Time	==Valid		
					Charger Off Time V	is true		
					Charger Off Time M	is true		
					The test only run as long as the module has not yet charged or precharged. After (pre)charge has been started the algorithm is allowed to run a a delay time.	10 seconds		
					Secondary micro has to run	1 second		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Compliment of fail conditions					
Battery Charger High Voltage Converter "B" Temparature Sensor Performance (2kW HV Converter Temperature Sensor-Rationality)	P1ED2	Sub-Test 1 of 2 Exessively Large Rate of Change (Noisy Sensor) DTC Fail Sets when the absolute rate of change of measured temperature is greater than or equal to a temperature change rate threshold - temperature changes are normally relatively slow	ABS(HV 2kW temperature current cycle - HV 2kW temperature previous cycle)	>= 2℃	Low Voltage DC (Secondary) micro status HV 2kW Temperature Sensor faults Primary MCU normal mode run time	is AWAKE* P1ED0 or P1ED1 not set > 1 second	640ms in a 800ms window	One Trip, Type A
		DTC Pass	ABS(HV 2kW temperature current cycle - HV 2kW temperature previous cycle)	< 2℃			800ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 2 of 2 Zero Offset Check DTC Fail Charger contains multiple temperature sensors. After a sufficient charger off time to allow sensor normalization, temperature sensor values are compared at start up to detect sensor reading offset errors. All sensors should report within a deadband. Diagnostic fails if any one or more of below test conditions is true. 1 Sensor has 3 failures 2 All sensors have 2 failures 3 Sensor has 2 failures and at least one other sensor has only one failure one other sensor has only one failure. Sensor failure means the absolute difference of sensors is great or equal the threshold	HV1_Failures==3 ||(HV1_Failures==2&&(Min_failures=2&&Max_failures=2)||Min_failures<=1) the variables are calculate in following way: Temperature ABS(PFC - HV1), Pfc_Failures++,Hv1_Failures++; Temperature ABS(PFC - HV2), Pfc_Failures++,Hv2_Failures++; Temperature ABS(PFC - Case), Pfc_Failures++,Case_Failures++; Temperature ABS(HV1 - HV2), Hv1_Failures++,Hv2_Failures++; Temperature ABS(HV1 - Case), Hv1_Failures++++,Case_Failures++; Temperature ABS(HV2 - Case), Hv2_Failures++++,Case_Failures++; Min_failures=MIN(PFC,HV1,HV2,Case); Max_failures=MAX(PFC,HV1,HV2,Case);	>=20℃ >=20℃ >=20℃ >=20℃ >=20℃ >=20℃	Low Voltage DC (Secondary) micro status PFC Temperature Sensor faults HV 1kW Temperature Sensor faults HV 2kW Temperature Sensor faults	is AWAKE* P1EDF or P1EE0 not set P1ECB or P1ECC not set P1ED0 or P1ED1 not set	640ms in a 800ms window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Cold Plate Temperature Sensor faults	P1ED6 or P1ED7 not set		
					Charger Off Time Charger Off Time V Charger Off Time M Charger Off Time Charger Off Time V Charger Off Time M The test only run as long as the module has not yet charged or precharged. After (pre)charge has been started the algorithm is allowed to run a a delay time.	>20 minutes ==use Data ==Valid ==Valid is true is true 10 seconds		
					Secondary micro has to run	1 second		
		DTC Pass	Compliment of fail conditions					
Battery Charger Cold Plate Temperature Sensor Performance (Cold Plate Temperature Sensor-Rationality)	P1ED8	Sub-Test 1 of 2 Exessively Large Rate of Change (Noisy Sensor) DTC Fail Sets when the absolute rate of change of measured temperature is greater than or equal to a temperature change rate threshold - temperature changes are normally relatively slow	ABS(Cold Plate temperature current cycle - Cold Plate temperature previous cycle)	>= 2℃	Low Voltage DC (Secondary) micro status	is AWAKE*	640ms in a 800ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Cold Plate Temperature Sensor faults	P1ED6 or P1ED7 not set		
					Primary MCU normal mode run time	> 1 second		
		DTC Pass	ABS(Cold Plate temperature current cycle - Cold Plate temperature previous cycle)	< 2℃			800ms	
		Sub-Test 2 of 2 Case Thermal Offset Rationality DTC Fail sets when one of below conditons is true. 1 Sensor has 3 failures 2 All sensors have 2 failures 3 Sensor has 2 failures and at least one other sensor has only one failure Sensor failure means the absolute difference of sensors is great or equal the threshold	Case_Failures==3 ||(Case_Failures==2&&(Min_failures=2&&Max_failures=2)||Min_failures<=1) the variables are calculate in following way: Temperature ABS(PFC - HV1), Pfc_Failures++,Hv1_Failures++; Temperature ABS(PFC - HV2), Pfc_Failures++,Hv2_Failures++; Temperature ABS(PFC - Case), Pfc_Failures++,Case_Failures++; Temperature ABS(HV1 - HV2), Hv1_Failures++,Hv2_Failures++; Temperature ABS(HV1 - Case), Hv1_Failures++++,Case_Failures++; Temperature ABS(HV2 - Case), Hv2_Failures++++,Case_Failures++; Min_failures=MIN(PFC,HV1,HV2,Case);	>=20℃ >=20℃ >=20℃ >=20℃ >=20℃ >=20℃	Low Voltage DC (Secondary) micro status PFC Temperature Sensor faults HV 1kW Temperature Sensor faults HV 2kW Temperature Sensor faults Cold Plate Temperature Sensor faults	is AWAKE* P1EDF or P1EE0 not set P1ECB or P1ECC not set P1ED0 or P1ED1 not set P1ED6 or P1ED7 not set	640ms in a 800ms window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Max_failures=MAX(PFC,HV1,HV2,Case);		Charger Off Time Charger Off Time V Charger Off Time M Charger Off Time Charger Off Time V Charger Off Time M The test only run as long as the module has not yet charged or precharged. After (pre)charge has been started the algorithm is allowed to run a a delay time. Secondary micro has to run	>20 minutes ==use Data ==Valid ==Valid is true is true 10 seconds 1 second		
		DTC Pass	Compliment of fail conditions					
Battery Charger 14 Volt Output Voltage Sensor Circuit Range/ Performance (LV Output Voltage Sensor Rationality)	P0D43	DTC Fail The Low Voltage Output Voltage Sensor is rationalized against other analog measurements of vehicle system voltage. The diagnostic fails if a deviation limit is exceeded:	Case 1: Run/Crank = High ABS(LV Voltage-RunCrank Voltage) AND ABS(LV Voltage-HVEMB Enable Voltage) Case 2: Run/Crank = Low ABS(LV Voltage-HVEMB Enable Voltage)	 >= 6 Volts >= 6 Volts >= 6 Volts	Low Voltage DC (Secondary) micro status Low Voltage DC (Secondary) Micro Ref Voltage faults LV Voltage Sensor faults	is AWAKE* P1EE9 or P1EEA not set P0D44 or P0D45 not set	4sec in a 5sec window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Case 1: Run/Crank = High ABS(LV Voltage-RunCrank Voltage) OR ABS(LV Voltage-HVEMB Enable Voltage) Case 2: Run/Crank = Low ABS(LV Voltage-HVEMB Enable Voltage)	 < 6 Volts < 6 Volts < 6 Volts			5sec	
Battery Charger High Voltage Converter "A" Output Power Regulation Performance(HV 1kW PWM Regulation Test-Functional Check)	P1EF0	Sub-Test 1 of 2 HV 1kW Voltage PWM Regulation Check DTC Fail Sets when one more of the following conditions is true: 1 The difference of the HV Voltage and HV Voltage Command is below or equal to the overshoot Threshold and the absolute difference of HV Voltage and the Voltage	One of following two conditions are true: 1.HV Voltage - HV Voltage Command AND (ABS(HV Voltage-HV Voltage Command) AND ABS(HV Current-HV Current Command)) OR 2.HV Voltage - HV Voltage Command AND HV Current	 <=25V >25V >1A >25V >2A	Low Voltage DC (Secondary) micro status	is AWAKE*	1.6sec in a 2sec window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		command is above voltage Threshold and the absolute difference of HV Current and the Current command is above Current Threshold 2 The difference of the HV Voltage and HV Voltage Command is above the overshoot Threshold and the HV Current is above the Current diff Threshold.			HV DC HV ON Command HighlineTap mode HV Voltage Sensor faults HV Current Sensor faults High Voltage DC (HV) Micro Ref Voltage faults	=ON =Inactive P0D4E or P0D4F not set P0D53 or P0D54 not set P1EEB or P1EEC not set		
		DTC Pass	One of followings condition is true. 1. HV Voltage - HV Voltage Command AND (ABS(HV Voltage-HV Voltage Command) OR ABS(HV Current-HV Current Command)) 2. HV Voltage - HV Voltage Command AND HV Current	<=25V <=25V <=1A >25V <=2A			2sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 2 of 2 HV 1kW Current PWM Regulation Check DTC Fail Sets when the difference of the HV Current and HV Current Command is above a threshold.	HV Current - HV Current Command	>1A	Low Voltage DC (Secondary) micro status HV Voltage - HV Command from HV DC HV DC HV ON Command HighlineTap mode HV Voltage Sensor faults HV Current Sensor faults High Voltage DC (HV) Micro Ref Voltage faults	is AWAKE* <= 25V =ON =Inactive P0D4E or P0D4F not set P0D53 or P0D54 not set P1EEB or P1EEC not set	1.6sec in a 2sec window	
		DTC Pass	HV Current - HV Current Command	<=1A			2sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger High Voltage Converter "B" Output Power Regulation Performance (HV 2kW PWM Regulation Test-Functional Check)	P1EF1	Sub-Test 1 of 2 HV 2KW Voltage PWM Regulation Functional DTC Fail Sets when one more of the following conditions is true: 1 The difference of the HV Voltage and HV Voltage Command is below or equal the overshoot Threshold and the absolute difference of HV Voltage and the Voltage command is above voltage Threshold and the absolute difference of HV Current and the Current command is above Current Threshold 2 The difference of the HV Voltage and HV Voltage Command is above the overshoot Threshold and the HV Current is above the Current diff Threshold.	One of following two conditions are true: 1.HV Voltage - HV Voltage Command AND (ABS(HV Voltage-HV Voltage Command) AND ABS(HV Current-HV Current Command)) OR 2.HV Voltage - HV Voltage Command AND HV Current	<=25V >25V >1A >25V >2A	Low Voltage DC (Secondary) micro status HV DC HV ON Command HighlineTap mode HV Voltage Sensor faults HV Current Sensor faults High Voltage DC (HV) Micro Ref Voltage faults	is AWAKE* ==ON = Active P0D4E or P0D4F not set P0D53 or P0D54 not set P1EEB or P1EEC not set	1.6sec in a 2sec window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	One of followings condition is true: 1.HV Voltage - HV Voltage Command AND (ABS(HV Voltage-HV Voltage Command) OR ABS(HV Current-HV Current Command)) 2.HV Voltage - HV Voltage Command AND HV Current	 <=25V <=25V <=1A >25V <=2A			2sec	
		Sub-Test 2 of 2 HV 2KW Current PWM Regulation Functional DTC Fail Sets when the difference of the HV Current and HV Current Command is above a threshold.	HV Current - HV Current Command	>1A	Low Voltage DC (Secondary) micro status HV Voltage - HV Command from HV DC HV DC HV ON Command HighlineTap mode HV Voltage Sensor faults HV Current Sensor faults High Voltage DC (HV) Micro Ref Voltage faults	is AWAKE* <= 25V =ON =Active P0D4E or P0D4F not set P0D53 or P0D54 not set P1EEB or P1EEC not set	1.6sec in a 2sec window	
		DTC Pass	HV Current - HV Current Command	<=1A			2sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger 14V Converter Output Power Regulation Performance (LV PWM Regulation Test-Functional Check)	P1EEF	Sub-Test 1 of 2 LV Voltage PWM Regulation Functional DTC Fail Sets when one more of the following conditions is true: 1 The difference of the LV Voltage and LV_Voltage_SetPointFromCmd is below or equal the overshoot Threshold and the absolute difference of LV Voltage and the LV_Voltage_SetPointFromCmd is above voltage	One of following conditions is true. 1.LV Voltage - LV_Voltage_SetPointFromCmd AND ABS(LV Voltage-LV_Voltage_SetPointFromCmd AND ABS(LV Current-LV_Current_SetPointFromCmd)) OR 2.LV Voltage - LV_Voltage_SetPointFromCmd AND LV Current	<=1.5V >2V >3A > 1.5V > 1A	Low Voltage DC (Secondary) micro status	is AWAKE*	1.6sec in a 2sec window	One Trip, Type A
		Threshold and the absolute difference of LV Current and the LV_Current_SetPointFromCmd is above Current Threshold 2 The difference of the LV Voltage and LV Voltage_SetPointFromCmd Command is above the overshoot Threshold and the LV Current is above the Current diff Threshold.			HV DC HV ON Command	=ON		
					LV Voltage Sensor faults	P0D44 or P0D45 not set		
					LV Current Sensor faults	P0D49 or P0D4A not set		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Low Voltage DC (Secondary) Micro Ref Voltage faults	P1EE9 or P1EEA not set		
		DTC Pass	One of following conditions is true. 1.LV Voltage - LV_Voltage_SetPointFrom Cmd AND ABS(LV Voltage-LV_Voltage_SetPointFrom Cmd)) OR ABS(LV Current-LV_Current_SetPointFrom Cmd)) 2.LV Voltage - LV_Voltage_SetPointFrom Cmd AND LV Current	<=1.5V <=2V <=3A >1.5V <=1A			2sec	
		Sub-Test 2 of 2 LV Current PWM Regulation Functional DTC Fail Sets when the difference of the LV Current and LV_Current_SetPointFromCmd is above a threshold.	LV Current - LV_Current_SetPointFrom Cmd	> 3A	Low Voltage DC (Secondary) micro status HV DC LV ON Command LV Voltage Sensor faults LV Current Sensor faults Low Voltage DC (Secondary) Micro Ref Voltage faults	is AWAKE* = ON P0D44 or P0D45 not set P0D49 or P0D4A not set P1EE9 or P1EEA not set	1.6sec in a 2sec window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					LV Voltage - LV Voltage Command	<= 1.5V		
		DTC Pass	LV Current - LV_Current_SetPointFromCmd	<= 3A			2sec	
Battery Charger Power Efficiency (Power Efficiency Functional)	P1EFD	DTC Fail Sets when the absolute difference of the AC Input power and the sum of the HV Output Power and the LV Output Power is above or equal to a threshold. Indicative of a sensor rationality error.	ABS(AC Power - (HV Voltage*HV Current + LV Voltage*LV Current))	>= 3300 Watts	Low Voltage DC (Secondary) micro status	is AWAKE*	1.6sec in a 2sec window	Two Trips, Type B
					LV Current Sensor faults	P0D49 or P0D4A not set		
					LV Voltage Sensor faults	P0D44 or P0D45 not set		
					HV Current Sensor faults	P0D53 or P0D54 not set		
					HV Voltage Sensor faults	P0D4E or P0D4F not set		
					High Voltage DC (HV) Micro Ref Voltage faults	P1EEB or P1EEC not set		
					Low Voltage DC (Secondary) Micro Ref Voltage faults	P1EE9 or P1EEA not set		
					AC Input Power Status	not FAILED		
		DTC Pass	ABS(AC Power - (HV Voltage*HV Current + LV Voltage*LV Current))	< 3300 Watts			2 seconds	

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 (Discharger Time Functional)	P0D5E	DTC Fail Sets if the High Voltage Output voltage is greater than or equal to a voltage threshold after an allowed discharge time period - discharge was unsuccessful.	High Voltage Output voltage Case 1: 1.5 seconds after receiving the High Voltage Charger Active Discharge Command OR Case 2: 1.5 seconds after a 5.25 second shut down delay timer has elapsed following confirmation of OBCM Loss of Comm With VICM (DTC U185C confirmed) - total elapsed time 6.75 seconds	>= 60 Volts	Low Voltage DC (Secondary) micro status HV Voltage Sensor faults	is AWAKE* P0D4E or P0D4F not set	1.5 sec in a 1.5 sec window	One Trip, Type A
		DTC Pass	High Voltage Output voltage Case 1: 1.5 seconds after receiving the High Voltage Charger Active Discharge Command OR Case 2: 1.5 seconds after a 5.25 second shut down delay timer has elapsed following confirmation of OBCM Loss of Comm With VICM (DTC U185C confirmed) - total elapsed time 6.75 seconds	< 60 Volts			< 1.5 sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Reverse Polarity Protection Circuit Performance (Reverse Battery Functional)	P1EFE	DTC Fail Sets when the Low Voltage Switch Enable signal is not equal to the LV Switch Enable Check (Relay status input should reflect relay control output state).	Low Voltage Switch Enable	≠ Low Voltage Switch Enable Check	Low Voltage DC (Secondary) micro status	is AWAKE*	1.6sec in a 2sec window	Two Trips, Type B
		DTC Pass	Low Voltage Switch Enable	= Low Voltage Switch Enable Check			2sec	
Battery Charger Control Module Long Term Memory (KAM) Error (EEPROM Integrity)	P16C3	DTC Fail Sets when the presence of predefined values at predefined locations in EEPROM cannot be confirmed	eepromPage00DiagDataByte OR eepromPage0ADiagDataByte	≠A5 (hex) ≠A5 (hex)	Low Voltage DC (Secondary) micro status	is AWAKE*	40 ms in a 40 ms window	One Trip, Type A
		DTC Pass	eepromPage00DiagDataByte AND eepromPage0ADiagDataByte	= A5 (hex) = A5 (hex)			40 ms	
Battery Charger Input Current Sensor Exceeded Learning Limit (AC Current Sensor Integrity)	P1F14	DTC Fail Sets if the AC Current Sensor calibration process has not been completed or if the calibration complete status flag in EEPROM has been erased or corrupted.	AC Current Sensor Cal Complete Flag (AC_Current_Cal_Hist_Status)	= 0	Low Voltage DC (Secondary) micro status	is AWAKE*	640ms in a 800ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	AC Current Sensor Cal Complete Flag (AC_Current_Cal_Hist_Status)	≠ 0			800 ms	
Battery Charger Hybrid/EV Battery Output Current Sensor Exceeded Learning Limit (HV Current Sensor Integrity)	P1F16	DTC Fail Sets if the High Voltage Output Current Sensor calibration process has not been completed or if the calibration complete status flag in EEPROM has been erased or corrupted.	High Voltage Current Sensor Cal Complete Flag (HV_Current_Cal_Hist_Status)	= 0	Low Voltage DC (Secondary) micro status	is AWAKE*	640ms in a 800ms window	One Trip, Type A
		DTC Pass	High Voltage Current Sensor Cal Complete Flag (HV_Current_Cal_Hist_Status)	≠ 0			800 ms	
Battery Charger 14 Volt Output Current Sensor Exceeded Learning Limit (LV Current Sensor Integrity)	P1F15	DTC Fail Sets if the Low Voltage Output Current Sensor calibration process has not been completed or if the calibration complete status flag in EEPROM has been erased or corrupted.	Low Voltage Current Sensor Cal Complete Flag (LV_Current_Cal_Hist_Status)	= 0	Low Voltage DC (Secondary) micro status	is AWAKE*	640ms in a 800ms window	One Trip, Type A
		DTC Pass	Low Voltage Current Sensor Cal Complete Flag (LV_Current_Cal_Hist_Status)	≠ 0			800 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Control Module Wake-Up Circuit Performance (ACC)	P16C6	DTC Fail Sets when the Accessory Wake Up is detected as low when expected to be high.	Accessory Wake Up High State Timer (accOnTimer)	<= 100ms	Low Voltage DC (Secondary) micro status Prop System Active Status HSGMLAN bus State HSGMLAN Comm Faults HCP_HS_LossOfComm	is AWAKE* is Active is ACTIVE U2609 not set is False	<= 100ms	One Trip, Type A
		DTC Pass	Accessory Wake Up High State Timer (accOnTimer)	> 100ms			> 100ms	
Battery Charger Control Module Supply Voltage Sensor Circuit Range/ Performance (PBIAS Voltage-Functional)	P1F03	DTC Fail The test uses two (2) sets of calibration values, one for determining if the PBIAS voltage is in range to turn the charger outputs on, and the other when the charger outputs are on to determine if the PBIAS voltage is sufficient to keep the outputs on.	PBIAS Voltage (BIASRAW) If the charger outputs (HV & LV) are off, PBIAS voltage must be: Else If the charger outputs are on (either HV or LV), PBIAS must be:	< 10.5 Volts OR > 13.5 Volts < 10.0 Volts OR > 15.0 Volts	High Voltage AC (Primary) micro status	is AWAKE* (AC connected or Bulk residual power)	Low voltage fail time = 3ms High voltage fail time = 10sec	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	PBIAS Voltage (BIASRAW) If the charger outputs (HV & LV) are off, PBIAS voltage must be: Else If the charger outputs are on (either HV or LV), PBIAS must be:	 >= 10.5 Volts OR <= 13.5 Volts >= 10.0 Volts OR <= 15.0 Volts			1 ms	
Battery Charger Input Voltage Conditioner Temperature Too High (PFC Thermal System Fault)	P1EF5	DTC Fail Diagnostic uses a hysteresis pair. FAIL sets when the PFC Thermister reported equivalent temperature is greater than or equal to an upper temperature threshold value	PFC Temperature	>= 100C	High Voltage AC (Primary) micro status	is AWAKE* (AC connected or Bulk residual power)	1ms in a 1ms window	One Trip, Type A
		DTC Pass Diagnostic uses a hysteresis pair. PASS sets when the PFC Thermister reported equivalent temperature is less than or equal to a lower temperature threshold value	PFC Temperature	<= 90C			1 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger High Voltage Converter "A" Temperature Too High (HV 1kW Converter Thermal System Fault)	P1EF3	DTC Fail Diagnostic uses a hysteresis pair. FAIL sets when the 1kW Converter Thermister reported equivalent temperature is greater than or equal to an upper temperature threshold value	1kW High Voltage Converter Temperature	>= 100C	High Voltage AC (Primary) micro status	is AWAKE* (AC connected or Bulk residual power)	1ms in a 1ms window	One Trip, Type A
		DTC Pass Diagnostic uses a hysteresis pair. PASS sets when the 1kW Converter Thermister reported equivalent temperature is less than or equal to a lower temperature threshold value	1kW High Voltage Converter Temperature	<= 90C			1 ms	
Battery Charger High Voltage Converter "B" Temperature Too High (HV 2kW Converter Thermal System Fault)	P1EF4	DTC Fail Diagnostic uses a hysteresis pair. FAIL sets when the 2kW Converter Thermister reported equivalent temperature is greater than or equal to an upper temperature threshold value	2kW High Voltage Converter Temperature	>= 100C	High Voltage AC (Primary) micro status	is AWAKE* (AC connected or Bulk residual power)	1ms in a 1ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass Diagnostic uses a hysteresis pair. PASS sets when the 2kW Converter Thermister reported equivalent temperature is less than or equal to a lower temperature threshold value	2kW High Voltage Converter Temperature	<= 90C			1 ms	
Battery Charger Converter Input Voltage Sensor "A" Circuit High (BLKS1)	P1EDA	DTC Fail Sets when the reported Bulk Voltage1 is greater than a voltage threshold	Bulk Voltage1	> 463 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Bulk Voltage1	<= 463 Volts			500 ms	
Battery Charger Converter Input Voltage Sensor "A" Circuit Low (BLKS1)	P1ED9	DTC Fail Sets when the reported Bulk Voltage1 is less than a voltage threshold	Bulk Voltage1	< 25 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Bulk Voltage1	>= 25 Volts			500 ms	
Battery Charger Converter Input Voltage Sensor "B" Circuit High (BLKS2)	P1EDD	DTC Fail Sets when the reported Bulk Voltage2 is greater than a voltage threshold	Bulk Voltage2	> 463 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Bulk Voltage2	<= 463 Volts			500 ms	
Battery Charger Converter Input Voltage Sensor "B" Circuit Low (BLKS2)	P1EDC	DTC Fail Sets when the reported Bulk Voltage2 is less than a voltage threshold	Bulk Voltage2	< 25 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Bulk Voltage2	>= 25 Volts			500 ms	
Battery Charger Control Module Supply Voltage Sensor Circuit High (PBIAS)	P1F02	DTC Fail Sets when the reported PBIAS Voltage is greater than a voltage threshold	PBIAS Voltage	> 16 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	PBIAS Voltage	<= 16 Volts			500 ms	
Battery Charger Control Module Supply Voltage Sensor Circuit Low (PBIAS)	P1F01	DTC Fail Sets when the reported PBIAS Voltage is less than a voltage threshold	PBIAS Voltage	< 6 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	PBIAS Voltage	>= 6 Volts			500 ms	
Battery Charger Input Current Sensor Circuit High (IACS)	P0D3B	DTC Fail Sets when the reported AC Current is greater than a current threshold	AC Current	> 24.78 Amps	AC Voltage	> 80 Volts	160 ms in a 200 ms window	One Trip, Type A
		DTC Pass	AC Current	<= 24.78 Amps			200 ms	
Battery Charger Input Current Sensor Circuit Low (IACS)	P0D3A	DTC Fail Sets when the reported AC Current is less than a current threshold	AC Current	< 0.8 Amps	AC Voltage	> 80 Volts	160 ms in a 200 ms window	One Trip, Type A
		DTC Pass	AC Current	>= 0.8 Amps			200 ms	
Battery Charger High Voltage Converter "A" Temparature Sensor Circuit High (THMOD)	P1ECC	DTC Fail Sets when the 1kW HV Converter Temperature sensor voltage (THMOD) is greater than a voltage threshold	1kW HV Converter Temperature Sensor Voltage (THMOD)	> 3.28 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	1kW HV Converter Temperature Sensor Voltage (THMOD)	<= 3.28 Volts			500 ms	
Battery Charger High Voltage Converter "A" Temparature Sensor Circuit Low (THMOD)	P1ECB	DTC Fail Sets when the 1kW HV Converter Temperature sensor voltage (THMOD) is less than a voltage threshold	1kW HV Converter Temperature Sensor Voltage (THMOD)	< 0.03 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	1kW HV Converter Temperature Sensor Voltage (THMOD)	>= 0.03 Volts			500 ms	
Battery Charger Input Voltage Conditioner Temperature Sensor Circuit High (THPFC)	P1EE0	DTC Fail Sets when the PFC Temperature sensor voltage is greater than a voltage threshold	PFC Temperature Sensor Voltage	> 3.28 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	PFC Temperature Sensor Voltage	<= 3.28 Volts			500 ms	
Battery Charger Input Voltage Conditioner Temperature Sensor Circuit Low (THPFC)	P1EDF	DTC Fail Sets when the PFC Temperature sensor voltage is less than a voltage threshold	PFC Temperature Sensor Voltage	< 0.03 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	PFC Temperature Sensor Voltage	>= 0.03 Volts			500 ms	
Battery Charger Control Module Reference Voltage "A" Circuit High (HV DC Ref Voltage)	P1EE8	DTC Fail Sets when the High Voltage AC (HV DC) Micro reference voltage is greater than a voltage threshold	High Voltage AC (HV DC) Micro Reference Voltage	> 1.25 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	High Voltage AC (HV DC) Micro Reference Voltage	<= 1.25 Volts			500 ms	
Battery Charger Control Module Reference Voltage "A" Circuit Low (HV DC Ref Voltage)	P1EE7	DTC Fail Sets when the High Voltage AC (HV DC) Micro reference voltage is less than a voltage threshold	High Voltage AC (HV DC) Micro Reference Voltage	< 1.00 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	High Voltage AC (HV DC) Micro Reference Voltage	>= 1.00 Volts			500 ms	
Battery Charger Input Voltage Sensor Circuit High (VACS)	P0D40	DTC Fail Sets when the reported AC Voltage is greater than a voltage threshold	AC Peak Voltage	> 422 Volts	AC Present	is TRUE	160 ms in a 200 ms window	One Trip, Type A
		DTC Pass	AC Peak Voltage	<= 422 Volts			200 ms	
Battery Charger Input Voltage Sensor Circuit Low (VACS)	P0D3F	DTC Fail Sets when the reported AC Voltage is less than a voltage threshold	AC Peak Voltage	< 90 Volts	AC Present	is TRUE	5500 ms in a 6875 ms window	One Trip, Type A
		DTC Pass	AC Peak Voltage	>= 90 Volts			6875 ms	
Battery Charger High Voltage Converter "B" Temparature Sensor Circuit High (THMOD2)	P1ED1	DTC Fail Sets when the 2kW HV Converter Temperature sensor voltage (THMOD2) is greater than a voltage threshold	2kW HV Converter Temperature Sensor Voltage (THMOD2)	> 3.28 Volts	AC Present	is TRUE	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	2kW HV Converter Temperature Sensor Voltage (THMOD2)	<= 3.28 Volts			500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger High Voltage Converter "B" Temparature Sensor Circuit Low (THMOD2)	P1ED0	DTC Fail Sets when the 2kW HV Converter Temperature sensor voltage (THMOD2) is less than a voltage threshold	2kW HV Converter Temperature Sensor Voltage (THMOD2)	< 0.03 Volts	AC Present	is TRUE	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	2kW HV Converter Temperature Sensor Voltage (THMOD2)	>= 0.03 Volts			500 ms	
Battery Charger High Voltage Converter "A" Input Current Sensor Circuit High (CSEN1)	P1EE3	DTC Fail CSEN1 Input is greater than a voltage threshold, (the micro performs this test internally)	CSEN1 Input Voltage	> 1.5 Volts	AC Present HV Output	is TRUE is OFF	950 ms in a 1000 ms window	One Trip, Type A
		DTC Pass	CSEN1 Input Voltage	<= 1.5 Volts			1000 ms	
Battery Charger High Voltage Converter "B" Input Current Sensor Circuit High (CSEN2)	P1EE5	DTC Fail CSEN2 Input is greater than a voltage threshold, (the micro performs this test internally)	CSEN2 Input Voltage	> 1.5 Volts	AC Present HV Output	is TRUE is OFF	950 ms in a 1000 ms window	One Trip, Type A
		DTC Pass	CSEN2 Input Voltage	<= 1.5 Volts			1000 ms	

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 Range/ Performance (AC Input Voltage Sensor-Rationality)	P0D3E	DTC Fail AC Peak Voltage is compared to two equivalent voltage measurements (Bulk1 and Bulk2). Fail is set if the deviation betweeen AC Peak Voltage and each of the two equivalent measurements is greater than voltage deviation thresholds.	ABS(AC Peak Voltage - Bulk1 Voltage) AND ABS(AC Peak Voltage - Bulk2 Voltage)	> 34 Volts > 34 Volts	AC Present PFC Discharged delay Bulk1 Voltage Sensor faults Bulk2 Voltage Sensor faults AC Voltage Sensor faults	is TRUE is TRUE (delay expired) P1ED9 or P1EDA not set P1EDC or P1EDD not set P0D3F or P0D40 not set	1760ms in a 1920ms window	One Trip, Type A
		DTC Pass	ABS(AC Peak Voltage - Bulk1 Voltage) AND ABS(AC Peak Voltage - Bulk2 Voltage)	<= 34 Volts <= 34 Volts			1920ms	
Battery Charger Input Current Sensor Circuit Range/ Performance (AC Input Current Sensor-Rationality)	P0D39	DTC Fail Sets when the AC Current zero offset value is greater than or equal to a current threshold.	AC Current	>= 5.4 Amps	AC Present AC Voltage Sensor faults PFC Discharged delay	is TRUE P0D3F or P0D40 not set is TRUE (delay expired)	512ms in a 640ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	AC Current	< 5.4 Amps			640ms	
Battery Charger Converter Input Voltage Sensor "A" Performance (Converter Input Bulk Voltage Sensor 1-Rationality)	P1EDB	DTC Fail Bulk1 Voltage is compared to two equivalent voltage measurements (AC Peak Voltage and Bulk2). Fail is set if the deviation betweeen Bulk1 Voltage and each of the two equivalent measurements is greater than voltage deviation thresholds.	ABS(Bulk1 Voltage - AC Peak Voltage) AND ABS(Bulk1 Voltage - Bulk2 Voltage)	> 34 Volts > 10 Volts	AC Present PFC Discharged delay Bulk1 Voltage Sensor faults Bulk2 Voltage Sensor faults AC Voltage Sensor faults	is TRUE is TRUE (delay expired) P1ED9 or P1EDA not set P1EDC or P1EDD not set P0D3F or P0D40 not set	512ms in a 640ms window	One Trip, Type A
		DTC Pass	ABS(Bulk1 Voltage - AC Peak Voltage) AND ABS(Bulk1 Voltage - Bulk2 Voltage)	<= 34 Volts <= 10 Volts			640ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Converter Input Voltage Sensor "B" Performance (Converter Input Bulk Voltage Sensor 2-Rationality)	P1EDE	DTC Fail Bulk2 Voltage is compared to two equivalent voltage measurements (AC Peak Voltage and Bulk1). Fail is set if the deviation betweeen Bulk2 Voltage and each of the two equivalent measurements is greater than voltage deviation thresholds.	ABS(Bulk2 Voltage - AC Peak Voltage) AND ABS(Bulk2 Voltage - Bulk1 Voltage)	> 34 Volts > 10 Volts	AC Present PFC Discharged delay Bulk1 Voltage Sensor faults Bulk2 Voltage Sensor faults AC Voltage Sensor faults	is TRUE is TRUE (delay expired) P1ED9 or P1EDA not set P1EDC or P1EDD not set P0D3F or P0D40 not set	512ms in a 640ms window	One Trip, Type A
		DTC Pass	ABS(Bulk2 Voltage - AC Peak Voltage) AND ABS(Bulk2 Voltage - Bulk1 Voltage)	<= 34 Volts <= 10 Volts			640ms	
Battery Charger Input Power Up Protection Circuit Peformance (AC Inrush RelayFunctionality)	P1EFF	DTC Fail Sets when the AC Relay Check input and the AC relay output are equal.(The AC Relay Check input should be opposite polarity of the AC Relay Output)	AC Relay Output	= AC Relay Check input	AC Present	is TRUE	2400ms in a 3000ms window	Two Trips, Type B
		DTC Pass	AC Relay Output	≠ AC Relay Check input			3000ms	

*** Microprossessor State Determination Table**

Inputs				Resulting State		
HVEM Comm Enable	RUN/CRANK	ACCESSORY	AC Power to Charger	LV DC Micro	HV DC Micro	HV AC Micro
Low	Low	Low	Off	Asleep	Asleep	Asleep
Low	Low	Low	On	Awake	Awake	Awake
Low	Low	High	Off	Awake	Asleep	Asleep
Low	Low	High	On	Awake	Awake	Awake
Low	High	Low	Off	Awake	Asleep	Asleep
Low	High	Low	On	Awake	Awake	Awake
Low	High	High	Off	Awake	Asleep	Asleep
Low	High	High	On	Awake	Awake	Awake
High	Low	Low	Off	Awake	Asleep	Asleep
High	Low	Low	On	Awake	Awake	Awake
High	Low	High	Off	Awake	Asleep	Asleep
High	Low	High	On	Awake	Awake	Awake
High	High	Low	Off	Awake	Asleep	Asleep
High	High	Low	On	Awake	Awake	Awake
High	High	High	Off	Awake	Asleep	Asleep
High	High	High	On	Awake	Awake	Awake

P0011

KtPHSD_phi_CamPosErrorLimIc1

X axis is Deg C
Y axis is RPM

	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
800	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
1200	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
1600	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
2000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
2400	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
2800	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
3200	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
3600	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
4000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
4400	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
4800	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
5200	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
5600	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
6000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
6400	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
6800	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000

P0014

KtPHSD_phi_CamPosErrorLimEc1

X axis is Deg C
Y axis is RPM

	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
800	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
1200	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
1600	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
2000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
2400	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
2800	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
3200	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
3600	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
4000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
4400	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
4800	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
5200	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
5600	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
6000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
6400	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000
6800	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000	3.5000

P0011

KtPHSD_t_StablePositionTimeIc1

X axis is Deg C
Y axis is RPM

	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	100.000	80.000	20.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
800	100.000	80.000	20.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
1200	100.000	80.000	20.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
1600	100.000	80.000	20.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
2000	100.000	80.000	20.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
2400	100.000	80.000	20.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
2800	100.000	80.000	20.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
3200	51.500	41.500	11.500	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
3600	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
4000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
4400	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
4800	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
5200	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
5600	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
6000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
6400	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
6800	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000

P0014

KtPHSD_t_StablePositionTimeEc1

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	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	100.000	80.000	20.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
800	100.000	80.000	20.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
1200	100.000	80.000	20.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
1600	100.000	80.000	20.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
2000	100.000	80.000	20.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
2400	100.000	80.000	20.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
2800	100.000	80.000	20.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
3200	51.500	41.500	11.500	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
3600	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
4000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
4400	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
4800	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
5200	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
5600	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
6000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
6400	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
6800	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000

P0133 - O2S Slow Response Bank 1 Sensor 1" Pass/Fail Threshold table

Z axis is the pass/fail result (see note below)
X axis is Lean to Rich response time (msec)
Y axis is Rich to Lean response time (msec)
Note: If the cell contains a "0" then the fault is not indicated, if it contains a "1" a fault is indicated

	0.000	0.024	0.036	0.048	0.060	0.072	0.084	0.096	0.108	0.120	0.132	0.144	0.156	0.168	0.180	0.192	1.000
0.000	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
0.036	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
0.048	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
0.060	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
0.072	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
0.084	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
0.096	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
0.108	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
0.120	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.132	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.144	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.156	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.168	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.180	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0
0.192	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
0.204	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0
1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

P0153 - O2S Slow Response Bank 2 Sensor 1" Pass/Fail Threshold table

Z axis is the pass/fail result (see note below)
X axis is Lean to Rich response time (msec)
Y axis is Rich to Lean response time (msec)
Note: If the cell contains a "0" then the fault is not indicated, if it contains a "1" a fault is indicated

	0.000	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	1.000
0.000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.050	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.100	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.149	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.159	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.170	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.180	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.189	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.199	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.210	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.220	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.229	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.239	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.250	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.300	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.350	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.399	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

P1133 - O2S HC L to R Switches Limit Bank 1 Sensor 1" Pass/Fail Threshold table

Z axis is Limit for L/R HC switches
Y axis is Average flow during the response test (gps)
X axis is estimated Ethanol percentage
Note: The cell contains the minumum switches

	0.0	10.0	50.0	70.0	80.0
0.0	35	35	35	35	35
6.3	35	35	35	35	35
12.5	35	35	35	35	35
18.8	36	36	36	36	36
25.0	40	40	40	40	40
31.3	42	42	42	42	42
37.5	45	45	45	45	45
43.8	45	45	45	45	45
50.0	45	45	45	45	45
56.3	45	45	45	45	45
62.5	45	45	45	45	45
68.8	45	45	45	45	45
75.0	45	45	45	45	45
81.3	45	45	45	45	45
87.5	45	45	45	45	45
93.8	45	45	45	45	45
100.0	45	45	45	45	45

P1133 - O2S HC R to L Switches Limit Bank 1 Sensor 1" Pass/Fail Threshold table

Z axis is Limit for R/L HC switches
Y axis is Average flow during the response test (gps)
X axis is estimated Ethanol percentage
Note: The cell contains the minumum switches

	0.0	10.0	50.0	70.0	80.0
0.0	34	34	34	34	34
6.3	34	34	34	34	34
12.5	34	34	34	34	34
18.8	36	36	36	36	36
25.0	40	40	40	40	40
31.3	42	42	42	42	42
37.5	45	45	45	45	45
43.8	45	45	45	45	45
50.0	45	45	45	45	45
56.3	45	45	45	45	45
62.5	45	45	45	45	45
68.8	45	45	45	45	45
75.0	45	45	45	45	45
81.3	45	45	45	45	45
87.5	45	45	45	45	45
93.8	45	45	45	45	45
100.0	45	45	45	45	45

P1153 - O2S HC L to R Switches Limit Bank 2 Sensor 1" Pass/Fail Threshold table

Z axis is Limit for L/R HC switches
Y axis is Average flow during the response test (gps)
X axis is estimated Ethanol percentage
Note: The cell contains the minumum switches

	0.0	10.0	50.0	70.0	80.0
0.0	30	30	30	30	30
6.3	30	30	30	30	30
12.5	40	40	40	40	40
18.8	40	40	40	40	40
25.0	60	60	60	60	60
31.3	60	60	60	60	60
37.5	60	60	60	60	60
43.8	60	60	60	60	60
50.0	60	60	60	60	60
56.3	60	60	60	60	60
62.5	60	60	60	60	60
68.8	60	60	60	60	60
75.0	60	60	60	60	60
81.3	60	60	60	60	60
87.5	60	60	60	60	60
93.8	60	60	60	60	60
100.0	60	60	60	60	60

P1153 - O2S HC R to L Switches Limit Bank 2 Sensor 1" Pass/Fail Threshold table

Z axis is Limit for R/L HC switches
Y axis is Average flow during the response test (gps)
X axis is estimated Ethanol percentage
Note: The cell contains the minumum switches

	0.0	10.0	50.0	70.0	80.0
0.0	30	30	30	30	30
6.3	30	30	30	30	30
12.5	40	40	40	40	40
18.8	40	40	40	40	40
25.0	60	60	60	60	60
31.3	60	60	60	60	60
37.5	60	60	60	60	60
43.8	60	60	60	60	60
50.0	60	60	60	60	60
56.3	60	60	60	60	60
62.5	60	60	60	60	60
68.8	60	60	60	60	60
75.0	60	60	60	60	60
81.3	60	60	60	60	60
87.5	60	60	60	60	60
93.8	60	60	60	60	60
100.0	60	60	60	60	60

Green Sensor Delay Criteria:

The specific diagnostic (from summary table) will not be enabled until the next ignition cycle after the airflow criteria below (by sensor location) has been met:

* B1S1 Airflow greater than 22 gps for 120000 grams of accumulated flow non-continuously.
* B1S2 Airflow greater than 22 gps for 120000 grams of accumulated flow non-continuously.
* B2S1 Airflow greater than 22 gps for 120000 grams of accumulated flow non-continuously.
* B2S2 Airflow greater than 22 gps for 120000 grams of accumulated flow non-continuously.

Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle.
Note: This feature is only enabled when the vehicle is new and cannot be enabled in service

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P00B6: Fail if power up ECT exceeds RCT by these values

Z axis is the Fast Failure temp difference (° C)
X axis is IAT Temperature at Power up (° C)

-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20

P0116: Fail if power up ECT exceeds IAT by these values

Z axis is the Fast Failure temp difference (° C)
X axis is IAT Temperature at Power up (° C)

-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20

P0128: Maximum Accumulated Airflow for IAT and Start-up ECT conditions

Z axis is the accumulated time failure threshold (seconds)
X axis is ECT Temperature at Power up (° C)
Y axis is IAT min during test (° C)

Remove for applications with single coolant

	IAT Range												
	Low	Hi	-40	-28	-16	-4	8	20	32	44	56	68	80
Primary	-7.0 ° C	60.0 ° C	2500	1953	1094	597	500	420	340	281	234	219	219
Alternate	-50.0 ° C	-50.0 ° C	2500	1953	1094	597	500	420	340	281	234	219	219

P0101, P0106, P0121, P012B, P0236, P1101: IFRD Residual Weighting Factors

TPS Residual Weight Factor based on RPM

RPM	0	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6500
	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

MAF Residual Weight Factor based on RPM

RPM	0	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6500
	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

MAF Residual Weight Factor Based on MAF Estimate

gm/sec	0.0	50.0	70.0	73.0	76.0	79.0	82.0	85.0	89.0	95.0	100.0	110.0	120.0	150.0	200.0	280.0	350.0
	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

MAP1 Residual Weight Factor based on RPM

RPM	0	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6500
	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

MAP2 Residual Weight Factor based on RPM

RPM	0	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6500
	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

MAP3 Residual Weight Factor based on RPM

RPM	0	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6500
	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

TIAP1 Residual Weight Factor based on RPM

RPM	0	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6500
	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

SCIAP1 Residual Weight Factor based on RPM

RPM	0	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6500
	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

SCIAP2 Residual Weight Factor based on RPM

RPM	0	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6500
	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

Boost Residual Weight Factor based on % of Boost

% Boost	0.00	0.06	0.13	0.19	0.25	0.31	0.38	0.44	0.50	0.56	0.63	0.69	0.75	0.81	0.88	0.94	1.00
	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

P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset based on RPM

RPM	1000	1750	2500	3250	4000	4750	5500	6250	7000
	1.0	1.0	1.0	1.0	2.0	2.0	2.0	3.0	3.0

P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow based on RPM

RPM	1000	1750	2500	3250	4000	4750	5500	6250	7000
	15.0	27.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0

P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP based on RPM

RPM	1000	1750	2500	3250	4000	4750	5500	6250	7000
	124.0	126.0	127.0	128.0	129.0	128.0	127.0	127.0	127.0

P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset based on RPM

RPM	1000	1750	2500	3250	4000	4750	5500	6250	7000
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow based on RPM

RPM	1000	1750	2500	3250	4000	4750	5500	6250	7000
	2.6	3.3	4.5	5.4	7.0	8.8	11.0	12.4	12.4

P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP based on RPM

RPM	1000	1750	2500	3250	4000	4750	5500	6250	7000
	34.1	27.3	26.1	25.4	25.7	24.1	29.5	29.4	29.4

Supercharger Intake Flow Rationality Diagnostic Failure Matrix

TPS Model Failure	MAF Model Failure	MAP 1 Model Failure	MAP 2 Model Failure	SCIAP 1 Model Failure	SCIAP 2 Model Failure	DTC Set
F	F	F	F	F	F	No DTC
F	F	F	F	F	T	No DTC
F	F	F	F	T	F	No DTC
F	F	F	F	T	T	P012B
F	F	F	T	F	F	No DTC
F	F	F	T	F	T	P1101
F	F	F	T	T	F	P1101
F	F	F	T	T	T	P1101
F	F	T	F	F	F	No DTC
F	F	T	F	F	T	P1101
F	F	T	F	T	F	P1101
F	F	T	F	T	T	P1101
F	F	T	T	F	F	P0106
F	F	T	T	F	T	P1101
F	F	T	T	T	F	P1101

Supercharger Intake Flow Rationality Diagnostic Failure Matrix, Con't						
TPS Model Failure	MAF Model Failure	MAP 1 Model Failure	MAP 2 Model Failure	SCIAP 1 Model Failure	SCIAP 2 Model Failure	DTC Set
F	F	T	T	T	T	P1101
F	T	F	F	F	F	No DTC
F	T	F	F	F	T	P0101
F	T	F	F	T	F	No DTC
F	T	F	F	T	T	P0101, P012B
F	T	F	T	F	F	P1101
F	T	F	T	F	T	P0101
F	T	F	T	T	F	P1101
F	T	F	T	T	T	P0101, P012B
F	T	T	F	F	F	P1101
F	T	T	F	F	T	P1101
F	T	T	F	T	F	P1101
F	T	T	F	T	T	P1101
F	T	T	T	F	F	P1101
F	T	T	T	F	T	P1101
F	T	T	T	T	F	P1101
F	T	T	T	T	T	P1101
T	F	F	F	F	F	P0121
T	F	F	F	F	T	No DTC
T	F	F	F	T	F	P0121
T	F	F	F	T	T	P1101
T	F	F	T	F	F	P1101
T	F	F	T	F	T	P1101
T	F	F	T	T	F	P1101
T	F	F	T	T	T	P1101
T	F	T	F	F	F	P0121
T	F	T	F	F	T	P1101
T	F	T	F	T	F	P0121
T	F	T	F	T	T	P1101
T	F	T	T	F	F	P1101
T	F	T	T	F	T	P1101
T	F	T	T	T	F	P1101
T	F	T	T	T	T	P1101
T	T	F	F	F	F	P0121
T	T	F	F	F	T	P1101
T	T	F	F	T	F	P0121
T	T	F	F	T	T	P1101
T	T	F	T	F	F	P1101
T	T	F	T	F	T	P1101
T	T	F	T	T	F	P1101
T	T	F	T	T	T	P1101
T	T	T	F	F	F	P0121
T	T	T	F	F	T	P1101
T	T	T	F	T	F	P0121
T	T	T	F	T	T	P1101
T	T	T	T	F	F	P1101
T	T	T	T	F	T	P1101
T	T	T	T	T	F	P1101
T	T	T	T	T	T	P1101

Turbocharger Intake Flow Rationality Diagnostic Failure Matrix								
MAF Model Failure	MAP 1 Model Failure	MAP 2 Model Failure	MAP 3 Model Failure	TIAP 1 Model Failure	TPS Model Failure	TIAP Correlation Failure	TIAP Correlation Valid	DTC Set
F	F	F	F	F	F	F	F	No DTC
F	F	F	F	F	F	F	T	No DTC
F	F	F	F	F	F	T	F	No DTC
F	F	F	F	F	F	T	T	No DTC
F	F	F	F	F	T	F	F	No DTC
F	F	F	F	F	T	F	T	No DTC
F	F	F	F	F	T	T	F	No DTC
F	F	F	F	F	T	T	T	No DTC
F	F	F	F	T	F	F	F	No DTC
F	F	F	F	T	F	F	T	No DTC
F	F	F	F	T	F	T	F	No DTC
F	F	F	F	T	F	T	T	No DTC
F	F	F	F	T	T	F	F	P1101
F	F	F	F	T	T	F	T	P0121
F	F	F	F	T	T	T	F	P1101
F	F	F	F	T	T	T	T	P0236
F	F	F	T	F	F	F	F	P1101
F	F	F	T	F	F	F	T	P1101
F	F	F	T	F	F	T	F	P1101
F	F	F	T	F	F	T	T	P1101
F	F	F	T	F	T	F	F	P1101
F	F	F	T	F	T	F	T	P1101
F	F	F	T	F	T	T	F	P1101
F	F	F	T	F	T	T	T	P1101
F	F	F	T	T	F	F	F	P1101
F	F	F	T	T	F	F	T	P1101
F	F	F	T	T	F	T	F	P1101
F	F	F	T	T	F	T	T	P1101
F	F	F	T	T	T	F	F	P1101
F	F	F	T	T	T	F	T	P1101
F	F	F	T	T	T	T	F	P1101
F	F	F	T	T	T	T	T	P1101
F	F	T	F	F	F	F	F	P1101
F	F	T	F	F	F	F	T	P1101
F	F	T	F	F	F	T	F	P1101
F	F	T	F	F	F	T	T	P1101
F	F	T	F	F	T	F	F	P1101
F	F	T	F	F	T	F	T	P1101
F	F	T	F	F	T	T	F	P1101
F	F	T	F	F	T	T	T	P1101
F	F	T	F	T	F	F	F	P1101
F	F	T	F	T	F	F	T	P1101
F	F	T	F	T	F	T	F	P1101
F	F	T	F	T	F	T	T	P1101
F	F	T	F	T	T	F	F	P1101
F	F	T	F	T	T	F	T	P1101
F	F	T	F	T	T	T	F	P1101
F	F	T	F	T	T	T	T	P1101
F	F	T	T	F	F	F	F	P1101
F	F	T	T	F	F	F	T	P1101
F	F	T	T	F	F	T	F	P1101
F	F	T	T	F	F	T	T	P1101
F	F	T	T	F	T	F	F	P1101
F	F	T	T	F	T	F	T	P1101
F	F	T	T	F	T	T	F	P1101
F	F	T	T	F	T	T	T	P1101

Turbocharger Intake Flow Rationality Diagnostic Failure Matrix, Con't								
MAF Model Failure	MAP 1 Model Failure	MAP 2 Model Failure	MAP 3 Model Failure	TIAP 1 Model Failure	TPS Model Failure	TIAP Correlation Failure	TIAP Correlation Valid	DTC Set
F	F	T	T	F	T	T	T	P1101
F	F	T	T	T	F	F	F	No DTC
F	F	T	T	T	F	F	T	No DTC
F	F	T	T	T	F	T	F	No DTC
F	F	T	T	T	F	T	T	No DTC
F	F	T	T	T	T	F	F	P1101
F	F	T	T	T	T	F	T	P1101
F	F	T	T	T	T	T	F	P1101
F	F	T	T	T	T	T	T	P1101
F	T	F	F	F	F	F	F	P1101
F	T	F	F	F	F	F	T	P1101
F	T	F	F	F	F	T	F	P1101
F	T	F	F	F	F	T	T	P0236
F	T	F	F	F	T	F	F	P1101
F	T	F	F	F	T	F	T	P0121
F	T	F	F	F	T	T	F	P1101
F	T	F	F	F	T	T	T	P0236
F	T	F	F	T	F	F	F	P1101
F	T	F	F	T	F	F	T	P1101
F	T	F	F	T	F	T	F	P1101
F	T	F	F	T	F	T	T	P0236
F	T	F	F	T	T	F	F	P1101
F	T	F	F	T	T	F	T	P0121
F	T	F	F	T	T	T	F	P1101
F	T	F	F	T	T	T	T	P0236
F	T	F	T	F	F	F	F	P1101
F	T	F	T	F	F	F	T	P1101
F	T	F	T	F	F	T	F	P1101
F	T	F	T	F	F	T	T	P1101
F	T	F	T	F	T	F	F	P1101
F	T	F	T	F	T	F	T	P1101
F	T	F	T	F	T	T	F	P1101
F	T	F	T	F	T	T	T	P1101
F	T	F	T	T	F	F	F	P1101
F	T	F	T	T	F	F	T	P1101
F	T	F	T	T	F	T	F	P1101
F	T	F	T	T	F	T	T	P1101
F	T	F	T	T	T	F	F	P1101
F	T	F	T	T	T	F	T	P1101
F	T	F	T	T	T	T	F	P1101
F	T	F	T	T	T	T	T	P1101
F	T	T	F	F	F	F	F	P1101
F	T	T	F	F	F	F	T	P1101
F	T	T	F	F	F	T	F	P1101
F	T	T	F	F	F	T	T	P1101
F	T	T	F	F	T	F	F	P1101
F	T	T	F	F	T	F	T	P1101
F	T	T	F	F	T	T	F	P1101
F	T	T	F	F	T	T	T	P1101
F	T	T	F	T	F	F	F	P1101
F	T	T	F	T	F	F	T	P1101
F	T	T	F	T	F	T	F	P1101
F	T	T	F	T	F	T	T	P1101
F	T	T	F	T	T	F	F	P1101
F	T	T	F	T	T	F	T	P1101
F	T	T	F	T	T	T	F	P1101
F	T	T	F	T	T	T	T	P1101

Turbocharger Intake Flow Rationality Diagnostic Failure Matrix, Con't								
MAF Model Failure	MAP 1 Model Failure	MAP 2 Model Failure	MAP 3 Model Failure	TIAP 1 Model Failure	TPS Model Failure	TIAP Correlation Failure	TIAP Correlation Valid	DTC Set
F	T	T	F	T	T	T	T	P1101
F	T	T	T	F	F	F	F	P0106
F	T	T	T	F	F	F	T	P0106
F	T	T	T	F	F	T	F	P0106
F	T	T	T	F	F	T	T	P0106
F	T	T	T	F	T	F	F	P1101
F	T	T	T	F	T	F	T	P1101
F	T	T	T	F	T	T	F	P1101
F	T	T	T	F	T	T	T	P1101
F	T	T	T	T	F	F	F	P1101
F	T	T	T	T	F	F	T	P1101
F	T	T	T	T	F	T	F	P1101
F	T	T	T	T	F	T	T	P1101
F	T	T	T	T	T	F	F	P1101
F	T	T	T	T	T	F	T	P1101
F	T	T	T	T	T	T	F	P1101
F	T	T	T	T	T	T	T	P1101
T	F	F	F	F	F	F	F	P1101
T	F	F	F	F	F	F	T	P1101
T	F	F	F	F	F	T	F	P1101
T	F	F	F	F	F	T	T	P0236
T	F	F	F	F	T	F	F	P1101
T	F	F	F	F	T	F	T	P0121
T	F	F	F	F	T	T	F	P1101
T	F	F	F	F	T	T	T	P0236
T	F	F	F	T	F	F	F	P1101
T	F	F	F	T	F	F	T	P1101
T	F	F	F	T	F	T	F	P1101
T	F	F	F	T	F	T	T	P0236
T	F	F	F	T	T	F	F	P1101
T	F	F	F	T	T	F	T	P0121
T	F	F	F	T	T	T	F	P1101
T	F	F	F	T	T	T	T	P0236
T	F	F	T	F	F	F	F	P1101
T	F	F	T	F	F	F	T	P1101
T	F	F	T	F	F	T	F	P1101
T	F	F	T	F	F	T	T	P1101
T	F	F	T	F	T	F	F	P1101
T	F	F	T	F	T	F	T	P1101
T	F	F	T	F	T	T	F	P1101
T	F	F	T	T	F	F	F	P1101
T	F	F	T	T	F	F	T	P1101
T	F	F	T	T	F	T	F	P1101
T	F	F	T	T	F	T	T	P1101
T	F	F	T	T	T	F	F	P1101
T	F	F	T	T	T	F	T	P1101
T	F	F	T	T	T	T	F	P1101
T	F	F	T	T	T	T	T	P1101
T	F	T	F	F	F	F	F	P1101
T	F	T	F	F	F	F	T	P1101
T	F	T	F	F	F	T	F	P1101
T	F	T	F	F	F	T	T	P1101
T	F	T	F	F	T	F	F	P1101
T	F	T	F	F	T	F	T	P1101
T	F	T	F	F	T	T	F	P1101

Turbocharger Intake Flow Rationality Diagnostic Failure Matrix, Con't								
MAF Model Failure	MAP 1 Model Failure	MAP 2 Model Failure	MAP 3 Model Failure	TIAP 1 Model Failure	TPS Model Failure	TIAP Correlation Failure	TIAP Correlation Valid	DTC Set
T	F	T	F	F	T	T	T	P1101
T	F	T	F	T	F	F	F	P1101
T	F	T	F	T	F	F	T	P1101
T	F	T	F	T	F	T	F	P1101
T	F	T	F	T	F	T	T	P1101
T	F	T	F	T	T	F	F	P1101
T	F	T	F	T	T	F	T	P1101
T	F	T	F	T	T	T	F	P1101
T	F	T	F	T	T	T	T	P1101
T	F	T	T	F	F	F	F	P1101
T	F	T	T	F	F	F	T	P1101
T	F	T	T	F	F	T	F	P1101
T	F	T	T	F	F	T	T	P1101
T	F	T	T	F	T	F	F	P1101
T	F	T	T	F	T	F	T	P1101
T	F	T	T	F	T	T	F	P1101
T	F	T	T	F	T	T	T	P1101
T	F	T	T	T	F	F	F	P0101
T	F	T	T	T	F	F	T	P0101
T	F	T	T	T	F	T	F	P0101
T	F	T	T	T	F	T	T	P0101
T	F	T	T	T	T	F	F	P1101
T	F	T	T	T	T	F	T	P1101
T	F	T	T	T	T	T	F	P1101
T	F	T	T	T	T	T	T	P1101
T	T	F	F	F	F	F	F	P1101
T	T	F	F	F	F	F	T	P1101
T	T	F	F	F	F	T	F	P1101
T	T	F	F	F	F	T	T	P0236
T	T	F	F	F	T	F	F	P1101
T	T	F	F	F	T	F	T	P0121
T	T	F	F	F	T	T	F	P1101
T	T	F	F	F	T	T	T	P0236
T	T	F	F	T	F	F	F	P1101
T	T	F	F	T	F	F	T	P1101
T	T	F	F	T	F	T	F	P1101
T	T	F	F	T	F	T	T	P0236
T	T	F	F	T	T	F	F	P1101
T	T	F	F	T	T	F	T	P0121
T	T	F	F	T	T	T	F	P1101
T	T	F	F	T	T	T	T	P0236
T	T	F	T	F	F	F	F	P1101
T	T	F	T	F	F	F	T	P1101
T	T	F	T	F	F	T	F	P1101
T	T	F	T	F	F	T	T	P1101
T	T	F	T	F	T	F	F	P1101
T	T	F	T	F	T	F	T	P1101
T	T	F	T	F	T	T	F	P1101
T	T	F	T	F	T	T	T	P1101
T	T	F	T	T	F	F	F	P1101
T	T	F	T	T	F	F	T	P1101
T	T	F	T	T	F	T	F	P1101
T	T	F	T	T	F	T	T	P1101
T	T	F	T	T	T	F	F	P1101
T	T	F	T	T	T	F	T	P1101
T	T	F	T	T	T	T	F	P1101

Turbocharger Intake Flow Rationality Diagnostic Failure Matrix, Con't								
MAF Model Failure	MAP 1 Model Failure	MAP 2 Model Failure	MAP 3 Model Failure	TIAP 1 Model Failure	TPS Model Failure	TIAP Correlation Failure	TIAP Correlation Valid	DTC Set
T	T	F	T	T	T	T	T	P1101
T	T	T	F	F	F	F	F	P1101
T	T	T	F	F	F	F	T	P1101
T	T	T	F	F	F	T	F	P1101
T	T	T	F	F	F	T	T	P1101
T	T	T	F	F	T	F	F	P1101
T	T	T	F	F	T	F	T	P1101
T	T	T	F	F	T	T	F	P1101
T	T	T	F	F	T	T	T	P1101
T	T	T	F	T	F	F	F	P1101
T	T	T	F	T	F	F	T	P1101
T	T	T	F	T	F	T	F	P1101
T	T	T	F	T	F	T	T	P1101
T	T	T	F	T	T	F	F	P1101
T	T	T	F	T	T	F	T	P1101
T	T	T	F	T	T	T	F	P1101
T	T	T	F	T	T	T	T	P1101
T	T	T	T	F	F	F	F	P1101
T	T	T	T	F	F	F	T	P1101
T	T	T	T	F	F	T	F	P1101
T	T	T	T	F	F	T	T	P1101
T	T	T	T	F	T	F	F	P1101
T	T	T	T	F	T	F	T	P1101
T	T	T	T	F	T	T	F	P1101
T	T	T	T	F	T	T	T	P1101
T	T	T	T	T	F	F	F	P1101
T	T	T	T	T	F	F	T	P1101
T	T	T	T	T	F	T	F	P1101
T	T	T	T	T	F	T	T	P1101
T	T	T	T	T	T	F	F	P1101
T	T	T	T	T	T	F	T	P1101
T	T	T	T	T	T	T	F	P1101
T	T	T	T	T	T	T	T	P1101

P0016: Cam Correlation Oil Temperature Threshold

X axis is Engine Oil Temperature in Deg C

Temp	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
	300.0	300.0	160.0	18.0	18.0	18.0	18.0	10.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

P0171, P0172: The following table defines the Long Fuel Trim cells utilized for FASD diagnosis (cells identified with a "Yes" are enabled, and with a "NO" are disabled)

Long-Term Fuel Trim Cell Usage

Cell I.D.	CeFADR_e	CeFADR_e	CeFADR_e	CeFADR_e	CeFADR_e	CeFADR_e	CeFADR_e	CeFADR_e	CeFADR_e	CeFADR_e	CeFADR_e	CeFADR_e	CeFADR_e	CeFADR_e	CeFADR_e	CeFADR_e_Cell15_PurgOffDecel
) Cell Usage	CeFADD_e	CeFADD_e	CeFADD_e	CeFADD_e	CeFADD_e	CeFADD_e	CeFADD_e	CeFADD_e	CeFADD_e	CeFADD_e	CeFADD_e	CeFADD_e	CeFADD_e	CeFADD_e	CeFADD_e	CeFADD_e_NonSelectedCell
ıled In Cell?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NO	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NO

P219A:

KtFABD_U_VarThresh1

AvgFlow / A	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
80	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
120	15	1	1	2	2	15	1	1	1	1	15	1	1	1	1	15	15
160	15	1	1	2	2	3	1	1	1	1	3	2	1	1	1	15	15
200	15	2	2	3	3	2	2	1	2	3	3	3	1	2	2	15	15
240	15	4	4	3	3	2	2	3	2	4	3	2	2	2	2	15	15
275	15	4	4	4	4	3	3	4	3	3	4	2	2	2	2	15	15
310	15	3	3	3	3	2	5	4	3	4	3	4	3	2	2	15	15
360	15	3	3	3	3	3	3	3	3	2	2	3	2	2	2	15	15
400	15	15	15	15	15	3	3	3	3	2	2	2	2	2	2	15	15
440	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
480	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
520	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
560	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
640	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
720	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
800	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15

KtFABD_U_VarThresh1_DoD (AFM applications only)

AvgFlow / A	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
80	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
120	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
160	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
200	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
240	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
275	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
310	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
360	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
400	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
440	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
480	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
520	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
560	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
640	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
720	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
800	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30

KtFABD_U_VarThresh2

AvgFlow / A	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
80	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
120	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
160	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
200	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
240	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
275	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
310	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
360	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
400	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
440	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
480	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
520	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
560	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
640	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
720	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
800	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30

KtFABD_U_VarThresh2_DoD (AFM applications only)

AvgFlow / A	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
80	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
120	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
160	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
200	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
240	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
275	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
310	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
360	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
400	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
440	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
480	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
520	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
560	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
640	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
720	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
800	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30

KtFABD_K_QualFactor1

AvgFlow / A	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
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
80	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
120	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
160	0.00	0.00	1.00	0.75	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.95	0.80	0.00	0.00	0.00
200	0.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00	0.80	1.00	1.00	0.80	0.00	0.00	0.00
240	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00
275	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	1.00	1.00	1.00	0.80	0.00	0.00	0.00
310	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
360	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00
400	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
440	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
480	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
520	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
560	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
640	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
720	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
800	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

KtFABD_K_QualFactor1_DoD (AFM applications only)

AvgFlow / A	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	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
80	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
120	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
160	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
200	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
240	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
275	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
310	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
360	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
400	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
440	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
480	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
520	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
560	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
640	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
720	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
800	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

KtFABD_K_QualFactor2

AvgFlow / Av	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	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
80	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
120	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
160	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
200	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
240	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
275	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
310	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
360	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
400	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
440	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
480	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
520	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
560	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
640	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
720	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
800	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

KtFABD_K_QualFactor2_DoD (AFM applications only)

AvgFlow / Av	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	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
80	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
120	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
160	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
200	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
240	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
275	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
310	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
360	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
400	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
440	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
480	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
520	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
560	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
640	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
720	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
800	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

KtFABD_U_Normalizer1

AvgFlow / Av	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
80	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
120	15	2	2	0	0	15	1	1	1	1	15	1	1	0	0	15	15
160	15	2	2	0	1	2	1	1	1	1	1	1	1	0	0	15	15
200	15	5	5	3	2	3	3	2	2	2	1	1	2	1	1	15	15
240	15	6	6	4	3	3	3	2	3	3	2	2	2	1	1	15	15
275	15	6	6	4	3	3	3	2	4	3	2	2	2	2	2	15	15
310	15	7	7	4	3	4	2	3	3	3	3	1	1	2	2	15	15
360	15	7	7	4	3	3	3	2	2	3	3	2	2	2	2	15	15
400	15	15	15	15	15	3	3	2	2	3	3	2	2	2	2	15	15
440	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
480	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
520	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
560	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
640	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
720	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
800	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15

KtFABD_U_Normalizer1_DoD (AFM applications only)

AvgFlow / A	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
80	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
120	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
160	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
200	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
240	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
275	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
310	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
360	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
400	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
440	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
480	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
520	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
560	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
640	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
720	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
800	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30

KtFABD_U_Normalizer2

AvgFlow / A	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
80	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
120	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
160	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
200	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
240	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
275	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
310	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
360	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
400	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
440	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
480	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
520	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
560	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
640	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
720	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
800	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30

KtFABD_U_Normalizer2_DoD (AFM applications only)

AvgFlow / A	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
80	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
120	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
160	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
200	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
240	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
275	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
310	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
360	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
400	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
440	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
480	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
520	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
560	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
640	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
720	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
800	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30

Closed Loop Enable Criteria

Engine run time greater than
KtFSTA_t_C(HYBRID ONLY)

Start Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Enable Time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

and
KtFSTA_t_ClosedLoopTime

t-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Enable Time	155.0	140.0	135.0	50.0	22.0	15.0	14.0	14.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

and pre converter 02 sensor voltage less than
KfFULC_U_O2_SensorReadyThrshLo

	< 1100
Voltage	*milliVolts*

for
KcFULC_O2_SensorReadyEvents

	> 25
nilliseconds)	*events*

and
COSC (Converter Oxygen Storage Control) not enabled
and
Consumed AirFuel Ratio is stoichiometry i.e. not in component protection
and
POPD or Catalyst Diagnostic not intrusive
and
Turbo Scavenging Mode not enabled
and
All cylinders whose valves are active also have their injectors enabled
and
O2S_Bank_ 1_TFTKO, O2S_Bank_ 2_TFTKO, FuelInjectorCircuit_FA and CylnderDeacDriverTFTKO = False

Long Term FT Enable Criteria

Closed Loop Enable and
Coolant greater than
KfFCLL_T_AdaptiveLoCoolant

	> 40
Coolant	*Celcius*

or less than
KfFCLL_T_AdaptiveHiCoolant

	< 120
Coolant	*Celcius*

and
KtFCLL_p_AdaptiveLowMAP_Limit

ric Pressure	65	70	75	80	85	90	95	100	105
Air Pressure	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0

and
TPS_ThrottleAuthorityDefaulted = False
and
Flex Fuel Estimate Algorithm is not active
and
Excessive fuel vapors boiling off from the engine oil algorithm (BOFR) is not enabled
and
Catalyst or EVAP large leak test not intrusive

Secondary Fuel Trim Enable Criteria

Closed Loop Enable and
KfFCLP_U_O2ReadyThrshLo

	< 1100
Voltage	*milliVolts*

for
KcFCLP_Cnt_O2RdyCyclesThrsh

	> 80
nilliseconds)	*events*

Long Term Secondary Fuel Trim Enable Criteria

KtFCLP_t_PostIntglDisableTime

t-Up Coolant	-40	-29	-18	-6	5	16	28	39	50	61	73	84	95	106	118	129	140
Enable Time	100.0	100.0	100.0	60.0	50.0	40.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0

Plus
KtFCLP_t_PostIntglRampInTime

t-Up Coolant	-40	-29	-18	-6	5	16	28	39	50	61	73	84	95	106	118	129	140
amp In Time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

and
KeFCLP_T_IntegrationCatalystMax

	< 1000
Modeled Ca	*Celcius*

and
KeFCLP_T_IntegrationCatalystMin

	> 300
Modeled Ca	*Celcius*

and
PO2S_Bank_1_Snsr_2_FA and PO2S_Bank_2_Snsr_2_FA = False

P0068: MAP / MAF / TPS Correleation

X-axis is TPS (%)
Data is MAP threshold (kPa)

X-axis	10.00	12.86	15.71	18.57	21.43	24.29	27.14	30.00	65.00
Data	78.75	75.09	71.11	66.02	59.77	52.20	43.71	34.92	100.00

X axis is TPS (%)
Data is MAF threshold (grams/sec)

X-axis	10.00	12.86	15.71	18.57	21.43	24.29	27.14	30.00	65.00
Data	26.06	32.02	37.08	39.54	42.63	46.29	43.64	38.88	511.99

X axis is Engine Speed (RPM)
Data is max MAF vs RPM (grams/sec)

X-axis	600.00	1400.00	2200.00	3000.00	3800.00	4600.00	5400.00	6200.00	7000.00
Data	17.90	39.19	63.43	80.91	112.92	138.31	168.70	174.20	176.70

X axis is Battery Voltage (V)
Data is max MAF vs Voltage (grams/sec)

X-axis	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00
Data	1.48	1.95	13.74	42.67	102.67	205.24	300.70	300.70	300.70

P1682: Ignition Voltage Correleation

X-axis is IAT (DegC)
Data is Voltage threshold (V)

X-axis	23.00	85.00	95.00	105.00	125.00
Data	7.00	8.70	9.00	9.20	10.00

P0606: Processor Performance Check - ETC software is not executed in proper order

X-axis is task loop time
Data is threshold (seconds)

X-axis	CePISR_e_6p25msSeq	CePISR_e_12p5msSeq	CePISR_e_25msSeq	CePISR_e_LORES_C
Data	1.750	1.750	1.750	409.594

X-axis is task loop time
Data indicates if feature is enabled

X-axis	CePISR_e_6p25msSeq	CePISR_e_12p5msSeq	CePISR_e_25msSeq	CePISR_e_LORES_C
Data	1	1	1	1

P16F3: No fast unmanaged retarded spark above the applied spark

X-axis is Erpm
Y-axis is Air per Clyinder (mg)
Data is spark delta threshold (kPa)

KtSPRK_phi_DeltTorqueScrtyAdv

APC/Erpm	500.00	980.74	1461.48	1942.23	2422.97	2903.71	3384.45	3865.20	4345.94	4826.68	5307.42	5788.16	6268.91	6749.65	7230.39	7711.13	8191.88
80.00	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98
160.00	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98
240.00	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98
320.00	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98
400.00	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98
480.00	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98
560.00	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98
640.00	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98
720.00	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98
800.00	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98
880.00	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98
960.00	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98
1040.00	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98
1120.00	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98
1200.00	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98
1280.00	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98
1360.00	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98	1023.98

P16F3: Absolute difference of the calculated Intake Manifold Pressure during engine event versus during time event

X-axis is engine torque (Nm)
Data is MAP delta threshold (kPa)

X-axis	1000.00	2000.00	3000.00	4000.00	5000.00	6000.00
Data	256.00	256.00	256.00	256.00	256.00	256.00

P16F3: Table to calculate limit for predicted torque for zero pedal determination.

X-axis is engine oil temp in C deg
Y-axis is engine speed RPM
Data is Torque (Nm)

	-40.00	-20.00	-10.00	0.00	50.00	90.00
700.00	4096.00	4096.00	4096.00	4096.00	4096.00	4096.00
900.00	4096.00	4096.00	4096.00	4096.00	4096.00	4096.00
1100.00	70.00	70.00	70.00	70.00	60.00	50.00
1400.00	45.00	42.00	38.00	35.00	35.00	35.00
1600.00	32.89	29.44	27.18	25.55	18.09	15.26
1800.00	34.82	31.10	28.67	26.92	19.35	16.51
2000.00	37.64	32.56	30.68	29.85	21.71	18.36
2200.00	40.80	35.20	33.13	32.22	23.24	19.84
2500.00	43.58	39.76	37.58	36.01	26.21	23.06
2700.00	42.72	38.90	36.72	35.15	25.34	22.19
3000.00	40.65	36.83	34.65	33.08	23.27	20.13
3300.00	36.87	33.05	30.87	29.30	19.49	16.35
3500.00	13.41	9.58	7.41	5.84	-3.97	-7.12
3700.00	7.50	3.67	1.50	-0.08	-9.88	-13.03
4000.00	4.25	0.43	-1.75	-3.32	-13.13	-16.28
4500.00	4.25	0.43	-1.75	-3.32	-13.13	-16.28
5000.00	4.25	0.43	-1.75	-3.32	-13.13	-16.28

Spark ESC PDT

P0324/P0326 Abnormal Noise Threshold (same table used for both):

X-axis: Engine Air Flow (mg per cylinder)

Y-axis: Engine Speed (RPM)	100	300	700	1200
500	0.1950	0.1950	0.1950	0.1950
1000	0.1950	0.1950	0.1950	0.1950
1500	0.1950	0.1950	0.1950	0.1950
2000	0.2030	0.2030	0.2030	0.2030
2500	0.2470	0.2470	0.2470	0.2470
3000	0.3380	0.3380	0.3380	0.3380
3500	0.3780	0.3780	0.3780	0.3780
4000	0.4500	0.4500	0.4500	0.4500
4500	0.4210	0.4210	0.4210	0.4210
5000	0.5100	0.5100	0.5100	0.5100
5500	0.5100	0.5100	0.5100	0.5100
6000	0.5100	0.5100	0.5100	0.5100
6500	0.5100	0.5100	0.5100	0.5100
7000	0.5100	0.5100	0.5100	0.5100
7500	0.5100	0.5100	0.5100	0.5100
8000	0.5100	0.5100	0.5100	0.5100
8500	0.5100	0.5100	0.5100	0.5100

P0325/P0330

Two methods are used for the Knock Sensor Open Circuit Diagnostic:

1) 20 kHz Method: 20 kHz signal is internally injected on one sensor line (Signal) and the output of the differential op-amp is checked to verify the 20 kHz travels through the sensor
2) Normal Noise: The amplitude of the FFT (in the knock frequency range) is checked to verify there is a knock signal within an expected range.

KtKNKD_e_OpenMethod is the cal table used to determine which Open Circuit method is used: '0' = Disabled; '1' = 20 kHz Method; '2' = Normal Noise Method

Y-axis: Engine Speed (RPM)	X-axis: Engine Air Flow (mg per cylinder) 100	300	700	1200
500	1	1	1	1
1000	1	1	1	1
1500	1	1	1	1
2000	1	1	1	1
2500	1	1	1	1
3000	1	1	1	1
3500	1	1	1	1
4000	1	1	1	1
4500	1	1	1	1
5000	1	1	1	1
5500	1	1	1	1
6000	1	1	1	1
6500	1	1	1	1
7000	1	1	1	1
7500	1	1	1	1
8000	1	1	1	1
8500	1	1	1	1

Open Circuit Thresholds:

1. 20 kHz Method:

Engine Speed (RPM):	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500
OpenCktThrshMin:	6.1602	6.1602	6.1602	6.0293	5.9980	6.0215	6.0566	6.0625	5.9902	5.8027	5.4531	4.8984	4.8984	4.8984	4.8984	4.8984	4.8984

Engine Speed (RPM):	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500
OpenCktThrshMax:	18.9473	18.9473	18.9473	18.4883	18.3750	18.4395	18.5195	18.4473	18.0586	17.1875	15.6699	13.3398	13.3398	13.3398	13.3398	13.3398	13.3398

2. Normal Noise Method:

Engine Speed (RPM):	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500
OpenCktThrshMin:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Engine Speed (RPM):	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500
OpenCktThrshMax:	0.0371	0.0410	0.0488	0.0566	0.0664	0.0762	0.0859	0.0957	0.1094	0.1309	0.1406	0.1504	0.1602	0.1699	0.1797	0.1895	0.2012

P06B6/P06B7

Engine Speed (RPM):	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500
OpenTestThreshLo	0.0742	0.0742	0.0742	0.0840	0.1035	0.1328	0.1699	0.2109	0.2578	0.3066	0.3555	0.4023	0.4473	0.4883	0.5234	0.5508	0.5684

Engine Speed (RPM):	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500
OpenTestThreshHi	0.2754	0.2754	0.2754	0.2754	0.3281	0.3789	0.5313	0.7324	0.9883	1.3027	1.6777	2.1191	2.6309	3.2188	3.8828	4.6309	5.4648

P0442: EONV Pressure Threshold Table (in Pascals)

X axis is fuel level in %
Y axis is temperature in deg C

	0.0000	6.2499	12.4998	18.7497	24.9996	31.2495	37.4994	43.7493	49.9992	56.2491	62.4990	68.7490	74.9989	81.2488	87.4987	93.7486	99.9985
-10.0000	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810
-4.3750	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810
1.2500	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810
6.8750	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810
12.5000	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810
18.1250	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810
23.7500	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810
29.3750	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810
35.0000	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810
40.6250	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810
46.2500	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810
51.8750	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810
57.5000	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810
63.1250	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810
68.7500	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810
74.3750	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810
80.0000	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810	-498.1810

P0442: Estimate of Ambient Temperature Valid Conditioning Time

EAT Valid Conditioning Time (in seconds)
Axis is Ignition Off Time (in seconds)

Axis	Curve
0	78
600	245
1200	245
1800	245
2400	245
3000	245
3600	185
4200	183
4800	181
5400	179
6000	176
6600	174
7200	172
7800	170
8400	168
9000	166
9600	163
10200	161
10800	159
11700	156
12600	153
13500	149
14400	146
15300	144
16200	143
17100	141
18000	140
19200	137
20400	135
21600	133
22800	129
24000	124
25200	120

P0442: Engine Off Time Before Vehicle Off Maximum as a Function of Estimated Ambient Temperature

Engine Off Time Before Vehicle Off Maximum Table (in seconds) — **Axis is Estimated Ambient Coolant in Deg C**

Axis	-10	-4	1	7	13	18	24	29	35	41	46	52	58	63	69	74	80
Curve	44	44	44	44	68	82	105	153	320	480	480	480	480	480	480	480	480

P0496: Purge Valve Leak Test Engine Vacuum Test Time (Cold Start) as a Function of Fuel Level

Purge Valve Leak Test Engine Vacuum Test Time (in seconds)
Axis is Fuel Level in %

Axis	Curve
0	100
6	100
12	80
19	75
25	70
31	65
37	60
44	60
50	60
56	60
62	60
69	55
75	50
81	45
87	40
94	30
100	30

CSED Section

Residual Calculation Time Weight Factors

Engine Run Time	0	2	3	4	7	10	15	20	30
Time Weight Factor	0	0	1	1	1	1	1	1	1

Extended Engine Exit Time

%Eth/Catm onEWMA	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

P0300-P0308: Idle SCD dt (decel index (> Idle SCD dt **AND** > Idle SCD ddt Tables))

Load	400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000
8	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
9	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
11	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
12	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
13	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
15	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
17	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
19	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
22	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
25	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
29	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
33	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
38	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
42	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
48	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
54	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
60	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767

P0300-P0308: Idle SCD ddt

Load	400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000
8	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
9	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
11	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
12	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
13	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
15	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
17	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
19	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
22	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
25	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
29	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
33	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
38	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
42	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
48	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
54	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
60	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767

P0300-P0308: Off Idle SCD dt **OR** (decel index >Off Idle SCD dt **AND** > Off Idle SCD ddt Tables))

Load	400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000
8	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
9	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
11	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
12	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
13	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
15	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
17	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
19	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
22	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
25	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
29	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
33	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
38	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
42	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
48	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
54	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
61	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767

P0300-P0308: SCD Delta ddt

Load		400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000
	8	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	9	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	11	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	12	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	13	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	15	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	17	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	19	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	22	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	25	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	29	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	33	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	38	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	42	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	48	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	54	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	61	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767

P0300-P0308: Idle Cyl Mode dt **OR** (decel index (>Idle Cyl Mode dt **AND** > Idle Cyl Mode ddt Tables))

Load		1250	1300	1350	1375	1400	1425	1450	1500	1600	1700	1800	1900	2000
	8	600	550	550	550	550	550	550	550	380	340	300	223	145
	9	800	540	540	540	540	540	540	540	310	298	285	212	138
	11	750	530	530	530	530	530	530	530	250	248	245	186	127
	12	700	530	530	530	530	530	530	530	260	258	255	193	130
	13	750	530	530	530	530	530	530	530	285	283	280	208	135
	15	800	530	530	530	530	530	530	530	290	288	285	218	150
	17	850	530	530	530	530	530	530	530	388	349	310	235	160
	19	1100	250	250	250	250	250	250	250	390	353	315	263	210
	22	1200	400	400	400	400	400	400	400	400	363	325	280	235
	25	1400	600	600	600	600	600	600	600	450	425	400	320	240
	29	1700	800	800	800	800	800	800	800	550	488	425	368	310
	33	2300	850	850	850	850	850	850	850	600	525	450	383	315
	38	2800	900	900	900	900	900	900	900	650	565	480	398	315
	42	3000	925	925	925	925	925	925	925	825	678	530	425	320
	48	3400	950	950	950	950	950	950	950	925	738	550	438	325
	54	3700	1100	1100	1100	1100	1100	1100	1100	1100	850	600	500	400
	60	3800	2800	2800	2800	2800	2800	2800	2800	1300	1150	1000	800	600

P0300-P0308: Idle Cyl Mode ddt

Load		1250	1300	1350	1375	1400	1425	1450	1500	1600	1700	1800	1900	2000
	8	1300	550	550	550	550	550	550	550	400	375	350	300	250
	9	1250	500	500	500	500	500	500	500	350	325	300	270	240
	11	1200	500	500	500	500	500	500	500	300	288	275	248	220
	12	1300	500	500	500	500	500	500	500	305	293	280	250	220
	13	1400	500	500	500	500	500	500	500	310	298	285	255	225
	15	1500	500	500	500	500	500	500	500	325	308	290	258	225
	17	1600	500	500	500	500	500	500	500	400	375	350	290	230
	19	1800	500	500	500	500	500	500	500	500	430	360	298	235
	22	2000	525	525	525	525	525	525	525	520	448	375	308	240
	25	2500	625	625	625	625	625	625	625	620	523	425	335	245
	29	3500	700	700	700	700	700	700	700	690	570	450	383	315
	33	4500	775	775	775	775	775	775	775	750	625	500	410	320
	38	5000	800	800	800	800	800	800	800	790	695	600	460	320
	42	5500	825	825	825	825	825	825	825	820	760	700	513	325
	48	5600	850	850	850	850	850	850	850	825	813	800	565	330
	54	5750	875	875	875	875	875	875	875	860	855	850	725	600
	60	4000	3000	3000	3000	3000	3000	3000	3000	1400	1225	1050	850	650

P0300-P0308: Cyl Mode dt **OR** (decel index > Cyl Mode dt AND > Cyl Mode ddt Tables))

Load	400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000
8	6000	6000	6000	6000	6000	2600	2100	1600	800	550	380	300	145	140	120	90	85	70
9	6000	6000	6000	6000	6000	2650	2150	1650	750	540	310	285	138	130	100	80	75	60
11	6000	6000	6000	6000	6000	2700	2200	1700	700	530	250	245	127	123	95	70	55	50
12	6000	6000	6000	6000	6000	2750	2250	1750	750	530	260	255	130	125	98	70	55	50
13	6000	6000	6000	6000	6000	2800	2300	1800	800	533	285	280	135	130	100	70	55	50
15	6000	6000	6000	6000	6000	2850	2350	1850	850	535	290	285	150	140	105	75	55	50
17	6000	6000	6000	6000	6000	3100	2600	2100	1100	575	388	310	160	160	110	80	65	55
19	6000	6000	6000	6000	6000	3200	2700	2200	1200	650	390	315	210	180	125	90	70	65
22	6000	6000	6000	6000	6000	3400	2900	2400	1400	825	400	325	235	200	140	100	75	75
25	6000	6000	6000	6000	6000	3700	3200	2700	1450	850	450	390	240	235	200	125	100	85
29	6000	6000	6000	6000	6000	4300	3800	3300	1500	950	550	390	310	270	200	125	120	90
33	6000	6000	6000	6000	6000	4800	4300	3800	1600	1000	600	390	315	295	210	125	120	90
38	6000	6000	6000	6000	6000	5000	4500	4000	2075	1100	650	390	315	310	210	125	120	120
42	6000	6000	6000	6000	6000	5400	4900	4400	2075	1450	800	500	320	320	210	125	120	120
48	6000	6000	6000	6000	6000	5700	5200	4700	2075	1450	900	525	320	320	315	220	130	130
54	6000	6000	6000	6000	6000	5800	5300	4800	2770	1500	1000	525	360	360	350	250	235	145
61	6000	6000	6000	6000	6000	5900	5400	4900	2770	2760	1300	855	450	375	365	300	260	150

P0300-P0308: Cyl Mode ddt

Load	400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000
8	6000	6000	6000	6000	6000	6000	6000	6000	1300	600	400	350	250	240	160	140	120	90
9	6000	6000	6000	6000	6000	6000	6000	6000	1250	575	350	300	240	220	150	120	100	80
11	6000	6000	6000	6000	6000	6000	6000	6000	1200	550	300	275	220	180	135	105	90	70
12	6000	6000	6000	6000	6000	6000	6000	6000	1200	600	305	280	220	190	140	110	95	77
13	6000	6000	6000	6000	6000	6000	6000	6000	1200	752	310	285	225	220	165	125	105	78
15	6000	6000	6000	6000	6000	6000	6000	6000	1200	775	325	290	225	220	170	130	110	85
17	6000	6000	6000	6000	6000	6000	6000	6000	1450	800	400	350	230	225	175	130	115	88
19	6000	6000	6000	6000	6000	6000	6000	6000	1600	925	500	360	235	230	180	130	120	92
22	6000	6000	6000	6000	6000	6000	6000	6000	1700	935	600	375	240	235	190	130	120	94
25	6000	6000	6000	6000	6000	6000	6000	6000	1750	950	650	400	245	240	200	130	120	95
29	6000	6000	6000	6000	6000	6000	6000	6000	2200	975	750	400	315	300	210	130	120	95
33	6000	6000	6000	6000	6000	6000	6000	6000	2350	1050	850	400	320	300	210	130	120	95
38	6000	6000	6000	6000	6000	6000	6000	6000	2990	1150	950	400	320	315	210	130	120	120
42	6000	6000	6000	6000	6000	6000	6000	6000	3500	1600	1275	700	320	320	210	130	120	120
48	6000	6000	6000	6000	6000	6000	6000	6000	3800	1950	1325	770	320	320	320	220	130	130
54	6000	6000	6000	6000	6000	6000	6000	6000	3900	2000	1350	775	375	375	370	355	245	145
61	6000	6000	6000	6000	6000	6000	6000	6000	4000	3000	1400	860	625	550	510	360	260	150

P0300-P0308: Rev Mode Table **OR** (decel index > Rev Mode Table)

Load	1100	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3500	4000	4500	5000	5500	6000	6500
8	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
9	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
11	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
12	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
13	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
15	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
17	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
19	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
22	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
25	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
29	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
33	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
38	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
42	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
48	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
54	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
61	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767

P0300-P0308: AFM Mode Table **OR** (decel index > AFM Table if active fuel management)

Load	400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000
0	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
6	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
13	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
19	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
25	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
31	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
38	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
44	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
50	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
56	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
63	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
69	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
75	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
81	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
88	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
94	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
100	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767

P0300-P0308: Zero torque engine load

Zero Torque: All Cylinders active

RPM	Pct load
400	5.79
500	5.79
600	5.79
700	5.79
800	5.79
900	5.73
1000	5.58
1100	5.28
1200	5.63
1400	5.75
1600	7.20
1800	7.80
2000	8.10
2200	8.15
2400	8.30
2600	8.40
2800	8.50
3000	8.60
3500	12.21
4000	14.61
4500	17.00
5000	19.40
5500	21.79
6000	24.19
6500	26.58
7000	28.98

Baro KPa	Multiplier
65	0.85
70	0.87
75	0.89
80	0.91
85	0.94
90	0.96
95	0.98
100	1.00
105	1.02

Zero Torque: Active Fuel Management (AFM)

RPM	Pct load
400	5.79
500	5.79
600	5.79
700	5.79
800	5.79
900	5.73
1000	5.58
1100	5.28
1200	5.63
1400	5.75
1600	7.20
1800	7.80
2000	8.10
2200	8.15
2400	8.30
2600	8.40
2800	8.50
3000	8.60
3500	12.21
4000	14.61
4500	17.00
5000	19.40
5500	21.79
6000	24.19
6500	26.58
7000	28.98

Note: Zero torque is adjusted for Baro. Misfire thresholds are relative to (maximum air density PID $1188 SAE xxx) and do not shift appreciably with altitude compared to (current density as defined PID $04 SAE1979)

Catalyst Damaging Misfire Percentage

Load	0	1000	2000	3000	4000	5000	6000	7000
0	50.0	50.0	50.0	32.0	25.0	25.0	18.0	11.0
10	50.0	50.0	50.0	32.0	25.0	25.0	18.0	11.0
20	50.0	50.0	47.9	32.0	24.4	24.1	17.3	10.8
30	50.0	50.0	35.2	28.7	21.5	19.2	12.6	9.2
40	50.0	50.0	25.3	20.3	20.0	17.1	9.1	7.1
50	36.6	36.6	22.5	17.0	15.5	12.1	8.0	6.0
60	23.0	23.0	20.0	14.0	11.0	7.0	7.0	5.0
70	23.0	23.0	20.0	13.5	10.0	7.0	6.5	5.0
80	23.0	23.0	20.0	13.0	9.0	7.0	6.0	5.0
90	20.5	20.5	19.0	12.0	8.5	6.5	6.0	5.0
100	18.0	18.0	18.0	11.0	8.0	6.0	6.0	5.0

RoughRoadSource = CeRRDR_e_TOSS
Rough Road Threshold

Trans Speed \ Engine Speed	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3500	4000	4500	5000	5500
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
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
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
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
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
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
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
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
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
1000	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
1100	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
1200	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
1300	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
1400	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

RoughRoadSource = CeRRDR_e_WheelSpeedInECM or CeRRDR_e_SerialDataFromABS
Rough Road Threshold

Kph	0	12	24	36	48	60	72	84	96	108	120	132	144	158	170	181	194
Accel	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.13	0.13	0.13	0.13	0.25	0.25	0.25	0.25	0.25

P0300-P0308: Abnormal Engine Speed

Cylinder Mode Abnormal Speed

RPM	0	1000	2000	3000	4000	5000	6000	7000	8000
Multiplier	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

SCD Mode Abnormal Speed

RPM	0	1000	2000	3000	4000	5000	6000	7000	8000
Multiplier	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

Rev Mode Abnormal Speed

RPM	0	1000	2000	3000	4000	5000	6000	7000	8000
Multiplier	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

P0300-P0308: Pattern Recognition Min and Max Multipliers

Min Multiplier

RPM	0	1000	2000	3000	4000	5000	6000	7000	8000
Multiplier	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85

Max Multiplier

RPM	0	1000	2000	3000	4000	5000	6000	7000	8000
Multiplier	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

P0300-P0308: Driveline Ring Filter

Ring Filter

RPM	0	1000	2000	3000	4000	5000	6000	7000	8000
Multiplier	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00

Number of Normals

RPM	0	1000	2000	3000	4000	5000	6000	7000	8000
Multiplier	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

P0531

HSPRat_DeltaPredictedTable **AXIS is Ambient Temp & Fan Speed, Curve is Predicted Delta**

Axis	0	20	30	40	50	60	70	80	100
Curve									
0	40.00	50.00	60.00	70.00	75.00	80.00	100.00	100.00	100.00
20	40.00	50.00	60.00	70.00	75.00	80.00	100.00	100.00	100.00
40	40.00	50.00	60.00	70.00	75.00	80.00	100.00	100.00	100.00
60	40.00	50.00	60.00	70.00	75.00	80.00	100.00	100.00	100.00
80	40.00	50.00	60.00	70.00	75.00	80.00	100.00	100.00	100.00
100	40.00	50.00	60.00	70.00	75.00	80.00	100.00	100.00	100.00
120	40.00	50.00	60.00	70.00	75.00	80.00	100.00	100.00	100.00
140	40.00	50.00	60.00	70.00	75.00	80.00	100.00	100.00	100.00
160	40.00	50.00	60.00	70.00	75.00	80.00	100.00	100.00	100.00

HSPRat_QualityFactorTable **AXIS is Ambient Temp & Fan Speed, Curve is Quality Factor**

Axis	0	20	30	40	50	60	70	80	100
Curve									
0	0.05000	0.25800	0.42999	0.46333	0.53000	0.63000	0.71666	0.83667	0.99001
20	0.05000	0.23500	0.38000	0.42667	0.49333	0.58000	0.67334	0.80667	0.99001
40	0.05000	0.16000	0.28000	0.31334	0.39000	0.50999	0.61667	0.75999	0.95000
60	0.05000	0.14999	0.25999	0.28999	0.34666	0.44000	0.53999	0.69333	0.92999
80	0.05000	0.13750	0.25000	0.28334	0.33667	0.41000	0.49001	0.63000	0.88000
100	0.05000	0.12250	0.23000	0.26334	0.31334	0.38000	0.46001	0.57666	0.78000
120	0.05000	0.09999	0.20000	0.25333	0.29666	0.33000	0.40334	0.52000	0.73000
140	0.05000	0.09000	0.18500	0.22000	0.24666	0.28000	0.34666	0.39667	0.48000
160	0.05000	0.08499	0.17999	0.19333	0.20999	0.23000	0.28333	0.32666	0.41000

HSPRat_CoolantFactorTable **AXIS is Coolant Temp, Curve is Weighting Factor**

Axis	-40	-20	0	20	40	60	80	100	120
Curve									
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	

HSPRat_OnTestThresholdTable **AXIS is ambient Temp, Curve is Threshold**

Axis	-20	0	20	60	100
Curve					
65.0	195.0	260.0	325.0	455.0	

HPC2 (VICM) Supporting Tables

KtBSED_U_BLF_CellVoltThresh	Temperature (°C, average battery temp)	-30	-20	-10	0	10	20	30	40	50
	Voltage (V)	1.85	1.86	1.96	1.96	1.98	2.05	2.05	2.05	2.05
KtBSED_U_BLF_PackVoltThresh	Temperature (°C, average battery temp)	-30	-20	-10	0	10	20	30	40	50
	Voltage (V)	184.1	186.07	195.67	195.67	198.87	205.27	205.27	205.27	205.27
KtBSED_U_BOV_CellVoltThresh	Temperature (°C, average battery temp)	-30	-20	-10	0	10	20	30	40	50
	Voltage (V)	4.348	4.354	4.358	4.398	4.398	4.398	4.398	4.398	4.398
KtBSED_U_BOV_PackVoltThresh	Temperature (°C, average battery temp)	-30	-20	-10	0	10	20	30	40	50
	Voltage (V)	414.3	414.94	415.26	419.1	419.1	419.1	419.1	419.1	419.1

KtBSED_R_SOH_ResistanceThresh	Temperature(°C, average battery temp) / SOC (%)	10	20	30	40	50	60	70	80	90
	-30	20.0000	20.0000	20.0000	20.0000	20.0000	20.0000	20.0000	20.0000	20.0000
	-20	20.0000	3.5080	2.8756	2.6482	2.5508	2.5248	2.5183	2.5151	2.5072
	-10	20.0000	1.8023	1.6748	1.5861	1.5518	1.5674	1.6084	1.7255	1.8580
	0	20.0000	1.4197	1.1950	1.0809	1.0417	1.0212	1.0193	1.0174	1.0149
	10	20.0000	0.8401	0.7702	0.7147	0.6880	0.6695	0.6731	0.6702	0.6652
	20	20.0000	0.6317	0.582	0.5415	0.518	0.505	0.5091	0.5093	0.504
	30	20.0000	0.4806	0.4448	0.4168	0.3973	0.3874	0.391	0.3933	0.3887
	40	20.0000	0.3868	0.3586	0.3404	0.3258	0.3167	0.3189	0.3222	0.3194
	50	20.0000	0.293023	0.272363	0.264074	0.254405	0.246081697	0.246765	0.251	0.25

P0D22: Engine Off Time Before Vehic Charger HV Output Current Deviation as a Function of Desired Current

Curve : Charger HV Output Current Deviation Table (in percent)
Axis: Desired Current in Amps

Axis	0	0.5	1	2	3	4	5
Curve	60	60	60	60	60	20	20

FPCM (FSCM) Supporting Tables

P2635 Fuel Pump Performance Maximum Fuel Flow map (grams / second)

X-axis= Desired Fuel Pressure (kiloPascals)
Y-axis= Battery voltage (volts)

	200	250	300	350	400	450	500	550	600
4.5	8.898438	8.898438	8.898438	8.898438	8.835938	5.414063	2.453125	0	0
6	8.898438	8.898438	8.898438	8.898438	8.835938	5.414063	2.453125	0	0
7.5	8.898438	8.898438	8.898438	8.898438	8.835938	5.414063	2.453125	0	0
9	8.898438	8.898438	8.898438	8.898438	8.835938	5.414063	2.453125	0	0
10.5	8.898438	8.898438	8.898438	8.898438	8.835938	5.414063	2.453125	0	0
12	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.125	5.179688	2.585938
13.5	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	7.59375
15	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438
16.5	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438
18	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438
19.5	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438
21	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438
22.5	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438
24	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438
25.5	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438
27	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438
28.5	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438

P2635 Fuel Injector Flow curve (grams / second)

X-axis= Fuel Pressure (kiloPascals)

128	148	168	188	208	228	248	268	288	308	328	348	368	388	408	428	448	468
1.014893	1.091064	1.162109	1.229004	1.291992	1.351074	1.407959	1.462891	1.516113	1.565918	1.61499	1.663086	1.709961	1.756104	1.800049	1.843018	1.884033	1.925049

488	508	528	548	568	588	608	628	648	668	688	708	728	748	768
1.965088	2.00293	2.040039	2.075928	2.112061	2.146973	2.180908	2.214111	2.24707	2.281982	2.315918	2.349121	2.38208	2.414063	2.447021

P2635 Minimum Fuel Injector Pulse Width curve (seconds)

X-axis= engine speed (revolutions / minute)

0	512	1024	1536	2048	2560	3072	3584	4096	4608	5120	5632	6144	6656	7168	7680	8192
0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25

ECM Fault Bundles

Cert Doc Bundle Name	Pcodes											
AnyCamPhaser_FA	P0010	P0011	P0013	P0014	P0020	P0021	P0023	P0024				
AnyCamPhaser_TFTKO	P0010	P0011	P0013	P0014	P0020	P0021	P0023	P0024				
IntkCamPhaser_FA	P0010	P0011	P0020	P0021								
EGRValvePerformance_FA	P0401	P042E										
EGRValveCircuit_FA	P0403	P0404	P0405	P0406								
EGRValve_FP	P0405	P0406	P042E									
EGRValveCircuit_TFTKO	P0403	P0404	P0405	P0406								
EGRValvePerformance_TFTKO	P0401	P042E										
O2S_Bank_ 1_TFTKO	P0131	P0132	P0134	P2A00								
O2S_Bank_ 2_TFTKO	P0151	P0152	P0154	P2A03								
O2S_Bank_1_Sensor_1_FA	P2A00	P0131	P0132	P0133	P0134	P0135	P0053	P1133	P015A	P015B	P0030	
O2S_Bank_1_Sensor_2_FA	P013A	P013B	P013E	P013F	P2270	P2271	P0137	P0138	P0140	P0141	P0054	P0036
O2S_Bank_2_Sensor_1_FA	P2A03	P0151	P0152	P0153	P0154	P0155	P0059	P1153	P015C	P015D	P0050	
O2S_Bank_2_Sensor_2_FA	P013C	P013D	P014A	P014B	P2272	P2273	P0157	P0158	P0160	P0161	P0060	P0056
PO2S_Bank_1_Snsr_2_FA	P0137	P0138	P0140	P0036	P0054	P0141	P2270	P2271				
PO2S_Bank_2_Snsr_2_FA	P0157	P0158	P0160	P0056	P0060	P0161	P2272	P2273				
ECT_Sensor_Ckt_FA	P0117	P0118										
ECT_Sensor_Ckt_TPTKO	P0117	P0118										
ECT_Sensor_Ckt_TFTKO	P0117	P0118										
ECT_Sensor_DefaultDetected	P0117	P0118	P0116	P0119								
ECT_Sensor_FA	P0117	P0118	P0116	P0119	P0128							
ECT_Sensor_TFTKO	P0117	P0118	P0116	P0119								
ECT_Sensor_Perf_FA	P0116											
ECT_Sensor_Ckt_FP	P0117	P0118										
ECT_Sensor_Ckt_High_FP	P0118											
ECT_Sensor_Ckt_Low_FP	P0117											
THMR_Insuff_Flow_FA	P00B7											
THMR_Therm_Control_FA	P0597	P0598	P0599									
THMR_RCT_Sensor_Ckt_FA	P00B3	P00B4										
THMR_ECT_Sensor_Ckt_FA	P0117	P0118	P0116	P00B6								
AAP_SnsrFA	naturally aspirated:	P2227	P2228	P2229	P2230							
	turbocharged:	P0237	P0238									

ECM Fault Bundles

Cert Doc Bundle Name	Pcodes										
AAP_SnsrCktFP	naturally aspirated:	P2228	P2229								
	turbocharged:	P0237	P0238								
AAP_SnsrTFTKO	naturally aspirated:	P2227	P2228	P2229	P2230						
	turbocharged:	P0237	P0238								
AAP2_SnsrFA	P2227	P2228	P2229	P2230							
AAP2_SnsrCktFP	P2228	P2229									
AAP2_SnsrTFTKO	P2227	P2228	P2229	P2230							
TC_BoostPresSnsrCktFA	P0237	P0238									
TC_BoostPresSnsrFA	P0236	P0237	P0238								
AmbPresSnsrCktFA	P2228	P2229									
AmbPresSnsrCktFP	P2228	P2229									
AmbientAirDefault	Baro sensor present:	P2227	P2228	P2229	P2230						
	No Baro sensor present:	P0101	P0102	P0103	P0106	P0107	P0108	P0111	P0112	P0113	P0114	P0121
		P0122	P0123	P012B	P012C	P012D	P0222	P0223	P1221			
	Baro sensor present:	P2227	P2228	P2229	P2230						
	No Baro sensor present:	P0101	P0102	P0103	P0106	P0107	P0108	P0111	P0112	P0113	P0114	P0121
		P0122	P0123	P012B	P012C	P012D	P0222	P0223	P1221			
IAT_SensorCircuitTFTKO	P0112	P0113									
IAT_SensorCircuitFA	P0112	P0113									
IAT_SensorCircuitFP	P0112	P0113									
IAT_SensorTFTKO	P0111	P0112	P0113	P0114							
IAT_SensorFA	P0111	P0112	P0113	P0114							

ECM Fault Bundles

Cert Doc Bundle Name	Pcodes		
MnfdTempSensorCktTFTKO	Turbocharged or supercharged, without Humidity sensor:	P0097	P0098
	Turbocharged or supercharged, with Humidity sensor:	P112C	P112D
	Naturally aspirated:	P0112	P0113
MnfdTempSensorCktFA	Turbocharged or supercharged, without Humidity sensor:	P0097	P0098
	Turbocharged or supercharged, with Humidity sensor:	P112C	P112D
	Naturally aspirated:	P0112	P0113

ECM Fault Bundles

Cert Doc Bundle Name	Pcodes			
MnfdTempSensorCktFP	Turbocharged or supercharged, without Humidity sensor: P0097 P0098			
	Turbocharged or supercharged, with Humidity sensor: P112C P112D			
	Naturally aspirated: P0112 P0113			
MnfdTempSensorTFTKO	Turbocharged or supercharged, without Humidity sensor: P0096	P0097	P0098	P0099
	Turbocharged or supercharged, with Humidity sensor: P112B	P112C	P112D	P112E
	Naturally aspirated: P0111	P0112	P0113	P0114
MnfdTempSensorFA	Turbocharged or supercharged, without Humidity sensor: P0096	P0097	P0098	P0099

ECM Fault Bundles

Cert Doc Bundle Name	Pcodes				
ThrotTempSensorTFTKO	Turbocharged or supercharged, with Humidity sensor:	P112B	P112C	P112D	P112E
	Naturally aspirated:	P0111	P0112	P0113	P0114
	Turbocharged, without Humidity sensor:	P0096	P0097	P0098	P0099
ThrotTempSensorFA	Turbocharged, with Humidity sensor:	P112B	P112C	P112D	P112E
	Naturally aspirated or supercharged	P0111	P0112	P0113	P0114
	Turbocharged, without Humidity sensor:	P0096	P0097	P0098	P0099
HumTempSnsrCktFA	Turbocharged, with Humidity sensor:	P112B	P112C	P112D	P112E
	Naturally aspirated or supercharged	P0111	P0112	P0113	P0114
		P0097	P0098		
HumTempSnsrCktFP		P0097	P0098		
HumTempSnsrFA		P0096	P0097	P0098	P0099

ECM Fault Bundles

Cert Doc Bundle Name	Pcodes							
IAT_ContCorrFA	P2199							
HumidityFA	P0097	P0098	P11C2	P11C3	P2227	P2228	P2229	P2230
SuperchargerBypassValveFA	P2261							
CylDeacSystemTFTKO	P3400							
MAF_SensorPerfFA	P0101							
MAF_SensorPerfTFTKO	P0101							
MAP_SensorPerfFA	P0106							
MAP_SensorPerfTFTKO	P0106							
SCIAP_SensorPerfFA	P012B							
SCIAP_SensorPerfTFTKO	P012B							
ThrottlePositionSnsrPerfFA	P0121							
ThrottlePositionSnsrPerfTFTKO	P0121							
TIAP_SensorPerfFA	P0236							
MAF_SensorFA	P0101	P0102	P0103	P010C	P010D			
MAF_SensorTFTKO	P0101	P0102	P0103	P010C	P010D			
MAF_SensorFP	P0102	P0103	P010C	P010D				
MAF_SensorCircuitFA	P0102	P0103	P010C	P010D				
MAF_SensorCircuitTFTKO	P0102	P0103	P010C	P010D				
MAF_SnsrCktFA	P121B	P121C						
MAF_SnsrCktTFTKO	P121B	P121C						
MAP_SensorTFTKO	P0106	P0107	P0108					
MAP_SensorFA	P0106	P0107	P0108					
MAP_SensorCircuitFP	P0107	P0108						
SCIAP_SensorFA	P012B	P012C	P012D					
SCIAP_SensorTFTKO	P012B	P012C	P012D					
SCIAP_SensorCircuitFP	P012C	P012D						
AfterThrottlePressureFA	naturally aspirated or turbocharged:	P0106	P0107	P0108				
	supercharged:	P012B	P012C	P012D				
AfterThrottleVacuumTFTKO	naturally aspirated or turbocharged:	P0106	P0107	P0108				

ECM Fault Bundles

Cert Doc Bundle Name	Pcodes											
SCIAP_SensorCircuitFA	supercharged: P012C naturally aspirated or turbocharged: P0106 supercharged: P012B P0107	P012B P012D P0108	P012C	P012D								
AfterThrottlePressTFTKO			P0107	P0108								
MAP_SensorCircuitFA			P012C	P012D								
MAP_EngineVacuumStatus	MAP_SensorFA OR P0107, P0108 Pending											
OAT_AmbientFilteredFA OAT_AmbientSensorFA OAT_PtEstFiltFA												
CrankCamCorrelationTFTKO	P0016	P0017	P0018	P0019								
CrankSensorFA	P0335	P0336										
CrankSensorTFTKO	P0335	P0336										
CamSensorFA	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391
CamSensorTFTKO	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391
CrankIntakeCamCorrelationFA	P0016	P0018										
CrankExhaustCamCorrelationFA	P0017	P0019										
IntakeCamSensorTFTKO	P0016	P0018	P0340	P0341	P0345	P0346						
IntakeCamSensorFA	P0016	P0018	P0340	P0341	P0345	P0346						
ExhaustCamSensorTFTKO	P0017	P0019	P0365	P0366	P0390	P0391						
ExhaustCamSensorFA	P0017	P0019	P0365	P0366	P0390	P0391						
IntakeCamSensor_FA	P0016	P0018	P0340	P0341	P0345	P0346						
IntakeCamSensor_TFTKO	P0016	P0018	P0340	P0341	P0345	P0346						
ExhaustCamSensor_FA	P0017	P0019	P0365	P0366	P0390	P0391						
ExhaustCamSensor_TFTKO	P0017	P0019	P0365	P0366	P0390	P0391						
CrankIntakeCamCorrFA	P0016	P0018										
CrankExhaustCamCorrFA	P0017	P0019										
CrankSensorFaultActive	P0335	P0336										
CrankSensor_FA	P0335	P0336										
CrankSensorTestFailedTKO	P0335	P0336										
CrankSensor_TFTKO	P0335	P0336										

ECM Fault Bundles

Cert Doc Bundle Name	Pcodes											
CamSensor_FA	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391
CamSensorAnyLocationFA	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391
CamSensor_TFTKO	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391
EngModeNotRunTmErr	P2610											
FuelTrimSystemB1_FA	P0171	P0172										
FuelTrimSystemB2_FA	P0174	P0175										
FuelTrimSystemB1_TFTKO	P0171	P0172										
FuelTrimSystemB2_TFTKO	P0174	P0175										
NA	P2096	P2097	P2098	P2099								
A/F Imbalance Bank1	P219A											
A/F Imbalance Bank2	P219B											
A/F Imbalance Bank1	P219A											
A/F Imbalance Bank2	P219B											
AIRSystemPressureSensor FA	P2430	P2431	P2432	P2433	P2435	P2436	P2437	P2438				
AIR System FA	P0411	P2440	P2444									
AIRValveControlCircuit FA	P0412											
AIRPumpControlCircuit FA	P0418											
Clutch Sensor FA	P0806	P0807	P0808									
ClutchPositionSensorCircuitLo FA	P0807											
ClutchPositionSensorCircuitHi FA	P0808											
Ethanol Composition Sensor FA	P0178	P0179	P2269									
PPS1_OutOfRange_Composite	P2122	P2123	P06A3									
PPS2_OutOfRange_Composite	P2127	P2128	P0697									
PPS1_OutOfRange_Composite	P2122	P2123	P06A3									
PPS2_OutOfRange_Composite	P2127	P2128	P0697									
PPS1_OutOfRange	P2122	P2123										
PPS2_OutOfRange	P2127	P2128										
PPS1_OutOfRange	P2122	P2123										
PPS2_OutOfRange	P2127	P2128										
AcceleratorPedalFailure	P2122	P2123	P2127	P2128	P2138	P0697	P06A3					
ControllerRAM_Error_FA	P0604											
ControllerProcessorPerf_FA	P0606											
TPS1_OutOfRange_Composite	P0122	P0123	P06A3									
TPS2_OutOfRange_Composite	P0222	P0223	P06A3									
TPS_FA	P0122	P0123	P0222	P0223	P2135							

ECM Fault Bundles

Cert Doc Bundle Name	Pcodes											
TPS_TFTKO	P0122	P0123	P0222	P0223	P2135							
TPS_Performance_FA	P0068	P0121	P1104	P2100	P2101	P2102	P2103					
TPS_Performance_TFTKO	P0068	P0121	P1104	P2100	P2101	P2102	P2103					
TPS_FaultPending	P0122	P0123	P0222	P0223	P2135							
TPS_FaultPending	P0122	P0123	P0222	P0223	P2135							
TPS_ThrottleAuthorityDefaulted	P0068	P0122	P0123	P0222	P0223	P16F3	P1104	P2100	P2101	P2102	P2103	P2135
EnginePowerLimited	P0068	P0122	P0123	P0222	P0223	P0606	P16F3	P1104	P2100	P2101	P2102	P2103
	P160E	P160D	P0191	P0192	P0193	P00C8	P00C9	P00CA	P0090	P0091	P0092	P228C
	P2135	P2138	P2122	P2123	P2127	P2128	P228D	P06A3	P0697			
5VoltReferenceA_FA	P0641											
5VoltReferenceB_FA	P0651											
5VoltReferenceMAP_OOR_Flt	P0697											
FuelInjectorCircuit_FA	P0201	P0202	P0203	P0204	P0205	P0206	P0207	P0208				
	P0261	P0264	P0267	P0270	P0273	P0276	P0279	P0282				
	P0262	P0265	P0268	P0271	P0274	P0277	P0280	P0283				
	P2147	P2150	P2153	P2156	P216B	P216E	P217B	P217E				
	P2148	P2151	P2154	P2157	P216C	P216F	P217C	P217F				
	P1248	P1249	P124A	P124B	P124C	P124D	P124E	P124F				
FuelInjectorCircuit_TFTKO	P0201	P0202	P0203	P0204	P0205	P0206	P0207	P0208				
	P0261	P0264	P0267	P0270	P0273	P0276	P0279	P0282				
	P0262	P0265	P0268	P0271	P0274	P0277	P0280	P0283				
	P2147	P2150	P2153	P2156	P216B	P216E	P217B	P217E				
	P2148	P2151	P2154	P2157	P216C	P216F	P217C	P217F				
	P1248	P1249	P124A	P124B	P124C	P124D	P124E	P124F				
FHPR_b_PumpCkt_FA	P0090	P0091	P0092	P00C8	P00C9	P00CA						
FHPR_b_PumpCkt_TFTKO	P0090	P0091	P0092	P00C8	P00C9	P00CA						
FHPR_b_FRP_SnsrCkt_FA	P0192	P0193										
FHPR_b_FRP_SnsrCkt_TFTKO	P0192	P0193										
FHPD_b_HPC_Windup_FA	P0089											
FHPD_b_HPC_Windup_ TFTKO	P0089											
FHPD_b_PumpCurr_FA	P163A											
FHPD_b_PumpCurr_TFTKO	P163A											
FHPD_b_HPC_PresErrPos_FA	P228C											
FHPD_b_HPC_PresErrPos_TFTKO	P228C											
FHPD_b_HPC_PresErrNeg_FA	P228D											
FHPD_b_HPC_PresErrNeg_TFTKO	P228D											
FHPR_b_FRP_SnsrPerfDiag_FA	P0191											
FHPR_b_FRP_SnsrPerfDiag_TFTKO	P0191											

ECM Fault Bundles

Cert Doc Bundle Name	Pcodes										
EngineMetalOvertempActive	P1258										
KS_Ckt_Perf_B1B2_FA	P0324	P0325	P0326	P0327	P0328	P0330	P0332	P0333	P06B6	P06B7	
IgnitionOutputDriver_FA	P0351	P0352	P0353	P0354	P0355	P0356	P0357	P0358			
CatalystSysEfficiencyLoB1_FA	P0420										
CatalystSysEfficiencyLoB2_FA	P0430										
EvapPurgeSolenoidCircuit_FA	P0443										
EvapFlowDuringNonPurge_FA	P0496										
EvapVentSolenoidCircuit_FA	P0449										
EvapSmallLeak_FA	P0442										
EvapEmissionSystem_FA	P0455	P0446									
FuelTankPressureSnsrCkt_FA	P0452	P0453									
VentCircuit_FA	P0449	P0498	P0499								
ELCPCircuit_FA	P1459	P145A									
FTP_SensorCircuit_FA	P0452	P0453									
ELCP_PumpCircuit_FA	P2400	P2401	P2402								
ELCP_SwitchCircuit_FA	P2418	P2419	P2420								
VICM_WakeupDiag_FA	P06E4										
VICM_WakeupDiag_TFTKO	P06E4										
LostCommBCM_FA	U0140										
LostCommBusB_VICM_FA	U182D										
CommBusAOff_VICM_FA	U0073										
CommBusBOff_VICM_FA	U0074										
AccCktLo_FA	P2537										
OAT_EstAmbTemp_FA	Only EREV sealed fuel system				P0071	P0072	P0073	P0502	P0503	P0722	P0723
OAT_EstAmbTemp_FA	Conventional fuel system				P0071	P0072	P0073	P0074	P2610		
EvapExcessPurgePsbl_FA	Conventional fuel system				P0442	P0443	P0455	P0496			
EvapExcessPurgePsbl_FA	Only EREV sealed fuel system				P0442	P0455	P0458				

ECM Fault Bundles

Cert Doc Bundle Name	Pcodes											
EvapReducedPurgePsbl_FA	Conventional fuel system Only				P0443	P0446	P0449	P0455				
EvapReducedPurgePsbl_FA	EREV sealed fuel system				P0443	P0446	P0449	P0459	P0497	P0499	P2419	P2422
CoolingFanSpeedTooHigh_FA	P0495											
FanOutputDriver_FA	P0480	P0481	P0482	P0691	P0692	P0693	P0694	P0695	P0696			
FuelLevelDataFault	P0461	P0462	P0463	P2066	P2067	P2068						
PowertrainRelayFault	P1682											
PowertrainRelayStateOn_FA	P0685											
PowertrainRelayStateOn_Error	P0685											
IgnitionOffTimer_FA	P2610											
IgnitionOffTimeValid	P2610											
EngineModeNotRunTimerError	P2610											
EngineModeNotRunTimer_FA	P2610											
ModuleOffTime_FA	P2610											
VehicleSpeedSensor_FA	P0502	P0503	P0722	P0723								
VehicleSpeedSensorError	P0502	P0503	P0722	P0723								
IAC_SystemRPM_FA	P0506	P0507										
TCM_EngSpdReqCkt	P150C											
ControllerProcessorPerf_FA	P0606											
ControllerRAM_Error_FA	P0604											
EngineMisfireDetected_TFTKO	P0300	P0301	P0302	P0303	P0304	P0305	P0306	P0307	P0308			
EngineMisfireDetected_FA	P0300	P0301	P0302	P0303	P0304	P0305	P0306	P0307	P0308			
EngOilTempSensorCircuitFA	P0197	P0198										
EngOilModeledTempValid	ECT_Sensor_FA	IAT_SensorCircuitFA										

ECM Fault Bundles

Cert Doc Bundle Name	Pcodes							
EngOilPressureSensorCktFA	P0522	P0523						
EngOilPressureSensorFA	P0521	P0522	P0523					
CylnderDeacDriverTFTKO	P3401	P3409	P3417	P3425	P3433	P3441	P3449	
BrakeBoosterSensorFA	P0556	P0557	P0558					
BrakeBoosterVacuumValid	P0556	P0557	P0558					
BrakeBoosterVacuumValid	VehicleSpeedSensor_FA	MAP_SensorFA						
CylnderDeacDriverTFTKO	P3401	P3409	P3417	P3425	P3433	P3441	P3449	
EngineTorqueEstInaccurate	EngineMisfireDetected_FA	FuelInjedtorCircuit_FA	FuelInjedtorCircuit_TFTKO	FuelTrimSystemB1_FA	FuelTrimSystemB2_FA	MAF_SensorTFTKO	MAP_SensorTFTKO	EGRValuePerforamnce_FA
ACHighSidePressSnsrCktFA	P0532	P0533						
ACFailedOnSD	See ACCM Document							
ACThrmlRefrigSpdVld	See ACCM Document							
ACCMLostComm	U016B							

LowFuelConditionDiagnostic	Flag set to TRUE if the fuel level < 10 % AND	
	No Active DTCs:	FuelLevelDataFault P0462 P0463
	for at least 30 seconds.	

ECM Fault Bundles

Cert Doc Bundle Name	Pcodes
Transfer Pump is Commanded On	Fuel Volume in Primary Fuel Tank < 0.0 liters AND Fuel Volume in Secondary Fuel Tank ≥ 0.0 liters AND Transfer Pump on Time < **Transfer PumpOn TimeLimit** Table AND Transfer Pump had been Off for at least 0.0 seconds AND Evap Diagnostic (Purge Valve Leak Test, Large Leak AND Engine Running

Long Name	Short Name
Bank	B
Brake	Brk
Circuit	Ckt
Engine	Eng
Fault Active	FA
Intake	Intk
Naturally Aspirated	NA
Performance	Perf
Position	Pstn
Pressure	Press
Sensor	Snsr
Supercharged	SC
System	Sys
Test Failed This Key On	TFTKO

HPC2 (VICM) Fault Bundles

Cert Doc Bundle NOTE: If any one of these codes were set for N sensors, these FA get set to TRUE for said N sensor

Battery Current Sensor

P0AC1	P0AC2	P1EBA	P1A07	P0B13	P0B10	P0B11	P1EBB	(U0111 and U185A)

Battery Voltage Sensor

P0ABC	P0ABD	P1A07	P0AF8	P0ABB	(U0111 and U185A)

Bus Voltage Sensor

P1AE8	P1AE9	P1AEA	P1AEB	P1AEC	P1AED	P1E20	P1E21	P1E28	U0293

Charger Current Sensor

P0D53	P0D54	U1838

CellVoltageRationalityFA

P0B3D	P1B79	P0B48	P1B80	U2401	P1B2A	P1E7B	P1B4B	P1BDE
P0B42	P1B7C	P0B4D	P1B83	P1E90	P1B2B	P1E7C	P1B4E	P1BE1
P0B47	P1B7F	P0B52	P1B86	P1E8F	P1B2C	P1E7D	P1B51	P1BE4
P0B4C	P1B82	P0B57	P1B89	P1E91	P1B2D	P1E7E	P1B54	P1BE7
P0B51	P1B85	P0B5C	P1B8C	P1E8E	P1E4C	P1E7F	P1B57	P1BEA
P0B56	P1B88	P0B61	P1B8F	P1E93	P1E4D	P1E80	P1B5A	P1BED
P0B5B	P1B8B	P0B66	P1B92	P1E96	P1E4E	P1E81	P1B5D	P1BF0
P0B60	P1B8E	P0B6B	P1B95	P1E95	P1E4F	P1E82	P1B60	P1BF3
P0B65	P1B91	P0B70	P1B98	P1E97	P1E50	P1E83	P1B63	P1BF6
P0B6A	P1B94	P0B75	P1B9B	P1E94	P1E51	P1E84	P1B66	P1BF9
P0B6F	P1B97	P0B7A	P1B9E	P1E99	P1E52	P1E86	P1B69	P1BFC
P0B74	P1B9A	P0B7F	P1BA1	P1E9C	P1E53	P1E87	P1B6C	P1E01
P0B79	P1B9D	P0B84	P1BA4	P1E9B	P1E54	P1E88	P1B6F	P1E04
P0B7E	P1BA0	P0B89	P1BA7	P1E9D	P1E56	P1E89	P1B72	P1B76
P0B83	P1BA3	P0B8E	P1BAA	P1E9A	P1E57	P1E8A	P1B75	P0B43
P0B88	P1BA6	P0B93	P1BAD	P1E9F	P1E58	P0B3C	P1B78	P1B7D
P0B8D	P1BA9	P0B98	P1BB0	P1EA2	P1E59	P0B41	P1B7B	U2606
P0B92	P1BAC	P0B9D	P1BB3	P1EA1	P1E5A	P0B46	P1B7E	P1B29
P0B97	P1BAF	P0BA2	P1BB6	P1EA3	P1E5B	P0B4B	P1B81	P1E7A
P0B9C	P1BB2	P0BA7	P1BB9	P1EA0	P1E5C	P0B50	P1B84	P1B48
P0BA1	P1BB5	P0BAC	P1BBC	P1EA5	P1E5D	P0B55	P1B87	P1BDB
P0BA6	P1BB8	P0BB1	P1BBF	P1EB1	P1E5E	P0B5A	P1B8A	P1B73
P0BAB	P1BBB	P0BB6	P1BC2	P1EB5	P1E5F	P0B5F	P1B8D	P0B3E
P0BB0	P1BBE	P0BBB	P1BC5	P0B3B	P1E60	P0B64	P1B90	P1B7A
P0BB5	P1BC1	P1B18	P1BC8	P0B40	P1E61	P0B69	P1B93	U2605
P0BBA	P1BC4	P1B1B	P1BCB	P0B45	P1E62	P0B6E	P1B96	P1B28

HPC2 (VICM) Fault Bundles

CellVoltageRationalityFA, Con't

P1B17	P1BC7	P1B1E	P1BCE	P0B4A	P1E63	P0B73	P1B99	P1E79
P1B1A	P1BCA	P1B21	P1BD1	P0B4F	P1E64	P0B78	P1B9C	P1B45
P1B1D	P1BCD	P1B24	P1BD4	P0B54	P1E65	P0B7D	P1B9F	P1BD8
P1B20	P1BD0	P1B27	P1BD7	P0B59	P1E66	P0B82	P1BA2	P1B70
P1B23	P1BD3	P1B47	P1BDA	P0B5E	P1E67	P0B87	P1BA5	P1E05
P1B26	P1BD6	P1B4A	P1BDD	P0B63	P1E68	P0B8C	P1BA8	P1B77
P1B46	P1BD9	P1B4D	P1BE0	P0B68	P1E69	P0B91	P1BAB	U2604
P1B49	P1BDC	P1B50	P1BE3	P0B6D	P1E6A	P0B96	P1BAE	P0BB8
P1B4C	P1BDF	P1B53	P1BE6	P0B77	P1E6B	P0B9B	P1BB1	P1E78
P1B4F	P1BE2	P1B56	P1BE9	P0B7C	P1E6C	P0BA0	P1BB4	P1B25
P1B52	P1BE5	P1B59	P1BEC	P0B81	P1E6E	P0BA5	P1BB7	P1BD5
P1B55	P1BE8	P1B5C	P1BEF	P0B86	P1E6F	P0BAA	P1BBA	P1B6D
P1B58	P1BEB	P1B5F	P1BF2	P0B8B	P1E70	P0BAF	P1BBD	P1E02
P1B5B	P1BEE	P1B62	P1BF5	P0B95	P1E71	P0BB4	P1BC0	P1B74
P1B5E	P1BF1	P1B65	P1BF8	P0B9A	P1E72	P0BB9	P1BC3	U2603
P1B61	P1BF4	P1B68	P1BFB	P0B9F	P1E73	P1B16	P1BC6	P0BB3
P1B64	P1BF7	P1B6B	P1BFE	P0BA4	P1E74	P1B19	P1BC9	P1E77
P1B67	P1BFA	P1B6E	P1E03	P0BA9	P1E75	P1B1C	P1BCC	P1B22
P1B6A	P1BFD	P1B71	P1E06	P0BAE	P1E76	P1B1F	P1BCF	P1BD2

VICMVoltageFA

P0ABC	P1B17	P1B91	P1BEE	P0BB1	P1B89	P1BE6	P1EA2	P1BB7
P0ABD	P1B1A	P1B94	P1BF1	P0BB6	P1B8C	P1BE9	P1EA1	P1BBA
P1A07	P1B1D	P1B97	P1BF4	P0BBB	P1B8F	P1BEC	P1EA3	P1BBD
P0AF8	P1B20	P1B9A	P1BF7	P1B18	P1B92	P1BEF	P1EA0	P1BC0
P0ABB	P1B23	P1B9D	P1BFA	P1B1B	P1B95	P1BF2	P1EA5	P1BC3
P0B3D	P1B26	P1BA0	P1BFD	P1B1E	P1B98	P1BF5	P1EB1	P1BC6
P0B42	P1B46	P1BA3	P1E02	P1B21	P1B9B	P1BF8	P1EB5	P1BC9
P0B47	P1B49	P1BA6	P1E05	P1B24	P1B9E	P1BFB	P0B3B	P1BCC
P0B4C	P1B4C	P1BA9	P0B3E	P1B27	P1BA1	P1BFE	P0B40	P1BCF
P0B51	P1B4F	P1BAC	P0B43	P1B47	P1BA4	P1E03	P0B45	P1BD2
P0B56	P1B52	P1BAF	P0B48	P1B4A	P1BA7	P1E06	P0B4A	P1BD5
P0B5B	P1B55	P1BB2	P0B4D	P1B4D	P1BAA	U2603	P0B4F	P1BD8
P0B60	P1B58	P1BB5	P0B52	P1B50	P1BAD	U2604	P0B54	P1BDB
P0B65	P1B5B	P1BB8	P0B57	P1B53	P1BB0	U2605	P0B59	P1BDE
P0B6A	P1B5E	P1BBB	P0B5C	P1B56	P1BB3	U2606	P0B5E	P1BE1
P0B6F	P1B61	P1BBE	P0B61	P1B59	P1BB6	U2401	P0B63	P1BE4
P0B74	P1B64	P1BC1	P0B66	P1B5C	P1BB9	P1E90	P0B68	P1BE7
P0B79	P1B67	P1BC4	P0B6B	P1B5F	P1BBC	P1E8F	P0B6D	P1BEA
P0B7E	P1B6A	P1BC7	P0B70	P1B62	P1BBF	P1E91	P0B77	P1BED
P0B83	P1B6D	P1BCA	P0B75	P1B65	P1BC2	P1E8E	P0B7C	P1BF0

HPC2 (VICM) Fault Bundles

VICMVoltageFA, Con't

P0B88	P1B70	P1BCD	P0B7A	P1B68	P1BC5	P1E93	P0B81	P1BF3
P0B8D	P1B73	P1BD0	P0B7F	P1B6B	P1BC8	P1E96	P0B86	P1BF6
P0B92	P1B76	P1BD3	P0B84	P1B6E	P1BCB	P1E95	P0B8B	P1BF9
P0B97	P1B79	P1BD6	P0B89	P1B71	P1BCE	P1E97	P0B95	P1BFC
P0B9C	P1B7C	P1BD9	P0B8E	P1B74	P1BD1	P1E94	P0B9A	P1E01
P0BA1	P1B7F	P1BDC	P0B93	P1B77	P1BD4	P1E99	P0B9F	P1E04
P0BA6	P1B82	P1BDF	P0B98	P1B7A	P1BD7	P1E9C	P0BA4	P1E57
P0BAB	P1B85	P1BE2	P0B9D	P1B7D	P1BDA	P1E9B	P0BA9	P1E68
P0BB0	P1B88	P1BE5	P0BA2	P1B80	P1BDD	P1E9D	P0BAE	P1E7A
P0BB5	P1B8B	P1BE8	P0BA7	P1B83	P1BE0	P1E9A	P0BB3	P0B41
P0BBA	P1B8E	P1BEB	P0BAC	P1B86	P1BE3	P1E9F	P0BB8	P0B96
P1B28	P1E58	P1E69	P1E7B	P0B46	P0B9B	P1B51	P1B84	P1B4E
P1B29	P1E59	P1E6A	P1E7C	P0B4B	P0BA0	P1B54	P1B87	P1B81
P1B2A	P1E5A	P1E6B	P1E7D	P0B50	P0BA5	P1B57	P1B8A	P1BB4
P1B2B	P1E5B	P1E6C	P1E7E	P0B55	P0BAA	P1B5A	P1B8D	P1E56
P1B2C	P1E5C	P1E6E	P1E7F	P0B5A	P0BAF	P1B5D	P1B90	P1E67
P1B2D	P1E5D	P1E6F	P1E80	P0B5F	P0BB4	P1B60	P1B93	P1E79
P1E4C	P1E5E	P1E70	P1E81	P0B64	P0BB9	P1B63	P1B96	P0B3C
P1E4D	P1E5F	P1E71	P1E82	P0B69	P1B16	P1B66	P1B99	P0B91
P1E4E	P1E60	P1E72	P1E83	P0B6E	P1B19	P1B69	P1B9C	P1B4B
P1E4F	P1E61	P1E73	P1E84	P0B73	P1B1C	P1B6C	P1B9F	P1B7E
P1E50	P1E62	P1E74	P1E86	P0B78	P1B1F	P1B6F	P1BA2	P1BB1
P1E51	P1E63	P1E75	P1E87	P0B7D	P1B22	P1B72	P1BA5	
P1E52	P1E64	P1E76	P1E88	P0B82	P1B25	P1B75	P1BA8	
P1E53	P1E65	P1E77	P1E89	P0B87	P1B45	P1B78	P1BAB	
P1E54	P1E66	P1E78	P1E8A	P0B8C	P1B48	P1B7B	P1BAE	

HPC2 (VICM) Fault Bundles

TempRationalityFA

P0A9C	P0C82	P0CB3	P1EA0
P0A9D	P0C83	P0CB4	P1EA1
P0A9E	P0C84	P0CB5	P1EA2
P0AC6	P0C89	P0CB8	P1EA3
P0AC7	P0C8A	P0CB9	P1EA5
P0AC8	P0C8B	P0CBA	P1EB1
P0ACB	P0C8E	P1E8E	P1EB2
P0ACC	P0C8F	P1E8F	P1EB3
P0ACD	P0C90	P1E90	P1EB4
P0AE9	P0C93	P1E91	P1EB5
P0AEA	P0C94	P1E93	U2401
P0AEB	P0C95	P1E94	U2603
P0BC3	P0C98	P1E95	U2604
P0BC4	P0C99	P1E96	U2605
P0BC5	P0C9A	P1E97	U2606
P0C34	P0CA9	P1E99	
P0C35	P0CAA	P1E9A	
P0C36	P0CAB	P1E9B	
P0C7D	P0CAE	P1E9C	
P0C7E	P0CAF	P1E9D	
P0C7F	P0CB0	P1E9F	

HPC2 (VICM) Supporting Definitions

CPDIAG Switch	The Control Pilot Diagnostic circuit switch is used in diagnosing the vehicle portion of the control pilot circuit. The sole purpose is to be used for diagnostics.
CPDIAG Switch State	Asserted: The control pilot circuit is being energized for diagnostic purposes. Not Asserted: The control pilot circuit is not being diagnosed.
Control Pilot Charging Switch	This is called the S2 switch. The Control Pilot Charging Switch is used by the VICM to enable/disable AC power to the vehicle and does so by modifying the EVSE generated Control Pilot Signal voltage
Charging Ventilation Switch	This is called S3 switch. The Charging Ventilation Switch is available to the VICM to enable/disable indoor ventilation when charging. The functionality is not being used for the MY11 EREV program, but the switch is diagnosed since a switch failure could corrupt the Control Pilot Signal adversly affecting the charging process.
Charger Contactor State: Precharge	The process of raising the OBCM high voltage output terminal voltage to match the high voltage battery voltage.
Aux Micro Logic State (digital logic state at input pin)	Low: expected state when CPDIAG is Not Asserted High: expected state when CPDIAG is Asserted
Main Micro Logic State (digital logic state at input pin)	Low: expected state when CPDIAG is Asserted High: expected state when CPDIAG is Not Asserted
No Active Cooling	No active cooling means that the battery pack is currently not being
No Active Heating	No active heating means that the battery pack is currently not being

Glossary of Key Terms

Term	Definition
ECM	Engine Control Module
HCP	Hybrid Control Processor
TCM	Transmission Control Module
VICM	Vehicle Integration Control Module
FSCM	Fuel System Control Module
EBCM	Electrohydraulic Brake Control Module
VITM	Voltage Current Temperature Module
MCP	Motor Control Module
ATPC	Auxiliary Transmission Pump Controller
ACCM	A/C Compressor Module
OBCM	On Board Charging Module
TPIM	Traction Power Inverter Module
PECL	Power Electronics Coolant Loop
BSCM	Brake System Control Module
EACCM	Electric A/C Compressor Control Module
BECM	Battery Energy Control Module

Time Required

X: Fail Counts
R: Loop Time
T: Fault Detect Time