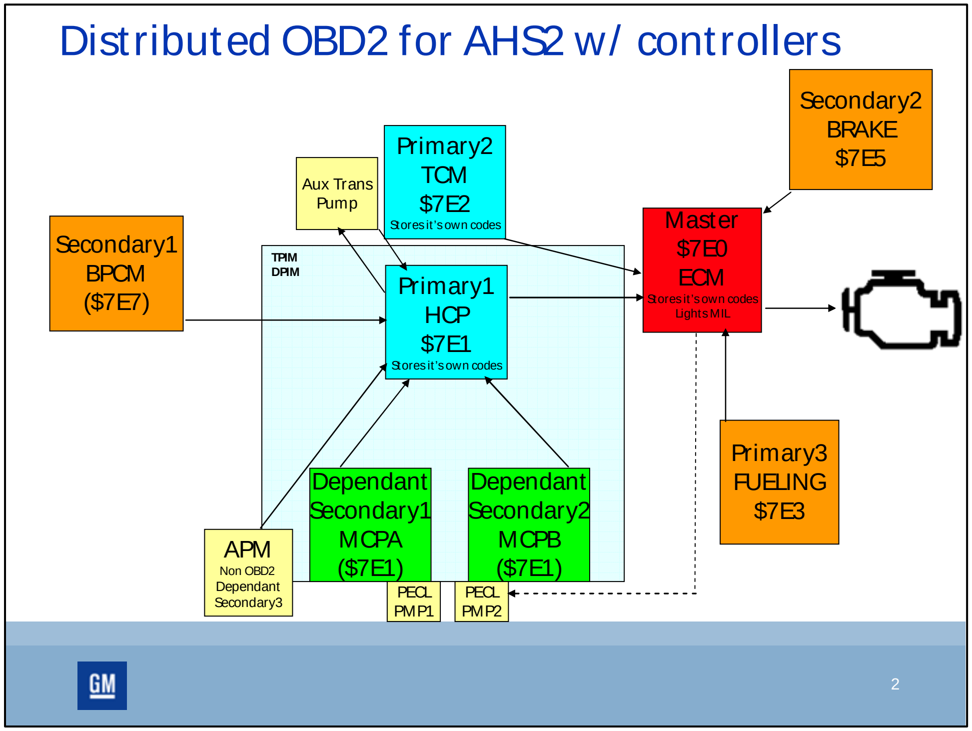


MY10 AHS2 Tahoe/Yukon/Escalade/Sierra/Silverado OBD Cert Application - There are many OBD controllers represented:

Colors indicate the type of OBD controller.
Red = MASTER (ECM) - Stores codes - Supports M1-9 - Controls MIL
Blue = PRIMARY (HCP, FSCM, TCM) - Stores codes - Supports Modes 1,4,9
Orange = SECONDARY (BECM, EBCM) - Supports Modes 1,4,9
Green = DEPENDANT SECONDARY (MCPA, MCPB)

Questions - Contact J. Vidricksen 248-670-8091

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, and < 32 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type B 2 trips
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)	The following DTC's are NOT active: P0010 IntkCMP B1 Circuit P0340, P0341, Intake B1 Cam sensors P0335, P0336, Crank sensors P0016, P0017, P0018, P0019 Cam to crank rationality	System Voltage > 11 Volts, and System Voltage < 32 Volts Desired cam position cannot vary more than 7.5 Cam Deg for at least KtPHSD_t_StablePositionTimeIc1 seconds (see Supporting Table)	200 failures out of 1000 samples	Type B 2 trips
					Engine is running VVT is enabled Desired camshaft position > 0 Power Take Off (PTO) not active		100 ms /sample	
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	2 cam sensor pulses more than -11 crank degrees before or 11 crank degrees after nominal position in one cam revolution.		Crankshaft and camshaft position signals are synchronized		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
					Engine is Spinning			
					Cam phaser is in "parked" position			
					No Active DTCs:	P0335, P0336 P0340, P0341 5VoltReferenceA_FA 5VoltReferenceB_FA		
					Time since last execution of diagnostic			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						< 1.0 seconds	One sample per cam 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).		Ign Switch position Ignition Voltage Engine Speed	= Crank or Run position 11.0 volts < Ign Voltage < 32.0 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).		Ign Switch position Ignition Voltage Engine Speed	= Crank or Run position 11.0 volts < Ign Voltage < 32.0 volts > 400 RPM	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
O2S Heater Control Circuit Bank 2 Sensor 1	P0050	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).		Ign Switch position Ignition Voltage Engine Speed	= Crank or Run position 11.0 volts < Ign Voltage < 32.0 volts > 400 RPM	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.
O2S Heater Control Circuit Bank 2 Sensor 2	P0056	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).		Ign Switch position Ignition Voltage Engine Speed	= Crank or Run position 11.0 volts < Ign Voltage < 32.0 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.	Learned Heater Resistance.	Calculated Heater Resistance < 2.8 ohms -OR- Calculated Heater Resistance > 9.5 ohms	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 ≤ Coolant ≤ 45.0 ºC < 32.0 volts < 3.00 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.	Learned Heater Resistance.	Calculated Heater Resistance < 4.1 ohms -OR- Calculated Heater Resistance > 10.8 ohms	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 ≤ Coolant ≤ 45.0 ºC < 32.0 volts < 3.00 seconds	Once per valid cold start	2 trips Type B
HO2S Heater Resistance Bank 2 Sensor 1	P0059	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Learned Heater Resistance.	Calculated Heater Resistance < 4.1 ohms -OR- Calculated Heater Resistance > 10.8 ohms	No Active DTC's Coolant – IAT Engine Soak Time	ECT_Sensor_FA P2610 IAT_SensorFA < 8.0 ºC > 28800 seconds	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.
					Coolant Temp Ignition Voltage Engine Run time	-30.0 ºC ≤ Coolant ≤ 45.0 ºC < 32.0 volts < 3.00 seconds		
HO2S Heater Resistance Bank 2 Sensor 2	P0060	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Learned Heater Resistance.	Calculated Heater Resistance < 0.0 ohms -OR- Calculated Heater Resistance > 0.0 ohms	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 ≤ Coolant ≤ 45.0 ºC < 32.0 volts < 3.00 seconds	Once per valid cold start	2 trips Type B
MAP / MAF / Throttle Position Correlation	P0068	Detect when MAP <u>and</u> MAF do not match estimated engine airflow as established by the TPS	1) Difference between measured MAP and estimated MAP exceeds threshold (kPa), or P0651 (5 Volt Ref), or P0107 (MAP circuit low), or P0108 (MAP circuit high) have failed this key cycle, then MAP portion of diagnostic fails	Table, f(TPS). See supporting tables	Engine Speed	> 800 RPM Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	Continuously fail MAP and MAF portions of diagnostic for 0.1875 ms Continuous in Primary processor	Type:A 1 Trip
			2) Absolute difference between MAF and estimated MAF exceed threshold (grams/sec), or P0102 (MAF circuit low), or P0103 (MAF circuit hi) have failed this key cycle, or maximum MAF versus RPM (Table) is greater than or equal to maximum MAF versus battery voltage, then MAF portion of diagnostic fails	Table, f(TPS). See supporting tables Table, f(RPM). See supporting tables				

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
				Table, f(Volts). See supporting tables				
Manifold Absolute Pressure - Barometric Pressure Correlation (naturally aspirated applications)	P0069	Compares baro sensor to the calculated baro estimate (part throttle calculation or unthrottled MAP)	Difference between baro sensor reading and estimated baro when distance since last estimated baro update OR Difference between baro sensor reading and estimated baro when distance since last estimated baro update	> 15.0 kPa <= 0.01 kilometers > 25.0 kPa > 0.01 kilometers	No Active DTCs: Engine Run Time	AmbientAirPressCktFA ECT_Sensor_Ckt_FA IAT_SensorFA MAF_SensorFA AfterThrottlePressureFA_NA TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA > 30.00 seconds	20 failures out of 25 samples 1 sample every 250 msec	Type B 2 trips
Mass Air Flow System Performance	P0101	Determines if the MAF sensor is stuck within the normal operating range	Filtered Throttle Model AND ABS(Measured Flow – Modeled Air Flow) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	<= 150 kPa*(g/s) > 10 grams/sec > 15.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 450 RPM <= 5700 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C	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.
						>= 0.00		
						Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM		
						Modeled Air Flow multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Estimate		
						MAP Model 2 multiplied by MAP2 Residual Weight Factor based on RPM		
						See table "IFRD Residual Weighting Factors".		
					No Active DTCs:	MAP_SensorCircuitFA		
						MAF_SensorCircuitFA		
						CrankSensor_FA		
						ECT_Sensor_FA		
						ECT_Sensor_Ckt_FA		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						IAT_SensorFA IAT_SensorFP CylDeacSystemTFTKO		
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	<= 1126 Hertz (~ .52 gm/sec)	Engine Run Time Engine Speed Ignition Voltage Above criteria present for a period of time	> 1.0 seconds >= 300 RPM >= 9.0 Volts >= 1.0 seconds	400 failures out of 500 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 (~ 1065.5 gm/sec)	Engine Run Time Engine Speed Ignition Voltage Above criteria present for a period of time	> 1.0 seconds >= 300 RPM >= 9.0 Volts >= 1.0 seconds	400 failures out of 500 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 AND ABS(Measured MAP – MAP Model 1) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	<= 150 kPa*(g/s) > 15.0 kPa > 15.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 450 RPM <= 5700 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C >= 0.00 Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM	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.
						MAP Model 1 multiplied by MAP1 Residual Weight Factor based on RPM MAP Model 2 multiplied by MAP2 Residual Weight Factor based on RPM See table "IFRD Residual Weighting Factors".		
					No Active DTCs:	MAP_SensorCircuitFA MAF_SensorCircuitFA CrankSensor_FA ECT_sensor_FA ECT_Sensor_FP IAT_SensorFA IAT_SensorCircuitFP CylDeacSystemTFTKO		
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 = 115.1 kPa)	Continuous		320 failures out of 400 samples 1 sample every 12.5 msec	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
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	< 45 Ohms (~150 deg C)	Engine Run Time Coolant Temp Vehicle Speed No Active DTCs:	> 10.0 seconds < 150 deg C >= 0 MPH ECT_Sensor_Ckt_FA ECT_Sensor_Ckt_FP VehicleSpeedSensorError	50 failures out of 63 samples 1 sample every 100 msec	Type B 2 trips
Intake Air Temperature Sensor Circuit High (Low Temperature)	P0113	Detects a continuous open circuit in the IAT signal circuit or the IAT sensor	Raw IAT Input	> 420000 Ohms (~-60 deg C)	Engine Run Time Coolant Temp Vehicle Speed Engine Air Flow No Active DTCs:	> 10.0 seconds > -40 deg C <= 320 MPH <= 512 gm/sec ECT_Sensor_Ckt_FA ECT_Sensor_Ckt_FP VehicleSpeedSensorError MAF_SensorFA MAF_SensorFP MAF_SensorTFTKO	50 failures out of 63 samples 1 sample every 100 msec	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 15.0 C after a minimum 28800 second soak and a block heater has not been detected	See "P0116: Fail if power up ECT exceeds IAT by these values" in the Supporting tables section	No Active DTC's Non-volatile memory initiation Test complete this trip Test aborted this trip IAT LowFuelCondition Diag	VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_Ckt_FA IgnitionOffTimeValid TimeSinceEngineRunningValid = Not occurred = False = False ≥ -7 ºC = False	1 failure 500 msec/sample Once per valid cold start	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			detected. 3) ECT at power up > IAT at power up by 15.0 C after a minimum 28800 seconds soak and the time spent cranking the engine without starting is greater than 10.0 seconds with the LowFuelConditionDiag	= False	**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) occurs. Diagnostic is aborted when 2) or 3) occurs:** 1a) Vehicle drive time 1b) Vehicle speed 1c) IAT drops from power up IAT 2) Engine run time with vehicle speed below 1b 3) Minimum IAT during test	 > 15.0 ºC < 10.0 Seconds > 400 Seconds with > 14.9 MPH ≥ 8.0 ºC > 1800 Seconds ≤ -7 ºC		
Engine Coolant Temp Sensor Circuit Low	P0117	This DTC detects a short to ground in the ECT signal circuit or the ECT sensor.	ECT Resistance (@ 150ºC)	< 45 Ohms			5 failures out of 6 samples 1 sec/sample Continuous	Type B 2 trips
Engine Coolant Temp Sensor Circuit High	P0118	Circuit Continuity This DTC detects a short to high or open in the ECT signal circuit or the ECT sensor.	ECT Resistance (@ -60ºC)	> 450000 Ohms	Or IAT min	> 10.0 seconds ≥ -7.0 °C	5 failures out of 6 samples 1 sec/sample	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
							Continuous	
TPS1 Circuit	P0120	Detects a continuous or intermittent short or open in TPS1 circuit on the secondary processor but sensor is in range on the primary processor	Secondary TPS1 Voltage < or Secondary TPS1 Voltage >	0.325 4.75		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions No 5 V reference error No 5 V reference DTCs	19/39 counts or 14 counts continuous; 12.5 msec/count in the secondary processor	Type A 1 trips
Throttle Position Sensor Performance	P0121	Determines if the Throttle Position Sensor input is stuck within the normal operating range	Filtered Throttle Model AND ABS(Measured Flow – Modeled Air Flow) Filtered	> 150 kPa*(g/s) > 10 grams/sec	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 450 RPM <= 5700 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C >= 0.00 Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Estimate	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.
						See table "IFRD Residual Weighting Factors".		
					No Active DTCs:	MAP_SensorCircuitFA MAF_SensorCircuitFA CrankSensor_FA ECT_sensor_FA ECT_Sensor_FP IAT_SensorFA IAT_SensorCircuitFP CylDeacSystemTFTKO		
TPS1 Circuit Low	P0122	Detects a continuous or intermittent short or open in TPS1 circuit on both processors or just the primary processor	Primary TPS1 Voltage <	0.325		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions No 5 V reference error	79/159 counts; 57 counts continuous; 3.125 msec /count in the Primary processor	Type A 1 trips
			Secondary TPS1 Voltage <	0.325		No 5 V reference DTCs	19/39 counts or 14 counts continuous; 12.5 msec/count in the Secondary processor	
TPS1 Circuit High	P0123	Detects a continuous or intermittent short in TPS1 circuit on both processors or just the primary processor	Primary TPS1 Voltage >	4.75		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions No 5 V reference error	79/159 counts; 57 counts continuous; 3.125 msec /count in the Primary processor	Type A 1 trips
			Secondary TPS1 Voltage >	4.75		No 5 V reference DTCs	19/39 counts or 14 counts continuous; 12.5 msec/count in the Secondary processor	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Engine Coolant Temperature Below Stat Regulating Temperature	P0128	This DTC detects if the engine coolant temperature rises too slowly due to an ECT or Cooling system fault	Actual accumulated airflow is > predicted accumulated airflow before:	See "P0128: Maximum Accumulated Airflow for IAT and Start-up ECT conditions" in the Supporting tables section	No Active DTC's	MAP_SensorFA MAF_SensorFA TPS_Performance_FA TPS_FA TPS_ThrottleAuthorityDefaulted IAT_SensorFA ECT_Sensor_Ckt_FA ECT_Sensor_Perf_FA VehicleSpeedSensor_FA	30 failures to set DTC 1 sec/sample Once per ignition key cycle	Type B 2 trips
			Range #1 (Primary) ECT reaches 75.0 °C when IAT min is < 52.0°C and ≥ 10.0°C.					
			Range #2 (Alternate) ECT reaches 55.0 °C when IAT min is < 10.0°C and ≥ -7.0°C.		Engine not run time	≥ 1800 seconds		
					Engine run time	≥ 120 seconds		
					Fuel Condition	Ethanol ≤ 87%		
					Range #1 (Primary) Test			
					ECT at start run	≤ 70.0 °C		
					Average Airflow	≥ 10.0 gps		
					Vehicle speed	> 5 mph for at least 1.5 miles		
					Range #2 (Alternate) Test			
					ECT at start run	≤ 50.0 °C		
					Average Airflow	≥ 10.0 gps		
					Vehicle speed	> 5 mph for at least 1.5 miles		
					Accumulated Airflow Adjustments			
					1) Max. airflow amount added when accumulating airflow is	70.0 gps		
					2) Zero Airflow accumulated when airflow is	< 17.0 gps		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					3) With AFM active Airflow added to accumulated is multiplied by	50.00%		
					4) With Decel Fuel Cut Off active, accumulated airflow is reduced by multiplying actual airflow by	1.00 times		
					5) With Hybrid Engine Off Active accumulated Airflow is reduced by	7.00 grams each second		
					Diagnostic will restart (using the lower value) if ECT drops	≥ 3.0°C below previous min ECT		
O2S Circuit Low Voltage Bank 1 Sensor 1	P0131	This DTC determines if the O2 sensor circuit is shorted to low.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is < 50 mvolts	No Active DTC's	TPS_ThrottleAuthority Defaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA	380 failures out of 475 samples Frequency: Continuous in 100 milli - second loop	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9922 ≤ equiv. ratio ≤ 1.0137		
					Air Per Cylinder	100 ≤ APC ≤ 800 mgrams		
					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 Time	> 2.0 seconds		
O2S Circuit High Voltage Bank 1 Sensor 1	P0132	This DTC determines if the O2 sensor circuit is shorted to high.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is > 1050 mvolts	**Open Test Criteria**		100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	Type B 2 trips
					No Active DTC's	TPS_ThrottleAuthority Defaulted MAF_SensorFA EthanolCompositionSensor_FA		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					AFM Status	= All Cylinders active		
					Heater Warm-up delay	= Complete		
					Predicted Exhaust Temp (by location)	= Warmed Up		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Engine Run Time	> 10 seconds		
					Engine Run Accum	> 300 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		
					Equivalence Ratio	0.9922 ≤ equiv. ratio ≤ 1.0137		
					Air Per Cylinder	100 ≤ APC ≤ 800 mgrams		
					Fuel Control State	not = Power Enrichment		
					All of the above met for Time	> 2 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 calculated 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_ThrottleAuthority Defaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault_NA MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA	Sample time is 40 seconds Frequency: Once per trip <u>Green Sensor Delay Criteria</u> The diagnostic will not be enabled until the next	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA EthanolCompositionSensor_FA EngineMisfireDetected_FA	ignition cycle after the following has been met: 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	
					Bank 1 Sensor 1 DTC's not active	= P0131, P0132 or P0134		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					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		
					O2 Heater on for	>= 0 seconds		
					Learned Htr resistance	= Valid		
					Engine Coolant	> 55 ºC		
					IAT	> -40 ºC		
					Engine run Accum	> 160 seconds		
					Time since any AFM status change	> 2.0 seconds		
					Time since Purge On to Off change	> 1.0 seconds		
					Time since Purge Off to On change	> 2.0 seconds		
					Purge duty cycle	>= 0 % duty cycle		
					Engine airflow	20 gps <= engine airflow <= 55 gps		
					Engine speed	1000 <= RPM <= 3000		

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	DFCO not active		
					Commanded Proportional Gain	>= 0.0 %		
					<u>All of the above met for</u>			
					Time	> 4.5 seconds		
O2S Circuit Insufficient Activity Bank 1 Sensor 1	P0134	This DTC determines if the O2 sensor circuit is open.	Measure Oxygen Sensor Signal.	350 mvolts < Oxygen Sensor signal < 550 mvolts	No Active DTC's	TPS_ThrottleAuthority Defaulted	400 failures out of 500 samples.	Type B 2 trips
						MAF_SensorFA		
						EthanolCompositionSensor_FA	Frequency: Continuous	
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					AFM Status	= All Cylinders active	100msec loop	
					Heater Warm-up delay	= Complete		
					Predicted Exhaust Temp (by location)	= Warmed Up		
					Engine Run Time	> 10 seconds		
					Engine Run Accum	> 300 seconds		
					Fuel	<= 87 % Ethanol		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
O2S Heater Performance Bank 1 Sensor 1	P0135	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Measured Heater Current.	Measured Heater current < 0.3 amps -OR- Measured Heater current > 3.1 amps	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 < system voltage< 32.0 volts = Complete = Not active > zero > 120 seconds	8 failures out of 10 samples Frequency: 1 tests per trip 5 seconds delay between tests and 1 second execution rate	Type B 2 trips
O2S Circuit Low Voltage Bank 1 Sensor 2	P0137	This DTC determines if the O2 sensor circuit is shorted to low.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is < 50 mvolts	No Active DTC's AIR intrusive test Fuel intrusive test Idle intrusive test System Voltage Idle Device Control Fuel Device Control AIR Device Control	TPS_ThrottleAuthority Defaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA = Not active = Not active = Not active 10.0 volts < system voltage< 32.0 volts = Not active = Not active = Not active	430 failures out of 540 samples Frequency: Continuous in 100 milli - second loop	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9922 ≤ equiv. ratio ≤ 1.0137		
					Air Per Cylinder	100 ≤ APC ≤ 800 mgrams		
					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 Time	> 2.0 seconds		
O2S Circuit High Voltage Bank 1 Sensor 2	P0138	This DTC determines if the O2 sensor circuit is shorted to high.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is > 1050 mvolts	**Open Test Criteria**		100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	Type B 2 trips
					No Active DTC's	TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					AFM Status	= All Cylinders active		
					Heater Warm-up delay	= Complete		
					Predicted Exhaust Temp (by location)	= Warmed Up		
					Engine Run Time	> 10 seconds		
					Engine Run Accum	> 300 seconds		
					Fuel Condition	<= 87 % Ethanol		
					No Active DTC's	MAP_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA		
					Low Fuel Condition Diag	= False		
					Fuel Condition	<= 87 % Ethanol		
					Equivalence Ratio	0.9922 ≤ equiv. ratio ≤ 1.0137		
					Air Per Cylinder	100 ≤ APC ≤ 800 mgrams		
					Fuel Control State	not = Power Enrichment		
					All of the above met for Time	> 2 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 is greater than the threshold. OR The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds) is greater than the airflow threshold.	1) B1S2 EWMA normalized integral value > 8.3 units OR 2) Accumulated air flow during slow rich to lean test > 75 grams (upper threshold is 450 mvolts and lower threshold is 150 mvolts)	No Active DTC's	TPS_ThrottleAuthority Defaulted 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 NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	Type:A 1 Trip EWMA
					B1S2 Failed this key cycle	P013B, P013E, P013F, P2270 or P2271		
					System Voltage	10.0 volts < system voltage< 32.0 volts	Green Sensor Delay Criteria	
					Learned heater resistance	= Valid		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Post fuel cell DTC's Passed DTC's Passed	= Not Valid = Not Valid = False = enabled = P2270 (and P2272 (if applicable)) = P013E (and P014A (if applicable))	The diagnostic will not be enabled until the next ignition cycle after the following has been met: 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	
					After above conditions are met: DFCO mode is continued (wo driver initiated pedal 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 is greater than the threshold. OR The Accumulated mass air flow monitored during the Slow Response Test (between the lower and upper voltage thresholds) is greater than the airflow threshold.	1) B1S2 EWMA normalized integral value > 32.0 units OR 2) Accumulated air flow during slow lean to rich test > 175 grams (lower threshold is 350 mvolts and upper threshold is 650 mvolts)	No Active DTC's	TPS_ThrottleAuthority Defaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	Type:A 1 Trip EWMA

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						EthanolCompositionSensor_FA		
					B1S2 Failed this key cycle	P013A, P013E, P013F, P2270 or P2271		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid	Green Sensor Delay Criteria	
					ICAT MAT Burnoff delay	= Not Valid	The diagnostic will not be enabled until the next ignition cycle after the following has been met: 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	
					Green O2S Condition	= Not Valid		
					Low Fuel Condition Diag	= False		
					Post fuel cell	= enabled		
					DTC's Passed	= P2270 (and P2272 (if applicable))		
					DTC's Passed	= P013E (and P014A (if applicable))		
					DTC's Passed	= P013A (and P013C (if applicable))		
					DTC's Passed	= P2271 (and P2273 (if applicable))		
					DTC's Passed	= P013F (and P014B (if applicable))		
					After above conditions are met: Fuel Enrich mode continued.			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
O2 Sensor Slow Response Rich to Lean Bank 2 Sensor 2	P013C	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 is greater than the threshold. OR The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds) is greater than the airflow threshold.	1) B1S2 EWMA normalized integral value > 8.3 units OR 2) Accumulated air flow during slow rich to lean test > 75 grams (upper threshold is 450 mvolts and lower threshold is 150 mvolts)	No Active DTC's	TPS_ThrottleAuthority Defaulted 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 NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	Type:A 1 Trip EWMA
					B2S2 Failed this key cycle	P013D, P014A, P014B, P2272 or P2273		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid	Green Sensor Delay Criteria	
					ICAT MAT Burnoff delay	= Not Valid	The diagnostic will not be enabled until the next ignition cycle after the following has been met: 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	
					Green O2S Condition	= Not Valid		
					Low Fuel Condition Diag	= False		
					Post fuel cell	= enabled		
					DTC's Passed	= P2270 (and P2272 (if applicable))		
					DTC's Passed	= P013E (and P014A (if applicable))		
					After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
							when the vehicle is new and cannot be enabled in service	
O2 Sensor Slow Response Lean to Rich Bank 2 Sensor 2	P013D	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 is greater than the threshold. OR The Accumulated mass air flow monitored during the Slow Response Test (between the lower and upper voltage thresholds) is greater than the airflow threshold.	1) B1S2 EWMA normalized integral value > 32.0 units OR 2) Accumulated air flow during slow lean to rich test > 175 grams (lower threshold is 350 mvolts and upper threshold is 650 mvolts)	No Active DTC's	TPS_ThrottleAuthority Defaulted 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 NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	Type:A 1 Trip EWMA
					B2S2 Failed this key cycle	P013C, P014A, P014B, P2272 or P2273		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid	Green Sensor Delay Criteria	
					ICAT MAT Burnoff delay	= Not Valid	The diagnostic will not be enabled until the next ignition cycle after the following has been met: Airflow greater than 22 gps for 120000 grams of accumulated flow	
					Green O2S Condition	= Not Valid		
					Low Fuel Condition Diag	= False		
					Post fuel cell	= enabled		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					DTC's Passed	= P2270 (and P2272 (if applicable))	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	
					DTC's Passed	= P013E (and P014A (if applicable))		
					DTC's Passed	= P013A (and P013C (if applicable))		
					DTC's Passed	= P2271 (and P2273 (if applicable))		
					DTC's Passed	= P013F (and P014B (if applicable))		
					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 cannot go below the threshold voltage. AND The Accumulated mass air flow monitored during the Delayed Response Test is greater than the threshold.	1) Post O2S signal > 450 mvolts AND 2) Accumulated air flow during stuck rich test > 50 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 NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	Type B 2 trips
					B1S2 Failed this key cycle	P013A, P013B, P013F, P2270 or P2271		
					System Voltage	10.0 volts < system voltage< 32.0 volts		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Post fuel cell DTC's Passed	= Valid = Not Valid = Not Valid = False = enabled = P2270 and P2272 (if applicable)	Green Sensor Delay Criteria The diagnostic will not be enabled until the next ignition cycle after the following has been met: 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	
					After above conditions are met: DFCO mode entered (wo driver initiated pedal input).			
O2 Sensor Delayed Response Lean to Rich Bank 1 Sensor 2	P013F	This DTC determines if the post catalyst O2 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.	Post O2 sensor cannot go above the threshold voltage. AND The Accumulated mass air flow monitored during the Delayed Response Test is greater than the threshold.	1) Post O2S signal < 350 mvolts AND 2) Accumulated air flow during lean to rich test > 285 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 NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					B1S2 Failed this key cycle	P013A, P013B, P013E, P2270 or P2271		
					System Voltage	10.0 volts < system voltage< 32.0 volts	Green Sensor Delay Criteria	
					Learned heater resistance	= Valid	The diagnostic will not be enabled until the next ignition cycle after the following has been met: 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	
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid		
					Low Fuel Condition Diag	= False		
					Post fuel cell	= enabled		
					DTC's Passed	= P2270 (and P2272 (if applicable))		
					DTC's Passed	= P013E (and P014A (if applicable))		
					DTC's Passed	= P013A (and P013C (if applicable))		
					DTC's Passed	= P2271 (and P2273 (if applicable))		
					After above conditions are met: Fuel Enrich mode entered.			
O2S Circuit Insufficient Activity Bank 1 Sensor 2	P0140	This DTC determines if the O2 sensor circuit is open.	Measure Oxygen Sensor Signal.	410 mvolts < Oxygen Sensor signal < 490 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA	590 failures out of 740 samples. Frequency: Continuous	Type B 2 trips
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					AFM Status	= All Cylinders active	100msec loop	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Heater Warm-up delay Predicted Exhaust Temp (by location) Engine Run Time Engine Run Accum Fuel	= Complete = Warmed Up > 10 seconds > 300 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.	Measured Heater Current.	Measured Heater current < 0.3 amps -OR- Measured Heater current > 2.9 amps	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 < system voltage< 32.0 volts = Complete = Not active > zero > 120 seconds	8 failures out of 10 samples Frequency: 1 tests per trip 5 seconds delay between tests and 1 second execution rate	Type B 2 trips
O2 Sensor Delayed Response Rich to Lean Bank 2 Sensor 2	P014A	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 cannot go below the threshold voltage. AND The Accumulated mass air flow monitored during the Delayed Response Test is greater than the threshold.	1) Post O2S signal > 450 mvolts AND 2) Accumulated air flow during stuck rich test > 50 grams.	No Active DTC's	TPS_ThrottleAuthority Defaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						EthanolCompositionSensor_FA		
					B2S2 Failed this key cycle	P013C, P013D, P014B, P2272 or P2273		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid	Green Sensor Delay Criteria	
					ICAT MAT Burnoff delay	= Not Valid	The diagnostic will not be enabled until the next ignition cycle after the following has been met: 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	
					Green O2S Condition	= Not Valid		
					Low Fuel Condition Diag	= False		
					Post fuel cell	= enabled		
					DTC's Passed	= P2270 and P2272 (if applicable)		
					After above conditions are met: DFCO mode entered (wo driver initiated pedal input).			
O2 Sensor Delayed Response Lean to Rich Bank 2 Sensor 2	P014B	This DTC determines if the post catalyst O2 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.	Post O2 sensor cannot go above the threshold voltage. AND The Accumulated mass air flow monitored during the Delayed Response Test is greater than the threshold.	1) Post O2S signal < 350 mvolts AND 2) Accumulated air flow during lean to rich test > 285 grams.	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA		
					B2S2 Failed this key cycle	P013C, P013D, P014A, P2272 or P2273		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid	Green Sensor Delay Criteria	
					ICAT MAT Burnoff delay	= Not Valid	The diagnostic will not be enabled until the next ignition cycle after the following has been met: 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	
					Green O2S Condition	= Not Valid		
					Low Fuel Condition Diag	= False		
					Post fuel cell	= enabled		
					DTC's Passed	= P2270 (and P2272 (if applicable))		
					DTC's Passed	= P013E (and P014A (if applicable))		
					DTC's Passed	= P013A (and P013C (if applicable))		
					DTC's Passed	= P2271 (and P2273 (if applicable))		
					After above conditions are met: Fuel Enrich mode entered.			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
O2S Circuit Low Voltage Bank 2 Sensor 1	P0151	This DTC determines if the O2 sensor circuit is shorted to low.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is < 50 mvolts	No Active DTC's	TPS_ThrottleAuthority Defaulted	380 failures out of 475 samples	Type B 2 trips
						MAP_SensorFA		
						AIR System FA		
						Ethanol Composition Sensor FA	Frequency: Continuous in 100 milli - second loop	
						EvapPurgeSolenoidCircuit_FA		
						EvapFlowDuringNonPurge_FA		
						EvapVentSolenoidCircuit_FA		
						EvapSmallLeak_FA		
						EvapEmissionSystem_FA		
						FuelTankPressureSnsrCkt_FA		
						FuelInjectorCircuit_FA		
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9922 ≤ equiv. ratio ≤ 1.0137		
					Air Per Cylinder	100 ≤ APC ≤ 800 mgrams		
					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			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Time	> 2.0 seconds		
O2S Circuit High Voltage Bank 2 Sensor 1	P0152	This DTC determines if the O2 sensor circuit is shorted to high.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is > 1050 mvolts	**Open Test Criteria**		100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	Type B 2 trips
					No Active DTC's	TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					AFM Status	= All Cylinders active		
					Heater Warm-up delay	= Complete		
					Predicted Exhaust Temp (by location)	= Warmed Up		
					Engine Run Time	> 10 seconds		
					Engine Run Accum	> 300 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		
					Equivalence Ratio	0.9922 ≤ equiv. ratio ≤ 1.0137		
					Air Per Cylinder	100 ≤ APC ≤ 800 mgrams		
					Fuel Control State	not = Power Enrichment		
					All of the above met for			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Time	> 2 seconds		
O2S Slow Response Bank 2 Sensor 1	P0153	This DTC determines if the O2 sensor response time is degraded.	The average response time is calculated over the test time, and compared to the threshold. Refer to **“P0153 - O2S Slow Response Bank 2 Sensor 1"** Pass/Fail Threshold table in the Supporting Tables tab.		No Active DTC's	TPS_ThrottleAuthority Defaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault_NA MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA EthanolCompositionSensor_FA EngineMisfireDetected_FA	Sample time is 40 seconds Frequency: Once per trip <u>Green Sensor Delay Criteria</u> The diagnostic will not be enabled until the next ignition cycle after the following has been met: 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	Type B 2 trips
					Bank 2 Sensor 1 DTC's not active	= P0151, P0152 or P0154		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					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		
					O2 Heater on for	>= 0 seconds		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Learned Htr resistance	= Valid		
					Engine Coolant	> 55 ºC		
					IAT	> -40 ºC		
					Engine run Accum	> 160 seconds		
					Time since any AFM status change	> 2.0 seconds		
					Time since Purge On to Off change	> 1.0 seconds		
					Time since Purge Off to On change	> 2.0 seconds		
					Purge duty cycle	>= 0 % duty cycle		
					Engine airflow	20 gps <= engine airflow <= 55 gps		
					Engine speed	1000 <= RPM <= 3000		
					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	DFCO not active		
					Commanded Proportional Gain	>= 0.0 %		
					All of the above met for			
					Time	> 4.5 seconds		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
O2S Circuit Insufficient Activity Bank 2 Sensor 1	P0154	This DTC determines if the O2 sensor circuit is open.	Measure Oxygen Sensor Signal.	350 mvolts < Oxygen Sensor signal < 550 mvolts	No Active DTC's System Voltage AFM Status Heater Warm-up delay Predicted Exhaust Temp (by location) Engine Run Time Engine Run Accum Fuel	TPS_ThrottleAuthority Defaulted MAF_SensorFA EthanolCompositionSensor_FA 10.0 volts < system voltage< 32.0 volts = All Cylinders active = Complete = Warmed Up > 10 seconds > 300 seconds <= 87 % Ethanol	400 failures out of 500 samples. Frequency: Continuous 100msec loop	Type B 2 trips
O2S Heater Performance Bank 2 Sensor 1	P0155	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Measured Heater Current.	Measured Heater current < 0.3 amps -OR- Measured Heater current > 3.1 amps	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 < system voltage< 32.0 volts = Complete = Not active > zero > 120 seconds	8 failures out of 10 samples Frequency: 1 tests per trip 5 seconds delay between tests and 1 second execution rate	Type B 2 trips
O2S Circuit Low Voltage Bank 2 Sensor 2	P0157	This DTC determines if the O2 sensor circuit is shorted to low.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is < 50 mvolts	No Active DTC's	TPS_ThrottleAuthority Defaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA	430 failures out of 540 samples Frequency: Continuous in 100	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						EvapPurgeSolenoidCircuit_FA	milli - second loop	
						EvapFlowDuringNonPurge_FA		
						EvapVentSolenoidCircuit_FA		
						EvapSmallLeak_FA		
						EvapEmissionSystem_FA		
						FuelTankPressureSnsrCkt_FA		
						FuelInjectorCircuit_FA		
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9922 ≤ equiv. ratio ≤ 1.0137		
					Air Per Cylinder	100 ≤ APC ≤ 800 mgrams		
					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			
					Time	> 2.0 seconds		
O2S Circuit High Voltage Bank 2 Sensor 2	P0158	This DTC determines if the O2 sensor circuit is shorted to high.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is > 1050 mvolts	**Open Test Criteria**		100 failures out of 125 samples	Type B 2 trips
					No Active DTC's	TPS_ThrottleAuthorityDefaulted		
						MAF_SensorFA		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						EthanolCompositionSensor_FA	Frequency: Continuous in 100 milli - second loop	
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					AFM Status	= All Cylinders active		
					Heater Warm-up delay	= Complete		
					Predicted Exhaust Temp (by location)	= Warmed Up		
					Engine Run Time	> 10 seconds		
					Engine Run Accum	> 300 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		
					Equivalence Ratio	0.9922 ≤ equiv. ratio ≤ 1.0137		
					Air Per Cylinder	100 ≤ APC ≤ 800 mgrams		
					Fuel Control State	not = Power Enrichment		
					All of the above met for Time	> 2 seconds		
O2S Circuit Insufficient Activity Bank 2 Sensor 2	P0160	This DTC determines if the O2 sensor circuit is open.	Measure Oxygen Sensor Signal.	410 mvolts < Oxygen Sensor signal < 490 mvolts	No Active DTC's	TPS_ThrottleAuthority Defaulted MAF_SensorFA	590 failures out of 740 samples.	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						EthanolCompositionSensor_FA	Frequency: Continuous	
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					AFM Status	= All Cylinders active	100msec loop	
					Heater Warm-up delay	= Complete		
					Predicted Exhaust Temp (by location)	= Warmed Up		
					Engine Run Time	> 10 seconds		
					Engine Run Accum	> 300 seconds		
					Fuel	<= 87 % Ethanol		
O2S Heater Performance Bank 2 Sensor 2	P0161	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Measured Heater Current.	Measured Heater current < 0.3 amps -OR- Measured Heater current > 2.9 amps	No Active DTC's	ECT_Sensor_FA	8 failures out of 10 samples Frequency: 1 tests per trip 5 seconds delay between tests and 1 second execution rate	Type B 2 trips
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Heater Warm-up delay	= Complete		
					O2S Heater device control	= Not active		
					B1S1 O2S Heater Duty Cycle	> zero		
					All of the above met for Time	> 120 seconds		
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	≥ **Long Term Trim Lean** Table	Engine speed	375 <rpm< 7000	> 100 ms Frequency: Continuous Development data indicates that the Fuel Adjustment System Diagnostic (FASD) is typically enabled during (97) % of the	Type B 2 trips
					BARO	> 70 kPa		
					Coolant Temp	-40 <°C< 150		
					MAP	10 <kPa< 255		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Inlet Air Temp	-20 <°C< 150	EPAIII drive cycle. This is also typical of real-world driving, however values will vary (higher or lower) based on the actual conditions present during the drive cycle.	
					MAF	1.0 <g/s< 510.0		
					VSS	< 83 mph		
					Fuel Level	> 10 % or if fuel sender is faulty		
					Long Fuel Trim data accumulation:	> 30.0 seconds of data must accumulate on each trip, with at least 20.0 seconds of data in the current fuel trim cell before a pass or fail decision can be made.		
					Long-Term Fuel Trim Cell Usage 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.**			
					Closed loop fueling Enabled A Function of Coolant Temperature based on Start-up coolant temp. and a function of Time also based on Start-up coolant temp. **Please see "Supporting Tables" Tab**			
					Long Fuel Trim enabled	Closed Loop Enabled and coolant temp > 39 and < 140		
					Catalyst Monitor Diag. Intrusive Test Not Active			
					Post O2 Diag. Intrusive Test Not Active			
					Device Control Not Active			
					EVAP Diag. “tank pull down” Not Active			
					fuel trim diagnosed during decels?	Yes		
					No active DTCs:	IAC_SystemRPM_FA		
						MAP_SensorFA		
						MAF_SensorFA		
						MAF_SensorTFTKO		
						AIR System FA		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSensorCircuit_FA Ethanol Composition Sensor FA FuelInjectorCircuit_FA EngineMisfireDetected_FA MAP_EngineVacuumStatus AmbientAirDefault_NA		
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 different, yet related tests that are used to determine a Rich fault, they are Passive and Intrusive and are described below:			BARO Coolant Temp MAP IAT MAF VSS Long Fuel Trim data accumulation:	> 70 kPa -40 <°C< 150 10 <kPa< 255 -20 <°C< 150 1.0 <g/s< 510.0 < 83 mph > 30.0 seconds of data must accumulate on each trip, with at least 20.0 seconds of data in the current fuel trim cell before a pass or fail decision can be made.	> 100 ms Frequency: Continuous Development data indicates that the Fuel Adjustment System Diagnostic (FASD) is typically enabled during (97) % of the EPAIII drive cycle. This is also typical of real-world driving, however values will vary (higher or lower) based on the actual conditions present during the drive cycle.	Type B 2 trips
					Long-Term Fuel Trim Cell Usage 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.**			
					Closed loop fueling Enabled A Function of Coolant Temperature based on Start-up coolant temp. and a function of Time also based on Start-up coolant temp. **Please see "Supporting Tables" Tab**			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Long Fuel Trim enabled	Closed Loop Enabled and coolant temp > 39 and < 140		
		Passive Test: Non-purge cells are monitored to determine if a rich condition exists.	The filtered Non-Purge Long Term Fuel Trim metric	≤ **Non Purge Rich Limit** Table				
		Intrusive Test- When the Purge Long Term fuel trim metric is ≤ **the Purge Rich Limit Table,** Purge is ramped off to determine if excess purge vapor is the cause of the Rich condition. If the filtered Purge-on Long Term fuel trim > **Purge Rich Limit Table** the test passes without checking the Non-Purge Long Term fuel trim metric.	If the Purge Long Term Fuel Trim metric AND The filtered Non-Purge Long Term Fuel Trim metric	≤ **Purge Rich Limit** Table ≤ **Non Purge Rich Limit** Table	A Passive Test decision cannot be made when Purge is enabled.	Fail determinations require that the Malfunction Criteria be satisfied for 3 out of 5 intrusive segments.		
			Segment Definition - Segments can last up to 30, and are separated by the lesser of 20 seconds of purge-on time or enough time to purge 16 grams of vapor. A maximum of 5 completed segments or 20 intrusive attempts are allowed for each intrusive test. After an intrusive test report is completed, another intrusive test cannot occur for 300 seconds to allow sufficient 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 200 seconds, indicating that the canister has been purged. Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, and the execution frequency of other diagnostics.					
					Catalyst Monitor Diag. Intrusive Test Not Active Post O2 Diag. Intrusive Test Not Active Device Control Not Active EVAP Diag. “tank pull down” Not Active fuel trim diagnosed during decels?	Yes		
					No active DTCs:	IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSensorCircuit_FA Ethanol Composition Sensor FA FuelInjectorCircuit_FA EngineMisfireDetected_FA MAP_EngineVacuumStatus AmbientAirDefault_NA		
Fuel System Too Lean Bank 2	P0174	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	≥ **Long Term Trim Lean** Table	Engine speed	375 <rpm< 7000	> 100 ms Frequency: Continuous Development data indicates that the Fuel Adjustment System Diagnostic (FASD) is typically enabled during (97) % of the EPAIII drive cycle. This is also typical of real-world driving, however values will vary (higher or lower) based on the actual conditions present during the drive cycle.	Type B 2 trips
					BARO	> 70 kPa		
					Coolant Temp	-40 <°C< 150		
					MAP	10 <kPa< 255		
					Inlet Air Temp	-20 <°C< 150		
					MAF	1.0 <g/s< 510.0		
					VSS	< 83 mph		
					Fuel Level	> 10 % or if fuel sender		
					Long Fuel Trim data accumulation:	> 30 seconds of data must accumulate on each trip, with at least 20 seconds of data in the current fuel trim cell before a pass or fail decision can be made.		
					Long-Term Fuel Trim Cell Usage 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.**			
					Closed loop fueling Enabled A Function of Coolant Temperature based on Start-up coolant temp. and a function of Time also based on Start-up coolant temp. **Please see "Supporting Tables" Tab**			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Long Fuel Trim enabled	Closed Loop Enabled and coolant temp > 39 and < 140		
					Catalyst Monitor Diag. Intrusive Test Not Active			
					Post O2 Diag. Intrusive Test Not Active			
					Device Control Not Active			
					EVAP Diag. "tank pull down" Not Active			
					fuel trim diagnosed during decels?	Yes		
					No active DTCs:	IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSensorCircuit_FA Ethanol Composition Sensor FA FuelInjectorCircuit_FA EngineMisfireDetected_FA MAP_EngineVacuumStatus AmbientAirDefault_NA		
Fuel System Too Rich Bank 2	P0175	Determines if the fuel control system is in a rich condition, based on the filtered long-term fuel trim metric. There are two different, yet related tests that are used to determine a Rich fault, they are Passive and Intrusive and are described below:			BARO Coolant Temp MAP IAT MAF VSS	> 70 kPa -40 <°C< 150 10 <kPa< 255 -20 <°C< 150 1.0 <g/s< 510.0 < 83 mph	> 100 ms Frequency: Continuous Development data indicates that the Fuel Adjustment System Diagnostic (FASD) is typically enabled during (97) % of the EPAIII drive cycle. This is also typical of real-world driving, however	Type B 2 Trip(s)

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Long Fuel Trim data accumulation:	> 30 seconds of data must accumulate on each trip, with at least 20 seconds of data in the current fuel trim cell before a pass or fail decision can be made.	values will vary (higher or lower) based on the actual conditions present during the drive cycle.	
					Long-Term Fuel Trim Cell Usage 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.**			
					Closed loop fueling Enabled A Function of Coolant Temperature based on Start-up coolant temp. and a function of Time also based on Start-up coolant temp. **Please see "Supporting Tables" Tab**			
					Long Fuel Trim enabled	Closed Loop Enabled and coolant temp > 39 and < 140		
		Passive Test: Non-purge cells are monitored to determine if a rich condition exists.	The filtered Non-Purge Long Term Fuel Trim metric	≤ **Non Purge Rich Limit** Table				
		Intrusive Test- When the Purge Long Term fuel trim metric is ≤ **the Purge Rich Limit Table,** Purge is ramped off to determine if excess purge vapor is the cause of the Rich condition. If the filtered Purge-on Long Term fuel trim > **Purge Rich Limit Table** the test passes without checking the Non-Purge Long Term fuel trim metric.	If the Purge Long Term Fuel Trim metric AND The filtered Non-Purge Long Term Fuel Trim metric	≤ **Purge Rich Limit** Table ≤ **Non Purge Rich Limit** Table	A Passive Test decision cannot be made when Purge is enabled.	Fail determinations require that the Malfunction Criteria be satisfied for 3 out of 5 intrusive segments.		
			Segment Definition - Segments can last up to 30, and are separated by the lesser of 20 seconds of purge-on time or enough time to purge 16 grams of vapor. A maximum of 5 completed segments or 20 intrusive attempts are allowed for each intrusive test. After an intrusive test report is completed, another intrusive test cannot occur for 300 seconds to allow sufficient 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 200 seconds, indicating that the canister has been purged. Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, and the execution frequency of other diagnostics.					

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Catalyst Monitor Diag. Intrusive Test Not Active Post O2 Diag. Intrusive Test Not Active Device Control Not Active EVAP Diag. “tank pull down” Not Active fuel trim diagnosed during decels? Yes			
					No active DTCs:	IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSensorCircuit_FA Ethanol Composition Sensor FA FuelInjectorCircuit_FA EngineMisfireDetected_FA MAP_EngineVacuumStatus AmbientAirDefault_NA		
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 circuit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 1 seconds	8 failures out of 10 samples 250 ms /sample Continuous	Type B 2 trips
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 circuit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 1 seconds	8 failures out of 10 samples 250 ms /sample Continuous	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
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 circuit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 1 seconds	8 failures out of 10 samples 250 ms /sample Continuous	Type B 2 trips
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 circuit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 1 seconds	8 failures out of 10 samples 250 ms /sample Continuous	Type B 2 trips
Injector 5	P0205	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		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 1 seconds	8 failures out of 10 samples 250 ms /sample Continuous	Type B 2 trips
Injector 6	P0206	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		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 1 seconds	8 failures out of 10 samples 250 ms /sample Continuous	Type B 2 trips
Injector 7	P0207	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		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 1 seconds	8 failures out of 10 samples 250 ms /sample Continuous	Type B 2 trips
Injector 8	P0208	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		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 1 seconds	8 failures out of 10 samples 250 ms /sample Continuous	Type B 2 trips
TPS2 Circuit	P0220	Detects a continuous or intermittent short or open in TPS2 circuit on the secondary processor but sensor is in range on the primary processor	Secondary TPS2 Voltage < or Secondary TPS2 Voltage >	0.25 4.59		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions No 5 V reference error No 5 V reference DTCs	19/39 counts or 14 counts continuous; 12.5 msec/count in the Secondary processor	Type:A 1 Trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
TPS2 Circuit Low	P0222	Detects a continuous or intermittent short in TPS2 circuit on both processors or just the primary processor	Primary TPS2 Voltage <	0.25		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	79/159 counts; 57 counts continuous; 3.125 msec /count in the Primary processor	Type:A 1 Trip
						No 5 V reference error		
			Secondary TPS2 Voltage <	0.25		No 5 V reference DTCs	19/39 counts or 14 counts continuous; 12.5 msec/count in the Secondary processor	
TPS2 Circuit High	P0223	Detects a continuous or intermittent short or open in TPS2 circuit on both processors or just the primary processor	Primary TPS2 Voltage >	4.59		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	79/159 counts; 57 counts continuous; 3.125 msec /count in the Primary processor	Type:A 1 Trip
						No 5 V reference error		
			Secondary TPS2 Voltage >	4.59		No 5 V reference DTCs	19/39 counts or 14 counts continuous; 12.5 msec/count in the Secondary processor	
Fuel Pump Primary Circuit (ODM)	P0230	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 Engine Speed	11 volts ≤ Voltage ≤ 32 volts ≥ 0 RPM	8 failures out of 10 samples 250 ms /sample Continuous	Type B 2 trips
Random Misfire Detected Cylinder 1 Misfire Detected Cylinder 2 Misfire Detected Cylinder 3 Misfire Detected	P0300 P0301 P0302	These DTC's will determine if a random or a cylinder specific misfire is occurring by monitoring crankshaft velocity	Deceleration index vs. Engine Speed Vs Engine load Deceleration index calculation is tailored to specific veh. Tables used are 1st tables encountered that are not max of range.	(>Idle SCD AND > Idle SCD ddt Tables) **OR** (>SCD Delta AND > SCD Delta ddt Tables) **OR** (>Idle Cyl Mode AND > Idle Cyl Mode ddt Tables)	Engine Run Time ECT If ECT at startup	> 2 crankshaft revolutions -7ºC < ECT < 130ºC < -7ºC	Emission Exceedence = (5) failed 200 rev blocks of 16. Failure reported with (1) Exceedence in 1st (16) 200 rev block,	Type B 2 trips (Mil Flashes with Catalyst Damaging Misfire)

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Cylinder 4 Misfire Detected Cylinder 5 Misfire Detected Cylinder 6 Misfire Detected Cylinder 7 Misfire Detected Cylinder 8 Misfire Detected	P0303 P0304 P0305 P0306 P0307 P0308		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** (>Cyl Mode AND > Cyl Mode ddt Tables) **OR** (>Rev Mode Table) **OR** (> AFM Table in Cyl Deact mode)	ECT System Voltage + Throttle delta - Throttle delta	21ºC < ECT < 130ºC 9.00<volts<32.00 < 75.00% per 25 ms < 75.00% per 25 ms	or (4) Exceedences thereafter. 1st Catalyst Exceedence = (1) 200 rev block as data supports for catalyst damage. 2nd and 3rd Catalyst Exceedence = (1) 200 rev block with catalyst damage.	
			Misfire Percent Emission Failure Threshold	≥ 1.24% P0300 ≥ 1.56% emission				
			Misfire Percent Catalyst Damage	>"Catalyst Damaging Misfire Percentage" Table: Except 1 cylinder misfire below 1200 rpm and 25.85% load			Continuous	
					Engine Speed	375 < rpm < 5600	4 cycle delay	
				disable conditions:	No active DTCs:	TPS_FA EnginePowerLimited MAF_SensorTFTKOn IAT_SensorTFTKO ECT_Sensor_Ckt_TFTKO 5VoltReferenceB_FA CrankSensorTestFailedTKO CrankSensorFaultActive CrankIntakeCamCorrelationFA CrankExhaustCamCorrelationFA	4 cycle delay	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						CrankCamCorrelationTFTKO		
						AnyCamPhaser_FA		
						AnyCamPhaser_TFTKO		
					P0315 & engine speed	> 1000 rpm		
					Fuel Level Low	LowFuelConditionDiagnostic	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	4 cycle delay	
					Fuel System Status	≠ Fuel Cut	4 cycle delay	
					Active Fuel Management	Transition in progress	7 cycle delay	
					Undetectable engine speed and engine load region	invalid speed load range in **decel index** tables	4 cycle delay	
					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:		4 cycle delay	
					TPS	≤ 0%		
					Veh Speed	> 30 MPH		
							0 cycle delay	
					Manual Trans	Clutch shift	4 cycle delay	
					Throttle Position	> 95.00%	7 cycle delay	
					AND Automatic transmission shift			
					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:	4 engine cycles after misfire		
					Stop filter early:	3 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	 > 1 % > 950 rpm		
					Monitor ABS RoughRoadSource	1 (1=Yes) FromABS		
			RR calc In EBCM (ABS) from Wheel speed		ABS/TCS system RoughRoad	not active not detected (wheel sensor)		
Crankshaft Position System Variation Not Learned	P0315	Monitor for valid crankshaft error compensation factors	Sum of Compensation factors	≥ 4.0040 OR ≤ 3.9960	OBD Manufacturer Enable Counter =	0	0.50 seconds Frequency Continuous 100 msec	Type:A 1 Trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Knock Sensor (KS) Module Performance	P0324	This diagnostic will detect a failed internal ECM component associated with knock control	Any Cylinder's Avg Gain Signal **or** All Cylinder's Actual Signals	> 4.50 Volts ≤ 0.20 Volts	Engine Speed Cylinder Air Mass No Active DTC's Engine Speed Cylinder Air Mass No Active DTC's	≥ 400 RPM > 60 milligrams KS_Ckt_Perf_B1B2_FA ≥ 400 RPM > 60 milligrams KS_Ckt_Perf_B1B2_FA	50 Failures out of 63 Samples 100 msec rate	Type:A 1 Trip
Knock Sensor (KS) Circuit Bank 1	P0325	This diagnostic checks for an open in the knock sensor circuit	Gated Low Pass Filter Voltage	> 4.0 Volts or < 1.24 Volts	Diagnostic Enabled (1 = Enabled) Engine Speed ECT Engine Run Time No Active DTC's Power Take Off	= 1 ≥ 400 RPM ≥ -40 deg. C ≥ 2 seconds KS_Ckt_Perf_B1B2_FA = Not Active	50 Failures out of 63 Samples 100 msec rate	Type B 2 trips
Knock Sensor (KS) Performance Bank 1	P0326	This diagnostic checks for an overactive knock sensor caused by excessive knock or noisy engine components	Knock Fast Retard (spark degrees) > KeKNOC_phi_FastRtdDiagThrsh	> (FastRtdMax + 6.0 degrees - 2.0) degrees spark See Supporting Tables for FastRtdMax	Diagnostic Enabled (1 = Enabled) Knock Detection Enabled Engine Speed MAP No Active DTC's Power Take Off	= 1 > 0 **Knock Detection Enabled** is calculated by multiplying the following three factors: FastAttackRate FastAttackCoolGain FastAttackBaroGain (see Supporting Tables) ≥ 500 RPM ≥ 10 kPa TPS_ThrottleAuthorityDefaulted = Not Active	31 Failures out of 63 Samples 100 msec rate	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Knock Sensor (KS) Circuit Low Bank 1	P0327	This diagnostic checks for an out of range low knock sensor signal	Sensor Input Signal Line **or** Sensor Return Signal Line	> 2.86 Volts < 1.48 Volts	ECT	≥ -40 deg. C	50 Failures out of 63 Samples 100 msec rate	Type B 2 trips
					Engine Run Time	≥ 2 seconds		
					Valid Oil Temp Required? (1= Yes, 0 = No)	= 0		
					If Yes:			
					Engine Oil Temp	< 256 deg. C		
					and			
					ValidOilTempModel	EngOilModeledTempValid		
					or			
					No OilTempSensor DTC's	EngOilTempSensorCircuitFA		
					If No:			
					No Eng Oil Temp enable criteria			
Knock Sensor (KS) Circuit High Bank 1	P0328	This diagnostic checks for an out of range high knock sensor signal	Sensor Input Signal Line **or** Sensor Return Signal Line	< 2.02 Volts > 3.76 Volts	ECT	≥ -40 deg. C	50 Failures out of 63 Samples 100 msec rate	Type B 2 trips
					Engine Run Time	≥ 2 seconds		
					Valid Oil Temp Required? (1= Yes, 0 = No)	= 0		
					If Yes:			
					Engine Oil Temp	< 256 deg. C		
					and			
					ValidOilTempModel	EngOilModeledTempValid		
					or			
					No OilTempSensor DTC's	EngOilTempSensorCircuitFA		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					If No: No Eng Oil Temp enable criteria			
Knock Sensor (KS) Circuit Bank 2	P0330	This diagnostic checks for an open in the knock sensor circuit	Gated Low Pass Filter Voltage	> 4.0 Volts or < 1.24 Volts	Diagnostic Enabled (1 = Enabled) Engine Speed ECT Engine Run Time No Active DTC's Power Take Off	= 1 ≥ 400 RPM ≥ -40 deg. C ≥ 2 seconds KS_Ckt_Perf_B1B2_FA = Not Active	50 Failures out of 63 Samples 100 msec rate	Type B 2 trips
Knock Sensor (KS) Circuit Low Bank 2	P0332	This diagnostic checks for an out of range low knock sensor signal	Sensor Input Signal Line **or** Sensor Return Signal Line	> 2.86 Volts < 1.48 Volts	ECT Engine Run Time Valid Oil Temp Required? (1= Yes, 0 = No) If Yes: Engine Oil Temp and ValidOilTempModel or No OilTempSensor DTC's If No: No Eng Oil Temp enable criteria	≥ -40 deg. C ≥ 2 seconds = 0 < 256 deg. C EngOilModeledTempValid EngOilTempSensorCircuitFA	50 Failures out of 63 Samples 100 msec rate	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Knock Sensor (KS) Circuit High Bank 2	P0333	This diagnostic checks for an out of range high knock sensor signal	Sensor Input Signal Line **or** Sensor Return Signal Line	< 2.02 Volts > 3.76 Volts	ECT	≥ -40 deg. C	50 Failures out of 63 Samples 100 msec rate	Type B 2 trips
					Engine Run Time	≥ 2 seconds		
					Valid Oil Temp Required? (1= Yes, 0 = No)	= 0		
					If Yes:			
					Engine Oil Temp	< 256 deg. C		
					and			
					ValidOilTempModel	EngOilModeledTempValid		
					or			
					No OilTempSensor DTC's	EngOilTempSensorCircuitFA		
					If No:			
					No Eng Oil Temp enable criteria			
Crankshaft Position (CKP) Sensor A Circuit	P0335	Determines if a fault exists with the crank position sensor signal	<u>Engine-Cranking Crankshaft Test:</u>		<u>Engine-Cranking Crankshaft Test:</u>		<u>Engine-Cranking Crankshaft Test:</u>	Type A 1 trips
			Time since last crankshaft position sensor pulse received	>= 4.0 seconds	Starter engaged		Continuous every 100 msec	
					AND			
					(cam pulses being received			
					OR			
					(DTC P0101	= FALSE		
					AND DTC P0102	= FALSE		
					AND DTC P0103	= FALSE		
					AND			
					Engine Air Flow	> 3.0 grams/second))		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Time-Based Crankshaft Test:		Time-Based Crankshaft Test:		Time-Based Crankshaft Test:	
			No crankshaft pulses received	>= 0.1 seconds	Engine is Running Starter is not engaged		Continuous every 12.5 msec	
					No DTC Active:	5VoltReferenceB_FA		
			Event-Based Crankshaft Test:		Event-Based Crankshaft Test:		Event-Based Crankshaft Test:	
			No crankshaft pulses received		Engine is Running OR Starter is engaged		2 failures out of 10 samples	
					No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA P0340 P0341	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:		Crank Re-synchronization Test:		Crank Re-synchronization Test:	Type A 1 trips
			Time in which 25 or more crank re-synchronizations occur	< 20.0 seconds	Engine Air Flow Cam-based engine speed	>= 3.0 grams/second > 450 RPM	Continuous every 250 msec	
					No DTC Active:	5VoltReferenceB_FA P0335		
			Time-Based Crankshaft Test:		Time-Based Crankshaft Test:		Time-Based Crankshaft Test:	
			No crankshaft synchronization gap found	>= 0.4 seconds	Engine is Running Starter is not engaged		Continuous every 12.5 msec	
					No DTC Active:	5VoltReferenceB_FA		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Engine Start Test during Crank:		Engine Start Test during Crank:		Engine Start Test during Crank:	
			Time since starter engaged without detecting crankshaft synchronization gap	>= 1.5 seconds	Starter engaged AND (cam pulses being received OR (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow	= FALSE = FALSE = FALSE > 3.0 grams/second))	Continuous every 100 msec	
			Event-Based Crankshaft Test:		Event-Based Crankshaft Test:		Event-Based Crankshaft Test:	
			Crank Pulses received in one engine revolution OR Crank Pulses received in one engine revolution	< 53 > 63	Engine is Running OR Starter is engaged No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA P0340 P0341	8 failures out of 10 samples One sample per engine revolution	
Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor A	P0340	Determines if a fault exists with the cam position bank 1 sensor A signal	Engine Cranking Camshaft Test:		Engine Cranking Camshaft Test:		Engine Cranking Camshaft Test:	Type B 2 trips
			Time since last camshaft position sensor pulse received OR Time that starter has been engaged without a camshaft sensor pulse	>= 5.5 seconds >= 4.0 seconds	Starter engaged AND (cam pulses being received OR (DTC P0101 AND DTC P0102	= FALSE = FALSE	Continuous every 100 msec	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					AND DTC P0103	= FALSE		
					AND			
					Engine Air Flow	> 3.0 grams/second))		
			Time-Based Camshaft Test:		Time-Based Camshaft Test:		Time-Based Camshaft Test:	
			Fewer than 4 camshaft pulses received in a time		Engine is Running		Continuous every 100 msec	
					Starter is not engaged			
				> 3.0 seconds	No DTC Active:	5VoltReferenceA_FA		
			Fast Event-Based Camshaft Test:		Fast Event-Based Camshaft Test:		Fast Event-Based Camshaft Test:	
			No camshaft pulses received during first 24 MEDRES events		Crankshaft is synchronized		Continuous every MEDRES event	
			(There are 24 MEDRES events per engine cycle)		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		
			Slow Event-Based Camshaft Test:		Slow Event-Based Camshaft Test:		Slow Event-Based Camshaft Test:	
			The number of camshaft pulses received during 100 engine cycles		Crankshaft is synchronized		8 failures out of 10 samples	
					No DTC Active:	5VoltReferenceA_FA		
				= 0		5VoltReferenceB_FA	Continuous every engine cycle	
						CrankSensor_FA		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor A	P0341	Determines if a performance fault exists with the cam position bank 1 sensor A signal	Fast Event-Based Camshaft Test:		Fast Event-Based Camshaft Test:		Fast Event-Based Camshaft Test:	Type B 2 trips
			The number of camshaft pulses received during first 24 MEDRES events is less than 2 or greater than 8		Crankshaft is synchronized		Continuous every MEDRES event	
					Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged			
			(There are 24 MEDRES events per engine cycle)					
					No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA		
			Slow Event-Based Camshaft Test:		Slow Event-Based Camshaft Test:		Slow Event-Based Camshaft Test:	
			The number of camshaft pulses received during 100 engine cycles		Crankshaft is synchronized		8 failures out of 10 samples	
				< 398	No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA	Continuous every engine cycle	
			OR	> 402		CrankSensor_FA Crank circuit		
IGNITION CONTROL #1 CIRCUIT	P0351	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 1 (Cylinders 1 and 4 for V6 with waste spark)			Engine running		50 Failures out of 63 Samples	Type B 2 trips
					Ignition Voltage	**> 6.00 Volts**		
			The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.				100 msec rate	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
IGNITION CONTROL #2 CIRCUIT	P0352	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 2 (Cylinders 2 and 5 for V6 with waste spark)	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	 **> 6.00 Volts**	50 Failures out of 63 Samples 100 msec rate	Type B 2 trips
IGNITION CONTROL #3 CIRCUIT	P0353	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 3 (Cylinders 3 and 6 for V6 with waste spark)	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	 **> 6.00 Volts**	50 Failures out of 63 Samples 100 msec rate	Type B 2 trips
IGNITION CONTROL #4 CIRCUIT	P0354	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 4 (if applicable)	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	 **> 6.00 Volts**	50 Failures out of 63 Samples 100 msec rate	Type B 2 trips
IGNITION CONTROL #5 CIRCUIT	P0355	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 5 (if applicable)	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	 **> 6.00 Volts**	50 Failures out of 63 Samples 100 msec rate	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
IGNITION CONTROL #6 CIRCUIT	P0356	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 6 (if applicable)	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	 **> 6.00 Volts**	50 Failures out of 63 Samples 100 msec rate	Type B 2 trips
IGNITION CONTROL #7 CIRCUIT	P0357	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 7 (if applicable)	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	 **> 6.00 Volts**	50 Failures out of 63 Samples 100 msec rate	Type B 2 trips
IGNITION CONTROL #8 CIRCUIT	P0358	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 8 (if applicable)	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	 **> 6.00 Volts**	50 Failures out of 63 Samples 100 msec rate	Type B 2 trips
Catalyst System Low Efficiency Bank 1	P0420	Oxygen Storage (Stored Oxygen Release Monitor or STORM)	OSC Mass EWMA (EWMA filtered)	<= 2.400 grams air	***Diagnostic Enable Conditions***		Minimum of 1 test per trip Maximum of 10 tests per trip Frequency: 12.5 ms continuous	Type A 1 Trip(s)

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		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. The catalyst diagnostic's strategy is to essentially measure this through a forced Rich A/F excursion following a decel fuel cutoff event. OSC Period = HO2S2 Resp Time – HO2S1 Resp Time – Inert Catalyst Transport Delay. OSC Mass = Integrate{ MAF(Bank,t) * [EquivalenceRatio(t)/FuelTrim LT – 1]} @ t, t=0 to OSC Period. Normalized OSC Mass = OSC Mass *Catalyst Temperature Compensation Factor. (Compensation table to the OSC Mass based on Cat Temp. Refer to "Supporting Tables")		Test Completion: HO2S1 ≥ 600 mV and HO2S2 ≥ 200 mV OR HO2S2 Response Time - HO2S1 Response Time > 1.10 seconds	This diagnostic has the ability to run as a stand alone diagnostic or following the Post O2 Performance Diagnostic (POPD) depending on the calibration value below: Stand Alone Diagnostic: 0 (a value of 1 means the diagnostic is running in the stand alone state and a value of 0 means the diagnostic is running following POPD's completion of the rich to lean portion of the diagnostic). If calibrated to run stand alone then the catalyst diagnostic must not have completed for trip. If calibrated to run following POPD's completion of the rich to lean portion of the diagnostic (i.e. Stand Alone Diagnostic = 0) then POPD must make the request for decel fuel cutoff through the catalyst diagnostic.			
		The Catalyst Monitoring Test is done during a deceleration. Several conditions must be meet in order to execute this test. These conditions and their related values are listed in the secondary parameters area of this document.			Predicted Catalyst Temperature	≥ 525 degC for > 80 seconds		
					Engine speed and Vehicle Speed	≥ 900 RPM and > 27 MPH respectively for a minimum of 20 seconds		
					Predicted Catalyst Temperature	≥ 525 degC and ≤ 800 degC		
					Tests attempted this trip	< 255		
					The catalyst diagnostic has not yet completed for the current trip.			
					Device control is Disabled			
					Green Converter Delay	Not Active		
					Induction Air	*-20 ≤ °C ≤ 100*		
					Fuel Level	≥ 2 percent (if there is no fuel level fault present) or ≥ 0 percent if there is a fuel level fault active		
					RunCrank Voltage	≥ 11.00 Volts		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Minimum Learn Enable Time to ensure stable BLM and PLM values	≥ 100 seconds or ≥ 100 seconds if the fuel tank level increases by ≥ 10 percent or following a code clearing event		
					ECT	*73 ≤ °C ≤ 128*		
					Barometric Pressure	≥ 70 KPA		
					Rapid Step Response (RSR) feature will initiate multiple tests:			
					If the difference between current EWMA value and the current OSC Normalized Mass value is > 1.570 and the current Normalized OSC Mass value is < 2.203			
					Maximum of 24 RSR tests to detect failure when RSR is enabled.			
					Green Converter Delay Criteria			
					This is part of the check for the Diagnostic Enable Conditions section			
					The diagnostic will not be enabled until the following has been met:			
					Predicted catalyst temperature > 550 ° C for 3600 seconds non-continuously.			
					To allow a DFCO Event			
					This is checked once a decel fuel cutoff event is detected but prior to the catalyst diagnostic moving into the state used to saturate the converters lean (prior to making a measurement). This is to ensure driver's foot is off of the throttle.			
					Torque Request	≤ 5.00 NM's		
					Valid DFCO Period Criteria			
					Prior Enable Criteria Met			
					Decel Fuel Cutoff Time	≥ 2.35 seconds		
					HO2S1 (pre-O2 sensor)	≤ 300.000 mV prior to DFCO exit		
					HO2S2 (post-O2 sensor)	≤ 101 mV for 2.50 seconds prior to DFCO exit		
					Valid DFCO Exit Criteria			
					Cumulative Throttle Movement	< 20.00 percent		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Equivalence Ratio	≥ 1.00		
					General Enable			
					DTC's Not Set			
					MAF_SensorFA			
					AmbientAirDefault_SC			
					IAT_SensorCircuitFA			
					IAT_SensorCircuitTFTKO			
					ECT_Sensor_FA			
					MAF_SensorTFTKO			
					O2S_Bank_1_Sensor_1_FA			
					O2S_Bank_1_Sensor_2_FA			
					O2S_Bank_2_Sensor_1_FA			
					O2S_Bank_2_Sensor_2_FA			
					FuelTrimSystemB1_FA			
					FuelTrimSystemB1_TFTKO			
					FuelTrimSystemB2_FA			
					FuelTrimSystemB2_TFTKO			
					EngineMisfireDetected_FA			
					EvapPurgeSolenoidCircuit_FA			
					IAC_SystemRPM_FA			
					CamSensor_FA			
					CrankSensorFaultActive			
					TPS_Performance_FA			
					EnginePowerLimited			
					VehicleSpeedSensor_FA			
Catalyst System Low Efficiency Bank 2	P0430	Oxygen Storage (Stored Oxygen Release Monitor or STORM)	OSC Mass EWMA (EWMA filtered)	<= 2.400 grams air	***Diagnostic Enable Conditions***		Minimum of 1 test per trip Maximum of 10 tests per trip Frequency: 12.5 ms continuous	Type A 1 Trip(s)

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		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. The catalyst diagnostic's strategy is to essentially measure this through a forced Rich A/F excursion following a decel fuel cutoff event. OSC Period = HO2S2 Resp Time – HO2S1 Resp Time – Inert Catalyst Transport Delay. OSC Mass = Integrate{ MAF(Bank,t) * [EquivalenceRatio(t)/FuelTrim LT – 1]} @ t, t=0 to OSC Period. Normalized OSC Mass = OSC Mass *Catalyst Temperature Compensation Factor. (Compensation table to the OSC Mass based on Cat Temp. Refer to "Supporting Tables")		Test Completion: HO2S1 ≥ 600 mV and HO2S2 ≥ 200 mV OR HO2S2 Response Time - HO2S1 Response Time > 1.10 seconds	This diagnostic has the ability to run as a stand alone diagnostic or following the Post O2 Performance Diagnostic (POPD) depending on the calibration value below: Stand Alone Diagnostic: 0 (a value of 1 means the diagnostic is running in the stand alone state and a value of 0 means the diagnostic is running following POPD's completion of the rich to lean portion of the diagnostic). If calibrated to run stand alone then the catalyst diagnostic must not have completed for trip. If calibrated to run following POPD's completion of the rich to lean portion of the diagnostic (i.e. Stand Alone Diagnostic = 0) then POPD must make the request for decel fuel cutoff through the catalyst diagnostic.			
		The Catalyst Monitoring Test is done during a deceleration. Several conditions must be meet in order to execute this test. These conditions and their related values are listed in the secondary parameters area of this document.			Predicted Catalyst Temperature	≥ 525 degC for > 80 seconds		
					Engine speed and Vehicle Speed	≥ 900 RPM and > 27 MPH respectively for a minimum of 20 seconds		
					Predicted Catalyst Temperature	≥ 525 degC and ≤ 800 degC		
					Tests attempted this trip	< 255		
					The catalyst diagnostic has not yet completed for the current trip.			
					Device control is Disabled			
					Green Converter Delay	Not Active		
					Induction Air	*-20 ≤ °C ≤ 100*		
					Fuel Level	≥ 2 percent (if there is no fuel level fault present) or ≥ 0 percent if there is a fuel level fault active		
					RunCrank Voltage	≥ 11.00 Volts		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Minimum Learn Enable Time to ensure stable BLM and PLM values	≥ 100 seconds or ≥ 100 seconds if the fuel tank level increases by ≥ 10 percent or following a code clearing event		
					ECT	*73 ≤ °C ≤ 128*		
					Barometric Pressure	≥ 70 KPA		
					Rapid Step Response (RSR) feature will initiate multiple tests:			
					If the difference between current EWMA value and the current OSC Normalized Mass value is > 1.730 and the current Normalized OSC Mass value is < 2.117			
					Maximum of 24 RSR tests to detect failure when RSR is enabled.			
					Green Converter Delay Criteria			
					This is part of the check for the Diagnostic Enable Conditions section			
					The diagnostic will not be enabled until the following has been met:			
					Predicted catalyst temperature > 550 ° C for 3600 seconds non-continuously.			
					To allow a DFCO Event			
					This is checked once a decel fuel cutoff event is detected but prior to the catalyst diagnostic moving into the state used to saturate the converters lean (prior to making a measurement). This is to ensure driver's foot is off of the throttle.			
					Torque Request	≤ 5.00 NM's		
					Valid DFCO Period Criteria			
					Prior Enable Criteria Met			
					Decel Fuel Cutoff Time	≥ 2.35 seconds		
					HO2S1 (pre-O2 sensor)	≤ 300.000 mV prior to DFCO exit		
					HO2S2 (post-O2 sensor)	≤ 101 mV for 2.50 seconds prior to DFCO exit		
					Valid DFCO Exit Criteria			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Cumulative Throttle Movement	< 20.00 percent		
					Equivalence Ratio	≥ 1.00		
					General Enable			
					DTC's Not Set			
					MAF_SensorFA			
					AmbientAirDefault_SC			
					IAT_SensorCircuitFA			
					IAT_SensorCircuitTFTKO			
					ECT_Sensor_FA			
					MAF_SensorTFTKO			
					O2S_Bank_1_Sensor_1_FA			
					O2S_Bank_1_Sensor_2_FA			
					O2S_Bank_2_Sensor_1_FA			
					O2S_Bank_2_Sensor_2_FA			
					FuelTrimSystemB1_FA			
					FuelTrimSystemB1_TFTKO			
					FuelTrimSystemB2_FA			
					FuelTrimSystemB2_TFTKO			
					EngineMisfireDetected_FA			
					EvapPurgeSolenoidCircuit_FA			
					IAC_SystemRPM_FA			
					CamSensor_FA			
					CrankSensorFaultActive			
					TPS_Performance_FA			
					EnginePowerLimited			
					VehicleSpeedSensor_FA			
Evaporative Emission (EVAP) System Small Leak Detected	P0442	This DTC will detect a small leak (≥ 0.020”) in the EVAP system between the fuel fill cap and the purge solenoid. The engine off natural vacuum method (EONV) is used. EONV is an evaporative system leak detection diagnostic that runs when the vehicle is shut off when enable conditions are met. Prior to sealing the system and performing the diagnostic, the	The total delta from peak pressure to peak vacuum during the test is normalized against a calibration pressure threshold table that is based upon fuel level and ambient temperature. (See P0442: EONV Pressure Threshold Table on Supporting Tables Tab). The normalized value is calculated by the following equation: 1 - (peak		Fuel Level Drive Time Drive length ECT Baro Odometer Engine not run time before key off must be	10 % ≤ Percent ≤ 90 % ≥ 600 seconds ≥ 3.1 miles ≥ 70 °C ≥ 70 kPa ≥ 10.0 miles	Once per trip, during hot soak (up to 2400 sec.). No more than 2 unsuccessful attempts between completed tests.	Type:A 1 Trip EWMA Average run length is 7 under normal conditions Run length is 3 to 6 trips after

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		fuel volatility is analyzed. In an open system (Canister Vent Solenoid [CVS] open) high volatility fuel creates enough flow to generate a measurable pressure differential relative to atmospheric.	pressure - peak vacuum)/pressure threshold. The normalized value is entered into EWMA (with 0= perfect pass and 1= perfect fail).			≤ refer to "P0442: Engine Off Time Before Vehicle Off Maximum as a Function of Estimated Ambient Temperature table" in Supporting Tables.		code clear or non-volatile reset
					Time since last complete test	≥ 17 hours		
					if normalized result and EWMA is passing			
					OR			
					Time since last complete test	≥ 10 hours		
					if normalized result or EWMA is failing			
					Estimated ambient temperature at end of drive	0 °C ≤ Temperature ≤ 34 °C		
					Estimate of Ambient Air Temperature Valid			
			When EWMA is	> 0.65 (EWMA Fail Threshold)				

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		After the volatility check, the vent solenoid will close. After the vent is closed, typically a build up of pressure from the hot soak begins (phase-1). The pressure typically will peak and then begin to decrease as the fuel cools. When the pressure drops (-62.27) Pa from peak pressure, the vent is then opened for 60 seconds to normalize the system pressure. The vent is again closed to begin the vacuum portion of the test (phase-2). As the fuel temperature continues to fall, a vacuum will begin forming. The vacuum will continue until it reaches a vacuum peak. When the pressure rises 62.27 Pa from vacuum peak, the test then completes. If the key is turned on while the diagnostic test is in progress, the test will abort.	, the DTC light is illuminated.					
			The DTC light can be turned off if the EWMA is	≤ 0.35 (EWMA Re-Pass Threshold)				
			and stays below the EWMA fail threshold for 2 additional consecutive trips.					

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Conditions for Estimate of Ambient Air Temperature to be valid:			
					1. Cold Start			
					Startup delta deg C (ECT-IAT)	≤ 8 °C		
					OR			
					2. Short Soak and Previous EAT Valid			
					Previous time since engine off	≤ 7200 seconds		
					OR			
					3. Less than a short soak and Previous EAT Not Valid			
					Previous time since engine off	≤ 7200 seconds		
					AND			
					Must expire Estimate of Ambient Temperature Valid Conditioning Time. **"P0442: Estimate of Ambient Temperature Valid Conditioning Time" in Supporting Tables Tab.**	Vehicle Speed ≥ 24.2 mph AND Mass Air Flow ≥ 10 g/sec		
					OR			
					4. Not a Cold Start and greater than a Short Soak			
					Previous time since engine off	> 7200 seconds		
					AND			
					Must expire maximum value in Estimate of Ambient Temperature Valid Conditioning Time. **Please see "P0442: Estimate of Ambient Temperature Valid Conditioning Time" in Supporting Tables Tab.**	Vehicle Speed ≥ 24.2 mph AND Mass Air Flow ≥ 10 g/sec		
				Abort Conditions:	**1. High Fuel Volatility**			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					During the volatility phase, pressure in the fuel tank is integrated vs. time. If the integrated pressure is	> -5		
					then test aborts and unsuccessful attempts is incremented.			
					OR			
					2. Vacuum Refueling Detected			
					See P0454 Fault Code for information on vacuum refueling algorithm.			
					OR			
					3. Fuel Level Refueling Detected			
					See P0464 Fault Code for information on fuel level refueling.			
					OR			
					4. Vacuum Out of Range and No Refueling			
					See P0451 Fault Code for information on vacuum sensor out of range and P0464 Fault Code for information on fuel level refueling.			
					OR			
					5. Vacuum Out of Range and Refueling Detected			
					See P0451 Fault Code for information on vacuum sensor out of range and P0464 Fault Code for information on fuel level refueling.			
					OR			
					6. Vent Valve Override Failed			
					Device control using an off-board tool to control the vent solenoid, cannot exceed during the EONV test	0.50 seconds		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					OR **7. Key up during EONV test**			
					No active DTCs:	FuelLevelDataFault MAF_SensorFA ECT_Sensor_FA IAT_SensorFA VehicleSpeedSensor_FA IgnitionOffTimeValid AmbientAirDefault_NA P0443 P0446 P0449 P0452 P0453 P0455 P0496		
Evaporative Emission (EVAP) Canister Purge Solenoid Valve Circuit (ODM)	P0443	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	11 volts ≤ Voltage ≤ 32 volts	20 failures out of 25 samples 250 ms /sample Continuous with solenoid operation	Type B 2 trips
Evaporative Emission (EVAP) Vent System Performance	P0446	This DTC will determine if a restriction is present in the vent solenoid, vent filler, vent hose or EVAP canister. This test runs with normal purge and vent valve is open.	Vent Restriction Prep Test:		Fuel Level	10% ≤ Percent ≤ 90%	Once per Cold Start	Type B 2 trips
			Vented Vacuum	< -623 Pa	System Voltage	11 volts ≤ Voltage ≤ 32 volts		
			or		Startup IAT	4 °C ≤ Temperature ≤ 30 °C		
			Vented Vacuum	> 1245 Pa	Startup ECT	≤ 35 °C	Time is dependent on driving conditions	
			for 60 seconds		BARO	≥ 70 kPa		
			Vent Restriction Test:		No active DTCs:	MAP_SensorFA		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Tank Vacuum for 5 seconds BEFORE Purge Volume 2 liters of fuel must be consumed after setting the DTC active the first time to set the DTC active the second time.	> 2989 Pa ≥ 10 liters		TPS_FA VehicleSpeedSensor_FA IAT_SensorCircuitFA ECT_Sensor_FA AmbientAirDefault_NA EnginePowerLimited P0443 P0449 P0452 P0453 P0454	Maximum time before test abort is 1000 seconds	
Evaporative Emission (EVAP) Vent Solenoid Control Circuit (ODM)	P0449	This DTC checks the circuit for electrical integrity during operation. If the P0449 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.		Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	20 failures out of 25 samples 250 ms / sample Continuous with solenoid operation	Type B 2 trips
Fuel Tank Pressure (FTP) Sensor Circuit Performance	P0451	The DTC will be set if the fuel tank vacuum sensor is out of range when it tries to re-zero prior to the phase-1 or phase-2 portions of the engine-off natural vacuum small leak test.	The tank vacuum sensor voltage is compared to a window about the nominal sensor voltage offset (~1.5 volts) Upper voltage threshold (voltage addition above the nominal voltage)	 0.2 volts	This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes		This test is executed during an engine-off natural vacuum small leak test. The number of times that it executes can range from zero to two per engine-off period.	1 trip Type A EWMA Average run length: 6

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Lower voltage threshold (voltage subtraction below the nominal voltage)	0.2 volts			The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete.	Run length is 2 trips after code clear or non-volatile reset
			The difference between tank vacuum sensor voltage and the nominal offset voltage is then normalized against the appropriate threshold listed above to produce a ratio between 0.0 and 1.0. This normalized re-zero ratio is then filtered with a EWMA (with 0= perfect pass and 1=perfect fail).					
			When EWMA is	> 0.73 (EWMA Fail Threshold)				
			, the DTC light is illuminated.					
			The DTC light can be turned off if the EWMA is	≤ 0.40 (EWMA Re-Pass Threshold)				
			and stays below the EWMA fail threshold for 2 additional consecutive trips.					

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage	P0452	This DTC will detect a fuel tank pressure sensor signal that is too low out of range.	Fuel tank pressure sensor signal The normal operating range of the fuel tank pressure sensor is 0.5 volts (~1245 Pa) to 4.5 volts (~ -3736 Pa).	< 0.15 volts (3 % of Vref or ~ 1681 Pa)	Time delay after sensor power up for sensor warm-up ECM State ≠ crank	is 0.10 seconds	80 failures out of 100 samples 100 ms / sample Continuous	Type B 2 trips
Fuel Tank Pressure (FTP) Sensor Circuit High Voltage	P0453	This DTC will detect a fuel tank pressure sensor signal that is too high out of range.	Fuel tank pressure sensor signal The normal operating range of the fuel tank pressure sensor is 0.5 volts (~1245 Pa) to 4.5 volts (~ -3736 Pa).	> 4.85 volts (97% of Vref or ~ -4172 Pa)	Time delay after sensor power up for sensor warm-up ECM State ≠ crank		80 failures out of 100 samples 100 ms / sample Continuous	Type B 2 trips
Fuel Tank Pressure (FTP) Sensor Circuit Intermittent	P0454	This DTC will detect intermittent tank vacuum sensor signals that would have caused the engine-off natural vacuum small leak test to abort due to an apparent re-fueling event.	If an abrupt change in tank vacuum is detected the engine-off natural vacuum test is aborted due to an apparent refueling event. Subsequent to the abort, a refueling rationality test is executed to confirm that a refueling event occurred. If a refueling is confirmed, then the test sample is considered passing. Otherwise, the sample is considered failing indicating an intermittent signal problem.		This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes		This test is executed during an engine-off natural vacuum small leak test. The test can only execute up to once per engine-off period. The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete.	Type:A 1 Trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			The abrupt change is defined as a change in vacuum:	112 Pa < Vacuum < 249 Pa			The test will report a failure if 2 out of 3 samples are failures.	
			in the span of 1.0 seconds.					
			A refueling event is confirmed if the fuel level has a persistent change					
			for 30 seconds.	of 10 %				
Evaporative Emission (EVAP) System Large Leak Detected	P0455	This DTC will detect a weak vacuum condition (large leak or purge blockage) in the EVAP system. Purge valve is controlled (to allow purge flow) and vent valve is commanded closed.	Purge volume	> 17 liters	Fuel Level	10% ≤ Percent ≤ 90%	Once per cold start	Type B 2 trips
			BEFORE		System Voltage	11 volts ≤ Voltage ≤ 32 volts		
			Tank vacuum	≤ 2740 Pa	BARO	≥ 70 kPa	Time is dependent on driving conditions	
					Purge Flow	≥ 3.75 %		
					No active DTCs:	MAP_SensorFA		
			2 liters of fuel must be consumed after setting the DTC active the first time to set the DTC active the second time.			TPS_FA VehicleSpeedSensor_FA IAT_SensorCircuitFA		
						ECT_Sensor_FA AmbientAirDefault_NA	Maximum time before test abort is 1000 seconds	
						EnginePowerLimited		
			<u>Weak Vacuum Follow-up Test</u> (fuel cap replacement test) Weak Vacuum Test failed.			P0443 P0449 P0452		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Passes if tank vacuum Note: Weak Vacuum Follow-up Test can only report a pass.	≥ 2740 Pa	 Cold Start Test If ECT > IAT, Startup temperature delta (ECT-IAT): Cold Test Timer Startup IAT Temperature Startup ECT Weak Vacuum Follow-up Test This test can run following a weak vacuum failure or on a hot restart.	P0453 P0454 ≤ 8 °C ≤ 1000 seconds 4 °C ≤ Temperature ≤ 30 °C ≤ 35 °C	Weak Vacuum Follow-up Test With large leak detected, the follow-up test is limited to 1300 seconds. Once the MIL is on, the follow-up test runs indefinitely.	
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 150 miles.	< 3 liters	Engine Running No active DTCs:	 VehicleSpeedSensor_FA	250 ms / sample Continuous	Type B 2 trips
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 %	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	180 failures out of 225 samples 100 ms / sample Continuous	Type B 2 trips
Fuel Level Sensor 1 Circuit High Voltage	P0463	This DTC will detect a fuel sender stuck out ofrange high in the primary fuel tank.	Fuel level Sender % of 5V range	> 60 %	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	180 failures out of 225 samples 100 ms / sample Continuous	Type B 2 trips
Fuel Level Sensor 1 Circuit Intermittent	P0464	This DTC will detect intermittent fuel level sensor signals that would have caused the engine-off natural vacuum small leak test to abort due to an apparent re-	If a change in fuel level is detected, the engine-off natural vacuum test is aborted due to an apparent refueling event. Subsequent to the abort, a		This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes		This test is executed during an engine-off natural vacuum small leak test. The test can	1 trip Type A

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		fueling event.	refueling rationality test is executed to confirm that an actual refueling event occurred. If a refueling event is confirmed, then the test sample is considered passing. Otherwise, the sample is considered failing indicating an intermittent signal problem.				only execute up to once per engine-off period.	
							The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete.	
			An intermittent change in fuel level is defined as:				The test will report a failure if 2 out of 3 samples are failures.	
			The fuel level changes	by 10 %				
			and does not remain	> 10 %				
			for 30 seconds during a 600 second refueling rationality test.					
Cooling Fan 1 Relay Control Circuit (ODM)	P0480	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 Engine Speed	11 volts ≤ Voltage ≤ 32 volts ≥ 0 RPM	20 failures out of 25 samples 250 ms / sample Continuous with fan operation	Type B 2 trips
Cooling Fan 2 Relay Control Circuit (ODM)	P0481	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 Engine Speed	11 volts ≤ Voltage ≤ 32 volts ≥ 0 RPM	20 failures out of 25 samples 250 ms / sample Continuous with fan operation	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Cooling Fan 3 Relay Control Circuit (ODM)	P0482	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	11 volts ≤ Voltage ≤ 32 volts	20 failures out of 25 samples	Type B 2 trips
					Engine Speed	≥ 0 RPM	250 ms / sample Continuous with fan operation	
Evaporative Emission (EVAP) System Flow During Non-Purge	P0496	This DTC will determine if the purge solenoid is leaking to engine manifold vacuum. This test will run with the purge valve closed and the vent valve closed.	Tank Vacuum for 5 seconds BEFORE Test time	> 2491 Pa ≥ refer to "P0496: Purge Valve Leak Test Engine Vacuum Test Time (Cold Start) as a Function of Fuel Level table" in Supporting Tables Tab.	Fuel Level System Voltage BARO Startup IAT Temperature Startup ECT	10% ≤ Percent ≤ 90% 11 volts ≤ Voltage ≤ 32 volts ≥ 70 kPa 4 °C ≤ Temperature ≤ 30 °C ≤ 35 °C	Once per cold start Cold start: max time is 1000 seconds	Type B 2 trips
					No active DTCs:	MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorCircuitFA ECT_Sensor_FA AmbientAirDefault_NA EnginePowerLimited P0443 P0449 P0452 P0453 P0454		
Engine Oil Pressure (EOP) Sensor Performance	P0521	Determines if the Engine Oil Pressure (EOP) Sensor is stuck or biased in range	**To fail a currently passing test:**		Diagnostic enabled/disabled		Performed every 100 msec	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						Enabled		
			The filtered,weighted difference between measured EOP and predicted EOP (a function of engine speed and engine oil temp.):	< -50.0 kPa OR > 50.0 kPa	Oil Pressure Sensor In Use	Present		
			To pass a currently failing test: The filtered, weighted difference between measured EOP and predicted EOP (a function of engine speed and engine oil temp.):	> -47.0 kPa AND < 47.0 kPa	Filtered engine oil pressure test weighting (function of engine speed, engine oil temperature, predicted oil pressure, and engine load stability). Details on Supporting Tables Tab (P0521 Section)	>= 0.30 weighting		
					No active DTC's	Fault bundles: CrankSensorFA ECT_Sensor_FA MAF_SensorFA IAT_SensorFA EOPCircuit_FA		
Engine Oil Pressure (EOP) Sensor Circuit Low Voltage	P0522	Determines if the Engine Oil Pressure (EOP) Sensor circuit voltage is too low	(Engine Oil Pressure Sensor Circuit Voltage) / 5 Volts	< 5 percent	Engine Running	= True	50 failures out of 63 samples	Type B 2 trips
					Ignition Voltage	<= 32.0 V and >= 11.0 V		
					Sensor Present	Yes	Performed every 100 msec	
					Diagnostic enabled/disabled	Enabled		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Engine Oil Pressure (EOP) Sensor Circuit High Voltage	P0523	Determines if the Engine Oil Pressure (EOP) Sensor circuit voltage is too high	(Engine Oil Pressure Sensor Circuit Voltage) / 5	> 95 percent	Engine Running Ignition Voltage Sensor Present Diagnostic enabled/disabled	= True <= 32.0 V and >= 11.0 V Yes Enabled	204 failures out of 255 samples Performed every 100 msec	Type B 2 trips
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	Cruise switch data integrity is equal to "illegal range"		CAN based switch diagnostic 1 is TRUE	fail continuously for greater than 0.700 seconds	Special Type C MIL: NO Trips: 1
Cruise Control Resume Circuit	P0567	Detects a failure of the cruise resume switch in a continuously applied state	Cruise Control Resume switch remains applied for greater than a calibratable period of time			CAN based switch diagnostic 1 is TRUE	fail continuously for greater than 90.000 seconds	Special Type C C
Cruise Control Set Circuit	P0568	Detects a failure of the cruise set switch in a continuously applied state	Cruise Control Set switch remains applied for greater than a calibratable period of time			CAN based switch diagnostic 1 is TRUE	fail continuously for greater than 90.000 seconds	Special 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 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			CAN based switch diagnostic 1 is TRUE	10/16 counts	Special Type C MIL: NO Trips: 1
Control Module Read Only Memory (ROM)	P0601	This DTC will be stored if the calibration check sum is incorrect	Output state invalid		PCM State	= crank or run	Diagnostic runs continuously in the background Diagnostic reports a fault if 1 failure occurs on the first pass. Diagnostic reports a fault if 5 failures occur after the first pass is complete.	Type A 1 trips
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 PCM is identified through calibration as a Service PCM	Diagnostic runs at powerup	Type A 1 trips
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 1 failure occurs	Type A 1 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
ECM RAM Failure	P0604	Indicates that the ECM is unable to correctly read data from or write data to RAM	1. Primary processor data pattern written doesn't match the pattern read for a count >	1 count if found on first memory scan. 5counts if found on subsequent scans.			1. Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously	Type A 1 trips
			2. Secondary processor battery backed RAM failed checksum twice for original values at power up and the defaulted values				2. Completion at initialization, <500 ms	
			3. Secondary processor copy of calibration area to RAM failed for a count >	2counts			3. Completion at initialization, <500 ms	
			4. Secondary Processor data pattern written doesn't match the pattern read consecutive times				4. Will finish within 30 seconds at all engine conditions.	
			5. Secondary Processor TPS or APPS minimum learned values fail compliment check continuously				5. 0.0625sec continuous	
ECM Processor	P0606	Indicates that the ECM has detected an internal processor integrity fault						Type A 1 trips
1.Communication of Seed & Key values between processors			Returned values from Seed & Key algorithm different than expected			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	1. 3/4 counts; 0.0ms/count	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						No errors exist in intercommunication between primary and secondary processors		
2. Processor Performance Check - ETC software is not executed or it is not executed in in proper order			Software tasks on the Primary Processor in the 12.5 ms loop were not executed or were not executed in the correct order.	0.0625sec continuous		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	2. 0.0625sec continuous	
			Software tasks on the Primary Processor in the 25 ms loop were not executed or were not executed in the correct order.	0.1250sec continuous			0.1250sec continuous	
			Software tasks on the Primary Processor in the 50 ms loop were not executed or were not executed in the correct order.	0.2500sec continuous			0.2500sec continuous	
			Software tasks on the Primary Processor in the 100 ms loop were not executed or were not executed in the correct order.	0.5000sec continuous			0.5000sec continuous	
			The first completion of the RAM diagnostic on the Primary Processor was completed > the amount of time	360.0000sec continuous			360.0000sec continuous	
			The first completion of the ROM diagnostic on the Primary Processor was completed > the amount of time	360.0000sec continuous			360.0000sec continuous	
			Software tasks on the Secondary Processor were not executed or were not executed in the correct order.	Two Consecutive Loops (12.5ms * 2) 25ms			25 ms	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
3. Processor Performance Check - SPI Failure			Loss or invalid message of SPI communication from the Secondary Processor at initialization detected by the Primary Processor or loss or invalid message of SPI communication from the Secondary Processor after a valid message was received by the Primary Processor Loss or invalid message of SPI communication from the Primary Processor at initialization detected by the Secondary Processor or loss or invalid message of SPI communication from the Primary Processor after a valid message was received by the Secondary Processor			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	In the primary processor, 159/400 counts intermittent or 15 counts continuous; 39 counts continuous @ initialization In the secondary processor 0.4750sec at initialization, 0.1750sec continuous or 20/200 intermittent.	
4. Processor Performance Check - Secondary Processor state of health (Main)			Primary processor check of the secondary processor by verifying the hardware line toggle between the two processors toggles within the threshold values	9.3750sec and 15.6250sec		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	9counts continuous at initialization or 9 counts continuous; 12.5 msec /count in the Primary processor	
5. Processor Performance Check - Primary Processor Learn Corruption Fault			Primary Processor TPS or APPS minimum learned values fail compliment check			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.1000sec continuous	
6. Processor Performance Check - Primary Processor Clock Fault			The ocillator failed for the Primary processor where the clock is outside the threshold	27.85 kHz and 37.68 kHz		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	100ms continuous	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
7. Processor Performance Check - Secondary Processor ALU Fault			The secondary check of the ALU failed to compute the expected result			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	12.5ms continuous	
8. Processor Performance Check - Secondary Processor Register Configuration Fault			Secondary processor failed configuration check of the registers.			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	12.5ms continuous	
9. Processor Performance Check - Secondary Processor StackFault			Secondary processor checks stack beginning and end point for pattern written at initialization .			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	12.5ms continuous	
10. Processor Performance Check - Secondary Processor MAIN Processor Fault			Secondary processor check that the Primary processor hasn't set a select combination of internal processor faults			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	12.5ms continuous	
11. Processor Performance Check - Primary Processor ALU Fault			The primary processor check of the ALU failed to compute the expected result	Two Consecutive Times			12.5ms continuous	
12. Processor Performance Check - Primary Processor Register Configuration Fault			Primary processor failed configuration check of the registers.				12.5ms continuous	
Main & MHC state of health fault	P0607	Primary state of health (SOH) discrete line is not toggling between the two processors for a time >	0.4875sec			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.4875sec continuous	Special Type C

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
								MIL: NO Trips: 1
Control Module Accelerator Pedal Position (APP) System Performance	P060D	Verify that the indicated accelerator pedal position calculation is correct	1. PPS sensor switch fault - When the APP sensor 2 is shorted to ground, the sensor value is >	41		1. Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions Engine Running TPS minimum learn is not active No Pedal related errors or diagnostic faults. Diagnostic is enabled (Only applicable for Legacy accelerator pedals)	Consecutive checks within 200ms or 2/2 counts; 175msec/count	Type A 1 trips
			2. Difference between primary processor indicated accelerator pedal position and secondary indicated accelerator pedal position is >	5		2. Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions Primary processor Pedal Sync Error is FALSE	44/40 counts or 39 counts continuous; 12.5 msec/count in the Secondary processor	
						Engine Running TPS minimum learn is not active Diagnostic is enabled (Only applicable for Legacy accelerator pedals)		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Control Module EEPROM Error	P062F	Indicates that the NVM Error flag has not been cleared	Last EEPROM write did not complete		Ignition State	#NAME?	1 test failure Diagnostic runs once at powerup	Type A 1 trips
5 Volt Reference #1 Circuit	P0641	Detects a continuous or intermittent short on the 5 volt reference circuit #1	Primary Processor Vref1 < Primary Processor Vref1 >	4.875 5.125		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19/39 counts or 0.1875sec continuous; 12.5 msec/count in Primary processor	Type A 1 trips
			Secondary Processor Vref1 < Secondary Processor Vref1 >	4.875 5.125			19/39 counts or 15 counts continuous; 12.5 msec/count in Secondary processor	
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	11 volts ≤ Voltage ≤ 32 volts	20 failures out of 25 samples 250 ms / sample Continuous	Type B 2 trip NO MIL
5 Volt Reference #2 Circuit	P0651	Detects a continuous or intermittent short on the 5 volt reference circuit #2	Primary Processor Vref2 < or Primary Processor Vref2 >	4.875 5.125		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19/39 counts or 0.1875sec continuous; 12.5 msec/count in main /Secondary processor	Type A 1 trips
			Secondary Processor Vref1 < Secondary Processor Vref1 >	4.875 5.125			19/39 counts or 15 counts continuous; 12.5 msec/count in Secondary processor	1

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
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	11 volts ≤ Voltage ≤ 32 volts	8 failures out of 10 samples 250 ms / sample Continuous	Type B 2 trip
Powertrain Relay Feedback Circuit High	P0690	This DTC is a check to determine if the Powertrain relay is functioning properly.	PT Relay feedback voltage is Stuck Test: PT Relay feedback voltage is when commanded 'OFF'	≥ 18 volts > 2 volts	Powertrain relay commanded "ON" No active DTCs:	PowertrainRelayStateOn_Error	5 failures out of 6 samples 1second / sample Stuck Test: 100 ms/ sample Continuous failures ≥ 2 seconds	Type B 2 trip
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
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 for Hybrid)	Message <> 2's complement of message	Serial communication to EBTCM (U0108) Power Mode	No loss of communication = Run	Count of 2's complement values not equal >= 10	1 trip(s) Special Type C

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			OR		Propulsion System	= Active		
			Serial Communication message ($140 for PPEI2 or $1C9 for PPEI3, $1CA 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	
			OR					
			Too many minimum limit torque request transitions occur from TRUE to FALSE to TRUE within a time period	Requested torque intervention type toggles from not increasing request to increasing request			>= 3 multi-transitions out of 5 samples	
			Torque request greater than allowed				Traction Torque Request >= Driver + 1946 Nm for axle torque based traction system	
							Performed every 25 msec	
Motor Electronics Coolant Temperature Sensor Circuit Range/Performance	P0A01	Determines the Range/Performance of the PECL	**Cold Start Fail:**		Engine off time	> 28800 seconds	Once at powerup (12.5ms frequency)	Type B 2 trips
			Delta between powerup PECL temp and ECT	> 30° C	No active DTC's:	P0112 P0113 P0117 P0118 P0101 P0102 P0103 P0A02 P0A03 P2610		
			&					
			Delta between powerup ECT and IAT	<= 15.75 ° C				
			Cold Start Pass:					
			Delta between powerup PECL temp and ECT	<= 15.75 ° C				
			&					
			Delta between powerup PECL temp and IAT	<= 15.75 ° C				

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Motor Electronics Coolant Temperature Sensor Circuit Low	P0A02	Determines the PECL Out of range low	Motor Electronics Coolant Temperature Sensor Resistance	< 25 Ω (≥ 162°C)	No Active DTC's Minimum IAT Propulsion active time	P0112 P0113 < 70° C > 10 Seconds	30 Failures out of 50 Samples Frequency: 100ms	Type B 2 trips
Motor Electronics Coolant Temperature Sensor Circuit High	P0A03	Determines the PECL Out of range high	Motor Electronics Coolant Temperature	< -60.5° C	No Active DTC's	IAT_SensorCircuitFA	100 ms	Type B 2 trips
Motor Electronics Coolant Temperature Sensor Circuit High	P0A03	Determines the PECL Out of range high	Motor Electronics Coolant Temperature Sensor Resistance	> 200,000 Ω (≤ -60.5°C)	No Active DTC's Minimum IAT Propulsion active time	P0112 P0113 > -20ºC > 10 Seconds	30 Failures out of 50 Samples Frequency: 100ms	Type B 2 trips
Hybrid Powertrain Control Module	P0A1D	Indicates that the MCPA has detected an HCP Status Failure fault	ECM criteria to look for MCPA message			Run/Crank High for at least 2.5000sec All other parameters and enable conditions are controlled by the PLD and MCPA processors in the HCP.	3/4 counts; 12.5ms/count	Type B 2 trip
Hybrid Powertrain Control Module Request MIL Illumination	P0AC4	Monitor Hybrid Control Module (HCP) MIL Request to determine when the HCP has detected a MIL illuminating fault.	HCP Emissions-Related DTC set			Time since power-up > 3 seconds Time Since Code Clear > 2 seconds Diagnostic System not Disabled for Service Run Crank Active	Continuous 100 msec	Type A 1 trips MIL: NO

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Inlet Airflow System Performance (naturally aspirated applications)	P1101	Determines if there are multiple air induction problems affecting airflow and/or manifold pressure.	Filtered Throttle Model AND (ABS(Measured Flow – Modeled Air Flow) Filtered OR ABS(Measured MAP – MAP Model 1) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered 16	<= 150 kPa*(g/s) > 10 grams/sec > 15.0 kPa) > 15.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 450 RPM <= 5700 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C >= 0.00 Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Estimate MAP Model 1 multiplied by MAP1 Residual Weight Factor based on RPM MAP Model 2 multiplied by MAP2 Residual Weight Factor based on RPM	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:	See table "IFRD Residual Weighting Factors". MAP_SensorCircuitFA MAF_SensorCircuitFA CrankSensor_FA ECT_sensor_FA ECT_Sensor_FP IAT_SensorFA IAT_SensorCircuitFP CylDeacSystemTFTKO		
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. OR If Slope Time 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 table & "P1133 - O2S HC R to L Switches Limit Bank 1 Sensor 1" Pass/Fail Threshold table in Supporting tables tab) OR S/T L/R switches < 3, or S/T R/L switches < 3	No Active DTC's	TPS_ThrottleAuthority Defaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault_NA MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA EthanolCompositionSensor_FA EngineMisfireDetected_FA	Sample time is 40 seconds Frequency: Once per trip Green Sensor Delay Criteria The diagnostic will not be enabled until the next ignition cycle after the following has been met: 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	Type B 2 trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Bank 1 Sensor 1 DTC's not active	= P0131, P0132 or P0134	run on that ignition cycle). Note: This feature is only enabled when the vehicle is new and cannot be enabled in service	
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					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		
					O2 Heater on for	>= 0 seconds		
					Learned Htr resistance	= Valid		
					Engine Coolant	> 55 ºC		
					IAT	> -40 ºC		
					Engine run Accum	> 160 seconds		
					Time since any AFM status change	> 2.0 seconds		
					Time since Purge On to Off change	> 1.0 seconds		
					Time since Purge Off to On change	> 2.0 seconds		
					Purge duty cycle	>= 0 % duty cycle		
					Engine airflow	20 gps <= engine airflow <= 55 gps		
					Engine speed	1000 <= RPM <= 3000		
					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		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Transient Fuel Mass	<= 100.0 mgrams		
					Baro	= Not Defaulted		
					Fuel Control State	not = Power Enrichment		
					Fuel State	DFCO not active		
					Commanded Proportional Gain	>= 0.0 %		
					All of the above met for Time	> 4.5 seconds		
O2S Insufficient Switching Bank 2 Sensor 1	P1153	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. OR If Slope Time 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 "P1153 - O2S HC L to R Switches Limit Bank 2 Sensor 1" Pass/Fail Threshold table & "P1153 - O2S HC R to L Switches Limit Bank 2 Sensor 1" Pass/Fail Threshold table in Supporting tables tab) OR S/T L/R switches < 3, or S/T R/L switches < 3	No Active DTC's	TPS_ThrottleAuthority Defaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault_NA MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA EthanolCompositionSensor_FA EngineMisfireDetected_FA	Sample time is 40 seconds Frequency: Once per trip <u>Green Sensor Delay Criteria</u> The diagnostic will not be enabled until the next ignition cycle after the following has been met: 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).	Type B 2 trip
					Bank 2 Sensor 1 DTC's not active	= P0151, P0152 or P0154		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					System Voltage	10.0 volts < system voltage< 32.0 volts	Note: This feature is only enabled when the vehicle is new and cannot be enabled in service	
					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		
					O2 Heater on for	>= 0 seconds		
					Learned Htr resistance	= Valid		
					Engine Coolant	> 55 ºC		
					IAT	> -40 ºC		
					Engine run Accum	> 160 seconds		
					Time since any AFM status change	> 2.0 seconds		
					Time since Purge On to Off change	> 1.0 seconds		
					Time since Purge Off to On change	> 2.0 seconds		
					Purge duty cycle	>= 0 % duty cycle		
					Engine airflow	20 gps <= engine airflow <= 55 gps		
					Engine speed	1000 <= RPM <= 3000		
					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		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Baro	= Not Defaulted		
					Fuel Control State	not = Power Enrichment		
					Fuel State	DFCO not active		
					Commanded Proportional Gain	>= 0.0 %		
					All of the above met for Time	> 4.5 seconds		
EngineMetal OvertempActive	P1258	The objective of the algorithm is to protect the engine in the event of engine metal overtemperature, mainly due to loss of coolant	The ECM detects that the engine coolant has exceeded a threshold for certain amount of time.	Engine Coolant > 132 for 10 seconds	If feature was active and it set the coolant sensor fault then feature will be enabled on coolant sensor fault pending on the next trip.	KeEMOG_b_DisableOvertempProtect = 0 Feature is enabled only if KeEMOG_b_DisableOvertempProtect = 1 and Engine Run time > 10	Time that EMOP active must be true for P1258 to be set is 0 seconds	Type A 1 trips
ABS Rough Road malfunction	P1380	This diagnostic detects if the ABS controller is indicating a fault, and misfire is present. When this occurs, misfire will continue to run.	GMLan Message: "Wheel Sensor Rough Road Magnitude Validity"	= FALSE	Vehicle Speed	VSS ≥ 5 MPH	40 failures out of 80 samples	1 trips Type C
					Engine Speed	rpm < 8192		
					Engine Load	load < 60	250 ms /sample	"Special Type C"
					RunCrankActive	= TRUE	Continuous	
					Active DTC	P0300, MIL Request		
ABS System Rough Road Detection Communication Fault	P1381	This diagnostic detects if the rough road information is no longer being received from the ABS controller, and misfire is present. When this occurs, misfire will continue to run.	Loss of GMLan Message: "Wheel Sensor Rough Road Magnitude"	= FALSE	Vehicle Speed	VSS ≥ 5 MPH	40 failures out of 80 samples	1 trips Type C
					Engine Speed	rpm < 8192		
					Engine Load	load < 60	250 ms /sample	"Special Type C"
					RunCrankActive	= TRUE	Continuous	
					Active DTC	P0300, MIL Request		

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 estimated accumulated exhaust power OR Average desired accumulated exhaust power - Average estimated accumulated exhaust power (EWMA filtered)	< -11.00 KJ/s (high RPM failure mode) > 6.00 KJ/s (low RPM failure mode)	Cold Start Emission Reduction Strategy Is Active. To enable the cold start emission reduction strategy the catalyst temperature must be < 300.00 degC and the engine coolant must be > 0.00 degC.		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)
					The Cold Start Emission Reduction strategy will exit when the catalyst temp is >= 600.00 degC and the engine run time is >= 10.00 seconds. The cold start emission reduction strategy may also exit if the engine run time is >= 90.00 seconds.			
					Vehicle Speed	< 1.2 MPH		
					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 delay timer > 5.00 seconds the diagnostic will continue the calculation.			
					Idle Speed Control System is Active (always TRUE in Hybrid vehicle).			
					General Enable			
					DTC's Not Set			
					ECT_Sensor_FA			
					IAT_SensorCircuitFA			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					CrankSensorFaultActive			
					FuelInjectorCircuit_FA			
					MAF_SensorFA			
					MAP_SensorFA			
					EngineMisfireDetected_FA			
					FuelInjectorCircuit_FA or			
					IAC_SystemRPM_FA			
					IgnitionOutputDriver_FA			
					TPS_FA			
					VehicleSpeedSensor_FA			
					MAP_SensorFA			
					MAF_SensorFA			
					FuelTrimSystemB1_FA or			
					FuelTrimSystemB2_FA or			
Throttle Actuator Control - Position Performance	P1516	1) Detect a throttle positioning error	The throttle model and actual Throttle position differ by >	7.196%.		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.1875sec in the Secondary processor	Type A 1 trips
			or					
			The actual Throttle position and throttle model differ by >	7.196%.				
					Engine Running or Ignition Voltage >	11		
					and Ignition Voltage >	5.4		
					and Throttle is being Controlled			
					and Communication Fault (SPI is not set)			
					and TPS minimum learn is not active			
					Ignition voltage failure is false (P1682)			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		2) Detect throttle control is driving the throttle in the incorrect direction	Throttle Position >	39.761%.		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.1375sec continuous	
					(Throttle is being Controlled and			
					TPS minimum learn is active) or			
					Reduce Engine Power is Active			
		3) Degraded Motor	Desired throttle position is stable within 0.25% for 4.0000sec and the delta between Indicated throttle position and desired throttle position in greater than 2.00%		Engine Running or Ignition Voltage >	11	0.4875sec continuous on secondary processor	
					and Ignition Voltage >	5.4		
					and Throttle is being Controlled			
					and Communication Fault (SPI is not set)			
					and TPS minimum learn is not active			
					Ignition voltage failure is false (P1682)			
Hybrid Control Torque Request Circuit	P15F2	Determines if torque request from the HCP is valid						Type A 1 trips
			1. Serial Communication 2's complement not equal for message $0A9		Secondary High Speed Bus is Present			
				Message <> 2's complement of message	No Serial communication loss to HCP (U1817)		>= 10 Password Protect errors out of 16 samples	
			OR				**OR**	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			2. Serial Communication rolling count value shall be + 1 from previous $0A9 message	Message rolling count value <> previous message rolling count value plus one	Run Crank Active	>= 0.50 Sec	>= 10 Rolling count errors out of 16 samples Pass diagnostic if samples >=16 Performed every 12.5 msec	
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 – ETC Run/Crank| >	3.00Volts	Powertrain commanded on and Run/crank voltage > or ETC Run/crank voltage > and Run/crank voltage >	Table, f(IAT). See supporting tables 5.5 5.5	240/480 counts 12.5 msec/count in main processor or 0.1750sec when ETC Run/Crank is lower than Run/Crank by the threshold value continuous;	Type A 1 trips
Remote Vehicle Speed Limiting Signal Circuit	P162B	Determines if the speed request from OnStar is valid	**Password Protect error** - Serial Communication message - ($3ED) OR **Rolling count error** - Serial Communication message ($3ED) rolling count value	Message <> two's complement of message	Vehicle Requested Speed Limit	< 136 MPH	>= 10 Password Protect errors out of 10 samples	Special Type C 1 trip(s)

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
				Message <> previous message rolling count value + one			>= 10 Rolling count errors out of 10 samples	
							Performed every 25 msec	
Internal Control Module Redundant Memory Performance	P16F3	Detect Processor Calculation faults due to RAM corruptions, ALU failures and ROM failures						Type A 1 trips
			Desired engine torque request greater than redundant calculation plus threshold	61.77Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Cylinders active greater than commanded	1 cylinder		Engine speed greater than 0rpm and less than 3200rpm	11/12 counts; each cylinder firing event/count	
			Engine min capacity above threshold	61.77Nm		Ignition in unlock/accessory, run or crank	3/4 counts; 12.5msec/count	
			No fast unmanaged retarded spark above the applied spark plus the threshold	Table, f(Erpm). See supporting tables		LoRes if engine rpm < 4500/4700rpm (hysteresis pair) 6.25ms if engine rpm >= 4500/4700rpm (hysteresis pair)	6/8 counts; each cylinder firing event/count	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Absolute difference of adjustment factor based on temperature and its dual store above threshold	3.99m/s		Ignition in unlock/accessory, run or crank	2/4 counts; 100.0msec/count	
			1) Absolute difference of redundant calculated engine speed above threshold 2)Time between lores events and its dual store do not equal	1) Table, f(Erpm). See supporting tables		Engine speed greater than 0rpm	6/8 counts; each cylinder firing event/count	
			After throttle blade pressure and its dual store do not match	N/A		Ignition in unlock/accessory, run or crank	8/16 counts; 12.5msec/count	
			Engine oil temperature and its dual store do not equal	N/A		Ignition in unlock/accessory, run or crank	3/4 counts; 50.0msec/count	
			Desired throttle position greater than redundant calculation plus threshold	7.20%.		Ignition in unlock/accessory, run or crank	8/16 counts; 12.5msec/count	
			Absolute difference of the rate limited pre-throttle pressure and its redundant calculation greater than threshold	0.72 kpa/s		Ignition in unlock/accessory, run or crank	8/16 counts; 12.5msec/count	
			Throttle desired torque above desired torque plus threshold	0.00Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Desired filtered throttle torque exceeds the threshold plus the higher of desired throttle torque or modeled throttle torque	62.77Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Torque feedback proportional term is out of allowable range or its dual store copy does not match	High Threshold 31.39Nm Low Threshold -31.39Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Torque feedback integral term magnitude or rate of change is out of allowable range or its dual store copy does not match	High Threshold 62.77Nm Low Threshold -62.77Nm Rate of change threshold 7.85Nm/loop		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Difference of Final Torque feedback proportional plus integral term and its redundant calculation is out of bounds given by threshold range	High Threshold 0.00Nm Low Threshold -0.00Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Difference of torque desired throttle area and its redundant calculation is out of bounds given by threshold range	High Threshold 0.50% Low Threshold -0.50%		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Difference of torque model coefficients and its redundant calculation is out of bounds given by threshold range	High Threshold 0.00 Low Threshold -0.00		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Difference of base friction torque and its redundant calculation is out of bounds given by threshold range	High Threshold 1.00Nm Low Threshold -1.00Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Accessory drive friction torque is out of bounds given by threshold range	High Threshold 62.77Nm Low Threshold 0.00Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			AC friction torque is out of bounds given by threshold range	High Threshold 62.77Nm Low Threshold 0.00Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Difference of Oil temperature delta friction torque and its redundant calculation is out of bounds given by threshold range	High Threshold 1.00Nm Low Threshold -1.00Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Generator friction torque is out of bounds given by threshold range	High Threshold 62.77Nm Low Threshold 0.00Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Supercharger friction torque is out of bounds given by threshold range	High Threshold 62.77Nm Low Threshold 0.00Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Filtered Torque error magnitude or its increase rate of change is out of allowable range or its dual store copy does not match	High Threshold 62.77Nm Low Threshold -62.77Nm Rate of change threshold 7.85Nm/loop		Engine speed >0rpm MAF, MAP and Baro DTCs are false	4/8 counts; 25.0msec/count	
			Torque error compensation is out of bounds given by threshold range	High Threshold 62.77Nm Low Threshold 0.00Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Delta Torque Baro compensation is out of bounds given by threshold range	High Threshold 16.70Nm Low Threshold -12.68Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			1) Difference of reserve torque value and its redundant calculation exceed threshold 2) Reserve request does not agree with operating conditions 2) Difference of final predicted torque and its redundant calculation exceed threshold 3) Rate of change of reserve torque exceeds threshold, increasing direction only 4) Reserve engine torque above allowable capacity by the threshold	1) 61.77Nm 2) NA 3) 61.77Nm 4) 61.77Nm		1&2) Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 62.77Nm 3&4) Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Absolute difference of the calculated spark offset for equivalence ratio and its redundant calculation greater than threshold	3.17 degrees		Engine speed >0rpm	6/8 counts; if engine rpm< 2900.00rpm, each cylinder firing event/count or if engine rpm >=2900.00rpm, 12.5ms/count	
			Engine Vacuum and its dual store do not match	N/A		Ignition in unlock/accessory, run or crank	8/16 counts; 12.5msec/count	
			Absolute difference of the calculated Intake Manifold Pressure during engine event versus during time event is greater than threshold	Table, f(Engine Torque). See supporting tables		Engine speed >0rpm	6/8 counts; each cylinder firing event/count	
			Min. Axle Torque Capacity is greater than threshold	1946.19Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Predicted torque for zero pedal determination is greater than threshold	62.77 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Commanded Predicted Axle Torque and its dual store do not match	1 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Steady State Estimated Engine Torque and its dual store are not equal	N/A		DoD not changing from Active to Inactive and preload torque not changing and one loop after React command Engine speed >0rpm	4/8 counts; 25.0msec/count	
			Difference of Weighting factor for number of cylinders fueled and its redundant calculation is above threshold	0.26		Engine run flag = TRUE > 1.00s	6/8 counts; 25.0msec/count	
			Difference of minimum spark advance limit and its redundant calculation is out of bounds given by threshold range	3.17 degrees		Ignition in unlock/accessory, run or crank	6/8 counts; if engine rpm< 4500rpm, 12.5msec/count or if engine rpm >=4500rpm, 50ms/count	
			Difference of commanded spark advance and adjusted delivered is out of bounds given by threshold range	3.17 degrees		Engine speed >0rpm	6/8 counts; if engine rpm< 4500/4700rpm (hysteresis pair), each cylinder firing event/count or if engine rpm >=4500/4700rpm (hysteresis pair), 6.25ms/count	
			Estimated Engine Torque and its dual store are not match	62.77Nm		Engine speed >0rpm	4/8 counts; 25.0msec/count	
			Estimated Engine Torque without reductions due to torque control and its dual store are not match	62.77Nm		Engine speed >0rpm	4/8 counts; 25.0msec/count	
			Commanded Engine Torque from Hybrid control module and its dual store are not equal	N/A		Ignition in unlock/accessory, run or crank	10/16 counts; 12.5msec/count	
			Difference of desired spark advance for managed torque and its redundant calculation is out of bounds given by threshold range	3.17 degrees		Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 62.77Nm	6/8 counts; if engine rpm< 4500/4700rpm (hysteresis pair), each cylinder firing event/count or if engine rpm >=4500/4700rpm (hysteresis pair), 6.25ms/count	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Absolute difference of Engine Capacity Minimum Running Immediate Brake Torque Excluding Cylinder Sensitivity and its redundant calculation is out of bounds given by threshold range	62.77Nm		Engine speed >0rpm	4/8 counts; 25.0msec/count	
			One step ahead calculation of air-per-cylinder and its dual store do not match	41.00g/s		Engine speed >0rpm	6/8 counts; each cylinder firing event/count	
			One step ahead calculation of air-per-cylinder greater than two step ahead calculation by threshold for time	Threshold: Dynamically calculated based on current engine conditions Fault Pending Threshold: 100ms Fault Active Threshold: 175ms		Engine speed > 500rpm	175.0000ms continuous	
			Rate limited cruise axle torque request and its dual store do not match	243.27Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			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 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	1) 1.00% 2) NA 3) NA		Ignition in unlock/accessory, run or crank	8/16 counts; 12.5msec/count	
			Commanded axle torque is greater than its redundant calculation by threshold	1946.00Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Commanded axle torque is less than its redundant calculation by threshold	-1460.00Nm		Ignition in unlock/accessory, run or crank Redundant commanded axle torque < --1460.00Nm	4/8 counts; 25.0msec/count	
			Preload Throttle Area is greater than its redundant calculation by threshold	0.10%.		Engine speed >0rpm	6/8 counts; each cylinder firing event/count	
			Preload timer and its redundant calculation do not equal	NA		Ignition in unlock/accessory, run or crank	6/8 counts; each cylinder firing event/count	
			Preload Throttle Area and its dual store do not equal	NA		Ignition in unlock/accessory, run or crank	6/8 counts; each cylinder firing event/count	
			Commanded engine torque due to fast actuators and its dual store do not equal	NA		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Commanded engine torque due to slow actuators and its dual store do not equal	NA		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Signed filtered defaulted output speed calculated from TOS and its dual store do not equal	NA		Hybrid control module only Ignition in unlock/accessory, run or crank	5/15 counts; 25.0msec/count	
			Arbitrated Air-Per-Cylinder filter coefficient is out of bounds given by threshold range	High Threshold 1.000 Low Threshold 0.200		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Shaped driver axle torque is out of bounds given by threshold range	High Threshold 1946.00Nm Low Threshold -2920.00Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Launch spark is active but the launch spark redundant path indicates it should not be active	NA		Engine speed < 4500.00 or 4700.00 rpm (hysteresis pair)	6/8 counts; 12.5msec/count	
			Rate limited vehicle speed and its dual store do not equal	NA		Time since first CAN message with vehicle speed >= 0.500sec	4/8 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 neutral and its dual store do not equal	NA		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Throttle progression mode and its dual store do not equal	NA		Ignition in unlock/accessory, run or crank	8/16 counts; 12.5msec/count	
			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 in unlock/accessory, run or crank	255/6 counts; 25.0msec/count	
			TOS to wheel speed conversion factor and its dual store do not equal	NA		Ignition in unlock/accessory, run or crank	5/15 counts; 25.0msec/count	
			Cylinders active greater than commanded	2 cylinders		Engine run flag = TRUE > 2.00s Number of cylinder events since engine run > 24 No fuel injector faults active	12/16 counts; each cylinder firing event/count	
			Absolute difference of Friction torque and its redundant calculation is out of bounds given by threshold range	62.77Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Absolute difference of Accessory torque and its redundant calculation is out of bounds given by threshold range	62.77Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Absolute difference of Filtered Air-per-cylinder and its redundant calculation is out of bounds given by threshold range	41.00mg		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Absolute difference between the previous Final Advance and the current Final Advance not Adjusted for Equivalence Ratio is out of bounds given by threshold range	3.17degrees			6/8 counts; if engine rpm< 4500/4700rpm (hysteresis pair), each cylinder firing event/count or if engine rpm >=4500/4700rpm (hysteresis pair), 6.25ms/count	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Equivance Ratio torque compensation exceeds threshold	-62.77Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Absolute difference between Equivance Ratio torque compensation and its dual store out of bounds given bt threshold	62.77Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Zero pedal axle torque is out of bounds given by threshold range	High Threshold 1946.00Nm Low Threshold -1500.00Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
			Creep Coast Axle Torque is out of bounds given by threshold range	High Threshold 1946.00Nm Low Threshold -1500.00Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0msec/count	
Control Module Throttle Actuator Position Performance	P2101	1) Detect a throttle positioning error	Difference between measured throttle position and modeled throttle position >	7.20%.		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	1. 15/15 counts; 12.5 msec/count in the primary processor	Type A 1 trips
					TPS minimum learn is not active and			
					Throttle is being Controlled and			
			Difference between modeled throttle position and measured throttle position >	7.20%.	(Engine Running or Ignition Voltage > or	11		
					Ignition Voltage >)	5.5		
					Ignition voltage failure is false (P1682)			
		2) Detect throttle control is driving the throttle in the incorrect direction or exceed the reduced power limit	Throttle Position >	39.26%.	TPS minimum learn is active		2. 11counts; 12.5 msec/count in the primary processor	
			Throttle Position >	39.06%.	Reduced Power is True			
Throttle return to default	P2119	Throttle unable to return to default throttle position after de-energizing ETC motor.	TPS1 Voltage >	1.689		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.4969sec continuous	Special Type C

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			AND		Throttle de-energized			
			TPS2 Voltage >	1.789	No TPS circuit faults			MIL:
			On the Primary processor		PT Relay Voltage >	5.5		NO
								Trips:
			OR					1
			TPS1 Voltage >	1.689				
			AND					
			TPS2 Voltage >	1.789				
			On the Secondary processor					
Accelerator Pedal Position (APP) Sensor #1	P2120	Detects a continuous or intermittent short or open in APP1 circuit on the secondary processor but sensor is in range on the primary processor	Secondary APP1 Voltage <	0.463		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19/39counts or 14counts continuous; 12.5 msec/count in the secondary processor	Type A 1 trips
			or Secondary APP1 Voltage >	4.75				
					No 5 V reference 2 error			
					No 5 V reference 2 fault (P0651)			
Accelerator Pedal Position (APP) Sensor 1 Lo	P2122	Detects a continuous or intermittent short or open in APP1 circuit on both processors or just the primary processor	1. Primary APP1 Voltage <	0.463		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	1. 19/39counts or 14counts continuous; 12.5 msec/count in the primary processor	Type A 1 trips
					No 5 V reference 2 error			
			2. Secondary APP1 Voltage <	0.463	No 5 V reference 2 fault (P0651)		2. 19/39counts or 14counts continuous; 12.5 msec/count in the secondary processor	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Accelerator Pedal Position (APP) Sensor 1 Hi	P2123	Detect a continuous or intermittent short in the APP1 sensor on on both processors or just the primary processor	1. Primary APP1 Voltage >	4.75		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	1. 19/39counts or 14counts continuous; 12.5 msec/count in the primary processor	Type A 1 trips
			2. Secondary APP1 Voltage >	4.75	No 5 V reference 2 error No 5 V reference 2 fault (P0651)		2. 19/39counts or 14counts continuous; 12.5 msec/count in the secondary processor	
Accelerator Pedal Position (APP) Sensor 2	P2125	Detects a continuous or intermittent short or open in APP2 circuit on the secondary processor but sensor is in range on the primary processor	Secondary APP2 Voltage <	0.325		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19/39counts or 14counts continuous; 12.5 msec/count in the secondary processor	Type A 1 trips
			or Secondary APP2 Voltage >	2.6	No 5 V reference 1 error No 5 V reference 1 fault (P0641)			
Accelerator Pedal Position (APP) Sensor 2 Lo	P2127	Detects a continuous or intermittent short or open in APP2 circuit on both processors or just the primary processor	1. Primary APP2 Voltage <	0.325		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	1. 19/39counts or 14counts continuous; 12.5 msec/count in the primary processor	Type A 1 trips
			2. Secondary APP2 Voltage <	0.325	No 5 V reference 1 error No 5 V reference 1 fault (P0641)		2. 19/39counts or 14counts continuous; 12.5 msec/count in the secondary processor	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Accelerator Pedal Position (APP) Sensor 2 Hi	P2128	Detect a continuous or intermittent short in the APP2 sensor on on both processors or just the primary processor	1. Primary APP2 Voltage >	2.6	No 5 V reference 1 error	Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	1. 19/39 counts or 14counts continuous; 12.5 msec/count in the primary processor	Type A 1 trips
			2. Secondary APP2 Voltage >	2.6	No 5 V reference 1 fault (P0641)		2. 19/39counts or 14counts continuous; 12.5 msec/count in the secondary processor	
Throttle Position (TP) Sensor 1-2 Correlation	P2135	Detects a continuous or intermittent correlation fault between TP sensors #1 and #2 on either processor	1. On the Primary processor, the difference between TPS1 displaced and TPS2 displaced >	7.00% offset at min. throttle position with it linearly increasing to 10% at max. throttle position	No TPS Sensor Faults No 5 V reference DTCs	Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	79/159 counts or 58 counts continuous; 3.125 msec/count in the primary processor	Type A 1 trips
			On the Secondary processor, the difference between TPS1 displaced and TPS2 displaced >	7.00% offset at min. throttle position with it linearly increasing to 10% at max. throttle position				
			2. On the primary processor, the difference between (raw min TPS1) and (raw_min TPS2) >	5.00%.	No TPS Sensor Faults No 5 V reference DTCs	Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19/39 counts or 15 counts continuous; 12.5 msec/count in the secondary processor	
			On the secondary processor, the difference between (raw min TPS1) and (raw_min TPS2) >	5.00%.				

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Accelerator Pedal Position (APP) Sensor 1-2 Correlation	P2138	Detects a continuous or intermittent correlation fault between APP sensors #1 and #2 on either processor	1. On the primary processor, the difference between APP 1 displaced and APP 2 displaced is >	9.51% offset at min. throttle position with it linearly increasing to 10% at max pedal position		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	1. 19/39 counts intermittent or 15 counts continuous, 12.5 msec/count in the primary processor	Type A 1 trips
			On the secondary processor, the difference between APP 1 displaced and APP 2 displaced is >	9.51% offset at min. throttle position with it linearly increasing to 10% at max pedal position	No APP Sensor Faults No 5 V reference DTCs			
			2. On the primary processor, the difference between the learned PPS1 min and PPS2 min >	5.00%.		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	2. 19/39 counts intermittent or 15 counts continuous, 12.5 msec/count in the secondary processor	
			On the primary processor, the difference between the learned PPS1 min and PPS2 min >	5.00%.				
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 >	6.25 MPH	CAN timer >	10.0000sec	400/800 counts for wheel speed correlation or 400/800 counts for TOS correlation; 25msec/count	Type A 1 trips
			Secure vehicle speed source is unavailable			Secure vehicle speed source is TOS vehicle speed or wheel speed vehicle speed Trans engaged state is not equal to not engaged.		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Transfer Case Speed Sensor Output (TCSS)	P2160	No activity in the TCSS Signal circuit	TCSS Raw Speed	<= 50 RPM			>= 5.0 Fail Time (sec)	Type B 2 trips
					Wheel Speed RPM High	<= 3000.0 N-M		
					Wheel Speed RPM Low	>= 100.0 N-M		
					Input Speed	>= 1000 RPM		
					Transmission Range ≠ Park or Neutral			
					Not in Reverse Inhibit state			
					Not garage shifting			
					Disables on these DTCs:	CrankSensorFA		
Transfer Case Speed Sensor Output (TCSS)	P2161	TCSS Circuit Signal Intermittent	Output Speed signal is increasing				>= 4.0 Enable Time (sec)	Type B 2 trips
			TCSS Loop-to-Loop change	>= 475 RPM	Engine Speed Lo	>= 1000 RPM		
			Or					
			Output Speed signal is decreasing		Transmission Range ≠ Park or Neutral			
			TCSS Loop-to-Loop change	>= 225 RPM	Not in Reverse Inhibit state			
					Not garage shifting			
					Disables on these DTCs:	CrankSensorFA P2160		
Minimum Throttle Position Not Learned	P2176	TP sensors were not in the minimum learn window after multiple attempts to learn the minimum.	During TPS min learn on the Primary processor, TPS Voltage >	18.700%.		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	2.0secs continuous	Type A 1 trips
			or					
			During TPS min learn on the Secondary processor, TPS Voltage >	18.700%.	No TPS circuit errors			
					No TPS circuit faults			
					Ignition voltage failure is false (P1682)			
					Minimum TPS learn active			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			and Number of learn attempts >	10counts				
Air Fuel Imbalance Bank 1	P219A	Determines if the air-fuel delivery system is imbalanced by monitoring the pre and post catalyst O2 sensor voltage characteristics	[Bank 1 Filtered Length Ratio variable OR Bank 1 AFM Filtered Length Ratio variable (AFM applications only)] AND [Bank 1 Filtered Post catalyst O2 voltage is NOT between] Note: If the first voltage value is >= the second voltage value, this is an indication that the post catalyst O2 data is not used for diagnosis on this application.	> 0.85 > 0.85 1000 and 0 millivolts	System Voltage	*10 <= V <= 32 for >= 4 seconds*	Frequency: Continuous Monitoring of O2 voltage signal in 12.5ms loop	Type B 2 Trip(s)
		Note: The AFIM Filtered Length Ratio is determined by calculating the difference between the measured O2 voltage length (accumulated O2 voltage over a 2.50 second period) and an emissions-correlated threshold value, divided by the threshold value, and finally multiplied by a Quality Factor (the latter ranges between 0 and 1, based on robustness to false diagnosis in the current operating region). The resulting ratio is then filtered utilizing a first-order lag filter.			Quality Factor	>= 0.80 in the current operating region	AFIM Filtered Length Ratio variable is updated after every 2.50 seconds of valid data.	
					ECT	> -20 oC		
					Engine speed	*425 <= rpm <= 6000*		
					Mass Airflow	*0.5 <= g/s <= 510.0*		
					Cumulative (absolute) delta MAF during the current 2.50 second sample period is Note: This protects against false diagnosis during severe transient maneuvers.	*< 150 g/s*		
					Air Per Cylinder	*0 <= mg/cylinder <= 2000*		
					PerCent Ethanol	<= 87 %		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Positive (rising) Delta O2 voltage during previous 12.5ms is OR Negative (falling) Delta O2 voltage during previous 12.5ms is	> 5.0 millivolts < -5.0 millivolts		
					O2 sensor switches	>= 1 times during current 2.50 second sample period		
					For AFM (Cylinder Deactivation) equipped vehicles only	No AFM state change during current 2.50 second sample period.		
					To improve S/N, pre-catalyst O2 voltages between 1000 and 0 millivolts are ignored. This feature is enabled at Air Per Cylinder values <= 0 mg/cylinder. Note: If the first voltage value is >= the second voltage value, AND/OR the Air Per Cylinder value is equal to zero, the feature is not used on this application and the full pre-catalyst O2 voltage range is utilized.			
					The first report is delayed for 30 seconds to allow time for the AFIM Filtered Length Ratio variable to saturate. This minimizes the possibility of reporting a pass before a potential failure could be detected.			
					Data collection is suspended under the following circumstances: - for 1.0 seconds after AFM transitions - for 1.0 seconds after Closed Loop transitions from Off to On - for 1.0 seconds after purge transitions from Off to On or On to Off - for 1.0 seconds after the AFIM diagnostic transitions from Disabled to Enabled			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Closed Loop fueling enabled >= 2.0 seconds Closed Loop fueling is enabled as a function of Time based on Start-up coolant temp. Please see "Supporting Tables" Tab			
					Fuel System Status	***LONG FT Enabled***		
					No EngineMisfireDetected_FA			
					No MAP_SensorFA			
					No MAF_SensorFA			
					No ECT_Sensor_FA			
					No Ethanol Composition Sensor FA			
					No TPS_ThrottleAuthorityDefaulted			
					No FuelInjectorCircuit_FA			
					No AIR System FA			
					No O2S_Bank_1_Sensor_1_FA			
					No O2S_Bank_2_Sensor_1_FA			
					No EvapPurgeSolenoidCircuit_FA			
					No EvapFlowDuringNonPurge_FA			
					No EvapVentSolenoidCircuit_FA			
					No EvapSmallLeak_FA			
					No EvapEmissionSystem_FA			
					No FuelTankPressureSensorCircuit_FA			
					Device Control Not Active			
					Intrusive Diagnostics Not Active			
					Engine OverSpeed Protection Not Active			
					Reduced Power Mode (ETC DTC) Not Active			
					PTO Not Active			
					Traction Control Not Active			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Air Fuel Imbalance Bank 2	P219B	Determines if the air-fuel delivery system is imbalanced by monitoring the pre and post catalyst O2 sensor voltage characteristics	[Bank 2 Filtered Length Ratio variable OR Bank 2 AFM Filtered Length Ratio variable (AFM applications only)] AND [Bank 2 Filtered Post catalyst O2 voltage is NOT between] Note: If the first voltage value is >= the second voltage value, this is an indication that the post catalyst O2 data is not used for diagnosis on this application.	> 0.50 > 0.50 1000 and 0 millivolts	System Voltage	*10 <= V <= 32 for >= 4 seconds*	<u>Frequency:</u> Continuous Monitoring of O2 voltage signal in 12.5ms loop	Type B 2 Trip(s)
		Note: The AFIM Filtered Length Ratio is determined by calculating the difference between the measured O2 voltage length (accumulated O2 voltage over a 2.50 second period) and an emissions-correlated threshold value, divided by the threshold value, and finally multiplied by a Quality Factor (the latter ranges between 0 and 1, based on robustness to false diagnosis in the current operating region). The resulting ratio is then filtered utilizing a first-order lag filter.			Quality Factor	>= 0.80 in the current operating region	AFIM Filtered Length Ratio variable is updated after every 2.50 seconds of valid data.	
					ECT	> -20 oC		
					Engine speed	*425 <= rpm <= 6000*		
					Mass Airflow	*0.5 <= g/s <= 510.0*		
					Cumulative (absolute) delta MAF during the current 2.50 second sample period is Note: This protects against false diagnosis during severe transient maneuvers.	*< 150 g/s*		
					Air Per Cylinder	*0 <= mg/cylinder <= 2000*		
					PerCent Ethanol	<= 87 %		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Positive (rising) Delta O2 voltage during previous 12.5ms is OR Negative (falling) Delta O2 voltage during previous 12.5ms is	> 5.0 millivolts < -5.0 millivolts		
					O2 sensor switches	>= 1 times during current 2.50 second sample period		
					For AFM (Cylinder Deactivation) equipped vehicles only	No AFM state change during current 2.50 second sample period.		
					To improve S/N, pre-catalyst O2 voltages between 1000 and 0 millivolts are ignored. This feature is enabled at Air Per Cylinder values <= 0 mg/cylinder. Note: If the first voltage value is >= the second voltage value, AND/OR the Air Per Cylinder value is equal to zero, the feature is not used on this application and the full pre-catalyst O2 voltage range is utilized.			
					The first report is delayed for 30 seconds to allow time for the AFIM Filtered Length Ratio variable to saturate. This minimizes the possibility of reporting a pass before a potential failure could be detected.			
					Data collection is suspended under the following circumstances: - for 1.0 seconds after AFM transitions - for 1.0 seconds after Closed Loop transitions from Off to On - for 1.0 seconds after purge transitions from Off to On or On to Off - for 1.0 seconds after the AFIM diagnostic transitions from Disabled to Enabled			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Closed Loop fueling enabled >= 2.0 seconds Closed Loop fueling is enabled as a function of Time based on Start-up coolant temp. Please see "Supporting Tables" Tab			
					Fuel System Status	***LONG FT Enabled***		
					No EngineMisfireDetected_FA			
					No MAP_SensorFA			
					No MAF_SensorFA			
					No ECT_Sensor_FA			
					No Ethanol Composition Sensor FA			
					No TPS_ThrottleAuthorityDefaulted			
					No FuelInjectorCircuit_FA			
					No AIR System FA			
					No O2S_Bank_1_Sensor_1_FA			
					No O2S_Bank_2_Sensor_1_FA			
					No EvapPurgeSolenoidCircuit_FA			
					No EvapFlowDuringNonPurge_FA			
					No EvapVentSolenoidCircuit_FA			
					No EvapSmallLeak_FA			
					No EvapEmissionSystem_FA			
					No FuelTankPressureSensorCircuit_FA			
					Device Control Not Active			
					Intrusive Diagnostics Not Active			
					Engine OverSpeed Protection Not Active			
					Reduced Power Mode (ETC DTC) Not Active			
					PTO Not Active			
					Traction Control Not Active			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Barometric Pressure (BARO) Sensor Performance	P2227	Detects noisy or erratic barometric pressure input	Difference between the current Baro sensor reading and the previous Baro sensor reading	> 10.0 kPa	Ignition has been on Vehicle Speed Engine Run Time No Active DTCs:	> 10.0 seconds < 62.5 MPH > 30.00 seconds AmbientAirPressCktFA ECT_Sensor_FA IAT_SensorFA MAF_SensorFA AfterThrottlePressure_NA or AfterThrottlePressure_SC TPS_FA TPS_Performance_FA VehicleSpeedSensorError	5 failures out of 25 samples 1 sample every 250 msec	Type B 2 trips
Barometric Pressure(BARO) Sensor Circuit Low	P2228	Detects a continuous short to low or open in either the signal circuit or the BARO sensor.	BARO Voltage	< 40.0 % of 5 Volt Range (2.0 Volts = 50.9 kPa)	Engine Run Time	> 30.00 seconds	20 failures out of 25 samples 1 sample every 12.5 msec	Type B 2 trips
Barometric Pressure(BARO) Sensor Circuit High	P2229	Detects an open sensor ground or continuous short to high in either the signal circuit or the BARO sensor.	BARO Voltage	> 90.0 % of 5 Volt Range (4.5 Volts = 115.0 kPa)	Engine Run Time	> 30.00 seconds	20 failures out of 25 samples 1 sample every 12.5 msec	Type B 2 trips
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	Post O2 sensor cannot achieve the rich threshold voltage. AND The Accumulated mass air flow monitored during the Stuck Lean	1) Post O2S signal < 791 mvolts AND 2) Accumulated air flow during stuck lean test > 160 grams.	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR	Type B 2 trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		(during coast) which increases the delivered fuel to achieve the required rich threshold.	Voltage Test is greater than the threshold before the above voltage threshold is met.			AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA	NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	
					B1S2 Failed this key cycle	P013A, P013B, P013E, P013F, P2270 or P2271		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid	Green Sensor Delay Criteria	
					ICAT MAT Burnoff delay	= Not Valid	The diagnostic will not be enabled until the next ignition cycle after the following has been met: 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	
					Green O2S Condition	= Not Valid		
					Low Fuel Condition Diag	= False		
					Engine Speed to enable test	900 <= RPM <= 2500		
					Engine Airflow	3 gps <= Airflow <= 20 g		
					Vehicle Speed to enable test	43.5 mph <= Veh Speed <= 80.8 mph		
					Closed loop integral	0.90 <= C/L Int <= 1.06		
					Closed Loop Active	= TRUE		
					Evap	not in control of purge		
					Ethanol	not in estimate mode		
					Post fuel cell	= enabled		
					All post sensor heater delays	= not active		
					O2S Heater on Time	>= 100.0 sec		
					Predicted Catalyst temp			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						550 ºC <= Cat Temp <= 900 ºC		
					Fuel State	= DFCO possible		
					All of the above met for at least 1.0 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 cannot achieve the lean threshold voltage. AND The Accumulated mass air flow monitored during the Stuck Rich Voltage Test is greater than the threshold before the above voltage threshold is met.	1) Post O2S signal > 100 mvolts AND 2) Accumulated air flow during stuck rich test > 90 grams.	No Active DTC's	TPS_ThrottleAuthority Defaulted 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 NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B 2 trip
					B1S2 Failed this key cycle	P013A, P013B, P013E, P013F or P2270		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid	Green Sensor Delay Criteria	
					ICAT MAT Burnoff delay	= Not Valid	The diagnostic will not be enabled until the next ignition cycle after the following has been met: Airflow greater than 22 gps for 120000	
					Green O2S Condition	= Not Valid		
					Low Fuel Condition Diag	= False		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Engine Speed	900 <= RPM <= 2500	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	
					Engine Airflow	3 gps <= Airflow <= 20 g		
					Vehicle Speed	43.5 mph <= Veh Speed <= 80.8 mph		
					Closed loop integral	0.90 <= C/L Int <= 1.06		
					Closed Loop Active	= TRUE		
					Evap	not in control of purge		
					Ethanol	not in estimate mode		
					Post fuel cell	= enabled		
					Power Take Off	= not active		
					All post sensor heater delays	= not active		
					O2S Heater on Time	>= 100.0 sec		
					Predicted Catalyst temp	550 ºC <= Cat Temp <= 900 ºC		
					Fuel State	= DFCO possible		
					DTC's Passed	= P2270 (and P2272 (if applicable))		
					DTC's Passed	= P013E (and P014A (if applicable))		
					DTC's Passed	= P013A (and P013C (if applicable))		
					After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).			
O2 Sensor Signal Stuck Lean Bank 2 Sensor 2	P2272	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	Post O2 sensor cannot achieve the rich threshold voltage. AND The Accumulated mass air flow monitored during the Stuck Lean Voltage Test is greater than the	1) Post O2S signal < 791 mvolts AND 2) Accumulated air flow during stuck lean test > 160 grams.	No Active DTC's	TPS_ThrottleAuthority Defaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA	Frequency: Once per trip Note: if NaPOPD_b_Reset FastRespFunc= FALSE for the given Fuel Bank OR	Type B 2 trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		delivered fuel to achieve the required rich threshold.	threshold before the above voltage threshold is met.			AIR System FA	NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	
						FuelInjectorCircuit_FA		
						FuelTrimSystemB1_FA		
						FuelTrimSystemB2_FA		
						EngineMisfireDetected_FA		
						EthanolCompositionSensor_FA		
					B2S2 Failed this key cycle	P013C, P013D, P014A, P014B, P2272 or P2273		
					System Voltage	10.0 volts < system voltage< 32.0 volts	Green Sensor Delay Criteria	
					Learned heater resistance	= Valid	The diagnostic will not be enabled until the next ignition cycle after the following has been met: 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	
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid		
					Low Fuel Condition Diag	= False		
					Engine Speed to enable test	900 <= RPM <= 2500		
					Engine Airflow	3 gps <= Airflow <= 20 gps		
					Vehicle Speed to enable test	43.5 mph <= Veh Speed <= 80.8 mph		
					Closed loop integral	0.90 <= C/L Int <= 1.06		
					Closed Loop Active	= TRUE		
					Evap	not in control of purge		
					Ethanol	not in estimate mode		
					Post fuel cell	= enabled		
					All post sensor heater delays	= not active		
					O2S Heater on Time	>= 100.0 sec		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Predicted Catalyst temp	550 ºC <= Cat Temp <= 900 ºC		
					Fuel State	= DFCO possible		
					All of the above met for at least 1.0 seconds, and then the Force Cat Rich intrusive stage is requested.			
O2 Sensor Signal Stuck Rich Bank 2 Sensor 2	P2273	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 cannot achieve the lean threshold voltage. AND The Accumulated mass air flow monitored during the Stuck Rich Voltage Test is greater than the threshold before the above voltage threshold is met.	1) Post O2S signal > 100 mvolts AND 2) Accumulated air flow during stuck rich test > 90 grams.	No Active DTC's	TPS_ThrottleAuthority Defaulted 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 NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B 2 trip
					B2S2 Failed this key cycle	P013C, P013D, P014A, P014B or P2272		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid	Green Sensor Delay Criteria	
					ICAT MAT Burnoff delay	= Not Valid	The diagnostic will not be enabled until the next ignition cycle after the following has been met: Airflow greater than 22 gps for 120000	
					Green O2S Condition	= Not Valid		
					Low Fuel Condition Diag	= False		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Engine Speed	900 <= RPM <= 2500	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	
					Engine Airflow	3 gps <= Airflow <= 20 gps		
					Vehicle Speed	43.5 mph <= Veh Speed <= 80.8 mph		
					Closed loop integral	0.90 <= C/L Int <= 1.06		
					Closed Loop Active	= TRUE		
					Evap	not in control of purge		
					Ethanol	not in estimate mode		
					Post fuel cell	= enabled		
					Power Take Off	= not active		
					All post sensor heater delays	= not active		
					O2S Heater on Time	>= 100.0 sec		
					Predicted Catalyst temp	550 ºC <= Cat Temp <= 900 ºC		
					Fuel State	= DFCO possible		
					DTC's Passed	= P2270 (and P2272 (if applicable))		
					DTC's Passed	= P013E (and P014A (if applicable))		
					DTC's Passed	= P013A (and P013C (if applicable))		
					After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).			
Engine Hood Switch Circuit	P254F	Circuit Performance	Hood Switch 1 State = Hood Switch 2 State		Ignition Voltage	> 11 volts and < 32 volts	0.5 seconds 100 msec loop	Type B 2 trip
ECM/PCM Internal Engine Off Timer Performance	P2610	This DTC determines if the engine off timer does not initialize or count properly.	Initial value test: Initial ignition off timer value OR	< 0 seconds	ECM is powered down IAT Temperature	-40 °C ≤ Temperature ≤ 125 °C	Initial value test: 3 failures	Type B 2 trip DTC sets on next key cycle

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		Clock rate test: Checks the accuracy of the 1 second timer by comparing it with the 12.5 ms timer	Initial ignition off timer value Clock rate test: Time between ignition off timer increments Time between ignition off timer increments Time since last ignition off timer increment Current ignition off time < old ignition off time Current ignition off timer minus old ignition off timer	> 10 seconds < 0.8 seconds > 1.2 seconds ≥ 1.375 seconds ≠ 1			1.375 sec / sample Clock rate test: 8 failures out of 10 samples 1second / sample test runs once each key-off	if failure detected
Four Wheel Drive (4WD) High Range Performance	P279A	Transfer Case Mode in GMLAN frame $2D1 = HIGH range AND Transfer Case ≠ HIGH range	Transfer Case Measured Ratio NOTE: Ratio constrained to 0 – 8 Please see "See HIGH Ratio Margin " in Supporting Tables Tab	>= (1.000 - Ratio Margin) <= (1.000 + Ratio Margin)	Engine Speed Vehicle Speed	>= 200 and <= 7500 rpm for 5 seconds ≤ 200 km/hr for ≥ 5 sec	32 failures out of 400 samples 12.5 msec loop, continuous	Type Special C 4 Wheel Drive Only
Four Wheel Drive (4WD) Low Range Performance	P279B	Transfer Case Mode in GMLAN frame $2D1 = LOW range AND Transfer Case ≠ Low range	Transfer Case Measured Ratio NOTE: Ratio constrained to 0 – 8 Please see "See LOW Ratio Margin " in Supporting Tables Tab	>= (2.700 - Ratio Margin) <= (2.790 + Ratio Margin)	Engine Speed Vehicle Speed	>= 200 and <= 7500 rpm for 5 seconds ≤ 200 km/hr for ≥ 5 sec	32 failures out of 400 samples 12.5 msec loop, continuous	Type Special C 4 Wheel Drive Only
Four Wheel Drive (4WD) u Range Performance	P279C	Transfer Case Mode in GMLAN frame $2D1 = NEUTRAL AND Transfer Case not in NEUTRAL	Transfer Case Measured Ratio ≠ High Range AND ≠ Low Range		Engine Speed	>= 200 and <= 7500 rpm for 5 seconds	32 failures out of 400 samples	Type Special C

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Please see "See NETURAL ratio margin" in Supporting Tables Tab		Vehicle Speed	≤ 200 km/hr for ≥ 5 sec	12.5 msec loop, continuous	4 Wheel Drive Only
Deactivation System Performance	P3400	Detects a “failed to deactivate” condition when Deactivation Mode allowed:	ABS(Measured MAP – MAP Model 2) Filtered **AND** ((Measured MAP – MAP Model 2) filtered) (*stored from previous all-Cylinder mode event*) - ((Measured MAP – MAP Model 2) filtered) (*current*)	< -10.0 kPa > 10.0 kPa	**DIAGNOSTIC ENABLE CONDITIONS**			Type B 2 trip
					Total filtered residual weight factors	>= 0 factor		
					ECT	> -7 and < 125 Deg C		
					IAT	> -20 and < 125 Deg C		
					Engine RPM	> 450 and < 5700 RPM		
						MAP Model 2 multiplied by MAP2 Residual Weight Factor based on RPM. See table IFRD Residual Weighting Factors		
					CYLINDER DEACTIVATION ENABLE CONDITIONS (Conditions below must be met for >= 0.25 seconds before cylinder deactivation will begin)		100 cylinder deactivation lag residual failures out of 200 samples	
					Engine running	> 20.0 seconds continuously after a key start, >MinEngRunAfterAutoStopTable after hybrid autostarts - Details on Supporting Tables Tab (P3400 Section)		
					Engine RPM	> **EngSpeedLwrLimitEnableTable** AND < **EngSpeedUprLimitEnableTable** - Details on Supporting Tables Tab (P3400 Section)	Performed once every 100 msec	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Engine coolant	>= 40 and <= 128 Deg C		
					Ignition voltage	>= 11.0 and <= 32.0 Volts		
					Brake booster vacuum	>= 0.0 kPa		
					Engine oil temp	>= 20 and <= 128 Deg C		
					Trans Gear	HalfCylDisabledTransGr and HafCylDisabledTransGrDeviceControl (when in device control)- See details on Supporting Tables Tab (P3400 Section)		
					Percent throttle area	< 28 Percent		
					Vehicle speed	>= 17.5 MPH		
					FCO not active for	>= 3.0 Seconds		
					Time since last cylinder deac mode event	>= 3.0 Seconds		
					Gear Shift	Not currently in progress		
					AC Clutch transition	Not currently in progress		
					Stored Oxygen Retrieval Monitor Diagnostic	Not active		
					Tip In Bump	Not active		
					Engine oil pressure	>= 187 and <= 455 kPa		
					Filtered engine vacuum	> AllCylToHalfCylVacuum - See details on Supporting Tables Tab (P3400 Section) for 0.00 sec.		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					PRNDL state	HalfCylDisabledPRNDL and HalfCylDisabledPRNDL DeviceControl tables (when in device control) - See details on Supporting Tables Tab (P3400 Section)		
					Oil aeration present	Aeration enabled by engine RPM > 5000 for 15 seconds, disabled by engine RPM < 4000 for 90 seconds		
					After exiting deac mode due to max time in half cylinder mode, must be in all cylinder mode for	>= 60 seconds		
					DFCO mode	Not currently in DFCO		
					Fuel shut off mode other than DFCO	Not currently in fuel shut-off		
					ETC Power management mode	Not active		
					Heater Perf.	Not in Heater Performance Mode		
					POSD Intrusive	POSD diagnostic not active		
					POPD Intrusive	POPD diagnostic not active		
					Low range 4WD	Not in Low Range 4WD		
					AFM is disabled at high percent ethanol	Ethanol concentration > 95 % disables AFM. Once disabled, ethanol concentration must be < 85 % to re-enable		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					If feature is enabled, AFM is allowed only when percent ethanol learn is not in progress	Feature is Disabled		
					Catalyst warm-up mode	Not in Catalyst warm-up mode		
					Green engine enrichment mode	Not in Green engine enrichment mode		
					2-Mode Hybrid vehicles	Hybrid module not requesting AFM disable		
					IF DEACTIVATED, ANY OF THE CONDITIONS BELOW WILL FORCE CYLINDER REACTIVATION			
					If deactivation mode is active for	>= 300 seconds		
					then reactivation will occur if:			
					Deac mode active	>= 300 seconds		
					OR			
					Delta vacuum	> 5 kPa or < -5 kPa		
					Delta calculated using 1st order vacuum lag filter	0.30 1st order lag filter value		
					Engine RPM	> **EngSpeedLwrLimitDisableTable** AND < **EngSpeedUprLimitDisableTable** - Details on Supporting Tables Tab (P3400 Section)		
					Engine Power Limited Mode	Active		
					Piston protection	Active		
					Engine Oil Temperature			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						< 18 Deg C or > 130 Deg C		
					Engine Oil Pressure	< 172 kPa or > 470 kPa		
					Oil aeration present	Aeration enabled by engine RPM > 5000 for 15 seconds, disabled by engine RPM < 4000 for 90 seconds		
					Engine Metal Overtemp Protection	Active		
					In device control only, when in Park or Neutral, vehicle speed	<= 5.0 MPH		
					Trans Gear	HalfCylDisabledTransGr and HafCylDisabledTransGrDeviceControl (when in device control)- See details on Supporting Tables Tab (P3400 Section)		
					PRNDL state	HalfCylDisabledPRNDL and HalfCylDisabledPRNDLDeviceControl tables (when in device control) - See details on Supporting Tables Tab (P3400 Section)		
					Ignition voltage	< 11.0 or > 32.0 Volts		
					Engine Coolant	< 36 or > 132 Deg C		
					Vehicle speed	< 14 MPH		
					Brake booster vacuum	< 0.0 kPa		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Filtered engine vacuum	HalfCylToAllCylVacuum - See details on Supporting Tables Tab (P3400 Section) for 0.00 sec.		
					ETC Power management mode	Active		
					Pct Throttle Area	> 30 Percent		
					Converter overtemp protect	Active		
					Piston protection	Active		
					Hot Coolant Mode	Active		
					Engine running	= False		
					Engine overspeed protection	Active		
					Engine Metal Overtemp Protect	Active		
					Cat. Temp Low	Active		
					POSD Intrusive	Active		
					FWD	In low range		
					Engine Misfire	Detected		
					Heater Performance	Active		
					POPD Intrusive	Active		
					No active DTC's	Fault bundles: Map_SensorFA VehicleSpeedSensorError ECT_Sensor_FA EOP_Sensor_FA PowertrainRelayFault BrakeBoosterSensorFA CrankSensorFA CamSensorFA		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						IAT_SensorFA CylnderDeacDriverTFTKO FourWheelDriveLowStateInvalid EngineTorqueEstInaccurate TransmissionGearDefaulted EnginePowerLimited		
Cylinder 1 Deactivation Solenoid Control Circuit	P3401	Checks the Solenoid Control Circuit electrical integrity for cylinder #1	The ECM detects that commanded state of driver and actual state of the control circuit do not match. (Short to ground, short to voltage, open circuit)		Engine RPM Ignition Voltage Diagnostic enabled/disabled	>= 400.0 RPM <= 32.0 and >= 11.0 Vo Enabled	20 failures out of 25 samples Performed every 250 msec	Type B 2 trip
Cylinder 4 Deactivation Solenoid Control Circuit	P3425	Checks the Solenoid Control Circuit electrical integrity for cylinder #4	The ECM detects that commanded state of driver and actual state of the control circuit do not match. (Short to ground, short to voltage, open circuit)		Engine RPM Ignition Voltage Diagnostic enabled/disabled	>= 400.0 RPM <= 32.0 and >= 11.0 Vo Enabled	20 failures out of 25 samples Performed every 250 msec	Type B 2 trip
Cylinder 6 Deactivation Solenoid Control Circuit	P3441	Checks the Solenoid Control Circuit electrical integrity for cylinder #6	The ECM detects that commanded state of driver and actual state of the control circuit do not match. (Short to ground, short to voltage, open circuit)		Engine RPM Ignition Voltage	>= 400.0 RPM <= 32.0 and >= 11.0 Vo	20 failures out of 25 samples	Type B 2 trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Diagnostic enabled/disabled	Enabled	Performed every 250 msec	
Cylinder 7 Deactivation Solenoid Control Circuit	P3449	Checks the Solenoid Control Circuit electrical integrity for cylinder #7	The ECM detects that commanded state of driver and actual state of the control circuit do not match. (Short to ground, short to voltage, open circuit)		Engine RPM	>= 400.0 RPM	20 failures out of 25 samples	Type B 2 trip
					Ignition Voltage	<= 32.0 and >= 11.0 Vo		
					Diagnostic enabled/disabled	Enabled	Performed every 250 msec	
Control Module Communication Bus A Off	U0073	This DTC monitors for a BUS A off condition	Bus off failures	≥ 4 counts	CAN hardware is bus OFF for	≥ 0.1 seconds	Diagnostic runs in 1000 ms loop	Type A 1 trips
			out of these samples	≥ 5 counts				
Control Module Communication Bus B Off	U0074	bus shorted condition has occurred to force the CAN device driver to enter a bus-off state	Bus off failures	≥ 4 counts	Bus off delay time	≥ 0.1 seconds	Diagnostic runs in 12.5 ms loop	Type A 1 trips
			out of these samples	≥ 5 counts				
Lost Communication With TCM (Automatic Transmission)	U0101	Detects that CAN serial data communication has been lost with the TCM.	Message is not received from controller for this amount of time	>500 msec	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	6.25 msec loop	Type A 1 trips
					Power mode is RUN			
					Communication bus is not OFF			
					or is typed as a C code			
					Normal Communication is enabled			
					Normal Transmit capability is TRUE			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					The diagnostic system is not disabled			
					The bus has been on for	> 3.0000 seconds		
					A message has been selected to			
					monitor.			
Lost Communication with Transfer Case Control Module	U0102	This DTC monitors for a loss of communication with the transfer case control module	Message is not received from controller for this amount of time	>750 msec	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	The diagnostic runs in the 1000	Type B 2 trips
					Power mode is RUN			
					Communication bus is not OFF			
					or is typed as a C code			
					Normal Communication is enabled			
					Normal Transmit capability is TRUE			
					The diagnostic system is not disabled			
					The bus has been on for	> 3.0000 seconds		
					A message has been selected to			
					monitor.			
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 this amount of time	>500 msec	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	The diagnostic runs in the 1000 ms loop	Type B 2 trips
					Power mode is RUN			
					Communication bus is not OFF			
					or is typed as a C code			
					Normal Communication is enabled			
					Normal Transmit capability is TRUE			
					The diagnostic system is not disabled			
					The bus has been on for	> 3.0000 seconds		
					A message has been selected to			
					monitor.			
Lost Communication With Brake System Control Module	U0129	Detects that CAN serial data communication has been lost with the Brake system control Module	Message is not received from controller for this amount of time	> 500 msec	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	6.25 msec loop	Type B 2 trips
					Power mode is RUN			
					Communication bus is not OFF			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					or is typed as a C code			
					Normal Communication is enabled			
					Normal Transmit capability is TRUE			
					The diagnostic system is not disabled			
					The bus has been on for	> 3.0000 seconds		
					A message has been selected to			
					monitor.			
Lost Communication With Hybrid Powertrain Control Module	U0293	Detects that CAN serial data communication has been lost with the HPCM	Message is not received from controller for this amount of time	> 500 msec	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	6.25 msec loop	Type A 1 trips
					Power mode is RUN			
					Communication bus is not OFF			
					or is typed as a C code			
					Normal Communication is enabled			
					Normal Transmit capability is TRUE			
					The diagnostic system is not disabled			
					The bus has been on for	> 3.0000 seconds		
					A message has been selected to			
					monitor.			
Lost Communication with MCPA on Bus B	U1815	Detects that CAN serial data communication has been lost MCPA on Bus B	Message is not received from controller for this amount of time	> 750 msec	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	6.25 msec loop	Type B 2 trips
					Power mode is RUN			
					Communication bus is not OFF			
					or is typed as a C code			
					Normal Communication is enabled			
					Normal Transmit capability is TRUE			
					The diagnostic system is not disabled			
					The bus has been on for	> 3.0000 seconds		
					A message has been selected to			
					monitor.			
Lost Communication with Hybrid Powertrain Control Module on Bus B	U1817	Detects that CAN serial data communication has been lost with HPCM on Bus B	Message is not received from controller for this amount of time	> 500 msec	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	6.25 msec loop	Type A 1 trips
					Power mode is RUN			
					Communication bus is not OFF			
					or is typed as a C code			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Normal Communication is enabled			
					Normal Transmit capability is TRUE			
					The diagnostic system is not disabled			
					The bus has been on for	> 3.0000 seconds		
					A message has been selected to			
					monitor.			
Lost Communication with Brake System Control Module on Bus B	U1820	Detects that CAN serial data communication has been lost with EBCM on Bus B	Message is not received from controller for this amount of time	> 500 msec	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	6.25 msec loop	Type B 2 trips
					Power mode is RUN			
					Communication bus is not OFF			
					or is typed as a C code			
					Normal Communication is enabled			
					Normal Transmit capability is TRUE			
					The diagnostic system is not disabled			
					The bus has been on for	> 3.0000 seconds		
					A message has been selected to			
					monitor.			

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
	10.0	10.0	10.0	10.0	10.0	8.0	6.0	4.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

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	300
600	450
1200	500
1800	600
2400	650
3000	650
3600	650
4200	650
4800	650
5400	650
6000	625
6600	600
7200	575
7800	550
8400	525
9000	500
9600	480
10200	460
10800	440
11700	420
12600	400
13500	380
14400	360
15300	340
16200	320
17100	300
18000	280
19200	260
20400	240
21600	220
22800	200
24000	200
25200	200

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	55
6	54
12	52
19	51
25	49
31	48
37	46
44	45
50	43
56	42
62	41
69	39
75	38
81	36
87	35
94	33
100	32
53	4
56	4
59	4
63	4
66	4
69	4
72	4
75	4
78	4
81	4
84	4
88	4
91	4
94	4
97	4
100	4

P0461, P2066, P2636: Transfer Pump Enable

TransferPumpOnTimeLimit (in seconds)
Axis is Fuel Level in %

Axis	Curve
0	0
3	0
6	0
9	0
13	0
16	0
19	0
22	0
25	0
28	0
31	0
34	0
38	0
41	0
44	0
47	0
50	0
53	0
56	0
59	0
63	0
66	0
69	0
72	0
75	0
78	0
81	0
84	0
88	0
91	0
94	0
97	0
100	0

P0326 Knock Detection Enabled Factors:

FastRtdMax:

X - axis = Engine Speed (RPM)
Y - axis = Manifold Pressure (kPa)

	0	512	1024	1536	2048	2560	3072	3584	4096	4608	5120	5632	6144	6656	7168	7680	8192
20	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
30	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
40	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
50	0.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
60	0.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
70	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
80	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
90	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
100	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
110	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
120	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
130	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
140	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
150	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
160	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
170	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
180	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Knock Detection Enabled Factors:

Knock Detection Enabled = FastAttackRate * FastAttackCoolGain * FastAttackBaroGain

RPM:	0	512	1024	1536	2048	2560	3072	3584	4096	4608	5120	5632	6144	6656	7168	7680	8192
FastAttackRate:	3.00	3.00	3.00	2.83	2.67	2.50	2.33	2.17	2.00	2.00	2.12	2.63	3.00	3.00	3.00	3.00	3.00

ECT (deg. C):	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
FastAttackCoolGain:	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.50	0.75	1.00	1.00	1.00	1.00	1.00	1.10	1.10	1.20

Baro:	55.00	61.25	67.50	73.75	80.00	86.25	92.50	98.75	105.00
FastAttackBaroGain:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Define Close Loop

KtFSTA_T_ClosedLoopTemp

Start-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Close Loop Enable Temp	85	80	75	65	45	39	39	39	39	39	39	39	39	39	39	39	39

KtFSTA_t_ClosedLoopTime

Start-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Close Loop Enable Time	120	90	65	45	25	10	10	10	10	10	10	10	10	10	10	10	10

FASD Section_Ian MacEwen

The following tables define the Lean and Rich failure thresholds for FASD

P0171 & P0174 (LONG TERM ONLY) **Long Term Trim Lean (Lean Fail threshold)**

% Ethanol	0.00	6.25	12.50	18.75	25.00	31.25	37.50	43.75	50.00	56.25	62.50	68.75	75.00	81.25	87.50	93.75	100.00
Long Term Fuel Trim Lean Threshold	1.325	1.325	1.325	1.325	1.325	1.325	1.325	1.325	1.325	1.325	1.325	1.325	1.325	1.325	1.325	1.325	1.325

P0172 & P0175 (LONG TERM ONLY) **Non Purge Rich Limit (Rich Fail threshold)**

% Ethanol	0.00	6.25	12.50	18.75	25.00	31.25	37.50	43.75	50.00	56.25	62.50	68.75	75.00	81.25	87.50	93.75	100.00
Long Term Fuel Non-Purge Rich Threshold	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700

P0172 & P0175 (LONG TERM ONLY) **Purge Rich Limit (Triggers Rich Intrusive test)**

% Ethanol	0.00	6.25	12.50	18.75	25.00	31.25	37.50	43.75	50.00	56.25	62.50	68.75	75.00	81.25	87.50	93.75	100.00
Long Term Fuel Purge Rich Threshold	0.705	0.705	0.705	0.705	0.705	0.705	0.705	0.705	0.705	0.705	0.705	0.705	0.705	0.705	0.705	0.705	0.705

The following tables define when the engine goes closed loop

P0171, P0172, P0174 & P0175 **Closed Loop Enable Temp vrs Coolant Temp**

Start-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Close Loop Enable Temp	85	80	75	65	45	39	39	39	39	39	39	39	39	39	39	39	39

P0171, P0172, P0174 & P0175 **Closed Loop Enable Time vrs Coolant Temp**

Start-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Close Loop Enable Time	120.0	90.0	65.0	45.0	25.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

P0171, P0172, P0174 & P0175 **KtFSTA_t_ClosedLoopAutostart (HYBRID ONLY)**

AutoStart Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Close Loop Enable Time	120.0	90.0	65.0	45.0	25.0	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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_Cell00_PurgOnAirMode5	CeFADR_e_Cell01_PurgOnAirMode4	CeFADR_e_Cell02_PurgOnAirMode3	CeFADR_e_Cell03_PurgOnAirMode2	CeFADR_e_Cell04_PurgOnAirMode1	CeFADR_e_Cell05_PurgOnAirMode0	CeFADR_e_Cell06_PurgOnIdle	CeFADR_e_Cell07_PurgOnDecel	CeFADR_e_Cell08_PurgOffAirMode5	CeFADR_e_Cell09_PurgOffAirMode4	CeFADR_e_Cell10_PurgOffAirMode3	CeFADR_e_Cell11_PurgOffAirMode2	CeFADR_e_Cell12_PurgOffAirMode1	CeFADR_e_Cell13_PurgOffAirMode0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel
FASD Cell Usage	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell
FASD Enabled In Cell?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

AFIM Section _ Ian MacEwen

KtOXYD_cmp_AFIM_LngthThrsh1

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
40	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
80	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
120	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
160	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
200	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
240	90000	90000	8768	8768	9296	10560	10656	10976	10976	14256	14256	15024	15024	90000	90000	90000	90000
280	90000	90000	8768	8768	9296	10560	10656	10976	11120	13488	14256	15024	15024	90000	90000	90000	90000
320	90000	8480	8480	8480	10960	10960	12336	12640	11248	12720	14352	14944	14944	90000	90000	90000	90000
360	90000	8480	8480	9056	11744	11184	13328	13216	11984	13248	15424	16112	16112	90000	90000	90000	90000
400	90000	8544	8544	9472	12528	12384	14160	13920	12960	14080	15504	14960	14960	90000	90000	90000	90000
440	90000	8544	9472	10384	12576	14688	12736	13552	14032	14288	16144	15552	14960	90000	90000	90000	90000
480	90000	90000	9936	9936	11184	15152	12880	14800	15920	14848	16528	16528	90000	90000	90000	90000	90000
520	90000	90000	10560	10560	11840	14608	12768	15424	15120	14736	16704	16704	90000	90000	90000	90000	90000
560	90000	90000	10608	10608	12768	16992	12720	16368	15072	18160	17424	16704	90000	90000	90000	90000	90000
640	90000	90000	10608	12288	13968	16864	13952	15152	15072	18160	18160	90000	90000	90000	90000	90000	90000
720	90000	90000	90000	13968	13968	16864	13952	13952	90000	90000	90000	90000	90000	90000	90000	90000	90000
800	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000

KtOXYD_cmp_AFIM_LngthThrsh1_DoD (AFM applications only)

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
40	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
80	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
120	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
160	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
200	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
240	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
280	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
320	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
360	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
400	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
440	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
480	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
520	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
560	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
640	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
720	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
800	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000

KtOXYD_cmp_AFIM_LngthThrsh2

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
40	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
80	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
120	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
160	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
200	90000	90000	8912	8912	9712	12448	12048	13392	13392	90000	90000	90000	90000	90000	90000	90000	90000
240	90000	90000	8912	8912	9712	12448	12048	13392	12992	12592	90000	90000	90000	90000	90000	90000	90000
280	90000	90000	9168	9168	10064	11968	12304	12896	12592	13472	17392	17248	17248	90000	90000	90000	90000
320	90000	10208	9888	9568	11056	14176	15344	14624	13376	14368	17392	17248	17248	90000	90000	90000	90000
360	90000	10208	10208	10128	11120	14528	14864	14864	12496	16224	19280	17792	17792	90000	90000	90000	90000
400	90000	10160	10160	10800	12272	14608	17600	15296	15584	16544	17616	19632	19632	90000	90000	90000	90000
440	90000	10160	10576	10992	12192	14624	14832	15168	17488	15904	17888	23840	23840	90000	90000	90000	90000
480	90000	90000	11248	11248	12352	14704	16512	14608	16640	18080	19232	21536	23840	90000	90000	90000	90000
520	90000	90000	10832	10832	13840	14880	16624	14800	16384	17552	23152	23152	90000	90000	90000	90000	90000
560	90000	90000	12592	12592	14368	16816	18448	15264	16176	20656	21904	23152	90000	90000	90000	90000	90000
640	90000	90000	12592	14208	15824	17088	18160	16704	16176	20656	20656	90000	90000	90000	90000	90000	90000
720	90000	90000	90000	15824	15824	17088	18160	18160	90000	90000	90000	90000	90000	90000	90000	90000	90000
800	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000

KtOXYD_cmp_AFIM_LngthThrsh2_DoD (AFM applications only)

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
40	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
80	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
120	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
160	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
200	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
240	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
280	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
320	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
360	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
400	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
440	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
480	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
520	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
560	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
640	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
720	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
800	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000

KtOXYD_K_AFIM_QualFactor1

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
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	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
200	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
240	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
280	0.00	0.00	0.00	1.00	1.00	1.00	1.00	0.95	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00
320	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00
360	0.00	0.00	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	0.00	0.00
400	0.00	0.00	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	0.00	0.00
440	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
480	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
520	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
560	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
640	0.00	0.00	0.00	0.00	1.00	1.00	1.00	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

KtOXYD_K_AFIM_QualFactor1_DoD (AFM applications only)

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
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	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
200	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
240	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
280	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
320	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
360	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
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

KtOXYD_K_AFIM_QualFactor2

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
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	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
200	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
240	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
280	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
320	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00
360	0.00	0.00	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	0.00	0.00
400	0.00	0.00	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	0.00	0.00
440	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
480	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
520	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
560	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
640	0.00	0.00	0.00	0.00	1.00	1.00	1.00	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

KtOXYD_K_AFIM_QualFactor2_DoD (AFM applications only)

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
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	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
200	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
240	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
280	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
320	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
360	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
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

Define Close Loop Enable Conditions

KtFSTA_t_ClosedLoopAutostart **(HYBRID ONLY)**

AutoStart Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Close Loop Enable Time	120.0	90.0	65.0	45.0	25.0	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

KtFSTA_t_ClosedLoopTime

Start-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Close Loop Enable Time	120.0	90.0	65.0	45.0	25.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

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

TPS Residual Weight Factor based on RPM

RPM	0	250	750	1250	1750	2250	2750	3250	3750	4250	4750	5250	5750	6250	6750	7250	9000
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.993	0.629	0.566	0.519	0.519	0.519	0.519

MAF Residual Weight Factor based on RPM

RPM	0	250	750	1250	1750	2250	2750	3250	3750	4250	4750	5250	5750	6250	6750	7250	9000
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.857	0.857	0.750	0.750	0.667	0.667	0.667

MAF Residual Weight Factor Based on MAF Estimate

gm/sec	0.0	40.0	47.0	56.0	67.0	79.0	93.0	111.0	131.0	156.0	184.0	218.0	259.0	307.0	363.0	431.0	510.0
	1.000	1.000	0.909	0.836	0.773	0.719	0.660	0.584	0.501	0.408	0.336	0.294	0.268	0.243	0.219	0.191	0.159

MAP1 Residual Weight Factor based on RPM

RPM	0	250	750	1250	1750	2250	2750	3250	3750	4250	4750	5250	5750	6250	6750	7250	9000
	0.625	0.625	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.417	0.417	0.417	0.417	0.417	0.417	0.417	0.417

MAP2 Residual Weight Factor based on RPM

RPM	0	250	750	1250	1750	2250	2750	3250	3750	4250	4750	5250	5750	6250	6750	7250	9000
	0.625	0.625	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.417	0.417	0.417	0.417	0.417	0.417	0.417	0.417

P0108: MAP Cold Run Time Threshold

X axis is Engine Coolant Temperature in Deg C

Temp	-30	-15	0	15	30
	1.5	1.2	0.8	0.5	0.0

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
80	80	80	60	60	40	40	30	30	30	30	30	30	30	30	30	30

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

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

	IAT Range Low	Hi	-40	-28	-16	-4	8	20	32	44	56	68	80
Primary	10.0 ° C	52.0 ° C	15876	15876	15876	15876	15876	14132	12387	10642	8898	7153	5409
Alternate	-7.0 ° C	10.0 ° C	14376	14376	14376	12917	11460	10000	8542	7084	5625	5625	5625

P0300-P0308: Idle SCD

(decel index (> Idle SCD AND > Idle SCD ddt Tables))

		400	500	600	700	800	900	1000	1100	1200
load	**8**	675	575	475	325	250	170	135	100	70
Load	**9**	650	550	450	300	220	150	120	80	60
	11	645	535	425	280	190	130	105	63	55
	12	580	515	450	285	175	125	90	60	53
	13	525	500	475	290	180	120	95	75	55
	14	563	525	488	295	185	128	103	80	57
	15	600	550	500	300	190	135	110	85	58
	16	613	563	513	313	195	143	120	88	59
	17	625	575	525	325	200	150	130	90	60
	18	638	588	538	338	213	163	138	95	63
	19	650	600	550	350	225	175	145	100	65
	21	663	613	563	363	238	183	150	108	68
	22	675	625	575	375	250	190	155	115	70
	24	688	638	588	388	263	195	160	120	73
	25	700	650	600	400	275	200	165	125	75
	27	713	663	613	413	288	208	170	133	80
	29	725	675	625	425	300	215	175	140	85

P0300-P0308: Idle SCD ddt

		400	500	600	700	800	900	1000	1100	1200
load	**8**	725	625	525	325	250	170	135	100	70
	9	700	600	500	300	220	150	120	70	60
	11	665	565	465	280	190	130	105	58	50
	12	640	545	450	280	175	125	90	50	48
	13	565	520	475	290	180	120	95	60	50
	14	583	535	488	295	185	128	103	70	53
	15	600	550	500	300	190	135	110	80	55
	16	613	563	513	313	195	143	120	83	60
	17	625	575	525	325	200	150	130	85	65
	18	638	588	538	338	213	163	138	88	70
	19	650	600	550	350	225	175	145	90	75
	21	663	613	563	363	238	183	150	100	78
	22	675	625	575	375	250	190	155	110	80
	24	688	638	588	388	263	195	160	118	83
	25	700	650	600	400	275	200	165	125	85
	27	738	675	613	413	288	208	170	133	88
	29	775	700	625	425	300	215	175	140	90

P0300-P0308: SCD Delta

OR (decel index >SCD Delta **AND** > SCD Delta ddt Tables))

		400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000
load	8	675	575	475	325	250	170	135	100	70	35	32767	32767	32767
Load	9	650	550	450	300	220	150	120	80	60	30	32767	32767	32767
	11	645	535	425	280	190	130	105	63	55	28	32767	32767	32767
	12	580	515	450	285	175	125	90	60	53	28	32767	32767	32767
	13	525	500	475	290	180	120	95	75	55	30	32767	32767	32767
	15	600	550	500	300	190	135	110	85	58	35	32767	32767	32767
	17	625	575	525	325	200	150	130	90	60	40	32767	32767	32767
	19	650	600	550	350	225	175	145	100	65	48	32767	32767	32767
	22	675	625	575	375	250	190	155	115	70	55	32767	32767	32767
	25	700	650	600	400	275	200	165	125	75	65	32767	32767	32767
	29	725	675	625	425	300	215	175	140	85	70	32767	32767	32767
	33	750	700	650	450	325	230	185	155	105	75	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

		400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000
load	8	725	625	525	325	250	170	135	100	70	40	32767	32767	32767
	9	700	600	500	300	220	150	120	70	60	35	32767	32767	32767
	11	665	565	465	280	190	130	105	58	50	30	32767	32767	32767
	12	640	545	450	280	175	125	90	50	48	28	32767	32767	32767
	13	565	520	475	290	180	120	95	60	50	30	32767	32767	32767
	15	600	550	500	300	190	135	110	80	55	35	32767	32767	32767
	17	625	575	525	325	200	150	130	85	65	40	32767	32767	32767
	19	650	600	550	350	225	175	145	90	75	48	32767	32767	32767
	22	675	625	575	375	250	190	155	110	80	55	32767	32767	32767
	25	700	650	600	400	275	200	165	125	85	65	32767	32767	32767
	29	775	700	625	425	300	215	175	140	90	80	32767	32767	32767
	33	850	750	650	450	325	230	185	150	105	85	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

OR (decel index (>Idle Cyl Mode **AND** > Idle Cyl Mode ddt Tables))

		400	500	600	700	800	900	1000	1100	1200
load	8	1550	1350	1150	900	650	600	450	220	200
Load	9	1500	1300	1100	800	600	500	350	200	175
	11	1425	1250	1075	700	450	350	300	185	165
	12	1250	1150	1050	650	425	300	200	175	160
	13	1300	1200	1100	675	400	250	175	155	145
	14	1300	1225	1150	688	400	238	188	165	150
	15	1300	1250	1200	700	400	225	200	175	155
	16	1300	1263	1225	725	413	238	208	180	160
	17	1300	1275	1250	750	425	250	215	185	165
	18	1313	1288	1263	775	438	255	223	188	170
	19	1325	1300	1275	800	450	260	230	190	175
	21	1338	1313	1288	825	463	268	238	193	180
	22	1350	1325	1300	850	475	275	245	195	185
	24	1363	1338	1313	875	488	288	255	198	190
	25	1375	1350	1325	900	500	300	265	200	195
	27	1413	1375	1338	950	525	325	283	225	205
	29	1450	1400	1350	1000	550	350	300	250	215

P0300-P0308: Idle Cyl Mode ddt

		400	500	600	700	800	900	1000	1100	1200
load	8	1600	1350	1100	900	650	600	580	200	175
	9	1550	1300	1050	800	600	500	350	180	155
	11	1500	1250	1000	700	450	350	300	165	145
	12	1300	1150	1000	625	425	300	200	160	125
	13	1400	1200	1000	650	385	275	200	135	120
	14	1400	1225	1050	663	380	263	200	145	130
	15	1400	1250	1100	675	375	250	200	155	140
	16	1375	1263	1150	688	388	250	208	160	145
	17	1350	1275	1200	700	400	250	215	165	150
	18	1350	1288	1225	725	413	255	223	170	158
	19	1350	1300	1250	750	425	260	230	175	165
	21	1350	1313	1275	763	438	268	238	180	170
	22	1350	1325	1300	775	450	275	245	185	175
	24	1363	1338	1313	788	463	288	255	193	178
	25	1375	1350	1325	800	475	300	265	200	180
	27	1413	1375	1338	825	488	325	283	225	190
	29	1450	1400	1350	850	500	350	300	250	200

P0300-P0308: Cyl Mode

OR (decel index > Cyl Mode AND > Cyl Mode ddt Tables))

		400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3500	4000	4500	5000	5500	6000	6500	7000
load	8	1550	1350	1150	1000	650	600	450	220	200	110	70	55	36	21	18	15	13	11	10	9	9	9	9	9	32767	32767
Load	9	1500	1300	1100	900	600	500	350	200	175	105	65	50	34	20	17	14	13	10	9	8	8	8	8	8	32767	32767
	11	1425	1250	1075	775	450	375	300	185	165	100	60	45	32	22	18	15	11	10	8	8	8	8	8	8	32767	32767
	12	1250	1150	1050	725	425	325	230	175	160	95	65	40	33	25	18	15	11	10	8	7	7	7	7	7	32767	32767
	13	1300	1200	1100	800	400	275	200	155	145	100	70	50	35	33	25	18	14	12	7	7	7	6	6	6	32767	32767
	15	1300	1250	1200	850	425	250	225	180	160	115	85	55	43	35	28	21	16	13	8	7	6	6	6	6	32767	32767
	17	1300	1275	1250	900	450	275	250	200	175	125	105	70	48	38	30	24	19	14	8	7	6	5	5	5	32767	32767
	19	1325	1300	1275	950	475	300	275	215	180	155	110	75	55	40	32	26	21	16	9	8	6	5	5	5	32767	32767
	22	1350	1325	1300	1000	500	325	300	230	200	185	120	90	65	45	38	28	24	18	10	8	6	5	4	4	32767	32767
	25	1375	1350	1325	1050	550	350	325	250	225	210	140	100	75	55	45	33	26	20	10	9	7	5	4	4	32767	32767
	29	1450	1400	1350	1100	650	450	400	300	265	225	160	120	85	65	50	35	32	25	11	10	7	5	4	4	32767	32767
	33	1525	1450	1375	1150	750	550	450	400	325	250	180	130	90	75	60	45	35	28	13	11	8	5	5	4	32767	32767
	38	1600	1500	1400	1200	800	600	475	450	350	275	200	140	110	90	65	50	45	30	16	12	8	6	5	5	32767	32767
	42	1750	1600	1450	1250	850	625	500	475	375	300	225	160	120	95	70	55	50	33	19	14	9	6	6	5	32767	32767
	48	1900	1700	1500	1300	900	650	525	500	400	325	250	180	140	100	75	60	55	40	22	16	10	7	6	6	32767	32767
	54	2050	1800	1550	1350	950	700	550	525	425	350	275	200	150	105	80	70	60	43	25	18	11	7	7	6	32767	32767
	61	2200	1900	1600	1400	1000	750	600	550	425	375	300	220	175	110	90	80	65	45	28	20	13	9	8	7	32767	32767

P0300-P0308: Cyl Mode ddt

load	400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3500	4000	4500	5000	5500	6000	6500	7000
8	1600	1350	1100	1000	650	600	580	200	175	115	70	55	36	24	19	15	13	12	0	0	0	0	0	0	32767	32767
9	1550	1300	1050	900	600	500	350	180	155	110	60	50	34	23	19	14	11	11	0	0	0	0	0	0	32767	32767
11	1500	1250	1000	750	450	375	300	165	145	90	50	43	32	22	18	14	10	9	0	0	0	0	0	0	32767	32767
12	1300	1150	1000	625	425	325	230	160	125	75	45	35	28	25	19	14	11	10	0	0	0	0	0	0	32767	32767
13	1400	1200	1000	700	400	275	200	135	120	80	50	38	30	28	22	16	13	10	0	0	0	0	0	0	32767	32767
15	1400	1250	1100	725	410	250	210	160	140	90	65	40	38	30	25	18	14	11	0	0	0	0	0	0	32767	32767
17	1350	1275	1200	800	425	275	225	180	150	100	85	60	43	33	28	20	17	11	0	0	0	0	0	0	32767	32767
19	1350	1300	1250	750	450	300	250	200	165	130	90	65	50	35	32	22	19	13	0	0	0	0	0	0	32767	32767
22	1350	1325	1300	775	475	325	275	210	180	160	100	80	60	40	35	25	20	16	0	0	0	0	0	0	32767	32767
25	1375	1350	1325	800	500	350	300	225	200	185	120	90	70	45	45	30	22	20	0	0	0	0	0	0	32767	32767
29	1450	1400	1350	850	625	450	350	300	235	200	140	110	80	60	50	35	28	28	0	0	0	0	0	0	32767	32767
33	1525	1450	1375	900	750	525	425	400	300	225	160	115	85	65	60	45	35	30	0	0	0	0	0	0	32767	32767
38	1600	1500	1400	950	800	550	450	425	325	250	180	125	90	80	65	50	45	35	0	0	0	0	0	0	32767	32767
42	1750	1600	1450	1000	850	600	475	450	350	275	200	140	100	85	70	55	50	38	0	0	0	0	0	0	32767	32767
48	1900	1700	1500	1050	900	650	500	475	375	300	225	160	125	90	75	60	55	40	0	0	0	0	0	0	32767	32767
54	2000	1800	1600	1100	950	700	525	500	400	325	250	180	135	95	80	70	60	43	0	0	0	0	0	0	32767	32767
61	2100	1900	1700	1150	1000	750	575	525	425	350	275	200	150	100	90	80	65	45	0	0	0	0	0	0	32767	32767

P0300-P0308: Rev Mode Table

OR (decel index > Rev Mode Table)

load	400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3500	4000	4500	5000	5500	6000	6500	7000
8	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	160	140	115	100	120	120	120	32767	32767
9	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	145	120	100	75	100	100	100	32767	32767
11	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	130	100	90	55	80	80	80	32767	32767
12	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	120	90	85	50	50	55	60	32767	32767
13	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	95	80	75	55	42	42	40	32767	32767
15	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	90	85	65	60	40	40	35	32767	32767
17	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	100	88	80	65	50	35	30	32767	32767
19	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	150	95	90	70	60	40	35	32767	32767
22	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	170	105	100	80	70	50	40	32767	32767
25	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	190	115	110	90	80	60	50	32767	32767
29	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	225	125	120	100	90	70	60	32767	32767
33	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	250	140	130	110	100	80	70	32767	32767
38	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	300	170	140	125	110	90	80	32767	32767
42	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	350	200	160	140	120	100	90	32767	32767
48	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	400	250	180	160	130	115	100	32767	32767
54	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	450	300	200	175	140	125	110	32767	32767
61	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	500	350	225	200	150	135	120	32767	32767

P0300-P0308: AFM Mode Table

OR (decel index > AFM Table if active fuel management)

load
Load

	400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3500	4000	4500	5000	5500	6000	6500	7000
8	1350	1250	1150	900	750	600	500	350	250	160	125	80	65	50	35	30	25	20	32767	32767	32767	32767	32767	32767	32767	32767
9	1300	1200	1100	800	700	550	450	310	230	145	110	70	55	45	30	25	23	19	32767	32767	32767	32767	32767	32767	32767	32767
11	1250	1150	1050	750	650	500	420	275	215	130	100	60	53	43	28	23	20	18	32767	32767	32767	32767	32767	32767	32767	32767
12	1200	1100	1000	700	600	450	385	240	205	125	95	55	50	40	26	21	19	17	32767	32767	32767	32767	32767	32767	32767	32767
13	1150	1050	950	675	550	435	350	250	190	120	80	53	48	38	28	20	18	16	32767	32767	32767	32767	32767	32767	32767	32767
15	1100	1000	900	650	525	425	340	265	200	130	85	50	45	35	29	21	17	15	32767	32767	32767	32767	32767	32767	32767	32767
17	1150	1050	950	625	450	415	345	275	215	140	95	65	48	38	30	22	18	16	32767	32767	32767	32767	32767	32767	32767	32767
19	1200	1100	1000	600	440	405	350	300	240	160	115	80	50	45	33	24	20	17	32767	32767	32767	32767	32767	32767	32767	32767
22	1250	1150	1050	675	460	415	375	325	270	180	140	100	55	50	40	30	22	18	32767	32767	32767	32767	32767	32767	32767	32767
25	1400	1250	1100	750	500	425	400	350	300	200	160	120	65	60	45	35	25	22	32767	32767	32767	32767	32767	32767	32767	32767
29	1450	1300	1150	825	550	450	450	400	350	225	180	130	75	65	50	40	30	25	32767	32767	32767	32767	32767	32767	32767	32767
33	1500	1350	1200	900	600	500	500	450	400	250	200	140	90	70	55	45	35	30	32767	32767	32767	32767	32767	32767	32767	32767
38	1550	1400	1250	950	625	550	550	500	450	300	220	150	110	80	60	50	40	35	32767	32767	32767	32767	32767	32767	32767	32767
42	1600	1450	1300	1000	650	600	600	550	500	350	240	160	120	85	65	55	45	40	32767	32767	32767	32767	32767	32767	32767	32767
48	1650	1500	1350	1075	675	650	650	600	550	400	260	170	130	90	70	60	50	45	32767	32767	32767	32767	32767	32767	32767	32767
54	1700	1550	1400	1150	700	700	700	650	600	450	280	180	140	95	75	65	55	50	32767	32767	32767	32767	32767	32767	32767	32767
61	1750	1600	1450	1250	750	750	750	700	650	500	300	190	150	100	80	70	60	55	32767	32767	32767	32767	32767	32767	32767	32767

P0300-P0308: Zero torque engine load

Zero Torque: All Cylinders active

RPM	Pct load
400	9.00
500	8.54
600	8.15
700	7.93
800	7.80
900	7.88
1000	7.96
1100	8.04
1200	8.12
1400	8.28
1600	8.44
1800	8.60
2000	8.76
2200	8.92
2400	9.08
2600	9.24
2800	9.40
3000	9.56
3500	11.73
4000	13.89
4500	16.06
5000	18.23
5500	20.40
6000	22.56
6500	24.73
7000	26.90

Baro KPa	Multiplier
65	0.82
70	0.85
75	0.88
80	0.90
85	0.93
90	0.95
95	0.97
100	1.00
105	1.03

Zero Torque: Active Fuel Management (AFM)

RPM	Pct load
400	10.20
500	9.80
600	9.65
700	9.55
800	9.60
900	9.65
1000	9.70
1100	9.75
1200	9.80
1400	9.95
1600	10.10
1800	10.25
2000	10.40
2200	10.55
2400	10.70
2600	10.85
2800	11.00
3000	11.15
3500	13.05
4000	14.95
4500	16.86
5000	18.76
5500	20.66
6000	22.56
6500	24.47
7000	26.37

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)

KcMISF_OneCylNoCatDamLvl

Catalyst Damaging Misfire Percentage

load / Load	0	1000	2000	3000	4000	5000	6000	7000
0	11	11	11	10	7	5	5	5
10	11	11	11	10	7	5	5	5
20	11	11	10	7	5	5	5	5
30	10	10	10	6	5	5	5	5
40	7	7	7	5	5	5	5	5
50	6	6	6	5	5	5	5	5
60	5	5	5	5	5	5	5	5
70	5	5	5	5	5	5	5	5
80	5	5	5	5	5	5	5	5
90	5	5	5	5	5	5	5	5
100	5	5	5	5	5	5	5	5

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	0.060	0.077	0.094	0.111	0.128	0.145	0.162	0.179	0.196	0.213	0.230	0.247	0.264	0.281	0.298	63.999
0.000	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
0.070	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
0.087	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
0.104	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
0.121	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
0.138	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
0.155	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
0.172	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
0.189	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
0.206	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.223	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.240	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.257	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0
0.274	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
0.291	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0
0.308	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0
63.999	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	0.060	0.077	0.094	0.111	0.128	0.145	0.162	0.179	0.196	0.213	0.230	0.247	0.264	0.281	0.298	63.999
0.000	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
0.070	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
0.087	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
0.104	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
0.121	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
0.138	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
0.155	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
0.172	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
0.189	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
0.206	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.223	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.240	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.257	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0
0.274	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
0.291	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0
0.308	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0
63.999	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 minimum switches

	0.0	10.0	20.0	50.0	80.0
0.0	20	20	20	20	20
6.3	20	20	20	20	20
12.5	20	20	20	20	20
18.8	20	20	20	20	20
25.0	20	20	20	20	20
31.3	20	20	20	20	20
37.5	20	20	20	20	20
43.8	20	20	20	20	20
50.0	20	20	20	20	20
56.3	20	20	20	20	20
62.5	20	20	20	20	20
68.8	20	20	20	20	20
75.0	20	20	20	20	20
81.3	20	20	20	20	20
87.5	20	20	20	20	20
93.8	20	20	20	20	20
100.0	20	20	20	20	20

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 minimum switches

	0.0	10.0	20.0	50.0	80.0
0.0	20	20	20	20	20
6.3	20	20	20	20	20
12.5	20	20	20	20	20
18.8	20	20	20	20	20
25.0	20	20	20	20	20
31.3	20	20	20	20	20
37.5	20	20	20	20	20
43.8	20	20	20	20	20
50.0	20	20	20	20	20
56.3	20	20	20	20	20
62.5	20	20	20	20	20
68.8	20	20	20	20	20
75.0	20	20	20	20	20
81.3	20	20	20	20	20
87.5	20	20	20	20	20
93.8	20	20	20	20	20
100.0	20	20	20	20	20

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 minimum switches

	0.0	10.0	20.0	50.0	80.0
0.0	20	20	20	20	20
6.3	20	20	20	20	20
12.5	20	20	20	20	20
18.8	20	20	20	20	20
25.0	20	20	20	20	20
31.3	20	20	20	20	20
37.5	20	20	20	20	20
43.8	20	20	20	20	20
50.0	20	20	20	20	20
56.3	20	20	20	20	20
62.5	20	20	20	20	20
68.8	20	20	20	20	20
75.0	20	20	20	20	20
81.3	20	20	20	20	20
87.5	20	20	20	20	20
93.8	20	20	20	20	20
100.0	20	20	20	20	20

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 minimum switches

	0.0	10.0	20.0	50.0	80.0
0.0	20	20	20	20	20
6.3	20	20	20	20	20
12.5	20	20	20	20	20
18.8	20	20	20	20	20
25.0	20	20	20	20	20
31.3	20	20	20	20	20
37.5	20	20	20	20	20
43.8	20	20	20	20	20
50.0	20	20	20	20	20
56.3	20	20	20	20	20
62.5	20	20	20	20	20
68.8	20	20	20	20	20
75.0	20	20	20	20	20
81.3	20	20	20	20	20
87.5	20	20	20	20	20
93.8	20	20	20	20	20
100.0	20	20	20	20	20

Tables supporting Engine Oil Temperature Sensor

P0196

FastFailTempDiff — **AXIS is Engine Coolant Temperature at ECM Power-up, Degrees C**

Axis	**-40**	**-28**	**-16**	**-4**	**8**	**20**	**32**	**44**	**56**	**68**	**80**	**92**	**104**	**116**	**128**	**140**	**152**
Curve	75.0	60.0	45.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0

TotalAccumulatedFlow — **Axis is Power up Engine Oil temperature, Curve is accumulated engine grams airflow**

Axis	**-40**	**-28**	**-16**	**-4**	**8**	**20**	**32**	**44**	**56**	**68**	**80**	**92**	**104**	**116**	**128**	**140**	**152**
Curve	15000	14000	13000	12000	11000	10000	9000	8000	7000	6000	5000	4000	5000	4000	3000	3000	3000

Tables supporting Deactivation System Performance

P3400

MinEngRunAfterAutoStopTable — **Axis is engine off time in seconds, Curve is minimum engine run time after start**

Axis	0	5	10	30	60	100	120	140	160	180	240	300	360	420	600	700	800
Curve	5.0	5.0	5.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	20.0	20.0

EngSpeedLwrLimitEnableTable — **AXIS is Gear State, Curve is Engine Speed**

Axis	**1st Gear**	**2nd Gear**	**3rd Gear**	**4th Gear**	**5thGear**	**6th Gear**	**EVT1**	**EVT2**	**Neutral**	**Reverse**	**Park**
Curve	925	575	925	925	925	925	575	575	925	925	925

EngSpeedUprLimitEnableTable — **AXIS is Gear State, Curve is Engine Speed**

Axis	**1st Gear**	**2nd Gear**	**3rd Gear**	**4th Gear**	**5thGear**	**6th Gear**	**EVT1**	**EVT2**	**Neutral**	**Reverse**	**Park**
Curve	2800	2800	2800	2800	2800	2800	2800	2800	2800	2800	2800

EngSpeedLwrLimitDisableTable — **AXIS is Gear State, Curve is Engine Speed**

Axis	**1st Gear**	**2nd Gear**	**3rd Gear**	**4th Gear**	**5thGear**	**6th Gear**	**EVT1**	**EVT2**	**Neutral**	**Reverse**	**Park**
Curve	850	500	850	850	850	850	500	500	850	850	850

EngSpeedUprLimitDisableTable — **AXIS is Gear State, Curve is Engine Speed**

Axis	**1st Gear**	**2nd Gear**	**3rd Gear**	**4th Gear**	**5thGear**	**6th Gear**	**EVT1**	**EVT2**	**Neutral**	**Reverse**	**Park**
Curve	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000

HalfCylToAllCylVacuum — **Horizontal AXIS is Gear State, Vertical axis is Engine RPM**

RPM	1st Gear	2nd Gear	3rd Gear	4th Gear	5th Gear	6th Gear	EVT1	EVT2	Neutral	Park	Reverse
0.0	0	0	0	0	0	30	0	0	0	0	0
100.0	0	0	0	0	0	30	0	0	0	0	0
200.0	0	0	0	0	0	30	0	0	0	0	0
300.0	0	0	0	0	0	30	0	0	0	0	0
400.0	0	0	0	0	0	30	0	0	0	0	0
500.0	0	0	0	0	0	30	0	0	0	0	0
600.0	0	0	0	0	0	30	0	0	0	0	0
700.0	0	0	0	0	0	25	0	0	0	0	0
800.0	0	0	0	0	0	20	0	0	0	0	0
900.0	0	0	0	0	0	15	0	0	0	0	0
1000.0	0	0	0	0	0	10	0	0	0	0	0
1100.0	0	0	0	0	0	5	0	0	0	0	0
1200.0	0	0	0	0	0	5	0	0	0	0	0
1300.0	0	0	0	0	0	5	0	0	0	0	0
1400.0	0	0	0	0	0	5	0	0	0	0	0
1500.0	0	0	0	0	0	5	0	0	0	0	0
1600.0	0	0	0	0	0	5	0	0	0	0	0
1700.0	0	0	0	0	0	5	0	0	0	0	0
1800.0	0	0	0	0	0	5	0	0	0	0	0
1900.0	0	0	0	0	0	5	0	0	0	0	0
2000.0	0	0	0	0	0	5	0	0	0	0	0
2100.0	0	0	0	0	0	5	0	0	0	0	0
2200.0	0	0	0	0	0	5	0	0	0	0	0
2300.0	0	0	0	0	0	5	0	0	0	0	0
2400.0	0	0	0	0	0	5	0	0	0	0	0
2500.0	0	0	0	0	0	5	0	0	0	0	0
2600.0	0	0	0	0	0	5	0	0	0	0	0
2700.0	0	0	0	0	0	5	0	0	0	0	0
2800.0	0	0	0	0	0	5	0	0	0	0	0
2900.0	0	0	0	0	0	5	0	0	0	0	0
3000.0	0	0	0	0	0	5	0	0	0	0	0
3100.0	0	0	0	0	0	5	0	0	0	0	0
3200.0	0	0	0	0	0	5	0	0	0	0	0

HalfCylDisabledPRNDL

PRNDL Drive 1	1
PRNDL Drive 2	1
PRNDL Drive 3	1
PRNDL Drive 4	1
PRNDL Drive 5	1
PRNDL Drive 6	0
PRNDL Neutral	1
PRNDL Reverse	1
PRNDL Park	1
PRNDL Transitional 1	1
PRNDL Transitional 2	1
PRNDL Transitional 4	1
PRNDL Transitional 7	1
PRNDL Transitional 8	1
PRNDL Transitional 11	1
PRNDL Transitional 13	1
PRNDL Transitional Illegal	1
PRNDL Transitional Between State	1

HalfCylDisabledPRNDLDeviceControl

PRNDL Drive 1	1
PRNDL Drive 2	1
PRNDL Drive 3	1
PRNDL Drive 4	1
PRNDL Drive 5	1
PRNDL Drive 6	0
PRNDL Neutral	0
PRNDL Reverse	1
PRNDL Park	0
PRNDL Transitional 1	1
PRNDL Transitional 2	1
PRNDL Transitional 4	1
PRNDL Transitional 7	1
PRNDL Transitional 8	1
PRNDL Transitional 11	1
PRNDL Transitional 13	1
PRNDL Transitional Illegal	1
PRNDL Transitional Between State	1

HalfCylDisabledTransGr Table — **AXIS is Gear State**

Axis	1st Gear	2nd Gear	3rd Gear	4th Gear	5thGear	6th Gear	EVT1	EVT2	Neutral	Reverse	Park
Curve	1	0	0	0	0	0	0	0	1	1	1

HalfCylDisabledTransGrDeviceControl — **AXIS is Gear State**

Axis	1st Gear	2nd Gear	3rd Gear	4th Gear	5thGear	6th Gear	EVT1	EVT2	Neutral	Reverse	Park
Curve	0	0	0	0	0	0	0	0	0	1	0

AllCylToHalfCylVacuum — **Horizontal AXIS is Gear State, Vertical axis is Engine RPM**

RPM	1st Gear	2nd Gear	3rd Gear	4th Gear	5th Gear	6th Gear	EVT1	EVT2	Neutral	Park	Reverse
0.0	0	0	0	0	0	0	0	0	0	0	0
100.0	0	0	0	0	0	0	0	0	0	0	0
200.0	0	0	0	0	0	0	0	0	0	0	0
300.0	0	0	0	0	0	0	0	0	0	0	0
400.0	0	0	0	0	0	0	0	0	0	0	0
500.0	0	0	0	0	0	0	0	0	0	0	0
600.0	0	0	0	0	0	0	0	0	0	0	0
700.0	0	0	0	0	0	0	0	0	0	0	0
800.0	0	0	0	0	0	0	0	0	0	0	0
900.0	0	0	0	0	0	0	0	0	0	0	0
1000.0	0	0	0	0	0	0	0	0	0	0	0
1100.0	0	0	0	0	0	0	0	0	0	0	0
1200.0	0	0	0	0	0	0	0	0	0	0	0
1300.0	0	0	0	0	0	0	0	0	0	0	0
1400.0	0	0	0	0	0	0	0	0	0	0	0
1500.0	0	0	0	0	0	0	0	0	0	0	0
1600.0	0	0	0	0	0	0	0	0	0	0	0
1700.0	0	0	0	0	0	0	0	0	0	0	0
1800.0	0	0	0	0	0	0	0	0	0	0	0
1900.0	0	0	0	0	0	0	0	0	0	0	0
2000.0	0	0	0	0	0	0	0	0	0	0	0
2100.0	0	0	0	0	0	0	0	0	0	0	0
2200.0	0	0	0	0	0	0	0	0	0	0	0
2300.0	0	0	0	0	0	0	0	0	0	0	0
2400.0	0	0	0	0	0	0	0	0	0	0	0
2500.0	0	0	0	0	0	0	0	0	0	0	0
2600.0	0	0	0	0	0	0	0	0	0	0	0
2700.0	0	0	0	0	0	0	0	0	0	0	0
2800.0	0	0	0	0	0	0	0	0	0	0	0
2900.0	0	0	0	0	0	0	0	0	0	0	0
3000.0	0	0	0	0	0	0	0	0	0	0	0
3100.0	0	0	0	0	0	0	0	0	0	0	0
3200.0	0	0	0	0	0	0	0	0	0	0	0

Tables supporting Engine Oil Pressure Rationality

P0521

EngSpeedWeightFactorTable — **AXIS is Engine RPM, Curve is Weight Factor**

Axis	0	500	900	1000	2000	3000	4000	4200	5000
Curve	0.00	0.00	0.00	0.45	0.45	0.45	0.46	0.44	0.00

EngOilTempWeightFactorTable — **AXIS is Engine Oil Temp Deg C, Curve is Weight Factor**

Axis	-10	-5	60	80	90	100	110	115	120
Curve	0.00	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.00

EngLoadStabilityWeightFactorTable — **AXIS is Delta APC, Curve is Weight Factor**

Axis	0	5	10	20	30	50	100	200	399
Curve	1.00	1.00	0.50	0.30	0.00	0.00	0.00	0.00	0.00

EngOilPredictionWeightFactorTable — **AXIS is Predicted Oil Pressure, Curve is Engine Oil Prediction Weight Factor**

Axis	0	170	250	275	360	375	400	500	600
Curve	0.00	0.00	0.10	1.00	1.00	1.00	1.00	0.86	0.00

EGR Section

KtEGRD_p_StepDelta

X axis is Kpa BARO

65	70	75	80	85	90	95	100	105
3.1953	3.1953	3.1953	3.1953	3.1953	3.1953	3.1953	3.1953	3.1953

KtEGRD_p_StepMAP_DIFF

X axis is Kpa BARO

65	70	75	80	85	90	95	100	105
-0.0391	-0.0391	-0.0391	-0.0391	-0.0391	-0.0391	-0.0391	-0.0391	-0.0391

KtEGRD_Cnt_StepSamplesPerTrip

X axis is Kpa BARO

65	70	75	80	85	90	95	100	105
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

KtEGRD_Cnt_SamplesAfterStep

X axis is Kpa BARO

65	70	75	80	85	90	95	100	105
10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000

KtEGRD_Cnt_SamplesAfterReset

X axis is Kpa BARO

65	70	75	80	85	90	95	100	105
10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000

Phaser Section

KtPHSD_phi_CamPosErrorLimIc1

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	13.0000	13.0000	10.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	10.0000	10.0000
800	13.0000	13.0000	10.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	10.0000	10.0000
1200	13.0000	13.0000	10.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	10.0000	10.0000
1600	13.0000	13.0000	10.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	10.0000	10.0000
2000	13.0000	13.0000	10.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	10.0000	10.0000
2400	13.0000	13.0000	10.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	10.0000	10.0000
2800	13.0000	13.0000	10.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	10.0000	10.0000
3200	13.0000	13.0000	10.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	10.0000	10.0000
3600	13.0000	13.0000	10.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	10.0000	10.0000
4000	13.0000	13.0000	10.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	10.0000	10.0000
4400	13.0000	13.0000	10.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	10.0000	10.0000
4800	13.0000	13.0000	10.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	10.0000	10.0000
5200	13.0000	13.0000	10.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	10.0000	10.0000
5600	13.0000	13.0000	10.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	10.0000	10.0000
6000	13.0000	13.0000	10.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	10.0000	10.0000
6400	13.0000	13.0000	10.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	10.0000	10.0000
6800	13.0000	13.0000	10.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	10.0000	10.0000

KtPHSD_phi_CamPosErrorLimEc1

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	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
800	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
1200	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
1600	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
2000	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
2400	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
2800	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
3200	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
3600	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
4000	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
4400	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
4800	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
5200	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
5600	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
6000	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
6400	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
6800	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

KtPHSD_phi_CamPosErrorLimIc2

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	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
800	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
1200	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
1600	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
2000	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
2400	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
2800	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
3200	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
3600	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
4000	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
4400	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
4800	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
5200	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
5600	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
6000	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
6400	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
6800	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

KtPHSD_phi_CamPosErrorLimEc2

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	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
800	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
1200	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
1600	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
2000	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
2400	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
2800	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
3200	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
3600	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
4000	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
4400	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
4800	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
5200	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
5600	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
6000	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
6400	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
6800	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

KtPHSD_t_StablePositionTimeIc1

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	100.000	80.000	20.000	8.000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	5.000	7.500	9.000
800	100.000	80.000	20.000	8.000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	5.000	7.500	9.000
1200	100.000	80.000	20.000	8.000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	5.000	7.500	9.000
1600	100.000	80.000	20.000	8.000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	5.000	7.500	9.000
2000	100.000	80.000	20.000	8.000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	5.000	7.500	9.000
2400	100.000	80.000	20.000	8.000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	5.000	7.500	9.000
2800	100.000	80.000	20.000	8.000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	5.000	7.500	9.000
3200	100.000	80.000	20.000	8.000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	5.000	7.500	9.000
3600	100.000	80.000	20.000	8.000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	5.000	7.500	9.000
4000	100.000	80.000	20.000	8.000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	5.000	7.500	9.000
4400	100.000	80.000	20.000	8.000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	5.000	7.500	9.000
4800	100.000	80.000	20.000	8.000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	5.000	7.500	9.000
5200	100.000	80.000	20.000	8.000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	5.000	7.500	9.000
5600	100.000	80.000	20.000	8.000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	5.000	7.500	9.000
6000	100.000	80.000	20.000	8.000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	5.000	7.500	9.000
6400	100.000	80.000	20.000	8.000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	5.000	7.500	9.000
6800	100.000	80.000	20.000	8.000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	5.000	7.500	9.000

KtPHSD_t_StablePositionTimeEc1

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
800	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

KtPHSD_t_StablePositionTimeIc2

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
800	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

KtPHSD_t_StablePositionTimeEc2

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
800	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

P0068: MAP / MAF / TPS Correlation

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

X-axis	4.9988	9.9991	14.9994	19.9997	25.0000	29.9988	34.9991	39.9994	99.9985
Data	29.7422	32.3594	32.5703	22.9531	17.9844	15.0234	100.0000	100.0000	100.0000

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

X-axis	4.9988	9.9991	14.9994	19.9997	25.0000	29.9988	34.9991	39.9994	99.9985
Data	27.7578	34.2500	41.0000	34.8359	36.0781	48.3594	255.0000	255.0000	255.0000

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

X-axis	600.0000	1400.0000	2200.0000	3000.0000	3800.0000	4600.0000	5400.0000	6200.0000	7000.0000
Data	25.0000	60.0000	100.0000	140.0000	180.0000	220.0000	250.0000	280.0000	300.0000

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

X-axis	6.0000	7.0000	8.0000	9.0000	10.0000	11.0000	12.0000	13.0000	14.0000
Data	0.0000	18.0000	40.0000	75.0000	135.0000	250.0000	500.0000	500.0000	500.0000

P1682: Ignition Voltage Correlation

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

X-axis	23.0000	85.0000	95.0000	105.0000	125.0000
Data	7.0000	8.6992	9.0000	9.1992	10.0000

P16F3: No fast unmanaged retarded spark above the applied spark

X-axis is Erpm
Y-axis is Air per Cylinder (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	32.16	37.55	28.53	32.33	34.14	34.20	30.44	28.47	26.09	20.25	20.02	17.03	17.03	17.03	17.03	17.03	17.03
160.00	35.20	38.52	22.81	22.22	21.84	21.78	20.23	19.02	17.44	14.80	14.67	12.97	12.97	12.97	12.97	12.97	12.97
240.00	38.86	39.16	19.77	15.89	15.42	15.22	14.64	14.55	13.41	11.94	11.80	10.63	10.63	10.63	10.63	10.63	10.63
320.00	29.11	27.61	18.14	14.08	13.30	13.47	13.45	13.28	12.06	10.92	10.59	9.67	9.67	9.67	9.67	9.67	9.67
400.00	19.59	17.23	17.38	12.77	12.23	12.83	13.27	12.77	11.31	10.23	9.78	9.05	9.05	9.05	9.05	9.05	9.05
480.00	19.20	12.64	13.05	12.86	12.27	12.84	13.13	12.17	10.69	9.69	9.16	8.50	8.50	8.50	8.50	8.50	8.50
560.00	33.19	13.23	9.94	9.83	11.56	13.11	12.83	11.50	10.13	9.20	8.53	7.84	7.84	7.84	7.84	7.84	7.84
640.00	29.84	11.81	8.61	8.19	9.55	11.53	11.88	10.72	9.64	8.73	7.88	7.11	7.11	7.11	7.11	7.11	7.11
720.00	52.58	11.83	8.33	6.78	7.39	7.78	8.73	8.88	8.52	7.59	7.00	6.48	6.48	6.48	6.48	6.48	6.48
800.00	57.98	10.75	8.48	5.84	6.34	6.66	7.09	7.11	6.31	5.91	5.67	5.39	5.39	5.39	5.39	5.39	5.39
880.00	64.64	9.86	7.80	5.34	5.83	6.02	6.61	6.52	5.78	5.41	5.20	4.89	4.89	4.89	4.89	4.89	4.89
960.00	64.64	9.86	7.80	5.34	5.83	6.02	6.61	6.52	5.78	5.41	5.20	4.89	4.89	4.89	4.89	4.89	4.89
1040.00	64.64	9.86	7.80	5.34	5.83	6.02	6.61	6.52	5.78	5.41	5.20	4.89	4.89	4.89	4.89	4.89	4.89
1120.00	64.64	9.86	7.80	5.34	5.83	6.02	6.61	6.52	5.78	5.41	5.20	4.89	4.89	4.89	4.89	4.89	4.89
1200.00	64.64	9.86	7.80	5.34	5.83	6.02	6.61	6.52	5.78	5.41	5.20	4.89	4.89	4.89	4.89	4.89	4.89
1280.00	64.64	9.86	7.80	5.34	5.83	6.02	6.61	6.52	5.78	5.41	5.20	4.89	4.89	4.89	4.89	4.89	4.89
1360.00	64.64	9.86	7.80	5.34	5.83	6.02	6.61	6.52	5.78	5.41	5.20	4.89	4.89	4.89	4.89	4.89	4.89

P16F3: Absolute difference of redundant calculated engine speed

X-axis is engine speed (rpm)
Data is engine speed delta (rpm)

X-axis	0.0000	250.0000	500.0000	750.0000	1000.0000
Data	1000.0000	750.0000	500.0000	300.0000	300.0000

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	0.0000	50.0000	100.0000	150.0000	407.0000	408.0000
Data	18.0000	18.0000	18.0000	18.0000	18.0000	255.0000

Transfer Case HIGH Ratio Margin

X-axis is Veh Spd km/hr
Y-axis is Engine Torq N-m
Data is Ratio Margin

	0.0	3.0	5.0	5.1	12.0	15.0	18.0	21.0	24.0
-200	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
-150	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
-100	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
-50	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
0	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
50	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
100	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
150	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
200	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1

Transfer Case LOW Ratio Margin

X-axis is Veh Spd km/hr
Y-axis is Engine Torq N-m
Data is Ratio Margin

	0.0	3.0	5.0	5.1	12.0	15.0	18.0	21.0	24.0
-200	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
-150	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
-100	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
-50	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
0	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
50	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
100	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
150	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
200	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1

Transfer Case NEUTRAL Ratio Margin

X-axis is Veh Spd km/hr
Y-axis is Engine Torq N-m
Data is Ratio Margin

	0.0	3.0	5.0	5.1	12.0	15.0	18.0	21.0	24.0
-200	8.0	8.0	8.0	1.0	0.1	0.1	0.1	0.1	0.1
-150	8.0	8.0	8.0	1.0	1.0	1.0	0.5	0.5	0.5
-100	8.0	8.0	8.0	2.0	2.0	2.0	1.0	1.0	1.0
-50	8.0	8.0	8.0	4.0	4.0	4.0	2.0	2.0	2.0
0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
50	8.0	8.0	8.0	4.0	4.0	4.0	2.0	2.0	2.0
100	8.0	8.0	8.0	2.0	2.0	2.0	1.0	1.0	1.0
150	8.0	8.0	8.0	1.0	1.0	1.0	0.5	0.5	0.5
200	8.0	8.0	8.0	1.0	0.1	0.1	0.1	0.1	0.1

TS	PDT	Cert Doc Bundle Name	Pcodes											
Genslak		CatalystSysEfficiencyLoB1_FA	P0420											
		CatalystSysEfficiencyLoB2_FA	P0430											
Hall	Evap	EvapPurgeSolenoidCircuit_FA	P0443											
		EvapFlowDuringNonPurge_FA	P0496											
		EvapVentSolenoidCircuit_FA	P0449											
		EvapSmallLeak_FA	P0442											
		EvapEmissionSystem_FA	P0455	P0446										
		FuelTankPressureSnsrCkt_FA	P0452	P0453										
Hall	Eng Interface	CoolingFanSpeedTooHigh_FA	P0495											
Hall	Evap	FuelLevelDataFault	P0461	P0462	P0463	P2066	P2067	P2068						
Hall	Engine Interface	PowertrainRelayFault	P1682											
		PowertrainRelayStateOn_FA	P0685											
		PowertrainRelayStateOn_Error	P0685											
		IgnitionOffTimer_FA	P2610											
		IgnitionOffTimeValid	P2610											
		TimeSinceEngineRunningValid	P2610											
Hall	Vehicle Infrastructure PMT	VehicleSpeedSensor_FA	P0502	P0503	P0722	P0723								
		VehicleSpeedSensorError	P0502	P0503	P0722	P0723								
MacEwen		FuelTrimSystemB1_FA	P0171	P0172										
		FuelTrimSystemB2_FA	P0174	P0175										
		FuelTrimSystemB1_TFTKO	P0171	P0172										
		FuelTrimSystemB2_TFTKO	P0174	P0175										
		A/F Imbalance Bank1	P1174 or	P219A										
		A/F Imbalance Bank2	P1175 or	P219B										
Mathews	Misfire PDT	EngineMisfireDetected_TFTKO	P0300	P0301	P0302	P0303	P0304	P0305	P0306	P0307	P0308			
		EngineMisfireDetected_FA	P0300	P0301	P0302	P0303	P0304	P0305	P0306	P0307	P0308			
Sawdon	Spark/ESC	KS_Ckt_Perf_B1B2_FA	P0324	P0325	P0326	P0327	P0328	P0330	P0332	P0333				
Sawdon	Spark/ESC	IgnitionOutputDriver_FA	P0351	P0352	P0353	P0354	P0355	P0356	P0357	P0358				
Siekkinen	O2 PDT	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				
		O2S_Bank_1_Sensor_2_FA	P013A	P013B	P013E	P013F	P2270	P2271	P0137	P0138	P0140	P0141	P0054	
		O2S_Bank_2_Sensor_1_FA	P2A03	P0151	P0152	P0153	P0154	P0155	P0059	P1153				
		O2S_Bank_2_Sensor_2_FA	P013C	P013D	P014A	P014B	P2272	P2273	P0157	P0158	P0160	P0161	P0060	
		ECT_Sensor_Ckt_FA	P0117	P0118										
		ECT_Sensor_Ckt_TPTKO	P0117	P0118										

		ECT_Sensor_Ckt_TFTKO	P0117	P0118										
		ECT_Sensor_DefaultDetected	P0117	P0118	P0116	P0125								
		ECT_Sensor_FA	P0117	P0118	P0116	P0125	P0128							
		ECT_Sensor_TFTKO	P0117	P0118	P0116	P0125								
		ECT_Sensor_Perf_FA	P0116											
		ECT_Sensor_Ckt_FP	P0117	P0118										
		ECT_Sensor_Ckt_High_FP	P0118											
		ECT_Sensor_Ckt_Low_FP	P0117											
Wiggins	Air Measurement	AmbientAirPressCktFA	P2228	P2229										
		AmbientAirPressCktFA_NoSnsr	P0106	P0107	P0108									
		AmbientAirDefault_NA	P0106	P0107	P0108	P2227	P2228	P2229						
Wiggins	Air Measurement	IAT_SensorCircuitTFTKO	P0112	P0113										
		IAT_SensorCircuitFA	P0112	P0113										
		IAT_SensorCircuitFP	P0112	P0113										
		IAT_SensorTFTKO	P0111	P0112	P0113									
		IAT_SensorFA	P0111	P0112	P0113									
		CylDeacSystemTFTKO	P3400											
		MAF_SensorPerfFA	P0101											
		MAF_SensorPerfTFTKO	P0101											
		MAP_SensorPerfFA	P0106											
		MAP_SensorPerfTFTKO	P0106											
		ThrottlePositionSnsrPerfFA	P0121											
		ThrottlePositionSnsrPerfTFTKO	P0121											
Wiggins	Air Measurement	MAF_SensorFA	P0101	P0102	P0103									
		MAF_SensorTFTKO	P0101	P0102	P0103									
		MAF_SensorFP	P0102	P0103										
		MAF_SensorCircuitFA	P0102	P0103										
		MAF_SensorCircuitTFTKO	P0102	P0103										
Wiggins	Air Measurement	MAP_SensorTFTKO	P0106	P0107	P0108									
		MAP_SensorFA	P0106	P0107	P0108									
		AfterThrottlePressureFA_NA	P0106	P0107	P0108									
		AfterThrottleVacuumTFTKO_NA	P0106	P0107	P0108									
		AfterThrottlePressTFTKO_NA	P0106	P0107	P0108									
		MAP_SensorCircuitFA	P0107	P0108										
		MAP_EngineVacuumStatus	MAP_SensorFA OR P0107, P0108 Pending											
Wiggins	Engine Positioning	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										
		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
York	Dilution PDT	AnyCamPhaser_FA	P0010	P0011	P0013	P0014	P0020	P0021	P0023	P0024				
York	Dilution PDT	AnyCamPhaser_TFTKO	P0010	P0011	P0013	P0014	P0020	P0021	P0023	P0024				
York	Dilution PDT	IntkCamPhaser_FA	P0010	P0011	P0020	P0021								
Miller	Open Loop	EngineMetalOvertempActive	P1258											
Jess	Oil Attributes PDT	EngOilModeledTempValid	ECT_Sensor_FA or IAT_SensorCircuitFA											
Jess	Oil Attributes PDT	EngOilPressureSensorCktFA	P0522	P0523										
Jess	Oil Attributes PDT	EngOilPressureSensorFA	P0521	P0522	P0523									
Kaiser	AFM PDT	CylnderDeacDriverTFTKO	P3401	P3409	P3417	P3425	P3433	P3441	P3449					
Kaiser	AFM PDT	BrakeBoosterSensorFA	P0556	P0557	P0558									
Miller		FuelInjectorCircuit_FA	P0201	P0202	P0203	P0204	P0205	P0206	P0207	P0208				
		FuelInjectorCircuit_TFTKO	P0201	P0202	P0203	P0204	P0205	P0206	P0207	P0208				
Kurnik		ControllerProcessorPerf_FA	P0606											
		ControllerRAM_Error_FA	P0604											
Bauerle		TPS_Performance_FA	P0068	P0121	P1516	P2101								
		EnginePowerLimited	P0068	P0606	P0120	P0122	P0123	P0220	P0222	P0223	P0641	P0651		
			P1516	P2101	P2120	P2122	P2123	P2125	P2127	P2128	P2135	P2138	P2176	
		TPS1_OutOfRange_Composite	P0120	P0122	P0123									
		TPS2_OutOfRange_Composite	P0220	P0222	P0223									
		TPS_FA	P2135	(TPS1_OutOfRange_Composite and TPS2_OutOfRange_Composite)										
		TPS_FaultPending	Always set to FALSE, As ETC diagnostics are set within 200 msec there is no real need for a pending flag											
		TPS_ThrottleAuthorityDefaulted	P0068	P0606	P1516	P2101	P2135	P2176	V5B_OutOfRange_Composite					
			(TPS1_OutOfRange_Composite and TPS2_OutOfRange_Composite)											

			(MAP_OutOfRange_Composite and MAF_OutOfRange_Composite)											
		AcceleratorEffectivePstnValid	Always set to TRUE, no P codes will set to FALSE											
Bauerle		5VoltReferenceA_FA	P0641											
		5VoltReferenceB_FA	P0651											
Kar		IAC_SystemRPM_FA	P0506	P0507										
		IAC_SystemRPM_FA	P0506	P0507										
Pellerito	Trans	TransmissionGearDefaulted	P182E	P1915										
		EngineTorqureInaccurate	EngineMisfireDetected_FA or											
			FuelInjectorCircuit_FA or											
			FuelInjectorCircuit_TFTKO or											
			FuelTrimSystemB1_FA or											
			FuelTrimSystemB2_FA or											
			MAF_SensorTFTKO or											
			MAP_SensorTFTKO or											
			EGRValvePerformance_FA											
Bolstrum		AcceleratorPedalFailure	P2122	P2123	P2127	P2128	P2138	P0697	P06A3					
		Long Name	**Short Name**											
		Bank	B											
		Brake	Brk											
		Circuit	Ckt											
		Engine	Eng											
		Fault Active	FA											
		Fault	Flt											
		Intake	Intk											
		Naturally Aspirated	NA											
		Out of Range	OOR											
		Performance	Perf											
		Position	Pstn											
		Pressure	Press											
		Sensor	Snsr											
		Supercharged	SC											
		System	Sys											
		Test Failed This Key On	TFTKO											
Hall	Evap	LowFuelConditionDiagnostic	Flag set to TRUE if the fuel level < 10 %											
			AND											
			No Active DTCs:		FuelLevelDataFault									
					P0462									
					P0463									
			for at least 30 seconds.											
		Transfer Pump is Commanded On	Fuel Volume in Primary Fuel Tank < 0.0 liters											
			AND											

			Fuel Volume in Secondary Fuel Tank ≥ 100.0 liters											
			AND											
			Transfer Pump on Time < **TransferPumpOnTimeLimit** Table											
			AND											
			Transfer Pump had been Off for at least 0.0 seconds											
			AND											
			Evap Diagnostic (Purge Valve Leak Test, Large Leak Test, and Waiting for Purge) is not running											
			AND											
			Engine Running											

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Idle Speed Diagnostics								
Idle Diagnostics P0506, P0507 have the following common enable criteria	***				Motor A speed faults: P0A3F, P1B03, P0A40, P0C52, P0C53, P0C5C, P0C5D	Not active		
					Motor B speed faults: P0A45, P1B04, P0A46, P0C57, P0C58, P0C61, P0C62	Not active		
					Vehicle Speed/TOS sensor faults: P0722, P077B, P215C	Not active		
					Accelerator pedal position	Not Defaulted		
					Accel Pedal position	<= 1 %		
					Engine State	Running (not starting or stopping states)		
					Vehicle speed	<= 1 kph		
					Commanded RPM Delta	< 25 RPM		
					IdleConditons present	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 95 RPM. Filter coefficient for engine speed = 0.00375	** Common Enables		1 loop execution at 100 ms rate	Two Trips
		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 = 0.00375	Hi idle diagnostic	Fault Active	Pass condition met for 15 seconds	
					** Common Enables			
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 -190 RPM. Filter coefficient for engine speed = 0.00375	** Common Enables		1 loop execution at 100 ms rate	Two Trips
		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	Low idle diagnostic ** Common Enables	Fault Active	Pass condition met for 15 seconds	
Power Moding Diagnostics								
System Voltage Low	P0562	Sets when the low voltage system voltage is below a threshold DTC Pass	Ignition Voltage	Ignition Voltage <= 10 Volts Ignition Voltage > 10 Volts	Ignition Key Status Engine Speed	RUN/CRANK >= 0 RPM	5 seconds in a 6 second window 1 second	Special Type C
System Voltage Hi	P0563	Sets when the low voltage system voltage is above a threshold DTC Pass	Ignition Voltage	Ignition Voltage >= 18 Volts Ignition Voltage < 18 Volts	Ignition Key Status	RUN/CRANK	5 seconds in a 6 second window 1 second	Special Type C
Ignition Switch Run/Start Position Circuit Low	P2534	Detects a run crank relay open circuit DTC Pass	Runk Crank Line voltage Run Crank Line Voltage	Ignition Run Crank line voltage <= 2 Volts Ignition Run 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) 5 seconds (200 * 0.025)	One Trip
Stuck Clutch Diagnostics								
Common Stuck Clutch diagnostic secondary enables for codes P07A3, P07A5, P07A7, P07A9	***				|Input speed - Input speed profile|	> 200 Rpm		
Transmission Friction Element A Stuck On	P07A3	Detects a stuck C1 clutch	C1 Slip speed	C1 slip speed <= 80 RPM	Range State C1 slip acceleration Excess torque on C1 ***	Mode 2 <= 30 RPM/s > 320 Nm FOR 0.25 seconds (10 * 0.025)	4.5 seconds ((60 + 120) * 0.025)	Two Trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		DTC Pass	C1 Slip Speed	C1 Slip Speed > 45 RPM	Operating Mode	Neutral, Mode 2, Gear 3, Gear 4	0.375 seconds (15 * 0.025)	
Transmission Friction Element B Stuck On	P07A5	Detects a stuck C2 clutch	C2 Slip speed	C2 slip speed <= 50 RPM	Range State C2 slip acceleration Excess torque on C2 ***	Mode 1 <= 10000 RPM/s > 320 Nm FOR 0.125 seconds (5 * 0.025)	3.2 seconds ((8 + 120) * 0.025)	Two Trips
		DTC Pass	C2 Slip Speed	C2 Slip Speed > 70 RPM	Operating Mode	Neutral, Mode 1, Gear 1	0.25 seconds (10 * 0.025)	
Transmission Friction Element C Stuck On	P07A7	Detects a stuck C3 clutch	C3 Slip speed	C3 slip speed <= 80 RPM	Range State C3 slip acceleration Excess torque on C3 ***	Mode 2 <= 30 RPM/s > 140 Nm FOR 0.25 seconds (10 * 0.025)	4.5 seconds ((60 + 120) * 0.025)	Two Trips
		DTC Pass	C3 Slip Speed	C3 Slip Speed > 45 RPM	Operating Mode	2, Gear 1, Gear 2, Gear 3	0.375 seconds (15 * 0.025)	
Transmission Friction Element D Stuck On	P07A9	Detects a stuck C4 clutch	C4 Slip speed	**Fail Case 1:** C4 slip speed <= 30 PRM	Range State C4 slip acceleration Excess torque on C4 ***	Mode 1 <= -1900 RPM/s > 700 Nm FOR 0.125 seconds (10 * 0.025)	3.2 seconds ((8 + 120) * 0.025)	Two Trips
				Fail Case 2: C4 slip speed <= 80 RPM	Range State C4 slip acceleration Excess torque on C4 ***	Mode 2 <= 50 RPM/s > 180 Nm FOR 0.25 seconds (10 * 0.025)	4.5 seconds ((60 + 120) * 0.025)	
		DTC Pass	C4 Slip Speed	C4 Slip Speed > 75 RPM	Operating Mode	Neutral, Mode 1, Mode 2, Gear 2, Gear 4	0.25 seconds (10 * 0.025)	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Transmission Auxiliary Oil Pump Diagnostics								
Transmission Auxiliary Oil Pump (TAOP) Feedback Signal out of Bound	P0C2B	This DTC sets when the TAOP controller is not communicating with the HCP	Incomplete or no fault message communication with TAOP controller.	A complete fault status message must be received every 1.5 seconds	RunCrankActive	= 1 for more than 0.2 seconds	9.75 seconds	Two Trips
		DTC Pass	Complete communication with TAOP controller	A complete fault status message must be received every 1.5 seconds			1.75 seconds	
Auxiliary Transmission Fluid Pump Performance	P2797	This diagnostic monitors the aux pump performance based on aux pump filtered desired and actual speed values	Aux pump speed	|Aux pump speed - Commanded Aux pump Speed| > 650 RPM for >.7s	Speed Command Filter Coefficient	0.1	Fail Condition met for 0.75 seconds (30 * 0.025) in a 1.25 second (50 * 0.025) window	Two Trips
					Aux Pump Speed Command	>= 650 RPM FOR 0.5 seconds	Total Fail Time 3*(0.75 seconds out of 1.seconds) + 240 seconds (Fail Condition met for 3 Fault Pendings with a Re-Try delay of 120 seconds between Fault Pendings)	
					RunCrankActive	= 1 for more than 0.2 seconds		
					Fault Pending Condition Met	> 3 times		
		DTC Pass	Aux pump speed	|Aux pump speed - Commanded Aux pump Speed| <= 650 RPM			Pass met for 0.5 seconds ((165-160) * 0.025)	
System Speed Rationality								
Internal Control Module Drive Motor/Generator - Engine Speed Sensor Performance	P0C2F	The DTC Monitors the Calculated Input Speed and Compares this with the Sensed Engine Speed	SPI Sensed Engine Speed and Input Speed	Sensed SPI Engine Speed Above 1500 RPM a difference ≥ 250 RPM else ≥ 1500 RPM	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	160 failure counts out of 320 sample @12.5 ms loop	One Trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			CAN Sensed Engine Speed and Input Speed	Sensed CAN Engine Speed Above 1500 RPM a difference ≥ 250 RPM else ≥ 1500 RPM			**Pass Conditions:** Sensed SPI Engine Speed Above 500 RPM a difference ≤ 250 RPM else ≤ 1500 RPM	
							Pass Conditions: Sensed CAN Engine Speed Above 500 RPM a difference ≤ 250 RPM else ≤ 1500 RPM for 500ms	
Transmission 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	Not FAULT ACTIVE	0.325 seconds (13 counts at 25ms)	One Trip
					Hybrid Motor Speed based Estimated Output Speed is Valid	Calculated based on M1 or M2 Speed Equation		
					Transmission Output Speed and Motor Output Speed Difference	≤ 50 RPM	**Pass Conditions**: Opposite of FAIL for 5 seconds (200 counts at 25ms)	
					Motor Estimated Transmission Output Speed	≥ 50 RPM		
Internal Mode Switch 2								
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	Transitional 17	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms)	Two Trips
			AND Directional IMS R1	R1 Circuit Has Not Been Observed High	Converted Directional IMS	Transitional 2	**Pass Conditions:** IMS R1 Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	
					AND Directional IMS R1	R1 Circuit NOT High for 5 seconds		

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	Transitional 30	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms)	Two Trips
			AND Directional IMS R1	R1 Circuit Has Not Been Observed Low			**Pass Conditions:** IMS R1 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	
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	DRIVE	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms)	Two Trips
			AND Directional IMS R2	R2 Circuit Has Not Been Observed High	Converted Directional IMS	PARK	**Pass Conditions:** IMS R2 Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	
					AND Directional IMS R2	R2 Circuit Low for 5 seconds		
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	Transitional 14 OR Transitional 29	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms)	Two Trips
			AND 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	Transitional 8 OR Transitional 20	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms)	Two Trips
			AND Directional IMS D1	D1 Circuit Has Not Been Observed High			**Pass Conditions:** IMS D1 Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	
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	Transitional 27	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms)	Two Trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			AND Directional IMS D1	D1 Circuit Has Not Been Observed Low			**Pass Conditions:** IMS D1 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	
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	Transitional 24	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms)	Two Trips
			AND Directional IMS D1	D2 Circuit Has Not Been Observed High			**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	Transitional 11 AND Transitional 23	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms)	Two Trips
			AND Directional IMS D2	D2 Circuit Has Not Been Observed Low			**Pass Conditions:** IMS D2 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	
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)	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms)	Two Trips
							Pass Conditions: Opposite of Fail for 3.125 seconds (125 counts at 25ms)	
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 Positions)	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	1.25 seconds (50 counts at 25ms)	One Trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
							Pass Conditions: Opposite of Fail for 1.7 seconds (68 counts at 25ms)	
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	Transitional 9	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms)	Two Trips
			AND Directional IMS S	S Circuit Has Not Been Observed High			**Pass Conditions:** IMS S Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	
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	Transitional 26 AND DRIVE	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms)	Two Trips
			AND Directional IMS S	S Circuit Has Not Been Observed Low			**Pass Conditions:** IMS S Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	
			AND Directional IMS R1	R1 Has Been Observed Low				
Transmission Output Speed Sensor								
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	20 kph	Number of Secured Vehicle Speed Sources	2	10 seconds (400 counts at 25ms)	Two Trips
					Secured Vehicle Speed Use Transmission Output Speed	TRUE		
					Secured Vehicle Speed Use Wheel Speed	TRUE	**Pass Conditions:** Opposite of Fail for 20 seconds (800 counts at 25ms)	
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 DTC will be stored if any software or calibration check sum 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	One Trip
Control Module Not Programmed	P0602	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	One Trip
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		Ignition Status	Run or Crank	1 failure Frequency: Once at powerup	One Trip
Control Module Random Access Memory (RAM) Failure	P0604	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	One Trip
PCM Processor Performance/Integrity Check 1. Main processor Arithmetic Logic Unit (ALU) fault 2. Main configuration register fault 3. Software timed loop execution 4. Communication (SPI bus) between main and secondary processors	P0606	Indicates that the HCP has detected an internal processor integrity fault	1. ALU not reporting as expected 2. Configuration register not reporting as expected 3. Software tasks loops > schedule tasks loop 4. Loss of SPI communication between main and secondary processors		Ignition Status	Accessory, Run, Crank	1. Main (ALU) Failure: 2 times in a row @ 50ms 2.Main (config) Failure: 2 times in a row @ 50ms 3. N/A 4. SPI Failure: MCP 10 fail counts out of 30 sample counts Executes: 6.25ms loop PLD 3 fail counts out	One Trip
					Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
							of 10 sample counts Executes: 50ms loop	
Control Module Long Term Memory Performance	P062F	Indicates that the NVM Error flag has not been cleared	Last EEPROM write did not complete		Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up	One Trip
Torque Security Diagnostics								
Internal Control Module Torque Performance	P061A	The regenerative braking ring compares the primary path torque calculations to the value created by a redundant secondary calculation. The values should be equal.						One Trip
		Fail Case 1: The regenerative braking ring compares the primary path output torque calculations to the value created by a redundant secondary calculation. The values should be equal.	The primary path calculation of regen output torque differs from the redundant calculation	>100 Nm	Regenerative Braking Torque	> 0 Nm	10 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		Fail Case 2: The regenerative braking ring compares the primary path axle torque calculations to the value created by a redundant secondary calculation. The values should be equal.	The primary path calculation of regen axle torque differs from the redundant calculation	>100 Nm	Regenerative Braking Torque	> 0 Nm	10 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
Internal Control Module Torque Calculation Performance	P061B	The system torque monitor compares the primary path torque calculations to limits created by a redundant secondary calculation.						One Trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		Fail Case 1: Exceeds upper torque limit	When the redundant calculation of the system torque exceeds the upper limit created by the primary torque calculation (0.2g = 458Nm offset) for greater than 200ms	458Nm (equivalent to .2g)		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	
		Fail Case 2: Exceeds lower torque limit	When the redundant calculation of the system torque exceeds the lower limit created by the primary torque calculation (0.15g = 343Nm offset) for greater than 200ms	343Nm (equivalent to .15g)		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	
		Fail Case 3: Transmission output torque rationality check violated	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		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	
		Fail Case 4: Brake torque request rationality check violated	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.	1Nm		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	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		Fail Case 5: Output torque negative when driver request is positive	When the PRNDL equals drive and the driver requested torque is positive while the commanded output torque is negative and below a -0.1g (-229Nm) threshold for greater than 200ms.	-229Nm (equivalent to -0.1g)		Enabled at low speed (7mph or less) or a TOSS sensor fault is active or vehicle speed sensor fault is active	14 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		Fail Case 6: Output torque positive when driver request is negative	When the PRNDL equals reverse and driver requested torque is negative while the commanded output torque is positive and greater than a 0.1g (229Nm) threshold for greater than 200ms.	229Nm (equivalent to 0.1g)		Enabled at low speed (7mph or less) or a TOSS sensor fault is active or vehicle speed sensor fault is active	14 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		Fail Case 7: Input Torque correction rationality check violated	When the difference between the primary and the redundantly calculated input torque correction exceeds 1Nm for greater than 200ms a failure is flagged	1Nm		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	
Alive Rolling Count / Protection Value fault for the Regenerative Braking Axle Torque	P1B15	Detect the ARC (Alive Rolling Count) or 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 s	20 fail counts out of 30 sample counts	One Trip
			The primary signal value does not equal the protection value	Primary Value ≠ Protection Value			Executes in a 6.25 ms Loop Detects in 200ms	
Alive Rolling Count / Protection Value fault for the Engine Actual Torque Steady State	P15F0	Detect the ARC (Alive Rolling Count) or Protection Value fault by checking the ARC and Protection Value of the Engine Actual 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 s	10 fail counts out of 16 sample counts	One Trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		Steady State					Executes in a 12.5 ms Loop	
			The primary signal value does not equal the protection value	Primary Value ≠ Protection Value				
							Detects in 200ms	
Alive Rolling Count / Protection Value fault for the commanded predicted axle torque	P15F1	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 s	10 fail counts out of 16 sample counts	One Trip
			The primary signal value does not equal the protection value	Primary Value ≠ Protection Value			Executes in a 12.5ms loop	
							Detects in 200ms	
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
		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 OR < 18 Volts	6 fail counts out of 8 sample counts	
							Executes in a	
							12.5ms loop	
							Detects in 200ms	
		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).		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts	6 fail counts out of 8 sample counts	
							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.
							Detects in 200ms	
		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.		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts	6 fail counts out of 8 sample counts Executes in a 12.5ms loop Detects in 200ms	
		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).		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts	6 fail counts out of 8 sample counts Executes in a 12.5ms loop Detects in 200ms	
		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.		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts	6 fail counts out of 8 sample counts Executes in a 12.5ms loop Detects in 200ms	
Dual Store Fault	P16F3	Detect the dual store memory fault by comparing the primary value and the dual store value of the individual variables						One Trip
		Fail Case 1: Detect the dual store memory fault by comparing the primary value and the dual store value of the commanded predicted axle torque	The primary value and the dual store value of the commanded predicted axle torque are not equal (AXLR)			Runs continuously	10 fail counts out of 16 sample counts 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.
							Detects in 200ms	
		Fail Case 2: Detect the dual store memory fault by comparing the primary value and the dual store value of the Engine Actual Torque Steady State	The primary value and the dual store value of the Engine Actual Torque Steady State are not equal (ETQR)			Runs continuously	10 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		Fail Case 3: Detect the dual store memory fault by comparing the primary value and the dual store value of the range state	The primary value and the dual store value of the range state are not equal. (HSER)			Runs continuously	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		Fail Case 4: Detect the dual store memory fault by comparing the primary value and the dual store value of the Motor A torque command	The primary value and the dual store value of the Motor A torque command are not equal. (HTDR)			Runs continuously	20 fail counts out of 30 sample counts Executes in a 6.25ms loop Detects in 200ms	
		Fail Case 5: Detect the dual store memory fault by comparing the primary value and the dual store value of the Motor B torque command	The primary value and the dual store value of the Motor B torque command are not equal (HTDR)			Runs continuously	20 fail counts out of 30 sample counts Executes in a 6.25ms loop Detects in 200ms	
		Fail Case 6: Detect the dual store memory fault by comparing the primary value and the dual store	The primary value and the dual store value of the Motor A torque achieved are not equal (MTQR)			Runs continuously	20 fail counts out of 30 sample counts	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		value of the Motor A torque achieved					Executes in a 6.25ms loop Detects in 200ms	
		Fail Case 7: Detect the dual store memory fault by comparing the primary value and the dual store value of the Motor B torque achieved	The primary value and the dual store value of the Motor B torque achieved are equal (MTQR)			Runs continuously	20 fail counts out of 30 sample counts Executes in a 6.25ms loop Detects in 200ms	
		Fail Case 8: Detect the dual store memory fault by comparing the primary value and the dual store value of the Regenerative Braking Axle Torque Request	The primary value and the dual store value of the Regenerative Braking Axle Torque Request are not equal (RGNR)			Runs continuously	20 fail counts out of 30 sample counts Executes in a 6.25ms loop Detects in 200ms	
		Fail Case 9: Detect the dual store memory fault by comparing the primary value and the dual store value of the Estimated Regenerative Braking Axle torque	The primary value and the dual store value of the Estimated Regenerative Braking Axle torque are not equal. (RGNR)			Runs continuously	10 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		Fail Case 10: Detect the dual store memory fault by comparing the primary value and the dual store value of the Hybrid Commanded Engine Torque	The primary value and the dual store value of the Hybrid Commanded Engine Torque Predicted are not equal (TRAR)			Runs continuously	10 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.
		Fail Case 11: Detect the dual store memory fault by comparing the primary value and the dual store value of the Validated Trans Range State	The primary value and the dual store value of the Validated Trans Range State are not equal (TRGR)			Runs continuously	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		Fail Case 12: Detect the dual store memory fault by comparing the primary value and the dual store value of the Trans Direction State Fault Active	The primary value and the dual store value of the Trans Direction State Fault Active are not equal (TRGR)			Runs continuously	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		Fail Case 13: Detect the dual store memory fault by comparing the primary value and the dual store value of the Transmission Direction State.	The primary value and the dual store value of the Transmission Direction Positive Indication state are not equal (TRGR)			Runs continuously	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		Fail Case 14: Detect the dual store memory fault by comparing the primary value and the dual store value of the Direction IMS Failure Active status	The primary value and the dual store value of the Direction IMS Failure Active status are not equal (TRGR)			Runs continuously	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		Fail Case 15: Detect the dual store memory fault by comparing the primary value and the dual store value of the Trans input speed	The primary value and the dual store value of the Trans input speed are not equal (TISR)			Runs continuously	20 fail counts out of 30 sample counts Executes in a	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
							6.25ms loop Detects in 200ms	
		Fail Case 16: Detect the dual store memory fault by comparing the primary value and the dual store value of the selected range equation	The primary value and the dual store value of the selected range equation are not equal (HSER)			Runs continuously	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		Fail Case 17: Detect the dual store memory fault by comparing the primary value and the dual store value of the Signed, Filtered, Default Output speed	The primary value and the dual store value of the Signed, Filtered, Default Output speed are not equal (TOSR)			Runs continuously	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		Fail Case 18: Detect the dual store memory fault by comparing the primary value and the dual store value of the Trans Output Acceleration	The primary value and the dual store value of the Trans Output Acceleration are not equal (TOSR)			Runs continuously	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		Fail Case 19: Detect the dual store memory fault by comparing the primary value and the dual store value of the rate limited secure vehicle speed	The primary value and the dual store value of the rate limited secure vehicle speed are not equal (VSPR)			Runs continuously	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.
		Fail Case 20: Detect the dual store memory fault by comparing the primary value and the dual store value of the transfer case range (4wd) variables	The primary value and the dual store value of the transfer case range (4wd) are not equal (FWDR)			Runs continuously	5 fail counts out of 16 sample counts Executes in a 25ms loop Detects in 200ms	
		Fail Case 21: Detect the dual store memory fault by comparing the primary value and the dual store value of the conversion factor for TOS	The primary value and the dual store value of the conversion factor for TOS are not equal (VSPR)			Runs continuously	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		Fail Case 21: Detect the dual store memory fault by comparing the primary value and the dual store value of the conversion factor for TOS	The primary value and the dual store value of the conversion factor for TOS are not equal (VSPR)			Runs continuously	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		Fail Case 22: Detect the dual store memory fault by comparing the primary value and the dual store value of the Estimated Regenerative Braking Output Torque	The primary value and the dual store value of the Estimated Regenerative Braking Output Torque are not equal (RGNR)			Runs continuously	10 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		Fail Case 23: Detect the dual store memory fault by comparing the primary value and the dual store value of the brake torque request output	The primary value and the dual store value of the brake torque request output are not equal (ATRR)			Runs continuously	10 fail counts out of 16 sample counts Executes in a	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
							12.5ms loop Detects in 200ms	
		Fail Case 24: Detect the dual store memory fault by comparing the primary value and the dual store value of the immediate output torque request	The primary value and the dual store value of the immediate output torque request are not equal (ATRR)			Runs continuously	10 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		Fail Case 25: Detect the dual store memory fault by comparing the primary value and the dual store value of the Motor A correction torque	The primary value and the dual store value of the Motor A correction torque are not equal (HTDR)			Runs continuously	20 fail counts out of 30 sample counts Executes in a 6.25ms loop Detects in 200ms	
		Fail Case 26: Detect the dual store memory fault by comparing the primary value and the dual store value of the Motor B correction torque	The primary value and the dual store value of the Motor B correction torque are not equal (HTDR)			Runs continuously	20 fail counts out of 30 sample counts Executes in a 6.25ms loop Detects in 200ms	
		Fail Case 27: Detect the dual store memory fault by comparing the primary value and the dual store value for the HV voltage	The primary value and the dual store value of the HV voltage are not equal (HVTR)			Runs continuously	10 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.
		Fail Case 28: Detect the dual store memory fault by comparing the primary value and the dual store value of the maximum operating voltage	The primary value and the dual store value of the maximum operating voltage are not equal (HVTR)			Runs continuously	10 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		Fail Case 29: Detect the dual store memory fault by comparing the primary value and the dual store value of the maximum control voltage	The primary value and the dual store value of the maximum control voltage are not equal (HVTR)			Runs continuously	10 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		Fail Case 30: Detect the dual store memory fault by comparing the primary value and the dual store value of the minimum control voltage	The primary value and the dual store value of the minimum control voltage are not equal (HVTR)			Runs continuously	10 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		Fail Case 31: Detect the dual store memory fault by comparing the primary value and the dual store value of the HV Voltage Lid	The primary value and the dual store value of the HV Voltage Lid are not equal (BPCR)			Runs continuously	5 fail counts out of 16 sample counts Executes in a 25ms loop Detects in 200ms	
		Fail Case 32: Detect the dual store memory fault by comparing the primary value and the dual store value of the Maximum Battery Module Temperature	The primary value and the dual store value of the Maximum Battery Module Temperature are not equal (VITR)			Runs continuously	5 fail counts out of 16 sample counts Executes in a 25ms loop	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
							Detects in 200ms	
		Fail Case 33: Detect the dual store memory fault by comparing the primary value and the dual store value of the Minimum Battery Module Temperature	The primary value and the dual store value of the Minimum Battery Module Temperature are not equal (VITR)			Runs continuously	5 fail counts out of 16 sample counts Executes in a 25ms loop Detects in 200ms	
		Fail Case 34: Detect the dual store memory fault by comparing the primary value and the dual store value of the Battery Module Temperature	The primary value and the dual store value of the Battery Module Temperature are not equal (VITR)			Runs continuously	5 fail counts out of 16 sample counts Executes in a 25ms loop Detects in 200ms	
		Fail Case 35: Detect the dual store memory fault by comparing the primary value and the dual store value of the Battery Charge Current	The primary value and the dual store value of the Battery Charge Current are not equal (VITR)			Runs continuously	5 fail counts out of 16 sample counts Executes in a 25ms loop Detects in 200ms	
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
		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 OR < 18 Volts	6 fail counts out of 8 sample counts Executes in a 12.5ms loop Detects in 200ms	
		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		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts	6 fail counts out of 8 sample counts	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			corrected transmission position, but the two do not match.				Executes in a 12.5ms loop Detects in 200ms	
		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.		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts	6 fail counts out of 8 sample counts Executes in a 12.5ms loop Detects in 200ms	
		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.		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts	6 fail counts out of 8 sample counts Executes in a 12.5ms loop Detects in 200ms	
		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		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts	6 fail counts out of 8 sample counts Executes in a 12.5ms loop Detects in 200ms	
		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		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts	6 fail counts out of 8 sample counts Executes in a 12.5ms loop Detects in 200ms	
Internal Control Module Programmable Logic Device	P16F5	The main processor monitor rings tests the capability of the PLD to detect any incorrect keys.	The hardwired signal that is from the PLD indicates receipt of a correct key when the main processor monitor deliberately			Does not run during shutdown test (see P16F9)	4 fail counts out of 6 sample counts	One Trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			sends bad keys		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts	Executes in a 12.5 ms Loop Detects in 200ms	
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
		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	
		Fail Case 2: Invalid Transmission Range State Group	The current Transmission Range State Group being used by the system is an invalid value.			Runs continuously	1 failure Detected within 25ms of failure	
		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.			Runs continuously	1 failure Detected within 25ms of failure	
		Fail Case 4: Range Equation mismatches current Transmission Range State	The Range Equation can not be rationalized against the current Transmission Range State.			Runs continuously	1 failure Detected within 25ms of failure	
		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.			Runs continuously	1 failure Detected within 25ms of failure	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		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			Runs continuously	1 failure Detected within 25ms of failure	
Internal Control Module Shutdown Performance	P16F9	The main processor monitor ring is testing the ability of the PLD to detect a seed/key error and take necessary action						Two Trips
		Fail Case 1: Monitor MCPA for shutdown path test passed	The CAN signal that is from MCPA indicates test status equals failed	A value of 1 at test startup or a value of 0 at the end of test would fail	1. Ignition Key Status	OFF	Executes in a 12.5 ms Loop	
					High Voltage Contactor Status	OPEN		
					2. Ignition Key Status	Run/Crank		
					AND			
					P16F9 Status	Test Failed on Previous Key Cycle	Detects in 350ms	
		Fail Case 2: Monitor MCPB for shutdown path test passed	The SPI signal that is from MCPB indicates test status equals failed	A value of 1 at test startup or a value of 0 at the end of test would fail	1. Ignition Key Status	OFF	Executes in a 12.5 ms Loop	
					High Voltage Contactor Status	OPEN		
					2. Ignition Key Status	Run/Crank		
					AND			
					P16F9 Status	Test Failed on Previous Key Cycle	Detects in 350ms	
Battery Pack Diagnostics								
Hybrid Battery System Discharge Time Too Long	P0C76	High voltage bus discharge time too long	High Voltage Inverter Rationalized Voltage	> 60V	Vehicle Power Mode	"= RUN"	2 Failures out of 2 Samples Frequency: Runs Once per Key-Cycle, 1000ms	Special Type C
					PECM State Machine State	"= Bus Discharge"		
					Discharge Time	≥ 1000ms		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Hybrid Battery Contactor Control Sequence Incorrect	P1A21	Contactor control functionality	Contactors closed this key on & Shutdown in process & Battery contactor state	= TRUE = FALSE ≠ CLOSED			50 ms	One trip
Hybrid Battery Pack Overtemperature	P0A7E	High voltage battery overtemperature	Battery temperature	> 61°C			3000 Failures out of 3600 Samples Frequency: 100ms	One Trip
Battery Safety Diagnostics								
Hybrid Battery System Voltage High	P0AFB	Detects if the control strategy cannot maintain the hybrid battery voltage below an upper limit	(Hybrid Battery Voltage - Hybrid Battery Voltage Safety Limit)	> 1V			800 fail counts out of 1200 sample counts Executes in a 12.5ms loop Detects in 15s	One Trip
Hybrid Battery Pack Current Sensor - Calculated Hybrid Battery Current Not Plausible	P1B2E	Detects if the measured battery pack current does not agree with the powertrain calculated current	|Battery Pack Current - Powertrain Calculated Current|	> 5A	Battery Pack Current No Active DTC's:	<=250A P0AC0 P0AC1 P0AC2 U0111	1200 fail counts out of 2400 sample counts Executes in a 25ms loop Detects in 60s	Special Type C

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Hybrid Battery Pack Temperature Measurement System Performance - Expected Temperature Change Not Detected	P1B30	Detects if the battery temperature measurements are stuck. Temperature is expected to change if the charge power is above a calibrated threshold.	Fail Condition occurs when the following conditions exist for > 360s: ΔBattery Max Module Temperature AND ΔBattery Min Module Temperature AND ΔBattery Inlet Air Temperature AND Battery RMS Charge Power over 60s windows Pass Condition: ΔBattery Max Module Temperature OR ΔBattery Min Module Temperature OR ΔBattery Inlet Air Temperature	= 0°C = 0°C = 0°C > 5.5kW != 0°C != 0°C != 0°C	Initialization Delay No Active DTC's: (PackVoltageFA AND LinkVoltageFA) Battery Max/Min Module Temperatures	> 10s U0111 P0AAD P0AAE P0AAF P0AC0 P0AC1 P0AC2 =FALSE = VALID (Becomes invalid when 3 or more temperature sensors are faulted from the list of DTC's: P0A9D P0A9E P0A9C P0AC7 P0AC8 P0AC6 P0ACC P0ACD P0ACB P0AEA P0AEB P0AE9)	1 fail counts out of 2 sample counts Executes in a 25ms loop Detects failure in 360s and pass in 50ms	Two Trips
Autostart Diagnostics								
Hybrid System Performance	P0AB9	This diagnostic indicates an autostart or autostop attempt failed.	A problem during the autostart/stop process causes the engine to stall.				12.5 ms	One Trip
Communication Diagnostics								

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Control Module Communication Bus A Off	U0073	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.	CAN device driver	= bus-off state.	Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts	3 failures out of 5 samples Detects in 450 msec at loop rate of 12.5 msec	One Trip
Control Module Communication Bus B Off	U0074	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.	CAN device driver	= bus-off state.	Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts	3 failures out of 5 samples Detects in 450 msec at loop rate of 12.5 msec	One Trip
Lost Communication With ECM/PCM on Bus A	U0100	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 OR < 18 Volts	Detects within 500 msec at 6.25 msec loop rate	One Trip
Lost Communication With TCM	U0101	Detects that CAN serial data communication has been lost with the ECM on Bus A	Missed TCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts	Detects within 500 msec at 6.25 msec loop rate	One Trip
Lost Communication With Brake System Control Module	U0129	Detects that CAN serial data communication has been lost with the EBCM on Bus A	Missed EBCM Messages		Ignition switch System Voltage	Run 10 V to 18 V	Detects within 500 msec at 6.25 msec loop rate	Two Trips
Lost Communication With Motor Control Processor on Bus B	U1815	Detects that CAN serial data communication has been lost with the MCPA on Bus B	Missed MCPA Messages		Ignition switch System Voltage	Run 10 V to 18 V	Detects within 500 msec at 6.25 msec loop rate	Two Trips
Lost Communication With ECM/PCM on Bus B	U1818	Detects that CAN serial data communication has been lost with the ECM on Bus B	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts	Detects within 500 msec at 6.25 msec loop rate	One Trip
Lost Communication With LostCommGateway_A_Bus B	U1829	Detects that CAN serial data communication has been lost with the ECM on Bus B	Missed CGM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts	Detects within 500 msec at 6.25 msec loop rate	Special Type C
Lost Communication With Battery Pack Control Module	U1888	Detects that CAN serial data communication has been lost with the BPCM	Missed BPCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts	Detects within 500 msec at 6.25 msec loop rate	One Trip

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 seconds	
Shift Solenoid Hydraulic Diags								
Shift Solenoid Hydraulic Diagnostics P0751, P0752, P0756, P0757 have the following common enable criteria	***				LinePressureEstimate	> 350 kpa **AND** **>=** 300 kpa FOR > 1 seconds **AND** > (Minimum Line Pressure - 30) kpa Where MinLinePressure is a lookup table Trans Fluid Temp vs Line Pressure: Temp Kpa -40 1400 -30 1400 -20 1000 -10 700 0 500 10 250		
					Propulsion System Active	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 0.40 -30 0.25 -20 0.10 -10 0.04 20 0.03 140 0.02	X Command X Position	1 0	Fail Conditions met for 3 seconds	Two Trips
		DTC Pass	X valve completes Low to High transition without failure		X Command X Position	1 1	1 loop execution at 0.0125 seconds	
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 .5 -30 .4 -20 .12 -10 0.08 20 0.03 140 0.0325	X Command X Position	0 1	Fail Conditions met for 3 seconds	Two Trips
		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	
				Stuck In Bore Case: X stuck in bore detection is indeterminant for an extended period of time	PCS4 hydraulic stuck high failure detected upon key up XY state X commanded high this key cycle	TRUE EVT Lo FALSE	Fail conditions met for > 1800 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 .9 -30 .6 -20 0.28 -10 0.20 20 0.05 140 0.035	Y Command Y Position	1 0	Fail Conditions met for 4.5 seconds	Two Trips

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 2.17 -30 1.35 -20 .54 -10 0.2 20 0.064 140 0.05	Y Command Y Position	0 1	Fail Conditions met for 4.5 seconds	One Trip
		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

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Pressure Control Solenoid hydraulic diagnostics P0776, P0777, P0796, P0797 P2714, P2715, share these common secondary parameter enable conditions	***				Engine speed	(> 550 RPM **FOR** > 1.25 seconds (100 * .0125)) **OR** (<= 50 RPM **FOR** 1.375 seconds **(**110 * 0.0125))		
					Xvalve transition	X valve s not in a transition, and hasn't transitioned in the last 0.275 seconds (0.025 + .25)		
					X Valve Stuck Hi Detection	No fault pending		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					LinePressureEstimate	> 350 kpa **AND** **>=** 300 kpa FOR > 1 seconds **AND** > (MinLinePressure - 30) kpa Where MinLinePressure is a lookup table TransTemp vs Line Pressure: Temp Kpa -40 1400 -30 1400 -20 1000 -10 700 0 500 10 250		
					Propulsion System Active	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 exhaust 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
		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 5 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)	Two Trips
		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 0.2 seconds (16 * 0.0125), more than 5 times in a given key cycle	Same as **Fail Case 1.**		N/A	
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 exhaust 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
		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 0.5 seconds (40 * 0.0125), more than 5 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 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)	Two Trips
		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 0.2 seconds (16 * 0.0125), more than 5 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 exhaust 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 >= (KtHCCD_t_PCS_PSReDelay + 0.1) seconds	Failure exists for 30 seconds (2400 * 0.0125)	Two Trips
		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 5 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
		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								
Clutch slip diagnostics P079A, P079B, P079C, P079D share these common secondary parameter enable conditions	***				LinePressureEstimate	> 350 kpa **AND** **>=** 300 kpa FOR > 1 seconds **AND** > (MinLinePressure - 30) kpa Where MinLinePressure is a lookup table Trans Fluid Temp vs Line Pressure: Temp Kpa -40 1400 -30 1400 -20 1000 -10 700 0 500 10 250		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Clutch 1 Slip	P079A	This DTC sets when excessive slip is observed on C1 while C1 has been commanded on	Clutch 1 Slip Speed	C1 Slip > 200 RPM	C1 Pressure Command	> = 1800 kpa	3 second (240 * 0.0125)	One Trip
					C1 Torq Estimate	> = 200 Nm		
					C1 Fill detected	1		
		DTC Pass	Clutch 1 Slip Speed	C1 Slip < 50 RPM	C1 Pressure Command	> = 1800 kpa	0.125 seconds (10 * 0.0125)	
					C1 Torq Estimate	> = 20 Nm		
					C1 Fill detected	1		
Clutch 2 Slip	P079B	This DTC sets when excessive slip is observed on C2 while C2 has been commanded on	Clutch 2 Slip Speed	C2 Slip > 200 RPM	C2 Pressure Command	> = 1800 kpa	1 second (80 * 0.0125)	Two Trips
					C2 Torq Estimate	> = 200 Nm		
					C2 Fill detected	1		
		DTC Pass	Clutch 2 Slip Speed	C2 Slip < 50 RPM	C2 Pressure Command	> = 1800 kpa	0.125 seconds (10 * 0.0125)	
					C2 Torq Estimate	> = 20 Nm		
					C2 Fill detected	1		
Clutch 3 Slip	P079C	This DTC sets when excessive slip is observed on C3 while C3 has been commanded on	Clutch 3 Slip Speed	C3 Slip > 100 RPM	C3 Pressure Command	> = 1800 kpa	0.625 seconds (50 * 0.0125)	Two Trips
					C3 Torq Estimate	> = 20 Nm		
					C3 Fill detected	1		
		DTC Pass	Clutch 3 Slip Speed	C3 Slip < 20 RPM	C3 Pressure Command	> = 1800 kpa	0.125 seconds (10 * 0.0125)	
					C3 Torq Estimate	> = 20 Nm		
					C3 Fill detected	1		
Clutch 4 Slip	P079D	This DTC sets when excessive slip is observed on C4 while C4 has been commanded on	Clutch 4 Slip Speed	C4 Slip > 100 RPM	C4 Pressure Command	> = 1800 kpa	0.3125 seconds (25 * 0.0125)	Two Trips
					C4 Torq Estimate	> = 20 Nm		
					C4 Fill detected	1		
		DTC Pass	Clutch 4 Slip Speed	C4 Slip < 10 RPM	C4 Pressure Command	> = 1800 kpa	0.125 seconds (10 * 0.0125)	
					C4 Torq Estimate	> = 20 Nm		
					C4 Fill detected	1		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Pressure Control Solenoid Electrical Diags								
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 RunCrankActive	> = 11 Volts && <= 16 Volts >= 0 RPM && <= 7500 RPM for >= 5 seconds <= 200 kph for >= 5 seconds 1		
Pressure Control (PC) Solenoid A System Performance	P0961	This DTC sets when an invalid voltage in PCS1 control circuit has been detected DTC Pass	PCS1 electrical status	HWIO circuitry detects out of range error is present HWIO circuitry detects an out of range error is not 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 1 second ((400 - 320) * 0.0125)	Two Trips
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 DTC Pass	PCS1 electrical status	HWIO circuitry detects an electrical low pressure error is present HWIO circuitry detects an electrical low pressure error is not 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 0.1 seconds ((40 - 32) * 0.0125)	One Trip
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

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		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 circuitry 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
		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
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
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
		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 circuitry 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

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		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
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
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 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 32) * 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 circuitry 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
		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

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
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
		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 circuitry 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
		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
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
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	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

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					*** Common Electrical Enables			
		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	Not failed this key on	Failure detected for 0.4 seconds (16 * 0.025) out of a 0.5 second (20 * 0.025) window	One Trip
					*** Common Electrical Enables			
		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	Not failed this key on	Failure detected for 0.4 seconds (16 * 0.025) out of a 0.5 second (20 * 0.025) window	One Trip
					*** Common Electrical Enables			
		DTC Pass		HWIO circuitry detects short to ground error is not present.			0.1 seconds ((20 - 16) * 0.025)	
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 (16 * 0.025) out of a 0.5 second (20 * 0.025) window	One Trip
					*** Common Electrical Enables			
		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 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 (16 * 0.025) out of a 0.5 second (20 * 0.025) window	One Trip
					*** Common Electrical Enables			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		DTC Pass		HWIO circuitry detects short to ground error is not present.			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	Run Crank Line voltage	Ignition Run 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
		DTC Pass	Run Crank Line Voltage	Ignition Run Crank line voltage > 2 Volts			5 seconds (200 * 0.025)	
Transmission Fluid Thermostat								
Transmission Fluid Overtemperature	P0218	The DTC detects if the transmission fluid temperature is too high.	Transmission Sump Temperature	≥ 135 °C	Transmission Temperature	-50 °C ≤ TFT ≤ 150 °C for 10 seconds	≥ 300 seconds	Two Trips
							Pass Conditions: Transmission Sump Temperature ≤ 130 °C for 5 seconds	
Transmission Control Module (TCM) Substrate Temperature Sensor								
Transmission Control Module (TCM) Internal Temperature Too High	P0634	The DTC detects the electronic circuitry is at high operating temperature.	Transmission Substrate Temperature	≥ 142 °C	Transmission Substrate Temperature	-50 °C ≤ Transmission Substrate Temperature ≤ 146 °C for 0.25 seconds	≥ 5 seconds	One Trip
			OR Ignition Voltage	≥ 18 V			≥ 2 seconds	
			AND Substrate Temperature	≥ 50 °C			**Pass Conditions**: Transmission Substrate Temperature ≤ 142 °C and Ignition Voltage is ≤ 18 V for 10 seconds	
							OR Transmission Substrate Temperature ≤ 50 °C and Ignition Voltage is ≥ 18 V for 10 seconds	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
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) AND	Highest of transmission temperature sensors / Temperature -40.106 / 255.9961 -40 / 50 -20 / 20 0 / 20 30 / 15 60 / 15 100 / 15 149.0 / 15 149.1016 / 255.9961	IF vehicle speed is < 8 kph 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
			Delta between TCM substrate temperature sensor and TCM powerup temperature sensor	Highest of transmission temperature sensors / Temperature -40.106 / 255.9961 -40 / 10 -20 / 8 0 / 8 30 / 8 60 / 8 100 / 8 149.0 / 8 149.1016 / 255.9961	Transmission state	NOT in park/neutral		
					Engine Torque Inaccurate	Must be FALSE		
					Accelerator Position Sensor Failure	Must be FALSE		
					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	Vehicle Speed ≤ 200 KPH for 5 seconds		
							Pass Conditions: Transmission substrate temperature delta between powerup temperature sensor AND fluid temperature	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
							sensor must be less than value in fail criteria table for > 70 seconds (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	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds	≥ 60 seconds	Two Trips
					Vehicle Speed	Vehicle Speed ≤ 200 KPH for 5 seconds		
							Pass Conditions: Transmission Substrate Temperature ≥ -55 °C for 4 seconds	
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	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds	≥ 60 seconds	Two Trips
					Vehicle Speed	Vehicle Speed ≤ 200 KPH for 5 seconds		
					Transmission Output Speed	Transmission Output Speed ≥ 200 RPM for 5 seconds cumulative.		
					Estimated Motor Power Loss	Estimated Motor Power Loss ≥ 0.4 kW for 200 seconds cumulative.		
							Pass Conditions: Transmission Substrate Temperature ≤ 150 °C for 4 seconds	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Transmission Control Module (TCM) Powerup Temperature 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) AND	Highest of transmission temperature sensors Temperature -40.106 255.9961 -40 50 -20 20 0 20 30 15 60 15 100 15 149.0 15 149.1016 255.9961	IF vehicle speed is < 8 kph 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
			Delta between TCM powerup temperature sensor and TCM substrate temperature sensor	Highest of transmission temperature sensors Temperature -40.106 255.9961 -40 10 -20 8 0 8 30 8 60 8 100 8 149.0 8 149.1016 255.996	Transmission state	NOT in park/neutral		
					Engine Torque Inaccurate	Must be FALSE		
					Accelerator Position Sensor Failure	Must be FALSE		
					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	Vehicle Speed ≤ 200 KPH for 5 seconds		
							Pass Conditions: Transmission substrate temperature delta	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
							between powerup temperature sensor AND fluid temperature sensor must be less than value in fail criteria table for > 70 seconds (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
					Vehicle Speed	Vehicle Speed ≤ 200 KPH for 5 seconds		
					Estimated Motor Power Loss	Estimated Motor Power Loss ≥ 0.4 kW for 200 seconds cumulative.		
					P0721, P0722, P0723, P215C	NOT Fault Active OR Failed This Key On		
							Pass Conditions: Transmission Substrate Temperature ≥ -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	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds	≥ 60 seconds	Two Trips
					Vehicle Speed	Vehicle Speed ≤ 200 KPH for 5 seconds		
							Pass Conditions: Transmission Substrate Temperature ≤ 150 °C for 4 seconds	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Transmission Fluid Temperature 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	Highest of transmission temperature sensors / Temperature -40.106 / 255.9961 -40 / 50 -20 / 20 0 / 20 30 / 15 60 / 15 100 / 15 149.0 / 15 149.1016 / 255.9961	IF vehicle speed is < 8 kph 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
			Delta between transmission fluid temperature (TFT) and TCM substrate temperature sensor	Highest of transmission temperature sensors / Temperature -40.106 / 255.9961 -40 / 50 -20 / 20 0 / 20 30 / 15 60 / 15 100 / 15 149.0 / 15 149.1016 / 255.9961	Transmission state	NOT in park/neutral		
					Engine Torque Inaccurate	Must be FALSE		
					Accelerator Position Sensor Failure	Must be FALSE		
					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	Vehicle Speed ≤ 200 KPH for 5 seconds		
							Pass Conditions: Transmission fluid temperature delta between powerup temperature sensor AND substrate	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
							temperature sensor must be less than value in fail criteria table for > 70 seconds (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	NOT Fault Active OR Failed This Key On	≥ 60 seconds	One Trip
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
					Vehicle Speed	Vehicle Speed ≤ 200 KPH for 5 seconds		
					Estimated Motor Power Loss	Estimated Motor Power Loss ≥ 0.4 kW for 200 seconds cumulative.		
							Pass Conditions: Transmission Sump Temperature ≥ -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	NOT Fault Active OR Failed This Key On	≥ 60 seconds	One Trip
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
					Vehicle Speed	Vehicle Speed ≤ 200 KPH for 5 seconds	**Pass Conditions**: Transmission Substrate Temperature ≤ 149 °C for 4 seconds	
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)	One Trip
							Pass Conditions: TOS Direction Raw = Forward or Reverse for 3.125 seconds (125 counts at 25ms)	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Transmission Output Speed (TOS) Sensor No Activity	P0722	The DTC detects no TOS sensor activity at low vehicle speed. (It compares expected output speed to an estimated output speed based on MtrA and MtrB divided by two.)	Raw Transmission Output Speed	≤ 50 RPM	Motor Estimated Transmission Output Speed	150 ≤ Motor Estimated Transmission Output Speed ≤ 5200 RPM	≥ 1.5 seconds	Two Trips
					Axle Torque	110 ≤ Axle Torque ≤ 5000 Nm	**Pass Conditions**: TOS ≥ 150 RPM	
Transmission Output Speed (TOS) Sensor Intermittent	P0723	The DTC detects an unrealistically large drop in TOS signal	TOS delta	≥ 1000 RPM	Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds	≥ 6 seconds	One Trip
					Vehicle Speed	Vehicle Speed ≤ 200 KPH for 5 seconds		
							Pass Conditions: TOS ≥ 500 RPM and the change in TOS is ≤ 2000 RPM for 2 seconds	
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	FALSE	0.35 seconds (14 counts at 25ms)	One Trip
					P215C	NOT Fault Active		
					TOS Hardware Input Output Transmission	Valid		
					Hybrid Motor Speed based Estimated Output Speed is Valid	Calculated based on M1 or M2 Speed Equation		
					Transmission Output Speed and Motor Output Speed Difference	≤ 50 RPM	**Pass Conditions**: Opposite as FAIL for 5 seconds (200 counts at 25ms)	
					Motor Estimated Transmission Output Speed	≥ 50 RPM		
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	≥ 140 RPM	WHEN Output Speed Calculated from Wheel Speeds AND Output Speed Calculated from Motor Speeds	≤ 150 RPM	200 ms (8 counts at 25ms)	Two Trips
					Output Speed Calculated from Motor Speeds AND Output Speed Calculated from Wheel Speeds Difference	≤ 100 RPM		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					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		
							Pass Conditions: Difference between Transmission Output Speed and the Calculated Average of Output Speed from the Motors and Wheel Speed Sensors ≤ 50 RPM for 0.5 seconds (20 counts at 25ms)	
Tap Up/Down Switch								
Tap Up Switch Circuit	P0815	The DTC detects the following failure modes of the tap up switch circuit: AHS2 utilizes D6, 4-1 P, R, N						Special Type C
		Fail Case 1: Switch stuck on in D1, D2, D3, or D4	Tap Up Switch Request	Request in D1, D2, D3, or D4	P0826	NOT Fault Active OR Failed This Key On	≥ 3 seconds	
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
					Vehicle Speed	Vehicle Speed ≤ 200 KPH for 5 seconds		
		Fail Case 2: Switch stuck on in D6, N, R, P	Tap Up Switch Request	Request in D6, N, R, P	P0826	NOT Fault Active OR Failed This Key On	≥ 600 seconds	
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
					Vehicle Speed	Vehicle Speed ≤ 200 KPH for 5 seconds	**Pass Conditions**: Tap Up Switch Request not active in NonTap Mode for 3 seconds	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Tap Down Switch Circuit	P0816	The DTC detects the following failure modes of the tap down switch circuit:						Special Type C
		Fail Case 1: Switch stuck on in D1, D2, D3, or D4	Tap Down Switch Request	Request in D1, D2, D3, or D4	P0826	NOT Fault Active OR Failed This Key On	≥ 3 seconds	
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
					Vehicle Speed	Vehicle Speed ≤ 200 KPH for 5 seconds		
		Fail Case 2: Switch stuck on in D6, N, R, P	Tap Down Switch Request	Request in D6, N, R, P	P0826	NOT Fault Active OR Failed This Key On	≥ 600 seconds	
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
					Vehicle Speed	Vehicle Speed ≤ 200 KPH for 5 seconds	**Pass Conditions**: Tap Down Switch Request not active in NonTap Mode for 3 seconds	
Tap Up and Down Shift Switch Circuit	P0826	The DTC detects the up/down shift switch circuit is at an illegal voltage.	Tap Up/Down Tap Switch Status	= Illegal Switch Active (Sensor ≤ 9.5V OR Sensor ≥17.5V)	Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds	≥ 8 seconds	Special Type C
					Vehicle Speed	Vehicle Speed ≤ 200 KPH for 5 seconds	**Pass Conditions**: Tap Up/Tap Down switch status not illegal for 1 second	
Tap Up and Down Shift Switch Signal Circuit Rolling Count	P1761	The DTC monitors the total continuous amount of tap up/down switch alive rolling count errors.	Tap Up/Down Tap Switch Status	= Illegal Switch Active	Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds	≥ 10 seconds	Special Type C
					Vehicle Speed	Vehicle Speed ≤ 200 KPH for 5 seconds	**Pass Conditions**: No Rolling Count Errors for 0.1 seconds	
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

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			AND PRNDL P Circuit Sensed	PRNDL P Circuit Has Not Been Observed Low	Transmission Direction State Fault Active		**Pass Conditions**: PRNDL P Circuit Has Been Observed Low for 1.5875 seconds	
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
			AND Trans Direction State	Trans Direction DRIVE	P182A	NOT Fault Active OR Failed This Key On		
					PRNDL State AND PRNDL A Circuit Sensed	PARK AND NOT PRNDL A Circuit Has Been Observed High for 1 second		
					Trans Direction State Fault Active	FALSE	**Pass Conditions**: PRNDL A Circuit Has Been Observed High for 1.5875 seconds	
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
			AND 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	
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
			AND Trans Direction State	Trans Direction DRIVE	P182C	NOT Fault Active OR Failed This Key On		
					PRNDL State	PARK	**Pass Conditions**: PRNDL B Circuit Has Been Observed Low for 1.5875 seconds	
					AND PRNDL B Circuit Sensed	PRNDL B Circuit Has Been Observed High for 1 second		
					Trans Direction State Fault Active	FALSE		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Internal Mode Switch P Circuit Low Voltage	P182D	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
			AND Trans Direction State	Trans Direction DRIVE	P182D	NOT Fault Active OR Failed This Key On		
					PRNDL State	PARK	**Pass Conditions**: PRNDL P Circuit Has Been Observed High for 1.5875 seconds	
					AND PRNDL P Circuit Sensed	AND PRNDL P Circuit Has Been Observed Low for 1 second		
					Trans Direction State Fault Active	FALSE		
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
					Vehicle Speed	Vehicle Speed ≤ 200 KPH for 5 seconds		
					P182E	NOT Fault Active OR Failed This Key On	**Pass Conditions**: PRNDL State is NOT Illegal for 5 seconds	
					P182E	NOT Fault Active OR Failed This Key On		
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
			AND PRNDL C Circuit Sensed	PRNDL C Circuit Has Not Been Observed Low	P182F	NOT Fault Active OR Failed This Key On		
					Trans Direction State Fault Active	FALSE	**Pass Conditions**: PRNDL C Circuit Has Been Observed Low for 4 seconds + 1 count at 6.25ms	
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
			AND PRNDL A Circuit Sensed	PRNDL A Circuit Has Not Been Observed Low	Trans Direction State Fault Active	FALSE		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
							Pass Conditions: PRNDL A Circuit Has Been Observed Low for 1.5875 seconds	
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
			AND 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	
Controller Diagnostics								
Control Module Read Only Memory (Rom)	P0601	This DTC will be stored if any software or calibration check sum 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	One Trip
Control Module Not Programmed	P0602	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	One Trip
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		Ignition Status	Run or Crank	1 failure Frequency: Once at powerup	One Trip
Control Module Random Access Memory (RAM) Failure	P0604	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	One Trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Bosch T43 TEHCM Security Output Disable/IPT Test	P0606	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.			Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts		
		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	One Trip
		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	
		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	
		Fail Case 4: WD error counter does not 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	
		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	
		Fail Case 6: WD error counter does not reach its desired level (sdi_Ufet = 6)	WD error count is higher than threshold	- WD error count: 0	IPT test completed	end of Initialization	3.125ms loop	One Trip
		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	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		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	
		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 is equal or higher than 90% of the Batt. Voltage.	- actuator supply voltage: < 1.5 volts or > 5.5 volts -WD error counter:<5	IPT test started	end of Initialization	3.125ms loop	
		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 count:>= 5	IPT test started	end of Initialization	3.125ms loop	
		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	
Control Module Long Term Memory Performance	P062F	Indicates that the NVM Error flag has not been cleared	Last EEPROM write did not complete		Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up	One Trip
Torque Security Faults								
Internal Control Module A/D Processing Performance	P060B	HWIO executes the A/D converter test. This test checks the Vref voltage at 3 levels.						
		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 OR < 18 Volts	6.25ms	One Trip
		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	
		Fail Case 3: AtoD converter test result is failed	1.0 x Vref is out of voltage threshold.	< approx. 4.978 Volts or > approx. 5 Volts			6.25ms	
Dual Store Fault	P16F3	Detect the dual store memory fault by comparing the primary value and the dual store value of the Hybrid Range State	Dual store value of the Hybrid Range State is not equal to primary dual store value.		Ignition switch	in crank or run	10 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	One Trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
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.						
		Fail Case 1	Transmission is 4th gear position. AND Range State is 7 AND X Valve Command has been corrupted to 0 AND Y Valve Command is 1 AND PCS2 Command is higher than threshold AND PCS3 Command higher than threshold AND PCS4 Command lower than threshold during more than time threshold	- PCS2 Command > 1800kpa - PCS3 Command > 1800kpa -PCS4 Command < 100kpa -time threshold: 200msec	Ignition switch	in crank or run	Executes in a 12.5ms loop Detects in 200ms	One Trip
		Fail Case 2	Transmission is 4th Gear position AND Range State is 7 AND X Valve Command is 1 AND Y Valve Command has been corrupted to 0 AND PCS2 Command is higher than threshold AND PCS3 Command higher than threshold AND PCS4 Command lower than threshold during more than time threshold	- PCS2 Command > 1800kpa - PCS3 Command > 1800kpa - PCS4 Command < 100kpa -time threshold: 200msec	Ignition switch	in crank or run	Executes in a 12.5ms loop Detects in 200ms	
		Fail Case 3	Transmission is 3rd Gear position AND Range State is 5 AND X Valve Command is 1 AND Y Valve Command is 0 AND PCS2 Command is higher than threshold AND PCS3 Command has been corrupted to equal to 0Kpa AND PCS4 Command is lower threshold during more than time threshold	- PCS2 Command > 1800kpa - PCS4 Command :< 100kpa -time threshold: 200msec	Ignition switch	in crank or run	Executes in a 12.5ms loop Detects in 200ms	
		Fail Case 4	Transmission is 2nd Gear position	- PCS3 Command > 1800kpa	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.
			AND Range State is 5	- PCS4 Command < 100kpa				
			AND X Valve Command is 1	-time threshold: 200msec				
			AND Y Valve Command is 0					
			AND PCS2 Command has been corrupted to equal 0kpa					
			AND PCS3 Command higher than threshold					
			AND PCS4 Command is lower than threshold during more than time threshold				Detects in 200ms	
		Fail Case 5	Transmission is in 4th Gear position	- PCS2 Command > 1800kpa	Ignition switch	in crank or run	Executes in a 12.5ms loop	
			AND Range State is 7	- PCS3 Command > 1800kpa				
			AND X Valve Command is 1	-time threshold: 200msec				
			AND Y Valve Command is 1					
			AND PCS2 Command is higher than threshold					
			AND PCS3 Command is higher than threshold					
			AND PCS4 Command has been corrupted to equal 2000kpa during more than time threshold				Detects in 200ms	
		Fail Case 6	Transmission is in 2nd Gear position	- PCS2 Command > 1800kpa	Ignition switch	in crank or run	Executes in a 12.5ms loop	
			AND Range State is 5	- PCS3 Command > 1800kpa				
			AND X Valve Command is 1	- PCS4 Command < 100kpa				
			AND Y Valve Command has been corrupted to equal 1	-time threshold: 200msec				
			AND PCS2 Command is higher than threshold					
			AND PCS3 Command is higher than threshold					
			AND PCS4 Command is lower than threshold during more than time threshold				Detects in 200ms	
		Fail Case 7	Transmission is in 1st Gear position	-PCS3 Command > 1800kpa	Ignition switch	in crank or run	Executes in a 12.5ms loop	
			AND Range State is 4	- PCS4 Command > 1800kpa				
			AND X Valve Command is 1	-time threshold: 200msec				
			AND Y Valve Command is 0					
			AND PCS2 Command has been corrupted to equal 2000kpa					

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			AND PCS3 Command is higher than threshold AND PCS4 Command is higher than threshold during more than time threshold				Detects in 200ms	
		Fail Case 8	Transmission is in 3rd Gear position AND Range State is 6 AND X Valve Command is 1 AND Y Valve Command is 1 AND PCS2 Command is higher than threshold AND PCS3 Command has been corrupted to equal 2000kpa AND PCS4 Command is higher than threshold during more than time threshold	- PCS2 Command > 1800kpa -PCS4 Command > 1800kpa -time threshold: 200msec	Ignition switch	in crank or run	Executes in a 12.5ms loop Detects in 200ms	
		Fail Case 9	Transmission is in 3rd gear position AND Range State is 6 AND X Valve Command is 1 AND Y Valve Command is 1 AND PCS2 Command is higher than threshold AND PCS3 Command is lower than threshold AND PCS4 Command has been corrupted to equal 0kpa during more than time threshold	- PCS2 Command > 1800kpa - PCS3 Command < 100kpa -time threshold: 200msec	Ignition switch	in crank or run	Executes in a 12.5ms loop Detects in 200ms	
EVT will shutdown the vehicle if a torque phase fault occurs	P16F8	Detect when command of all 3 control solenoids to high position during torque phase exceeds time threshold						
		Fail Case 1	Transmission is in 4th Gear position AND Range State has been corrupted to 19 AND X Valve Command is 1 AND Y Valve Command is 1 AND PCS2 Command is higher than threshold AND PCS3 Command is higher than threshold AND PCS4 Command has been corrupted to equal 2000kpa during more than time threshold	- PCS2 Command > 1800kpa - PCS3 Command > 1800kpa -time threshold: 200msec	Ignition switch	in crank or run	Executes in a 12.5ms loop Detects in 200ms	One Trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
fault occurs		Fail Case 2	Transmission is in 2^{nd} Gear position AND Range State has been corrupted to 11 AND X Valve Command is 1 AND Y Valve Command is 0 AND PCS2 Command is higher than threshold AND PCS3 Command is higher than threshold AND PCS4 Command has been corrupted to equal 2000kpa during more than time threshold	- PCS2 Command > 1800kpa - PCS3 Command > 1800kpa -time threshold: 200msec	Ignition switch	in crank or run	Executes in a 12.5ms loop Detects in 200ms	
Alive Rolling Count / Protection Value fault	P179B	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 OR < 18 Volts	10 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	One Trip
Communication Diagnostics								
Control Module Communication Bus A Off	U0073	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.	CAN device driver	= bus-off state.	Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts	3 failures out of 5 samples Detects in 450 msec at loop rate of 12.5 msec	Type A
Lost Communication With ECM/PCM on Bus A	U0100	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 OR < 18 Volts	Detects within 500 msec at 6.25 msec loop rate	Type A
Lost Communication With Hybrid Controller	U0293	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 OR < 18 Volts	Detects within 500 msec at 6.25 msec loop rate	Type A

P0711:

Start Up Transmission Temperature °C	Time for Transmission Temperature to Reach 20 °C
-50	3200
-25	2600
-10	2000
-5	1800
20	300

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
CAN Communication:								
CAN Communication Loss – HCP	U1885	Communication Error	No message from HCP (Contactor Command)	> 3.0 s	HS Comm Enable input BPCM Power Mode	= TRUE =RUN	3.0 s	Two Trips Type B
CAN Communication Loss – ECM	U1886	Communication Error	No message from ECM (Vehicle Speed Average)	> 3.0 s	HS Comm Enable input BPCM Power Mode High Voltage Management Virtual Network Activation	= TRUE =RUN =Inactive	3.0 s	Two Trips Type B
CAN Communication Loss – CGM	U1862	Communication Error	No message from CGM (Fan Speed Limit)	> 75ms	HS Comm Enable input BPCM Power Mode High Voltage Management Virtual Network Activation	= TRUE =RUN =Inactive	75ms	Special Type "C"
Block 1 Voltage Sensor Circuit:								
Block 1 Voltage measurement – Out of Range - Low	P0B3D	Out of range low	Block 1	< 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 1 Voltage measurement – Out of Range - High	P0B3E	Out of range high	Block 1	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 1 Voltage measurement – Rationality	P0B3C	Rationality compares block voltage sensor to pack voltage sensor	| Block 1 * 20 - Battery Pack Voltage|	> 70 V	12V System Voltage Block 1 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0B3D P0B3E P0ABC P0ABD P0ABB P0A1F =RUN > 200ms	160 Failures out of 170 Samples Frequency: 100ms	Two Trips Type B
Block 2 Voltage Sensor Circuit:								
Block 2 Voltage measurement – Out of Range - Low	P0B42	Out of range low	Block 2 AND Block 3	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 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.
Block 2 Voltage measurement – Out of Range - High	P0B43	Out of range high	Block 2	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 2 Voltage measurement – Rationality	P0B41	Rationality compares block voltage sensor to pack voltage sensor	| Block 2 * 20 - Battery Pack Voltage| AND | Block 3 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 2 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0B42 P0B43 P0ABC P0ABD P0ABB P0A1F =RUN > 200ms	160 Failures out of 170 Samples Frequency: 100ms	Two Trips Type B
Block 3 Voltage Sensor Circuit:								
Block 3 Voltage measurement – Out of Range - Low	P0B47	Out of range low	Block 3 AND Block 4	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 3 Voltage measurement – Out of Range - High	P0B48	Out of range high	Block 3	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 3 Voltage measurement – Rationality	P0B46	Rationality compares block voltage sensor to pack voltage sensor	| Block 3 * 20 - Battery Pack Voltage| AND | Block 4 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 3 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B47 P0B48 P0ABC P0ABD P0ABB =RUN > 200ms	160 Failures out of 170 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.
Block 4 Voltage Sensor Circuit:								
Block 4 Voltage measurement – Out of Range - Low	P0B4C	Out of range low	Block 4 AND Block 5	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 4 Voltage measurement – Out of Range - High	P0B4D	Out of range high	Block 4	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 4 Voltage measurement – Rationality	P0B4B	Rationality compares block voltage sensor to pack voltage sensor	| Block 4 * 20 - Battery Pack Voltage| AND | Block 5 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 4 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B4C P0B4D P0ABC P0ABD P0ABB =RUN > 200ms	160 Failures out of 170 Samples Frequency: 100ms	Two Trips Type B
Block 5 Voltage Sensor Circuit:								
Block 5 Voltage measurement – Out of Range - Low	P0B51	Out of range low	Block 5 AND Block 6	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 5 Voltage measurement – Out of Range - High	P0B52	Out of range high	Block 5	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 5 Voltage measurement – Rationality	P0B50	Rationality compares block voltage sensor to pack voltage sensor	| Block 5 * 20 - Battery Pack Voltage| AND | Block 6 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 5 Voltage sensor input No active DTCs:	>= 9.0 V <= 18.0 V = VALID P0A1F P0B51 P0B52 P0ABC	160 Failures out of 170 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.
						P0ABD P0ABB		
					BPCM Power Mode	=RUN		
					Time since contactors closed	> 200ms		
Block 6 Voltage Sensor Circuit:								
Block 6 Voltage measurement - Out of Range - Low	P0B56	Out of range low	Block 6	< 2 V	12V System Voltage	>= 9.0 V <= 18.0 V	15 Failures out of 20 Samples	Two Trips Type B
			AND		No active DTCs:	P0A1F		
			Block 7	< 2 V	BPCM Power Mode	=RUN	Frequency: 100ms	
Block 6 Voltage measurement - Out of Range - High	P0B57	Out of range high	Block 6	> 23 V	12V System Voltage	>= 9.0 V <= 18.0 V	15 Failures out of 20 Samples	Two Trips Type B
					No active DTCs:	P0A1F		
					BPCM Power Mode	=RUN	Frequency: 100ms	
Block 6 Voltage measurement - Rationality	P0B55	Rationality compares block voltage sensor to pack voltage sensor	| Block 6 * 20 - Battery Pack Voltage|	> 70 V	12V System Voltage	>= 9.0 V <= 18.0 V	160 Failures out of 170 Samples	Two Trips Type B
			AND		Block 1 Voltage sensor input	= VALID		
			| Block 7 * 20 - Battery Pack Voltage|	> 70 V	No active DTCs:	P0A1F	Frequency: 100ms	
						P0B56 P0B57 P0ABC P0ABD P0ABB		
					BPCM Power Mode	=RUN		
					Time since contactors closed	> 200ms		
Block 7 Voltage Sensor Circuit:								
Block 7 Voltage measurement - Out of Range - Low	P0B5B	Out of range low	Block 7	< 2 V	12V System Voltage	>= 9.0 V <= 18.0 V	15 Failures out of 20 Samples	Two Trips Type B
			AND		No active DTCs:	P0A1F		
			Block 8	< 2 V	BPCM Power Mode	=RUN	Frequency: 100ms	
Block 7 Voltage measurement - Out of Range - High	P0B5C	Out of range high	Block 7	> 23 V	12V System Voltage	>= 9.0 V <= 18.0 V	15 Failures out of 20 Samples	Two Trips Type B
					No active DTCs:	P0A1F		
					BPCM Power Mode	=RUN	Frequency: 100ms	
Block 7 Voltage measurement - Rationality	P0B5A	Rationality compares block voltage sensor to pack voltage sensor	| Block 7 * 20 - Battery Pack Voltage|	> 70 V	12V System Voltage	>= 9.0 V <= 18.0 V	160 Failures out of 170 Samples	Two Trips Type B
			AND		Block 7 Voltage sensor input	= VALID		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			| Block 8 * 20 - Battery Pack Voltage|	> 70 V	No active DTCs: BPCM Power Mode Time since contactors closed	P0A1F P0B5B P0B5C P0ABC P0ABD P0ABB =RUN > 200ms	Frequency: 100ms	
Block 8 Voltage Sensor Circuit:								
Block 8 Voltage measurement - Out of Range - Low	P0B60	Out of range low	Block 8 AND Block 9	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 8 Voltage measurement - Out of Range - High	P0B61	Out of range high	Block 8	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 8 Voltage measurement - Rationality	P0B5F	Rationality compares block voltage sensor to pack voltage sensor	| Block 8 * 20 - Battery Pack Voltage| AND | Block 9 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 8 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B60 P0B61 P0ABC P0ABD P0ABB =RUN > 200ms	160 Failures out of 170 Samples Frequency: 100ms	Two Trips Type B
Block 9 Voltage Sensor Circuit:								
Block 9 Voltage measurement - Out of Range - Low	P0B65	Out of range low	Block 9 AND Block 10	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 9 Voltage measurement - Out of	P0B66	Out of range high	Block 9	> 23 V	12V System Voltage	>= 9.0 V <= 18.0 V	15 Failures out of 20 Samples	Two Trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Range - High					No active DTCs: BPCM Power Mode	P0A1F =RUN	 Frequency: 100ms	
Block 9 Voltage measurement - Rationality	P0B64	Rationality compares block voltage sensor to pack voltage sensor	| Block 9 * 20 - Battery Pack Voltage| AND | Block 10 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 9 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B65 P0B66 P0ABC P0ABD P0ABB =RUN > 200ms	160 Failures out of 170 Samples Frequency: 100ms	Two Trips Type B
Block 10 Voltage Sensor Circuit:								
Block 10 Voltage measurement - Out of Range - Low	P0B6A	Out of range low	Block 10 AND Block 11	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 10 Voltage measurement - Out of Range - High	P0B6B	Out of range high	Block 10	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 10 Voltage measurement - Rationality	P0B69	Rationality compares block voltage sensor to pack voltage sensor	| Block 10 * 20 - Battery Pack Voltage| AND | Block 11 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 10 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B6A P0B6B P0ABC P0ABD P0ABB =RUN > 200ms	160 Failures out of 170 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.
Block 11 Voltage Sensor Circuit:								
Block 11 Voltage measurement - Out of Range - Low	P0B6F	Out of range low	Block 11 AND Block 12	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 11 Voltage measurement - Out of Range - High	P0B70	Out of range high	Block 11	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 11 Voltage measurement - Rationality	P0B6E	Rationality compares block voltage sensor to pack voltage sensor	| Block 11 * 20 - Battery Pack Voltage| AND | Block 12 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 11 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B6F P0B70 P0ABC P0ABD P0ABB =RUN > 200ms	160 Failures out of 170 Samples Frequency: 100ms	Two Trips Type B
Block 12 Voltage Sensor Circuit:								
Block 12 Voltage measurement - Out of Range - Low	P0B74	Out of range low	Block 12 AND Block 13	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 12 Voltage measurement - Out of Range - High	P0B75	Out of range high	Block 12	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 12 Voltage measurement - Rationality	P0B73	Rationality compares block voltage sensor to pack voltage sensor	| Block 12 * 20 - Battery Pack Voltage| AND | Block 13 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 12 Voltage sensor input No active DTCs:	>= 9.0 V <= 18.0 V = VALID P0A1F P0B74 P0B75 P0ABC	160 Failures out of 170 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.
						P0ABD P0ABB		
					BPCM Power Mode	=RUN		
					Time since contactors closed	> 200ms		
Block 13 Voltage Sensor Circuit:								
Block 13 Voltage measurement - Out of Range - Low	P0B79	Out of range low	Block 13	< 2 V	12V System Voltage	>= 9.0 V <= 18.0 V	15 Failures out of 20 Samples	Two Trips Type B
			AND		No active DTCs:	P0A1F		
			Block 14	< 2 V	BPCM Power Mode	=RUN	Frequency: 100ms	
Block 13 Voltage measurement - Out of Range - High	P0B7A	Out of range high	Block 13	> 23 V		>= 9.0 V <= 18.0 V	15 Failures out of 20 Samples	Two Trips Type B
					No active DTCs:	P0A1F		
					BPCM Power Mode	=RUN	Frequency: 100ms	
Block 13 Voltage measurement - Rationality	P0B78	Rationality compares block voltage sensor to pack voltage sensor	| Block 13 * 20 - Battery Pack Voltage|	> 70 V	12V System Voltage	>= 9.0 V <= 18.0 V	160 Failures out of 170 Samples	Two Trips Type B
			AND		Block 13 Voltage sensor input	= VALID		
			| Block 14 * 20 - Battery Pack Voltage|	> 70 V	No active DTCs:	P0A1F	Frequency: 100ms	
						P0B79 P0B7A P0ABC P0ABD P0ABB		
					BPCM Power Mode	=RUN		
					Time since contactors closed	> 200ms		
Block 14 Voltage Sensor Circuit:								
Block 14 Voltage measurement - Out of Range - Low	P0B7E	Out of range low	Block 14	< 2 V	12V System Voltage	>= 9.0 V <= 18.0 V	15 Failures out of 20 Samples	Two Trips Type B
			AND		No active DTCs:	P0A1F		
			Block 15	< 2 V	BPCM Power Mode	=RUN	Frequency: 100ms	
Block 14 Voltage measurement - Out of Range - High	P0B7F	Out of range high	Block 14	> 23 V	12V System Voltage	>= 9.0 V <= 18.0 V	15 Failures out of 20 Samples	Two Trips Type B
					No active DTCs:	P0A1F		
					BPCM Power Mode	=RUN	Frequency: 100ms	
Block 14 Voltage measurement - Rationality	P0B7D	Rationality compares block voltage sensor to pack voltage sensor	| Block 14 * 20 - Battery Pack Voltage|	> 70 V	12V System Voltage	>= 9.0 V <= 18.0 V	160 Failures out of 170 Samples	Two Trips Type B
			AND		Block 14 Voltage sensor input	= VALID		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			| Block 15 * 20 - Battery Pack Voltage|	> 70 V	No active DTCs:	P0A1F P0B7E P0B7F P0ABC P0ABD P0ABB	Frequency: 100ms	
					BPCM Power Mode	=RUN		
					Time since contactors closed	> 200ms		
Block 15 Voltage Sensor Circuit:								
Block 15 Voltage measurement - Out of Range - Low	P0B83	Out of range low	Block 15	< 2 V	12V System Voltage	>= 9.0 V <= 18.0 V	15 Failures out of 20 Samples	Two Trips Type B
			AND		No active DTCs:	P0A1F		
			Block 16	< 2 V	BPCM Power Mode	=RUN	Frequency: 100ms	
Block 15 Voltage measurement - Out of Range - High	P0B84	Out of range high	Block 15	> 23 V	12V System Voltage	>= 9.0 V <= 18.0 V	15 Failures out of 20 Samples	Two Trips Type B
					No active DTCs:	P0A1F		
					BPCM Power Mode	=RUN	Frequency: 100ms	
Block 15 Voltage measurement - Rationality	P0B82	Rationality compares block voltage sensor to pack voltage sensor	| Block 15 * 20 - Battery Pack Voltage|	> 70 V	12V System Voltage	>= 9.0 V <= 18.0 V	160 Failures out of 170 Samples	Two Trips Type B
			AND		Block 15 Voltage sensor input	= VALID		
			| Block 16 * 20 - Battery Pack Voltage|	> 70 V	No active DTCs:	P0A1F P0B83 P0B84 P0ABC P0ABD P0ABB	Frequency: 100ms	
					BPCM Power Mode	=RUN		
					Time since contactors closed	> 200ms		
Block 16 Voltage Sensor Circuit:								
Block 16 Voltage measurement - Out of Range - Low	P0B88	Out of range low	Block 16	< 2 V	12V System Voltage	>= 9.0 V <= 18.0 V	15 Failures out of 20 Samples	Two Trips Type B
			AND		No active DTCs:	P0A1F		
			Block 17	< 2 V	BPCM Power Mode	=RUN	Frequency: 100ms	
Block 16 Voltage measurement - Out of	P0B89	Out of range high	Block 16	> 23 V	12V System Voltage	>= 9.0 V <= 18.0 V	15 Failures out of 20 Samples	Two Trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Range - High					No active DTCs: BPCM Power Mode	P0A1F =RUN	Frequency: 100ms	
Block 16 Voltage measurement - Rationality	P0B87	Rationality compares block voltage sensor to pack voltage sensor	| Block 16 * 20 - Battery Pack Voltage| AND | Block 17 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 16 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B88 P0B89 P0ABC P0ABD P0ABB =RUN > 200ms	160 Failures out of 170 Samples Frequency: 100ms	Two Trips Type B
Block 17 Voltage Sensor Circuit:								
Block 17 Voltage measurement - Out of Range - Low	P0B8D	Out of range low	Block 17 AND Block 18	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 17 Voltage measurement - Out of Range - High	P0B8E	Out of range high	Block 17	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 17 Voltage measurement - Rationality	P0B8C	Rationality compares block voltage sensor to pack voltage sensor	| Block 17 * 20 - Battery Pack Voltage| AND | Block 18 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 17 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B8D P0B8E P0ABC P0ABD P0ABB =RUN > 200ms	160 Failures out of 170 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.
Block 18 Voltage Sensor Circuit:								
Block 18 Voltage measurement - Out of Range - Low	P0B92	Out of range low	Block 18 AND Block 19	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 18 Voltage measurement - Out of Range - High	P0B93	Out of range high	Block 18	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 18 Voltage measurement - Rationality	P0B91	Rationality compares block voltage sensor to pack voltage sensor	| Block 18 * 20 - Battery Pack Voltage| AND | Block 19 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 18 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B92 P0B93 P0ABC P0ABD P0ABB =RUN > 200ms	160 Failures out of 170 Samples Frequency: 100ms	Two Trips Type B
Block 19 Voltage Sensor Circuit:								
Block 19 Voltage measurement - Out of Range - Low	P0B97	Out of range low	Block 19 AND Block 20	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 19 Voltage measurement - Out of Range - High	P0B98	Out of range high	Block 19	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	15 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Block 19 Voltage measurement - Rationality	P0B96	Rationality compares block voltage sensor to pack voltage sensor	| Block 19 * 20 - Battery Pack Voltage| AND | Block 20 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 19 Voltage sensor input No active DTCs:	>= 9.0 V <= 18.0 V = VALID P0A1F P0B97 P0B98 P0ABC	160 Failures out of 170 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.
						P0ABD P0ABB		
					BPCM Power Mode	=RUN		
					Time since contactors closed	> 200ms		
Block 20 Voltage Sensor Circuit:								
Block 20 Voltage measurement - Out of Range - Low	P0B9C	Out of range low	Block 20	< 2 V	12V System Voltage	>= 9.0V <= 18.0V	15 Failures out of 20 Samples	Two Trips Type B
					No active DTCs:	P0A1F		
					BPCM Power Mode	=RUN	Frequency: 100ms	
Block 20 Voltage measurement - Out of Range - High	P0B9D	Out of range high	Block 20	> 23 V	12V System Voltage	>= 9.0V <= 18.0V	15 Failures out of 20 Samples	Two Trips Type B
					No active DTCs:	P0A1F		
					BPCM Power Mode	=RUN	Frequency: 100ms	
Block 20 Voltage measurement - Rationality	P0B9B	Rationality compares block voltage sensor to pack voltage sensor	| Block 20 * 20 - Battery Pack Voltage|	> 70 V	12V System Voltage	>= 9.0V <= 18.0V	160 Failures out of 170 Samples	Two Trips Type B
					Block 20 Voltage sensor input	= VALID		
					No active DTCs:	P0A1F P0B9C P0B9D P0ABC P0ABD P0ABB	Frequency: 100ms	
					BPCM Power Mode	=RUN		
					Time since contactors closed	> 200ms		
Battery Pack Voltage Sensor Circuit:								
Hybrid Battery Pack Voltage Sense Circuit Low	P0ABC	Out of range low	Battery Pack Voltage	< 40 V	12V System Voltage	>= 9.0V <= 18.0V	300 Failures out of 400 Samples	One Trip Type A
					BPCM Power Mode	=RUN		
					Time since contactors closed	> 200ms	Frequency: 10ms	
					No active DTCs:	P0A1F		
Hybrid Battery Pack Voltage Sense Circuit High	P0ABD	Out of range high	Battery Pack Voltage	> 430 V	12V System Voltage	>= 9.0V <= 18.0V	300 Failures out of 400 Samples	One Trip Type A
					BPCM Power Mode	=RUN		
					Time since contactors closed	> 200ms	Frequency: 10ms	
					No active DTCs:	P0A1F		
Hybrid Battery Pack Voltage Sense Circuit Rationality	P0ABB	Rationality compares pack voltage sensor to sum of the block	|Sum of battery block voltages - Battery Pack voltage|	> 50 V	12V System Voltage	>= 9.0V <= 18.0V	70 Failures out of 80 Samples	One Trip Type A

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		voltages	AND BPCM High Voltage Battery Pack Voltage Validity	 = VALID	Pack Voltage sensor input BPCM Power Mode Time since contactors closed No active DTCs:	= VALID =RUN > 200ms P0A1F P0ABC P0ABD	 Frequency: 100ms	
Current sensor Circuit:								
Hybrid Battery Pack Current Sensor Circuit Low	P0AC1	Out of range low By convention, battery discharging corresponds to a positive current.	Current Sensed (High range) AND Current Sensed (Mid range) AND Current Sensed (Low range)	> 200 A > 52 A > 22 A	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P1A07 P0A1F	30 Failures out of 40 Samples Frequency: 100ms	One Trip Type A
Hybrid Battery Pack Current Sensor Circuit High	P0AC2	Out of range high By convention, battery charging corresponds to a negative current.	Current Sensed (High range) AND Current Sensed (Mid range) AND Current Sensed (Low range)	< -200 A < -52 A < -22 A	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P1A07 P0A1F	30 Failures out of 40 Samples Frequency: 100ms	One Trip Type A
Hybrid Battery Pack Current Sensor Circuit Rationality	P0AC0	Rationality checks sensor offset; rationalizes battery voltage change to net current (energy) input/output	(| Current Sensor Offset (High range) | OR | Current Sensor Offset (Mid range) | OR | Current Sensor Offset (Low range) |) OR	> 5 A > 5 A > 5 A	12V System Voltage Contactor Status Current Sensor sensor Input No active DTCs:	>= 9.0V <= 18.0V =OPEN =VALID P1A07 P0A1F P0AC1 P0AC2	3 Failures out of 10 Samples Frequency: 1000ms	One Trip Type A
			(|Current sensor Input (Hi range)| AND | Current sensor Input (Hi range) - Current sensor Input (Me range) | AND | Current sensor Input (Hi range) - Current sensor Input (Lo range) |)	<= 20A >= 4A >= 4A	BPCM Power Mode 12V System Voltage No active DTCs:	=RUN >= 9.0V <= 18.0V P1A07 P0A1F P0AC1	3 Failures out of 10 Samples Frequency: 1000ms	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			OR			P0AC2		
			(Deviation of accumulated block voltage for 1sec AND Deviation of current for 1sec)	> 10 V < 0.5 A	BPCM Power Mode 12V System Voltage No active DTCs:	=RUN >= 9.0V <= 18.0V P1A07 P0A1F P0AC1 P0AC2	3 Failures out of 10 Samples Frequency: 1000ms	
Temperature sensor1 Circuit:								
Temperature Sensor 1 Circuit Low	P0A9D	Out of range low	Temperature Input1 AND (Temperature Input2 OR Temperature Input3 OR Temperature Input4)	> 95 ºC < 70 ºC < 70 ºC < 70 ºC	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P0A1F	30 Failures out of 40 Samples Frequency: 100ms	Two Trips Type B
Temperature Sensor 1 Circuit High	P0A9E	Out of range high	Temperature Input1	< -45 ºC	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P0A1F	30 Failures out of 40 Samples Frequency: 100ms	Two Trips Type B
Temperature Sensor 1 Circuit Rationality	P0A9C	Rationality compares temperature with the other 3 sensor values read	| Temperature Input1 - Temperature Input2 | AND |Temperature Input1 - Temperature Input3| AND |Temperature Input1 - Temperature Input4|	> 15 ºC > 15 ºC > 15 ºC	12V System Voltage BPCM Power Mode Temperature Sensor 1 Input No active DTCs:	>= 9.0V <= 18.0V =RUN = VALID P0A1F P0A9D P0A9E	90 Failures out of 100 Samples Frequency: 100ms	Two Trips Type B
Temperature sensor2 Circuit:								
Temperature Sensor 2 Circuit Low	P0AC7	Out of range low	Temperature Input2 AND (Temperature Input1 OR	> 95 ºC < 70 ºC	12V System Voltage BPCM Power Mode	>= 9.0V <= 18.0V =RUN	30 Failures out of 40 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.
			Temperature Input3 OR Temperature Input4)	< 70 ºC < 70 ºC	No active DTCs:	P0A1F		
Temperature Sensor 2 Circuit High	P0AC8	Out of range high	Temperature Input2	< -45 ºC	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P0A1F	30 Failures out of 40 Samples Frequency: 100ms	Two Trips Type B
Temperature Sensor 2 Circuit Rationality	P0AC6	Rationality compares temperature with the other 3 sensor values read	| Temperature Input2 - Temperature Input1 | AND | Temperature Input2 - Temperature Input3 | AND | Temperature Input2 - Temperature Input4 |	> 15 ºC > 15 ºC > 15 ºC	12V System Voltage BPCM Power Mode Temperature Sensor 2 Input No active DTCs:	>= 9.0V <= 18.0V =RUN = VALID P0A1F P0AC7 P0AC8	90 Failures out of 100 Samples Frequency: 100ms	Two Trips Type B
Temperature sensor3 Circuit:								
Temperature Sensor 3 Circuit Low	P0ACC	Out of range low	Temperature Input3 AND (Temperature Input1 OR Temperature Input2 OR Temperature Input4)	> 95 ºC < 70 ºC < 70 ºC < 70 ºC	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P0A1F	30 Failures out of 40 Samples Frequency: 100ms	Two Trips Type B
Temperature Sensor 3 Circuit High	P0ACD	Out of range high	Temperature Input3	< -45 ºC	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P0A1F	30 Failures out of 40 Samples Frequency: 100ms	Two Trips Type B
Temperature Sensor 3 Circuit Rationality	P0ACB	Rationality compares temperature with the other 3 sensor values read	|Temperature Input3 - Temperature Input1| AND | Temperature Input3 - Temperature Input2 | AND |Temperature Input3 - Temperature Input4|	> 15 ºC > 15 ºC > 15 ºC	12V System Voltage BPCM Power Mode Temperature Sensor 3 Input No active DTCs:	>= 9.0V <= 18.0V =RUN = VALID P0A1F P0ACC P0ACD	90 Failures out of 100 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.
Temperature sensor4 Circuit:								
Temperature Sensor 4 Circuit Low	P0AEA	Out of range low	Temperature Input4 AND (Temperature Input1 OR Temperature Input2 OR Temperature Input3)	> 95 ºC < 70 ºC < 70 ºC < 70 ºC	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P0A1F	30 Failures out of 40 Samples Frequency: 100ms	Two Trips Type B
Temperature Sensor 4 Circuit High	P0AEB	Out of range high	Temperature Input4	< -45 ºC	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P0A1F	30 Failures out of 40 Samples Frequency: 100ms	Two Trips Type B
Temperature Sensor 4 Circuit Rationality	P0AE9	Rationality compares temperature with the other 3 sensor values read	| Temperature Input4 - Temperature Input1 | AND | Temperature Input4 - Temperature Input2 | AND | Temperature Input4 - Temperature Input3 |	> 15 ºC > 15 ºC > 15 ºC	12V System Voltage BPCM Power Mode Temperature Sensor 4 Input No active DTCs:	>= 9.0V <= 18.0V =RUN = VALID P0A1F P0AEA P0AEB	90 Failures out of 100 Samples Frequency: 100ms	Two Trips Type B
Inlet Air Temperature sensor Circuit:								
Inlet Air Temperature Sensor Circuit Low	P0AAE	Out of range low	Inlet Air Temperature Input	> 95 ºC	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P0A1F	30 Failures out of 40 Samples Frequency: 100ms	Two Trips Type B
Inlet Air Temperature Sensor Circuit High	P0AAF	Out of range high	Inlet Air Temperature Input	< -45 ºC	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P0A1F	30 Failures out of 40 Samples Frequency: 100ms	Two Trips Type B
Inlet Air Temperature Sensor Circuit Rationality	P0AAD	Rationalizes that inlet air temperature should not be higher than the outlet temperature	|Powerup Inlet Air Temperature Input - Powerup Outlet Air AND |Powerup Outlet Air Temperature Input - Powerup Max Module Temperature|	> 20 ºC ≤ 10 ºC	12V System Voltage BPCM Power Mode Engine Off Time Engine Off Time Validity	>= 9.0V <= 18.0V =RUN > 8 hours = Valid	Once at Powerup	Two Trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Engine Off Time Mask	= True		
					Powerup Outlet Air Temperature Input	≥ -7°C		
					Battery Max Module Temperature	= Valid		
					Time since Run/Crank Terminal status transitioned to Active	≥ 15 sec		
					No active DTCs:	P0AAE P0AAF P0AB2 P0AB3 P0AB4 P0A1F		
Outlet Air Temperature sensor Circuit:								
Outlet Air Temperature Sensor Circuit Low	P0AB3	Out of range low	Temperature Sensor Outlet Air Input AND (Temperature Input1 OR Temperature Input2 OR Temperature Input3 OR Temperature Input4)	> 95 ºC < 70 ºC < 70 ºC < 70 ºC < 70 ºC	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P0A1F	30 Failures out of 40 Samples Frequency: 100ms	Two Trips Type B
Outlet Air Temperature Sensor Circuit High	P0AB4	Out of range high	Temperature Sensor Outlet Air Input	< -45 ºC	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P0A1F	30 Failures out of 40 Samples Frequency: 100ms	Two Trips Type B
Outlet Air Temperature Sensor Circuit Rationality	P0AB2	Rationalizes that the outlet air temperature should not be higher than the highest battery pack module temperature	Temperature Sensor Outlet Air Input - BPCM High Voltage Battery	> 10 ºC	12V System Voltage Fan Command BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V = ON =RUN P0A1F P0A9C P0A9D P0A9E	90 Failures out of 100 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.
						P0AB3 P0AB4 P0AC6 P0AC7 P0AC8 P0ACB P0ACC P0ACD P0AE9 P0AEA P0AEB P0A81		
Battery Cooling Fan:								
Fan Relay Welded	P0BC1		Fan control signal monitor voltage	>= 0.9 V	12V System voltage	>= 9.0 V <= 18.0 V	10 Failures out of 20 Samples	Two Trips Type B
					BPCM Power Mode	=RUN		
					Fan command	= OFF	Frequency: 100ms	
					No active DTCs:	P0A1F P0A81		
Fan Unit Failure	P0A81		Fan control signal monitor voltage	>= 2.3 V OR <= 0.5 V	12V System voltage	>= 9.0 V <= 18.0 V	50 Failures out of 50 Samples	Two Trips Type B
					BPCM Power Mode	=RUN		
					Fan command	=ON	Frequency: 100ms	
					Fan speed	>= 35 %		
					No active DTCs:	P0A1F		
			Fan control signal monitor voltage	>= 7.0 V	12V System voltage	>= 9.0 V <= 18.0 V	30 Failures out of 40 Samples	
					BPCM Power Mode	=RUN		
					No active DTCs:	P0A1F	Frequency: 100ms	
			Fan control signal monitor voltage	> 4.0 V AND < 7.0 V	12V System voltage	>= 9.0 V <= 18.0 V	90 Failures out of 100 Samples	
					BPCM Power Mode	=RUN		
					Fan command	=OFF	Frequency: 100ms	
					No active DTCs:	P0A1F		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			PWM signal monitor (SI)	< 0.15 V	12V System voltage BPCM Power Mode Fan command No active DTCs:	>= 9.0 V <= 18.0 V =RUN =ON P0A1F	30 Failures out of 40 Samples Frequency: 100ms	
			PWM signal monitor (SI)	> 9.0 V	12V System voltage BPCM Power Mode No active DTCs:	>= 9.0 V <= 18.0 V =RUN P0A1F	30 Failures out of 40 Samples Frequency: 100ms	
			PWM signal monitor (SI)	> 4.0 V AND < 7.0 V	12V System voltage BPCM Power Mode Fan command No active DTCs:	>= 9.0 V <= 18.0 V =RUN =OFF P0A1F	90 Failures out of 100 Samples Frequency: 100ms	
Battery Cooling System Performance	P0C32		Maximum Battery Module Temperature	> Temperature as defined in table below: Inlet Temp vs. Max Module Temp C C -30 45 -20 45 -10 45 -5 45 0 46 5 48 10 49 15 50 20 52 25 54 30 56 35 58 40 61 45 65 50 70 60 80	12V System voltage Battery Max Module Temperature No active DTCs:	>= 9.0 V <= 18.0 V =VALID (less than 3 Module Temperature Sensors have associated circuit faults active) P0AAD P0AAE P0AAF P0A1F	1200 Failures out of 1200 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.
					Fan command	= ON		
Current Sensor Voltage Supply:								
Current Sensor Voltage Supply	P1A07	Out of range	Current Sensor Supply Voltage OR Current Sensor Supply Voltage	< 4.8 V > 5.2 V	12V System Voltage No active DTCs:	>= 9.0V <= 18.0V P0A1F	8 Failures out of 10 Samples Frequency: 100ms	One Trip Type A
High Voltage Interlock Circuit:								
High Voltage Interlock Circuit Low	P1AE3	Out of range low	HVIL Current Output AND HVIL Current Output AND HVIL Current Input	> 5 mA < 18 mA < 5 mA	12V System Voltage BPCM Power Mode HVIL State No active DTCs:	>= 9.0V <= 18.0V = RUN = Asserted P0A1F	1 Failures out of 1 Samples Frequency: 10ms	Special Type "C"
High Voltage Interlock Circuit High	P1AE4	Out of range high	HVIL Current Output AND HVIL Current Input	< 5 mA > 35 mA	12V System Voltage BPCM Power Mode HVIL State No active DTCs:	>= 9.0V <= 18.0V = RUN = Asserted P0A1F	1 Failures out of 1 Samples Frequency: 10ms	Special Type "C"
High Voltage Interlock Circuit Open	P1AE2	Open	HVIL Current Output AND HVIL Current Input	< 5 mA < 5 mA	12V System Voltage BPCM Power Mode HVIL State No active DTCs:	>= 9.0V <= 18.0V = RUN = Asserted P0A1F	1 Failures out of 1 Samples Frequency: 10ms	Special Type "C"
Pre-Charge Voltage :								
Pre-Charge too Fast	P0C77	HV bus = Open	([BPCM High Voltage pack Voltage AND Precharge Time] AND [| BPCM High Voltage pack Voltage - Sum of battery block voltages | AND Precharge Time])	< 60V, =0ms =< 23V =<20ms	12V System Voltage BPCM Power Mode No active DTCs:	=> 9.0 V =< 18.0 V = RUN P0A1F P0AC0	1 time (5ms)	Special Type "C"
		OR				P0AC1	OR	
		HV bus = Short	(BPCM High Voltage Battery Pack Current AND Precharge Time)	=> 25A > 100ms		P0AC2 P0ABC P0ABD	1 time (5ms)	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						P0ABB		
High Voltage Battery:								
Battery Module – Voltage deviation EOL	P0BBD	Voltage deviation is high	Maximum | Block Voltage(n) - Block Voltage (n+1) |	> 1.5 V	BPCM Power Mode	= RUN	3 Failures out of 3 Samples	Two Trips Type B
					12V System Voltage	>= 9.0V <= 18.0V		
					Battery current	>0.2A	Frequency: 1s	
					Min. battery temp.	>= -7ºC		
					No active DTC's:	P0B3D		
						P0B3E		
						P0B3C		
						P0B42		
						P0B43		
						P0B41		
						P0B47		
						P0B48		
						P0B46		
						P0B4C		
						P0B4D		
						P0B4B		
						P0B51		
						P0B52		
						P0B50		
						P0B56		
						P0B57		
						P0B55		
						P0B5B		
						P0B5C		
						P0B5A		
						P0B60		
						P0B61		
						P0B5F		
						P0B65		
						P0B66		
						P0B64		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						P0B6A P0B6B P0B69 P0B6F P0B70 P0B6E P0B74 P0B75 P0B73 P0B79 P0B7A P0B78 P0B7E P0B7F P0B7D P0B83 P0B84 P0B82 P0B88 P0B89 P0B87 P0B8D P0B8E P0B8C P0B92 P0B93 P0B91 P0B97 P0B98 P0B96 P0B9C P0B9D P0B9B P0A1F		
Battery Module – Over Voltage	P1A4E	Voltage too high	High Voltage Battery Pack Voltage	> 408 V	BPCM Power Mode	= RUN	40 Failures out of 40 Samples	Special Type "C"

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					12V System Voltage	>= 9.0V <= 18.0V		
					Block voltage rationality	= Pass (at least 1block)	Frequency: 100ms	
			OR		No active DTC's:	P0B3D	OR	
			Any Block Voltage N	> 20.4 V		P0B3E	20 Failures out of 20 Samples	
						P0B3C		
						P0B42	Frequency: 100ms	
						P0B43		
						P0B41		
						P0B47		
						P0B48		
						P0B46		
						P0B4C		
						P0B4D		
						P0B4B		
						P0B51		
						P0B52		
						P0B50		
						P0B56		
						P0B57		
						P0B55		
						P0B5B		
						P0B5C		
						P0B5A		
						P0B60		
						P0B61		
						P0B5F		
						P0B65		
						P0B66		
						P0B64		
						P0B6A		
						P0B6B		
						P0B69		
						P0B6F		
						P0B70		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						P0B6E P0B74 P0B75 P0B73 P0B79 P0B7A P0B78 P0B7E P0B7F P0B7D P0B83 P0B84 P0B82 P0B88 P0B89 P0B87 P0B8D P0B8E P0B8C P0B92 P0B93 P0B91 P0B97 P0B98 P0B96 P0B9C P0B9D P0B9B P0A1F		
Battery Module – Under Voltage	P1A1F	Voltage too low	High Voltage Battery Pack Voltage	< 168 V	BPCM Power Mode	= RUN	40 Failures out of 40 Samples	Special Type "C"
					12V System Voltage	>= 9.0V <= 18.0V		
					Block voltage rationality	= Pass (at least 1block)	Frequency: 100ms	
			OR		No active DTC's:	P0B3D	OR	
			Any Block Voltage N	< 8.4 V		P0B3E	20 Failures out of 20 Samples	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						P0B3C		
						P0B42	Frequency: 100ms	
						P0B43		
						P0B41		
						P0B47		
						P0B48		
						P0B46		
						P0B4C		
						P0B4D		
						P0B4B		
						P0B51		
						P0B52		
						P0B50		
						P0B56		
						P0B57		
						P0B55		
						P0B5B		
						P0B5C		
						P0B5A		
						P0B60		
						P0B61		
						P0B5F		
						P0B65		
						P0B66		
						P0B64		
						P0B6A		
						P0B6B		
						P0B69		
						P0B6F		
						P0B70		
						P0B6E		
						P0B74		
						P0B75		
						P0B73		
						P0B79		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						P0B7A P0B78 P0B7E P0B7F P0B7D P0B83 P0B84 P0B82 P0B88 P0B89 P0B87 P0B8D P0B8E P0B8C P0B92 P0B93 P0B91 P0B97 P0B98 P0B96 P0B9C P0B9D P0B9B P0A1F		
Battery Module – resistance High EOL	P0A80	High Module Resistance	Max Cell Resistance	> Resistance threshold as defined in table below; Bat. Temp. Vs Resistance C mOhm -10 141.33 -5 112.05 0 88.90 5 68.67 10 52.92 15 40.10 25 27.00 35 23.55 45 21.22 50 20.00	BPCM Power Mode System Voltage Battery current Charge samples in 60s Discharge samples in 60s Data sufficiently dispersed and symmetric *n = # of measurements in 60s* *X = measured current* Battery temperature # of calculated block resistances	= RUN >= 9.0V <= 18.0V > -70 A < +100 A ≥ 15 ≥ 15 =TRUE	10 Failures out of 10 Samples	One Trip Type A

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					meeting above criteria	> -10ºC < +50ºC >= 5blocks		
			OR		No Active DTC's:	P0A1F		
			Avg Module Resistance/3.16	> Resistance threshold as defined in table below; Bat. Temp. Vs Resistance C mOhm -10 141.33 -5 112.05 0 88.90 5 68.67 10 52.92 15 40.10 25 27.00 35 23.55 45 21.22 50 20.00			Frequency: 60s	
Battery – Over temperature	P1ABE	Battery temp. too high	2 or more Battery Module Temperatures	> 65ºC	BPCM Power Mode System Voltage No active DTC's:	= RUN >= 9.0V <= 18.0V P0A9D P0A9E P0A9C P0AC7 P0AC8 P0AC6 P0ACC P0ACD P0ACB P0AEA P0AEB P0AE9 P0A1F	50 Failures out of 50 Samples Frequency: 100ms	Special Type "C"
			OR					
			1 or more Battery Module Temperatures	> 70ºC				

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Controller Faults								
Controller – RAM Error	P1A05	Microcomputer detects RAM Failure	Read value does not match write value.	(Conduct a verify check by writing 4bytes pitch from the first digit accordingly. If the read value does not match write value when the test pattern of 0x55555555 and 0xAAAAAAAA are written.)	BPCM Power Mode	= RUN	1 Failures out of 1 Samples Frequency: 100ms	One Trip Type A
Controller – ROM Error	P1A06	Microcomputer detects ROM Failure	Calculated CS of ROM and the already written CS in the GMHeader area is not the same.		BPCM Power Mode	= RUN	1 Failures out of 1 Samples Frequency: 100ms	One Trip Type A
Controller – EEPROM Error	P1A01	Error occur at mirror check during EEPROM downloading	An error is detected when verifying check sum during startup EEPROM read at the following locations: a) Calibration area b) Parameter area c) Diag area (status history) d) Diag area (X/Y counter)		BPCM Power Mode	= RUN	Run Once at Startup (100ms)	One Trip Type A
Micro controller failure	P0A1F	Microcomputer detects watchdog timeout.	Watchdog timer interruption occurred and the BPCM is reset.		BPCM Power Mode	= RUN	1 Failures out of 1 Samples Frequency: 100ms	One Trip Type A
		OR					OR	
		Processor StackOverflow	Usage of micro processor stack	> 80%			1 Failures out of 1 Samples Frequency: 10ms	
		OR					OR	
		Program Processing Time-out	Previously activated DMA transmission incomplete				1 Failures out of 1 Samples Frequency: 10ms	
		OR					OR	
		Program Processing Time-out	10msec transaction time	> 10ms (No waiting time available during 10ms process waiting time.)			1 Failures out of 1 Samples Frequency: 10ms	
		OR					OR	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		A/D Conversion Failure	A/D conversion interrupt does not activate the standard number of times in 10ms AND A/D conversion interrupt is not completed				1 Failures out of 1 Samples Frequency: 10ms	
			OR				OR	
		A/D Conversion Failure	A/D conversion interrupt does not activate the standard number of times in 1s				1 Failures out of 1 Samples Frequency: 1s	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Wheel Speed Sensors								
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
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)	> 100ms	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

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Left Front Wheel Speed Sensor Circuit	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	> 12.8kph < 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	> 12.8kph < 19.5 True (Note 1) C1208	70ms	two trips
		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	> 12.8kph < 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	> 12.8kph < 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 > 12.8kph 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	> 12.8kph 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	> 12.8kph 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	> 12.8kph 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	> 12.8kph True (Note 1) C1210	280ms Pass >30s	two trips
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
Input Sensors								
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 (0.25v typically) Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	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 (4.75v typically) Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	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 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 (0.25v typically) Nominal Range: (4.75v - 5.25v - Supply 4.5 - 0.5v - Sensor)	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 (4.75v typically) Nominal Range: (4.75v - 5.25v - Supply 4.5 - 0.5v - Sensor)	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 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	5 mm (>1.07v typical) Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	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 = 5 mm	Brake Pedal Apply Detected	True (Note 2)	7ms	
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 Threshold Brake Ped Pos 4 input offset <Threshold	5 mm (>1.07v typical) Nominal Range: 4.75v - 5.25v - Supply 4.5v - 0.5v - Sensor	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	
		Base brake pedal travel sensor 4 offset error	Brake Pedal Travel Sensor 4 > Max Threshold	Max Threshold = 5 mm	Brake Pedal Apply Detected	True (Note 2)	7 ms	
Brake Pedal Position Sensor 3 Plausibility	C12F8	The brake pedal position 3 input signal does not correlate with the brake pedal position 4 signal or with the MC Pressure signal.	ABS{(Brake Ped Pos 3 input + Brake Ped Pos 4 input) - Sensor_Supply_Voltage} < Threshold Brake Ped Pos 3 input outside correlation table with M/C pressure input Pass Threshold conditions within	0.5v Outside acceptance table (Note 4) Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Sensor Supply Voltage Sensor Supply Voltage Processing_Enabled No Active DTCs	> 4.75v < 5.25 True (Note 1) C120F C127D C129A C129B C129C C12E5	30ms (condition 1) 150ms (condition 2)	two trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		The difference of the two travel sensor inputs is greater than a predefined threshold.	|(Input 1 + Input 2) - sensor supply voltage| > Threshold	0.5v	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	
Brake Pedal Position Sensor 4 Plausibility	C120C	The brake pedal position 4 input signal does not correlate with the brake pedal position 3 signal or with the MC Pressure signal.	ABS{(Brake Ped Pos 3 input + Brake Ped Pos 4 input) - Sensor_Supply_Voltage} < Threshold Brake Ped Pos 4 input outside correlation table with M/C pressure input Pass Threshold conditions within thresholds	0.5v Outside acceptance table (Note 4) Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Sensor Supply Voltage Sensor Supply Voltage Processing_Enabled No Active DTCs	> 4.75v < 5.25 True (Note 1) C120F C127D C129D C129E C129F C12E5	30ms (condition 1) 150ms (condition 2)	two trips
		The difference of the two travel sensor inputs is greater than a predefined threshold.	|(Input 1 + Input 2) - sensor supply voltage| > Threshold	0.5v	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	
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

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 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
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

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Brake Pedal Position Sensor Power Circuit Low	C120F	The supply to the pedal position sensor is shorted to ground.	Pedal supply voltage < Threshold	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
Internal 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
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
ABS Regenerative Axle Pressure Sensor Circuit Open or Shorted Low	C12B9	The regen axle pressure sensor is either open or shorted to ground.	Regen Axle 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 Regenerative Axle Pressure Sensor Circuit Shorted High	C12BA	The regen axle pressure sensor signal is shorted high.	Regen Axle 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

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
ABS Regenerative Axle Pressure Sensor Erratic	C12BB	A regen axle 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) C12B9 C12BA	100ms Pass = 150ms	Two trips
ABS Regenerative Axle Pressure Sensor Raw Offset Error	C128F	The regen axle pressure sensor's raw offset is out of range.	Regen Axle 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) C12B9 C12BA C12BB	1s	Two trips
ABS Regenerative Axle Pressure Sensor Offset Error	C128C	The regen axle pressure sensor's input signal offset is out of range.	Regen Axle 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) C12B9 C12BA C12BB	20ms	Two trips
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

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
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
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 Sensor and Regenerative Axle Pressure Sensor Correlation	C12F7	The regen axle pressure sensor is checked with the boost pressure sensor by equalizing pressure at the two sensors and comparing their difference to a trimmed threshold. The pressures are equalized by controlling the regen axle valves during the test.	(Regen axle pressure – Boost pressure) > Threshold Pass Threshold: < 500 kPa	500 kPa	All Wheel Speeds = 0 Brake Pedal Apply Detected Boost Pressure Regen Valves Active Processing_Enabled No active DTCs:	> 300s True (Note 2) > 150 kPa True True (Note 1) C127D C128A C128C C128D C128F C12B9 C12BA C12BB C12BC C12BD C12BE C12E4 C12F7	100 ms	two trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
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
		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	
Hydraulic Control Unit								
ABS Left Front **Isolation** Solenoid Driver **Shorted**	C12C2	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 Threshold: > 30%	30% battery Nominal Range: (8v > 16v)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v Off	30ms	Two trips
ABS Right Front **Isolation** Solenoid Driver **Shorted**	C12C5	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 Threshold: > 30%	30% battery Nominal Range: (8v > 16v)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v Off	30ms	Two trips
ABS Left Rear **Isolation** Solenoid Circuit **Shorted**	C12F2	This failsafe performs the shorted coil detection for HW CLC (Closed Loop Current) coils	Current Feedback > Threshold Pass Threshold: < 150% of requested current	150% of requested current Nominal Range: (8v > 16v)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v Off	15ms	Two trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
ABS Left Rear **Isolation** Solenoid Performance	C12F3	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 Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Commanded Current Commanded Current	True (Note 7) > 8v < 16v > 0.0a < 2.5a	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	
ABS Right Rear **Isolation** Solenoid Circuit **Shorted**	C12F5	This failsafe performs the 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 Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Commanded Current Commanded Current	True (Note 7) > 8v < 16v > 0.25a < 0.35a	15ms	Two trips
ABS Right Rear **Isolation** Solenoid Performance	C12F6	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 Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Commanded Current Commanded Current	True (Note 7) > 8v < 16v > 0.0a < 2.5a	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	
ABS Left Front **Dump** Solenoid **Driver Shorted**	C12CC	Whenever the Power Switch Slip Control is closed and the driver transistor is turned off (solenoid commanded off) the feedback voltage should be **High.**	Solenoid feedback voltage < Threshold Pass Threshold: > 30%	30% battery Nominal Range: (8v > 16v)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v Off	30ms (Solenoid in ON/OFF Mode)	Two trips
ABS Right Front **Dump** Solenoid **Driver Shorted**	C12CF	Whenever the Power Switch Slip Control is closed and the driver transistor is turned off (solenoid commanded off) the feedback voltage should be **High.**	Solenoid feedback voltage < Threshold Pass Threshold: > 30%	30% battery Nominal Range: (8v > 16v)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v Off	30ms (Solenoid in ON/OFF Mode)	Two trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
ABS Left Rear **Dump** Solenoid **Circuit Open**	C12D0	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 Solenoid feedback voltage > Threshold Pass Threshold: > 80% Pass Threshold: < 30%	80% battery 30% battery Nominal Range: (8v > 16v)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v Off	30ms (Solenoid in ON/OFF Mode)	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 Solenoid feedback voltage > Threshold Pass Threshold >65.23%	65.23% battery 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 Left Rear **Dump** Solenoid **Circuit Shorted**	C12D1	Whenever the Power Switch Slip Control 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 battery (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 Slip Control is closed and the driver transistor is not turned on (solenoid commanded on) the feedback voltage should be **low.**	Solenoid feedback voltage > Threshold Pass Pass Threshold < 85%	85% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v On	21ms (Solenoid in PWM Mode)	
ABS Left Rear **Dump** Solenoid **Driver Shorted**	C12D2	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 Threshold: > 30%	30% battery Nominal Range: (8v > 16v)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v Off	30ms (Solenoid in ON/OFF Mode)	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)	
ABS Right Rear **Dump** Solenoid **Circuit Open**	C12D3	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 Solenoid feedback voltage > Threshold Pass Threshold: > 80% Pass Threshold: < 30%	80% battery 30% battery Nominal Range: (8v > 16v)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v Off	30ms (Solenoid in ON/OFF Mode)	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 Solenoid feedback voltage > Threshold Pass Threshold >65.23%	65.23% battery 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 Right Rear **Dump** Solenoid **Circuit Shorted**	C12D4	Whenever the Power Switch Slip Control 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 battery (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 Slip Control is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **low.**	Solenoid feedback voltage > Threshold Pass Pass Threshold < 85%	85% 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 Right Rear **Dump** Solenoid **Driver Shorted**	C12D5	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 Threshold >30%	30% battery Nominal Range: (8v > 16v)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 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)	
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 battery (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)	
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 battery (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	
ABS Proportioning Valve Solenoid Circuit **Shorted**	C12DF	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 Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Commanded Current Commanded Current	True (Note 7) > 8v < 16v > 0.25a < 0.35a	15ms	Two trips
ABS Proportioning Valve **Solenoid Performance**	C12F4	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 Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Commanded Current Commanded Current	True (Note 7) > 8v < 16v > 0.0a < 2.5a	100ms	Two trips
		Whenever the Power Switch Slip Control 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 Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v Off	30ms	
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
		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

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Controller								
EBCM Device Voltage Low	C12E1	System voltage is too low for certain operations.	System voltage < Threshold Pass Threshold Volt >9v	9v Nominal Range: (N/A)	Ignition	!= Crank	100ms	Special C
EBCM Device Voltage High	C12E2	System voltage is too high for certain operations.	System voltage > Threshold Pass Threshold Volt <16v	16v Nominal Range: (N/A)	Ignition	!= Crank	100ms	Two trips
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
Traction Control Power Switch Circuit Open	C120D	When the power switch has been commanded on the voltage level is monitored for proper operation.	Voltage Level < Threshold Pass Threshold volt > 80% voltage	80% voltage Nominal Range: (N/A)	Power Switch Slip Control Enabled Power Switch Command	True (Note 7) On	50ms	Two trips
Traction Control Power Switch Circuit Shorted	C120E	When the power switch has been commanded off the voltage level should be at or near zero volts.	Voltage Level > Threshold Pass Threshold volt < 80% voltage	80% voltage Nominal Range: (N/A)	Power Switch Command	Off	50ms	Two trips
Controller								
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

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
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	80% bat volt Nominal Range: (N/A)		Run during Start-up	30ms	one trip
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
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
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

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
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
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 Execution 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 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.	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
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

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
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
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
		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-synchronize 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
EBCM CAN Hardware Initialization	C12E3	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
Control Module Communication Bus B Off	U180F	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	CAN Hardware Transmit Error Counter > Threshold	256 Nominal Range: (N/A)		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.
		a transmitter whenever it does not monitor a dominant bit during the ACK SLOT. If the transmit error counter or receive error counter reach a value of 256 this fault is set.						
EBCM Communication Bus "B" RAM Error	C126D	The first CAN device does not pass RAM check on the mailbox area. The CAN mailbox RAM check is executed once after power up or reset of the microprocessor.	RAM Read value != RAM Written value	0 Nominal Range: (N/A)		Executed once upon startup	15 ms	Two trips
EBCM Communication Bus "B" Performance	C126C	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	Two trips
Antilock Brake System Control Module Lost Communication With Hybrid Powertrain Control Module on Bus B	U1843	PRIV_REGEN_BRAKING_STAT 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
		PRIV_EST_REGEN_TORQ_ARC 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	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		PRIV_EST_REGEN_TORQ_PROT 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	
Antilock Brake System Control Module Lost Communication With Engine Control Module on Bus B	U1842	ENGINE_HYBRID_STAT_1 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.			Upon Starting Scheduler in the Application	190msec	two trips
Antilock Brake System Control Module Lost Communication With Engine Control Module	U186A	PPEI_TRANSFER_CASE_STAT 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	140msec	two trips
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 > $-0.5 m/s^2$ (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 comparison 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 hydraulic modulator - no wheel control valves are being commanded and the motor is not being commanded.

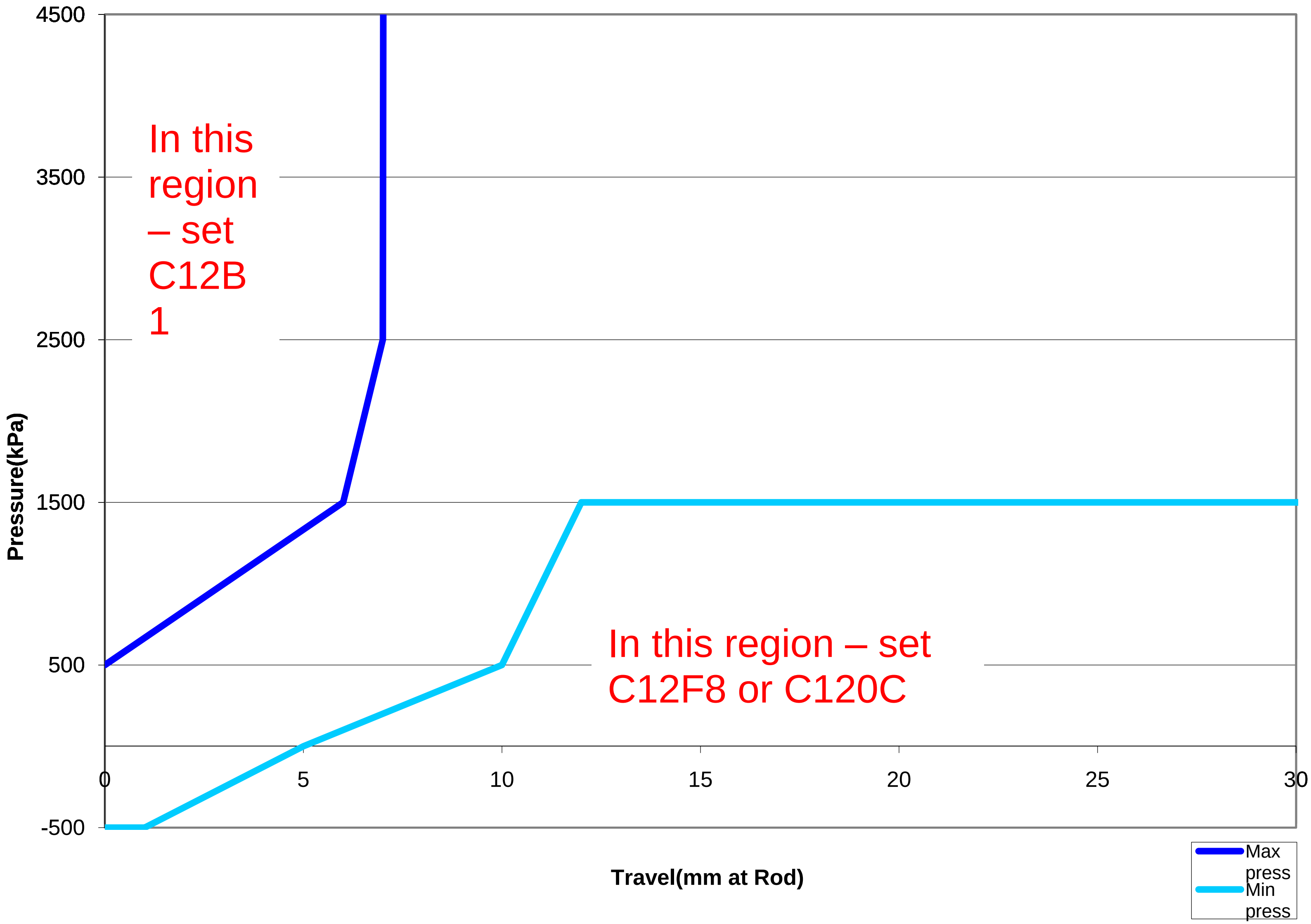
Note #7 - Power Switch Slip Control Enable is used to open the power control FET in the electronics as a safety mechanism for the brake controller. It is set to FALSE when the following DTCs are set to 'Fault': C12C2, C12C5, C12D2, C12D5, C12CC, C12CF, C12C6, C12C8, C12DE, C12D8, C12D2, C1256, C1255, 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.
Fuel Rail Pressure (FRP) Sensor Performance (Rationality)	P018B	This DTC detects if the fuel pressure sensor is stuck within the normal operating range	Absolute value of change in fuel pressure as sensed during intrusive test.	<= 30 kPa	1. FRP Circuit Low DTC (P018C)	not active	<u>Frequency:</u> Continuous; 12.5 ms loop. 60 seconds between intrusive tests that pass Intrusive test requested if fuel system is clamped for >= 5 seconds or fuel pressure error variance <= typically (0.3 to 0.6) (calculated over a 2.5sec period); otherwise report pass Duration of intrusive test is fueling related (5 to 12 seconds). 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)	DTC Type A 1 trip
					2. FRP Circuit High DTC (P018D)	not active		
					3. FuelPump Circuit Low DTC (P0231)	not active		
					4. FuelPump Circuit High DTC (P0232)	not active		
					5. FuelPump Circuit Open DTC (P023F)	not active		
					6. Reference Voltage DTC (P0641)	not active		
					7. Reference Voltage DTC (P06A6)	not active		
					8. Fuel Pump Control Module Driver Over-temperature DTC's (P064A, P1255)	not active		
					9. Control Module Internal Performance DTC (P0606)	not active		
					10. Engine run time	>=5 seconds		
					11. Emissions fuel level (PPEI $3FB)	not low		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					12. Fuel pump control 13. Fuel pump control state 14. Engine fuel flow 15. ECM fuel control system failure (PPEI $1ED)	enabled normal or FRP Rationality control > 0.047 g/s failure has not occurred		
Fuel Rail Pressure (FRP) Sensor Circuit Low Voltage	P018C	This DTC detects if the fuel pressure sensor circuit is shorted to 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 to 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 HS Comm OR Fuel Pump Control AND Ignition Run/Crank Voltage	Run or Crank enabled enabled 9V < voltage < 18V	72 test failures in 80 test samples if Fuel Pump Current <100A 3 test failures in 15 test samples if Fuel Pump Current >=100A 1 sample/12.5 ms	DTC Type A
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 except Hybrid vehicles. For Hybrids, operation is continuous in AutoStop mode	DTC Type A

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
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 < 18V	72 test failures in 80 test samples; 1 sample/12.5ms	DTC Type A
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	Run or Crank	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.
					HS Comm OR Fuel Pump Control	enabled enabled		
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	P0606	This DTC indicates the FSCM has detected an internal processor fault or external watchdog fault (PID 2032 can tell what causes the fault.)	1. For all I/O configuration register faults:				Tests 1 and 2 1 failure Frequency: Continuously (12.5ms)	DTC Type A 1 trip
			•Register contents	Incorrect value.	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled		
			2. For Processor Clock Fault: •EE latch flag in EEPROM. OR		1. For all I/O configuration register faults: •KeMEMD_b_ProcFltCfgRegEnbl	TRUE	Test 3 3 failures out of 15 samples	
2. Processor clock test				0x5A5A			1 sample/12.5 ms	
			• RAM latch flag.	0x5A	2. For Processor Clock Fault: •KeMEMD_b_ProcFltCLKDiagEnbl	TRUE		
3. External watchdog test			3. For External Watchdog Fault: • Software control of viper chip.	Control Lost	3. For External Watchdog Fault: •KeFRPD_b_FPExtWDogDiagEnbl	TRUE		
					3. For External Watchdog Fault: •Control Module ROM(P0601)	not active		
					3. For External Watchdog Fault: •Control Module RAM(P0604)	not active		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
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
5 Volt Reference Circuit (Short High/Low)	P0641	Detects a continuous short 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	20 samples 1 sample/12.5 ms	DTC Type A 1 trip
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 (Tier 1 Supplier - Contineta's responsibility)	Module Range of Operation **AND** Viper Temp	1. Module is within Acceptable Operation Range (Motorola's responsibility - FSCM is in normal operating range for module voltage versus PWM duty cycle. Linear range from 100% @ 12.5V to 70% @ 18V.) > 190C	Ignition OR HS Comm OR Fuel Pump Control KeFRPD_b_FPOverTempDiagEnbl Ignition Run/Crank	Run or Crank enabled enabled TRUE 9V<voltage<18V	3 failures out of 15 samples 1 sample/12.5 ms	DTC Type B 2 trips
5 Volt Reference Circuit (Out of Range)	P06A6	Detects that the #1 5 V sensor reference circuit is out of range	Reference voltage	> 102.5% nominal (i.e. 5.125V) OR < 97.5% nominal (i.e. 4.875V)	Ignition	Run or Crank	80 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.
Fuel Pump Control Module - Driver Over-temperature 2	P1255	This DTC detects if an internal fuel pump driver overtemperature condition exists under extreme operating conditions (GM's responsibility)	Module Range of Operation	Outside normal range (FSCM is NOT in normal operating range for module voltage versus PWM duty cycle. Linear range from 100% @ 12.5V to 70% @ 18V.)			3 failures out of 15 samples 1 sample/12.5 ms	DTC Type B 2 trips
					Ignition	Run or Crank		
					OR			
			AND		HS Comm	enabled		
					OR			
					Fuel Pump Control	enabled		
			Driver Temp	> 190C	KeFRPD_b_FPOverTempDiagEnbl	TRUE		
					Ignition Run/Crank	9V<voltage<18V		
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	200 samples 1 sample/25.0 ms	DTC Type A 1 trip
Fuel Pump Flow Performance	P2635	This DTC detects degradation in the performance of the PFI 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 in the range of -28.4 to -193.5 kPa.) . **OR**	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
				<= High Threshold (function of desired fuel rail pressure and fuel flow rate. 15% of resultant Target Pressure in the range of +19.5 to +166.5 kPa.) .	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. Reference Voltage DTC (P06A6)	not active		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					9. Fuel Pump Control Module Driver Over-temperature DTC's (P064A, P1255)	not active		
					10. Control Module Internal Performance DTC (P0606)	not active		
					11. An ECM fuel control system failure (PPEI $1ED)	has not occurred		
					12. The Barometric pressure (PPEI $4C1) signal	valid (for absolute fuel pressure sensor)		
					13. Engine run time	>= 30 seconds		
					14. Emissions fuel level (PPEI $3FB)	not low		
					15. Fuel pump control	enabled		
					16. Fuel pump control state	normal		
					17. Battery Voltage	11V<=voltage=<18V		
					18. Fuel flow rate	> 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)		
					19. 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	1. Power mode	Run/Crank	5 failures out of 5 samples (5 seconds)	DTC Type B 2 trips
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	Run/Crank	12 failures out of 12 samples (12 seconds)	DTC Type B 2 trips
					2. Ignition Run/Crank Voltage	(11 – 18 V)		
					3. U0073	not active		

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	> 75 A	Main Relay	Closed	X: 8 cts Y: 10 cts R: 0.083 - 0.5 ms T: 0.66 - 3.50 ms	One Trip
					Wakeup Signal	On		
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	> 600 A	Wakeup Signal	On	X: 2 cts Y: 10 cts R: 2.08 ms T: 2.08 ms	One Trip
		Fail Case 2: To detect slow, intermittent 3 Phase over current and to protect IGBT.					X: 5 cts Y: 50 cts R: 2.08 ms T: 8.32 ms	
Drive Motor "A" Phase U-V-W Circuit/Open	P0C05	Drive Motor "A" Missing Motor Current	Two Non-Peak Phase Sensors are BOTH	> ABS (9 A)	Inverter State	RUN	2 Task1 Loops = 4.2 ms	One Trip
			AND THEN		Inverter Voltage	> 35 V	PLUS	
		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.	Phase Axis Current	< ABS (9 A)	Rotor Position	-30 deg < Phase Axis < +30 deg	X: 201 cts Y: N/A R: 0.083 - 0.17 ms T: 16.7 - 33.4 ms = 20.9 - 37.6 ms TOTAL	
					Peak Phase Current	>= 23 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	< -700 A	Wakeup Signal	On	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips
					PWMOutputEnable	FALSE		
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	> 700 A	Wakeup Signal	On	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips
					PWMOutputEnable	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	On	X: 100 cts Y: N/A R: 2.08ms T: 208ms	Two Trips
					Power Stage	OPEN		
					P0BE7/P0BE8	NOT ACTIVE		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Drive Motor "A" Phase V Current Sensor Circuit Low	P0BEB	Circuit Low monitor to detect the failure of V-phase current sensor circuit below valid range	V Phase current sensor output at highside	< -700 A	Wakeup Signal	On	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips
					PWMOutputEnable	FALSE		
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	> 700 A	Wakeup Signal	On	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips
					PWMOutputEnable	FALSE		
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	On	X: 100 cts Y: N/A R: 2.08ms T: 208ms	Two Trips
					Power Stage	OPEN		
					P0BEB/P0BEC	NOT ACTIVE		
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	< -700 A	Wakeup Signal	On	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips
					PWMOutputEnable	FALSE		
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	> 700 A	Wakeup Signal	On	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips
					PWMOutputEnable	FALSE		
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	On	X: 100 cts Y: N/A R: 2.08ms T: 208ms	Two Trips
					Power Stage	OPEN		
					P0BEF/P0BF0	NOT ACTIVE		
MCP A IGBT Diagnostics								
Drive Motor "A" Inverter Performance	P0A78	Detects IGBT Desaturation Faults	Phase A, B, or C High or Low Side Devices	OVERDRIVEN (Status Fault Bit)	Wakeup Signal	On	X: 1 ct Y: N/A R: 2.08ms T: 2.08ms	One Trip
Drive Motor "A" Inverter Power Supply Circuit/Open	P0C0B	Detects IGBT Bias Faults	Phase A, B, or C Power Supply	FAILED (Status Fault Bit)	Inverter State	Initialization Complete	X: 1 ct Y: N/A R: 2.08ms T: 2.08ms	One Trip
					Run/Crank Voltage OR	> 9.5 Volts OR < 18 Volts		
MCP A High Voltage (HV) Diagnostics:								
Drive Motor "A" Hybrid Battery System Voltage High	P1AEE	To detect over voltage and to protect TPIM Vdc Circuit	HV Sensor Voltage	> 475V	WakeUp Signal	On	X: 5 cts Y: N/A R: 0.083 - 0.17 ms T: 0.42 - 0.83 ms	One Trip

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 Low Voltage	P1AE8	Circuit Low monitor to detect the failure of HV output voltage sensor circuit below valid range	HV Sensor Voltage	<0V	Inverter State	Initialization Complete	X: 70 cts Y: 100 cts R: 2.08ms T: 146ms	Two Trips
Drive Motor "A" Control Module Hybrid Battery Voltage Sense Circuit High Voltage	P1AE9	Circuit High monitor to detect the failure of HV output voltage sensor circuit above valid range	HV Sensor Voltage	>500 V	Inverter State	Initialization Complete	X: 50 cts Y: 100 cts R: 2.08ms T: 104ms	Two Trips
Drive Motor "A" Control Module Hybrid Battery System Voltage	P1AEC	To check correlation of HV_MCP with HV_Midpack and HV_Battery Voltages.	ABS(MCP HV voltage - HV Battery voltage) AND ABS(MCP HV voltage - MidPack voltage)	>= 34 V >= 90 V	WakeUp Signal	On	X: 18 cts Y: 30 cts R: 10.4ms T: 187ms	One Trip
Drive Motor "A" HV Interlock (HVIL) Break Detected	P1B05	To detect interlock circuit open or shorted.	Raw HVIL Voltage	< 1 V OR > 3 V	WakeUp Signal	On	250ms debounce time+ X: 10 cts Y: 14 cts R: 10.4ms T: 104ms= 354 ms total	Special Type C
					HV CAN Msg Rx	TRUE		
					BPCM Sourcing MCP HVIL Status	TRUE		
Drive Motor "A" Control Module Hybrid Battery Voltage System Isolation Fault	P1AF0	Isolation Lost between Battery Pack and Chassis	Isolation Ratio (MidPack Voltage / HV Battery Voltage)	< 0.27 OR >1.80	No HV Clamp Fault or MidPack Sensor OOR Faults: P1AEE, P1AF4, and P1AF5	NOT ACTIVE	X: 450 cts Y: 500 cts R: 10.4ms T: 4689ms	Special Type C
					HV Sensor Voltage	> 50V		
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor Circuit Low	P1AF4	Circuit Low monitor to detect the failure of HV MidPack voltage sensor circuit below valid range	MidPack Voltage	<0V	Inverter State	Initialization Complete	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor Circuit High	P1AF5	Circuit High monitor to detect the failure of HV MidPack voltage sensor circuit above valid range	MidPack Voltage	>500 V	Inverter State	Initialization Complete	X: 50 cts Y: 100 cts R: 10.4ms T: 521ms	Two Trips
Motor A Temperature Sensor								
Drive Motor "A" Control Module Temperature Sensor Performance	P0A2B	Motor A Temperature Sensor In-Range Rationality Check	ABS(Motor Temp - PIM Temp Avg)	> 28 deg C	Ignition Off Time	>=360 min	8336ms start delay	Two Trips
					PIM Temp Average	>=-40 deg C		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Motor Temp	>=-40 deg C	plus 350 cts R: 10.4ms T: 2604ms =10.9 sec total	
					No PIM or Motor Temp OOR Faults: P0AEF, P0AF0, P0BD3, P0BD4, P0BDD, P0BDE, P0A2C and P0A2D.	NOT ACTIVE		
Drive Motor "A" Control Module Temperature Sensor Circuit Out of Range High	P0A2D	To detect temperature sensor Out of Range high (voltage).	Motor Temperature	< -40 deg C (near 5V)	Wakeup Signal	On	X: 900 cts Y:1800cts R: 10.4ms T: 9378ms	Two Trips
					When malfunction present at start of trip: Cumulative Motor Warmup Time	>=1.5min		
					above Motor Warmup Torque Threshold	>=ABS(20 Nm)		
Drive Motor "A" Control Module Temperature Sensor Circuit Out of Range Low	P0A2C	To detect temperature sensor Out of Range low (voltage).	Motor Temperature	> 230 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips
Drive Motor "A" Over Temperature	P0A2F	To detect a sustained motor overtemperature condition	Motor Temperature initially exceeds fault threshold, and does not decrease below reset threshold	> 200 deg C initial fault >135 deg C reset	Motor Temperature	IN RANGE	X: 300 cts Y: 450 cts R: 10.4ms T: 3125ms	Two Trips
					No Perf Fault; P0A2B	NOT ACTIVE		
SPI / SCI Bus Timeout								
Drive Motor "A" Control Module Lost Communication With SPI Bus	P1AFC	To detect loss of communication on the SPI bus with the HCP module	SPI Receive Timeout flag	TRUE	Inverter State	Run	X: 241 cts Y: N/A R:10.42ms T: 2510ms	One Trip
					Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts		
Drive Motor "A" Control Module Lost Communication With SCI Bus	P1AFD	To detect loss of communication on the SCI bus with Motor "B" Control Module SCI Diag Timeout	SCI_Rx_Timeout	TRUE	Wakeup Signal	On	X: 200 cts Y: 300 cts R: 10.4ms T: 2083ms	Two Trips
Motor Control Processor Voltage Diagnostics								
Sensor Reference Voltage "A" Circuit Low	P0642	Detects Sensor Voltage (5V) below an acceptable threshold.	Scaled 5V Supply Voltage	< 4.80V	Wakeup Signal	On	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	One Trip
					Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Sensor Reference Voltage "A" Circuit High	P0643	Detects Sensor Voltage (5V) above an acceptable threshold.	Scaled 5V Supply Voltage	> 5.20V	Wakeup Signal	On	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	One Trip
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: 35 cts Y: 150 cts R: 10.4ms T: 365ms	Two Trips
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: 100 cts Y: 150 cts R: 10.4ms T: 1042ms	Two Trips
Control Module Power Supply "A" Circuit Low	P1ADE	Detects Control Module Power Supply (12V) below an acceptable threshold.	Scaled 12V Supply Voltage	< 7.7V	Wakeup Signal	On	X: 35 cts Y: 50 cts R: 10.4ms T: 365ms	Special Type C
MCP A Controller Faults								
Drive Motor "A" Control Module Internal Performance	P0A1B	ALU calculation error, Register Overflow, or Watchdog Timer Fault	ALU HWIO Fault OR Stack Address Overrun OR EEPROM not completely written at Powerdown (Watchdog timer fault)	TRUE TRUE	For all: Wakeup Signal For Watchdog Fault Only: No power-on reset, stack overflow, or low 12V interrupt conditions	On	X: 1 ct Y: N/A R: 10.4ms T: 10.4ms	One Trip
Drive Motor "A" Control Module Random Access Memory (RAM)	P1A50	To detect an error in the MCP A RAM write area.	RAM check value	Outside RAM Address Range	Wakeup Signal	On	X: 1 ct Y: N/A R: 10.4ms T: 10.4ms	One Trip
Drive Motor "A" Control Module Read Only Memory (ROM)	P1A51	To detect an error in the MCP A ROM using a checksum calculation	FlashCellError	TRUE	Wakeup Signal	On	X: 1 ct Y: N/A R: 10.4ms T: 10.4ms	One Trip
Drive Motor "A" Control Module EEPROM Error	P1ADC	Detects mismatch between Flash and EEPROM Power Off Levels	EEpromCellStatus	TRUE	Wakeup Signal	On	X: 1 ct Y: N/A R: 10.4ms T: 10.4ms	One Trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Drive Motor "A" Control Module Programmable Logic Device Not Programmed	P1AFA	Detects if PLD was not successfully programmed during initialization	PLDFault	TRUE	Wakeup Signal	On	X: 1 ct Y: N/A R: 10.4ms T: 10.4ms	One Trip
MCP A Not Programmed								
Drive Motor "A" Control Module Not Programmed	P1A4F	Drive Motor "A" Control Module Programmed with Test Code, or Motor B calibration (via Cal ID)	Calibration contains Test code identifier or Motor B Identifier	TRUE		Always	X: 1 ct Y: N/A R: 10.4ms T: 10.4ms	One Trip
Motor A Inverter Temperature Sensors								
Drive Motor Inverter Temperature Sensor A Circuit Range/Performance	P0AEE	Inverter A Temperature Sensor #1 In-Range Rationality Check	ABS(PIM Temp 0 - PIM Temp Avg)	>15 deg C	Ignition Off Time PIM Temp Average Motor Temp No PIM or Motor Temp OOR Faults; P0AEF, P0AF0, P0BD3, P0BD4, P0BDD, P0BDE, P0A2C and P0A2D.	>=360 min >=-40 deg C >=-40 deg C NOT ACTIVE	8336ms start delay plus X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms =10.9 sec total	Two Trips
Drive Motor Inverter Temperature Sensor A Circuit High	P0AF0	Sensor #1 Out of Range high (voltage).	PIM Temp 0 Temperature	< -40 deg C (near 5V)	Wakeup Signal When malfunction present at start of trip: Cumulative Inverter Warmup Time above Inverter Warmup Torque Threshold	ON >=1.5min >=ABS(20 Nm)	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips
Drive Motor Inverter Temperature Sensor A Circuit Low	P0AEF	To detect Inverter A Temperature Sensor #1 Out of Range low (voltage).	PIM Temp 0 Temperature	> 125 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips
Drive Motor Inverter Temperature Sensor C Circuit Range/Performance	P0BD2	Inverter A Temperature Sensor #2 In-Range Rationality Check	ABS(PIM Temp 1 - PIM Temp Avg)	>15 deg C	Ignition Off Time PIM Temp Average Motor Temp No PIM or Motor Temp OOR Faults; P0AEF, P0AF0, P0BD3, P0BD4, P0BDD, P0BDE, P0A2C and P0A2D.	>=360 min >=-40 deg C >=-40 deg C NOT ACTIVE	8336ms start delay plus 350 cts R: 10.4ms T: 2604ms =10.9 sec total	Two Trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Drive Motor Inverter Temperature Sensor C Circuit High	P0BD4	Sensor #2 Out of Range high (voltage).	PIM Temp 1 Temperature	< -40 deg C (near 5V)	Wakeup Signal	ON	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips
					When malfunction present at start of trip: Cumulative Inverter Warmup Time above Inverter Warmup Torque Threshold	>=1.5min >=ABS(20 Nm)		
Drive Motor Inverter Temperature Sensor C Circuit Low	P0BD3	To detect Inverter A Temperature Sensor #2 Out of Range low (voltage).	PIM Temp 1 Temperature	> 125 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips
Drive Motor Inverter Temperature Sensor E Circuit Range/Performance	P0BDC	Inverter A Temperature Sensor #3 In-Range Rationality Check	ABS(PIM Temp 2 - PIM Temp Avg)	>15 deg C	Ignition Off Time	>=360 min	8336ms start delay plus X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms =10.9 sec total	Two Trips
					PIM Temp Average	>=-40 deg C		
					Motor Temp	>=-40 deg C		
					No PIM or Motor Temp OOR Faults; P0AEF, P0AF0, P0BD3, P0BD4, P0BDD, P0BDE, P0A2C and P0A2D.	NOT ACTIVE		
Drive Motor Inverter Temperature Sensor E Circuit High	P0BDE	To detect Inverter A Temperature Sensor #3 Out of Range high (voltage).	PIM Temp 2 Temperature	< -40 deg C (near 5V)	Wakeup Signal	ON	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips
					When malfunction present at start of trip: Cumulative Inverter Warmup Time above Inverter Warmup Torque Threshold	>=1.5min >=ABS(20 Nm)		
Drive Motor Inverter Temperature Sensor E Circuit Low	P0BDD	To detect Inverter A Temperature Sensor #3 Out of Range low (voltage).	PIM Temp 2 Temperature	> 125 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips
Drive Motor "A" Inverter Phase U Over Temperature	P0C11	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp 0 Temperature exceeds initial fault threshold, and does not decrease below reset threshold	> 88 deg C initial fault >85 deg C reset	PIM Temperature	IN RANGE	X: 500 cts Y: 650 cts R: 10.4ms T: 5208ms	One Trip
					No Perf Fault; P0AEE	NOT ACTIVE		

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 2 Temperature exceeds initial fault threshold, and does not decrease below reset threshold	> 88 deg C initial fault >85 deg C reset	PIM Temperature	IN RANGE	X: 500 cts Y: 650 cts R: 10.4ms T: 5208ms	One Trip
					No Perf Fault; P0BDC	NOT ACTIVE		
Drive Motor "A" Inverter Phase W Over Temperature	P0C13	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp 1 Temperature exceeds initial fault threshold, and does not decrease below reset threshold	> 88 deg C initial fault >85 deg C reset	PIM Temperature	IN RANGE	X: 500 cts Y: 650 cts R: 10.4ms T: 5208ms	One Trip
					No Perf Fault; P0BD2	NOT ACTIVE		
Motor A Resolver Sensors - Discrete								
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	Resolver Initialization Delay Run/Crank Voltage OR Powertrain Relay Voltage	500ms > 9.5 Volts OR < 18 Volts	X: 420 cts Y: 500 cts R: 0.083 - 0.17 ms T: 35.0 - 70.0 ms	One Trip
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	Resolver Initialization Delay	500ms	X: 420 cts Y: 500 cts R: 0.083 - 0.17 ms T: 35.0 - 70.0 ms	One Trip
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	Resolver Initialization Delay	500ms	X: 420 cts Y: 500 cts R: 0.083 - 0.17 ms T: 35.0 - 70.0 ms	One Trip
Drive Motor "A" Position Sensor Circuit Overspeed	P1B0D	To detect when Motor A has exceeded operational maximum speed	ABS(Motor speed) initially AND then ABS(Motor Speed)	>8500 rpm >7500 rpm	Wakeup Signal	On	X: 30 cts Y: 37 cts R: 10.4ms T: 312ms	One Trip
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)	>50 rpm	Key Off	TRUE	832ms	Two Trips
			OR: Filtered DC Voltage	< 192 V	Wakeup Signal	ON	start delay	
			OR: ALL Phase Curr Max-Min Delta	<15 A	ABS(Motor Speed)	< 20 rpm	plus	
			For Time Period	> 20% of 0.3s learn time (>60ms)	followed by Start Delay	400 Task 1 Counts (400 * 2.08 ms) =832 ms	300 ms learn time = 1132 ms total	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			OR: Offset Learn Completes AND ABS(Offset Correction Angle)	>30 deg				
Motor A Resolver Sensors - Circuit								
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: 521ms	One Trip
Drive Motor "A" Position Sensor Circuit "A" High	P0C53	To detect Resolver Circuit S1/3 Out of Range High	Resolver S13 Circuit Reference Voltage	> 3.0 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	One Trip
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: 521ms	One Trip
Drive Motor "A" Position Sensor Circuit "B" High	P0C5D	To detect Resolver Circuit S2/4 Out of Range High	Resolver S24 Circuit Reference Voltage	> 3.0 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	One Trip
Motor A Crank Pulse Faults								
Drive Motor "A" Control Module Crankshaft Position Sensor Circuit	P1AC6	Detects Lack of Response from 58X Crank Sensor	Crank Synchronization	NO ACTIVITY	Wakeup Signal	On	X: 200 cts Y: 300 cts R: 10.4ms T: 2083ms	Two Trips
Drive Motor "A" Control Module Crankshaft Position Sensor Performance	P1AC7	Detects Invalid 58X Crank Sensor Signal	CPC Signal	NOT VALID	Engine Movement Detected OR Edges Seen	> 5rpm > 0	X: 700 cts Y: 800 cts R: 10.4ms T: 7294ms	Two Trips
Torque Security Faults								
Drive Motor A Torque Delivered Performance	P0C19	Fail Case 1: Test of three phase current correlation	The sum of three phase currents is higher than current threshold during more than threshold time	Current threshold: 75 A Threshold time: 100ms	Ignition switch	in crank or run	48 fail counts out of 60 sample counts Executes in a 2.08ms loop Detects in 100ms	One Trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		Fail Case 2: Static Variable test	Verify the calculated check sum (CRC) is not equal to previous saved check sum (CRC)		Ignition switch	in crank or run	2.08 ms loop	
		Fail Case 3: Monitor torque command by checking the SPI communication status	SPI rolling count fails to update more than threshold time	Threshold time: 90msec	Ignition switch	in crank or run	45 fail counts out of 50 sample counts Detects in 90ms 2.08 ms loop	
		Fail Case 4: Check the DC current flow direction with respect to torque command/motor speed	DC current fails to show correct sign and magnitude more than current threshold during more than threshold time	Current threshold: 10 A to 80 A (function of motor speed.); Time threshold: 200 ms	MCP power stage	Active	86 fail counts out of 96 sample counts Detects in 200ms 2.08 ms loop	
		Fail Case 5: Check the secured motor torque achieved error with respect to torque command	The absolute error between calculated motor torque achieved and motor torque command is higher than torque threshold during more than threshold time	Torque threshold: 86.18 Nm Time threshold: 200 ms	MCP power stage	Active	86 fail counts out of 96 sample counts Detects in 200ms 2.08 ms loop	One Trip
		Fail Case 6: Check the Task1 reported motor torque achieved vs. torque command	The absolute error between Task1 reported motor torque achieved and motor torque command is higher than torque threshold during more than threshold time	Torque threshold: 86.18 Nm Time threshold: 200 ms	Ignition switch	in crank or run	86 fail counts out of 96 sample counts Detects in 200ms 2.08 ms loop	
		Fail Case 7: Check the secured calculated three phase short motor torque vs. the reported task1 motor torque	The absolute error between secured calculated three phase short torque vs. Task1 reported motor torque is higher than torque threshold during more than threshold time	Torque threshold: 52 Nm Time threshold: 200 ms	MCP power stage	Motor 3-phase short	96 fail counts out of 120 sample counts Detects in 200ms 2.08 ms loop	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		Fail Case 8: Check the secured calculated three phase open motor torque vs. the reported task1 motor torque	The absolute error between secured calculated three phase open torque vs. Task1 reported motor torque is higher than torque threshold during more than threshold time	Torque threshold: 52 Nm Time threshold: 200 ms	MCP power stage	Motor 3-phase open	96 fail counts out of 120 sample counts Detects in 200ms 2.08 ms loop	One Trip
Drive Motor A Control Module Programmable Logic Device Security Code	P1AFB	Fail Case 1: Detect the validity of the Seeds sent by PLD	The number of identical seed in consecutive loops sent from PLD is higher than threshold	191 counts	Ignition switch	in crank or run	191 fail counts out of 250 sample counts 0.083 ms to 0.5 ms (function of motor speed.);	One Trip
		Fail Case 2: Detect the validity of response by PLD when MCP sends repeated bad keys to PLD	The number of bad response from PLD when MCP is sending bad key is higher than threshold	191 counts	Ignition switch	in crank or run	191 fail counts out of 5000 sample counts 0.083 ms to 0.5 ms (function of motor speed.);	
Drive Motor "A" Control Module Shutdown Performance	P1AF8	Detect the duration MCP used to conduct shut down path verification after key-on initialization.	The number of Task 2 loops used in shut down path verification is higher than threshold	40 counts	Initialization	ON	40 fail counts out of 50 sample counts 10 ms loop	One Trip
Communication Diagnostics								
Lost Communication With Battery Pack Control Module	U1875	Detects that CAN serial data communication has been lost with the BPCM on Bus A	Missed BPCM Messages		Ignition switch	Run	X: 12 cts Y: 12 cts R: 10.4ms plus 1 sec cntdwn timer before each cnt incr= T: 12.17 sec total	Two Trips
Lost Communication With ECM/PCM	U1876	Detects that CAN serial data communication has been lost with the ECM	Missed ECM Messages		Ignition switch	Run	X: 12 cts Y: 12 cts R: 10.4ms plus 1 sec cntdwn timer before each cnt incr= T: 12.17 sec total	Two Trips

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

GMT9x1/926 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

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	> 75 A	Main Relay	Closed	X: 8 cts Y: 10 cts R: 0.083 - 0.5 ms T: 0.66 - 3.50 ms	One Trip
					Wakeup Signal	On		
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	> 600 A	Wakeup Signal	On	X: 2 cts Y: 10 cts R: 2.08 ms T: 2.08 ms	One Trip
		Fail Case 2: To detect slow, intermittent 3 Phase over current and to protect IGBT.					X: 5 cts Y: 50 cts R: 2.08 ms T: 8.32 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.	Two Non-Peak Phase Sensors are BOTH	> ABS (9 A)	Inverter State	RUN	2 Task1 Loops = 4.2 ms	One Trip
			AND THEN		Inverter Voltage	> 35 V	PLUS	
			Phase Axis Current	< ABS (9 A)	Rotor Position	-30 deg < Phase Axis < +30 deg	X: 201 cts Y: N/A R: 0.083 - 0.5 ms T: 16.7 - 101 ms =	
					Peak Phase Current	>= 23 A	TOTAL	
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	< -700 A	Wakeup Signal	On	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips
					PWMOutputEnable	FALSE		
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	> 700 A	Wakeup Signal	On	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips
					PWMOutputEnable	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	On	X: 100 cts Y: N/A R: 2.08ms T: 208ms	Two Trips
					Power Stage	OPEN		
					P0BF3/P0BF4	NOT ACTIVE		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Drive Motor "B" Phase V Current Sensor Circuit Low	P0BF7	Circuit Low monitor to detect the failure of V-phase current sensor circuit below valid range	V Phase current sensor output at highside	< -700 A	Wakeup Signal	On	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips
					PWMOutputEnable	FALSE		
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	> 700 A	Wakeup Signal	On	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips
					PWMOutputEnable	FALSE		
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	On	X: 100 cts Y: N/A R: 2.08ms T: 208ms	Two Trips
					Power Stage	OPEN		
					P0BF7/P0BF8	NOT ACTIVE		
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	< -700 A	Wakeup Signal	On	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips
					PWMOutputEnable	FALSE		
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	> 700 A	Wakeup Signal	On	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips
					PWMOutputEnable	FALSE		
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	On	X: 100 cts Y: N/A R: 2.08ms T: 208ms	Two Trips
					Power Stage	OPEN		
					P0BFB/P0BFC	NOT ACTIVE		
MCPB IGBT Diagnostics								
Drive Motor "B" Inverter Performance	P0A79	Detects IGBT Desaturation Faults	Phase A, B, or C High or Low Side Devices	OVERDRIVEN (Status Fault Bit)	Wakeup Signal	On	X: 1 ct Y: N/A R: 2.08ms T: 2.08ms	One Trip
Drive Motor "B" Inverter Power Supply Circuit/Open	P0C0E	Detects IGBT Bias Faults	Phase A, B , or C Power Supply	FAILED (Status Fault Bit)	Inverter State	Initialization Complete	X: 1 ct Y: N/A R: 2.08ms T: 2.08ms	One Trip
					Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
MCP B High Voltage (HV) Diagnostics:								
Drive Motor "B" Hybrid Battery System Voltage High	P1AEF	To detect over voltage and to protect TPIM Vdc Circuit	HV Sensor Voltage	> 475V	WakeUp Signal	On	X: 5 cts Y: N/A R: 0.083 - 0.5 ms T: 0.42 - 2.50 ms	One Trip
Drive Motor "B" Control Module Hybrid Battery Voltage Sense Circuit Low Voltage	P1AEA	Circuit Low monitor to detect the failure of HV output voltage sensor circuit below valid range	HV Sensor Voltage	<0V	Inverter State	Initialization Complete	X: 70 cts Y: 100 cts R: 2.08ms T: 146ms	Two Trips
Drive Motor "B" Control Module Hybrid Battery Voltage Sense Circuit High Voltage	P1AEB	Circuit High monitor to detect the failure of HV output voltage sensor circuit above valid range	HV Sensor Voltage	>500 V	Inverter State	Initialization Complete	X: 50 cts Y: 100 cts R: 2.08ms T: 104ms	Two Trips
Drive Motor "B" Control Module Hybrid Battery System Voltage	P1AED	To check correlation of HV_MCP with HV_Midpack and HV_Battery Voltages.	ABS(MCP HV voltage - HV Battery voltage) AND ABS(MCP HV voltage - MidPack voltage)	>= 34 V >= 90 V	WakeUp Signal	On	X: 18 cts Y: 30 cts R: 10.4ms T: 187ms	One Trip
Drive Motor "B" HV Interlock (HVIL) Break Detected	P1B06	To detect interlock circuit open or shorted.	Raw HVIL Voltage	< 1 V OR > 3 V	WakeUp Signal	On	250ms debounce time+ X: 10 cts Y: 14 cts R: 10.4ms T: 104ms= 354 ms total	Special Type C
					HV CAN Msg Rx	TRUE		
					BPCM Sourcing MCP HVIL Status	TRUE		
Drive Motor "B" Control Module Hybrid Battery Voltage System Isolation Fault	P1AF2	Isolation Lost between Battery Pack and Chassis	Isolation Ratio (MidPack Voltage / HV Battery Voltage)	< 0.27 OR >1.80	No HV Clamp Fault or MidPack Sensor OOR Faults; P1AEF, P1AF6, and P1AF7	NOT ACTIVE	X: 450 cts Y: 500 cts R: 10.4ms T: 4689ms	Special Type C
					HV Sensor Voltage	> 50V		
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensor Circuit Low	P1AF6	Circuit Low monitor to detect the failure of HV MidPack voltage sensor circuit below valid range	MidPack Voltage	<0V	Inverter State	Initialization Complete	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensor Circuit High	P1AF7	Circuit High monitor to detect the failure of HV MidPack voltage sensor circuit above valid range	MidPack Voltage	>500 V	Inverter State	Initialization Complete	X: 50 cts Y: 100 cts R: 10.4ms T: 521ms	Two Trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Motor B Temperature Sensor								
Drive Motor "B" Control Module Temperature Sensor Performance	P0A31	Motor B Temperature Sensor In-Range Rationality Check	ABS(Motor Temp - PIM Temp Avg)	> 28deg C	Ignition Off Time	>=360 min	8336ms start delay plus X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms =10.9 sec total	Two Trips
					PIM Temp Average	>=-40 deg C		
					Motor Temp	>=-40 deg C		
					No PIM or Motor Temp OOR Faults; P0AF4, P0AF5, P0BD8, P0BD9, P0BE2, P0BE3, P0A32 and P0A33.	NOT ACTIVE		
Drive Motor "B" Control Module Temperature Sensor Circuit Out of Range High	P0A33	To detect temperature sensor Out of Range high (voltage).	Motor Temperature	< -40 deg C (near 5V)	Wakeup Signal	On	X: 900 cts Y:1800cts R: 10.4ms T: 9378ms	Two Trips
					When malfunction present at start of trip: Cumulative Motor Warmup Time above Motor Warmup Torque Threshold	>=1.5min >=ABS(20 Nm)		
Drive Motor "B" Control Module Temperature Sensor Circuit Out of Range Low	P0A32	To detect temperature sensor Out of Range low (voltage).	Motor Temperature	> 230 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips
Drive Motor "B" Over Temperature	P0A35	To detect a sustained motor overtemperature condition	Motor Temperature initially exceeds fault threshold, and does not decrease below reset threshold	> 200 deg C initial fault >135 deg C reset	Motor Temperature	IN RANGE	X: 300 cts Y: 450 cts R: 10.4ms T: 3125ms	Two Trips
					No Perf Fault; P0A31	NOT ACTIVE		
SPI Bus Timeout								
Drive Motor "B" Control Module Lost Communication With SPI Bus	P1B02	To detect loss of communication on the SPI bus with the HCP module	SPI Receive Timeout flag	TRUE	Inverter State Run/Crank Voltage OR Powertrain Relay Voltage	Run > 9.5 Volts OR < 18 Volts	X: 241 cts Y: N/A R:10.42ms T: 2510ms	One Trip
Motor Control Processor Voltage Diagnostics								
Sensor Reference Voltage "B" Circuit Low	P0652	Detects Sensor Voltage (5V) below an acceptable threshold.	Scaled 5V Supply Voltage	< 4.80V	Wakeup Signal Run/Crank Voltage OR Powertrain Relay Voltage	On > 9.5 Volts OR < 18 Volts	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	One Trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Sensor Reference Voltage "B" Circuit High	P0653	Detects Sensor Voltage (5V) above an acceptable threshold.	Scaled 5V Supply Voltage	> 5.20V	Wakeup Signal	On	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	One Trip
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: 35 cts Y: 150 cts R: 10.4ms T: 365ms	Two Trips
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: 100 cts Y: 150 cts R: 10.4ms T: 1042ms	Two Trips
Control Module Power Supply "B" Circuit Low	P1AE0	Detects Control Module Power Supply (12V) below an acceptable threshold.	Scaled 12V Supply Voltage	< 7.7V	Wakeup Signal	On	X: 35 cts Y: 50 cts R: 10.4ms T: 365ms	Special Type C
MCP B Controller Faults								
Drive Motor "A" Control Module Internal Performance	P0A1C	Overflow, or Watchdog Timer Fault	ALU HWIO Fault OR Stack Address Overrun OR EEPROM not completely written at Powerdown (Watchdog timer fault)	TRUE TRUE	For all: Wakeup Signal For Watchdog Fault Only: No power-on reset, stack overflow, or low 12V interrupt conditions	On	X: 1 ct Y: N/A R: 10.4ms T: 10.4ms	One Trip
Drive Motor "B" Control Module Random Access Memory (RAM)	P1A53	To detect an error in the MCP B RAM write area.	RAM check value	Outside RAM Address Range	Wakeup Signal	On	X: 1 ct Y: N/A R: 10.4ms T: 10.4ms	One Trip
Drive Motor "B" Control Module Read Only Memory (ROM)	P1A54	To detect an error in the MCP B ROM using a checksum calculation	FlashCellError	TRUE	Wakeup Signal	On	X: 1 ct Y: N/A R: 10.4ms T: 10.4ms	One Trip
Drive Motor "B" Control Module EEPROM Error	P1ADD	Detects mismatch between Flash and EEPROM Power Off Levels	EEpromCellStatus	TRUE	Wakeup Signal	On	X: 1 ct Y: N/A R: 10.4ms T: 10.4ms	One Trip
MCP B Not Programmed								
Drive Motor "B" Control Module Not Programmed	P1A52	Drive Motor "B" Control Module Programmed with Test Code, or Motor A calibration (via Cal ID)	Calibration contains Test code identifier or Motor A Identifier	TRUE		Always	X: 1 ct Y: N/A R: 10.4ms T: 10.4ms	One Trip

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Motor B Inverter Temperature Sensors								
Drive Motor Inverter Temperature Sensor B Circuit Range/Performance	P0AF3	Inverter B Temperature Sensor #1 In-Range Rationality Check	ABS(PIM Temp 0 - PIM Temp Avg)	>15 deg C	Ignition Off Time	>=360 min	8336ms start delay plus X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms =10.9 sec total	Two Trips
					PIM Temp Average	>=-40 deg C		
					Motor Temp	>=-40 deg C		
					No PIM or Motor Temp OOR Faults; P0AF4, P0AF5, P0BD8, P0BD9, P0BE2, P0BE3, P0A32 and P0A33.	NOT ACTIVE		
Drive Motor Inverter Temperature Sensor B Circuit High	P0AF5	To detect Inverter B Temperature Sensor #1 Out of Range high (voltage).	PIM Temp 0 Temperature	< -40 deg C (near 5V)	Wakeup Signal	ON	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips
					When malfunction present at start of trip: Cumulative Inverter Warmup Time above Inverter Warmup Torque Threshold	>=1.5min >=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 0 Temperature	> 125 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips
Drive Motor Inverter Temperature Sensor D Circuit Range/Performance	P0BD7	Inverter B Temperature Sensor #2 In-Range Rationality Check	ABS(PIM Temp 1 - PIM Temp Avg)	>15 deg C	Ignition Off Time	>=360 min	8336ms start delay plus X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms =10.9 sec total	Two Trips
					PIM Temp Average	>=-40 deg C		
					Motor Temp	>=-40 deg C		
					No PIM or Motor Temp OOR Faults; P0AF4, P0AF5. P0BD8, P0BD9, P0BE2, P0BD3, P0A32 or P0A33.	NOT ACTIVE		
Drive Motor Inverter Temperature Sensor D Circuit High	P0BD9	Sensor #2 Out of Range high (voltage).	PIM Temp 1 Temperature	< -40 deg C (near 5V)	Wakeup Signal	ON		Two Trips
					When malfunction present at start of trip: Cumulative Inverter Warmup Time	>=1.5min		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					above Inverter Warmup Torque Threshold	>=ABS(20 Nm)	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	
Drive Motor Inverter Temperature Sensor D Circuit Low	P0BD8	To detect Inverter B Temperature Sensor #2 Out of Range low (voltage).	PIM Temp 1 Temperature	> 125 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips
Drive Motor Inverter Temperature Sensor F Circuit Range/Performance	P0BE1	Inverter B Temperature Sensor #3 In-Range Rationality Check	ABS(PIM Temp 2 - PIM Temp Avg)	>15 deg C	Ignition Off Time	>=360 min	8336ms start delay plus X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms =10.9 sec total	Two Trips
					PIM Temp Average	>=-40 deg C		
					Motor Temp	>=-40 deg C		
					No PIM or Motor Temp OOR Faults; P0AF4, P0AF5, P0BD8, P0BD9, P0BE2, P0BE3, P0A32 and P0A33.	NOT ACTIVE		
Drive Motor Inverter Temperature Sensor F Circuit High	P0BE3	To detect Inverter B Temperature Sensor #3 Out of Range high (voltage).	PIM Temp 2 Temperature	< -40 deg C (near 5V)	Wakeup Signal	ON	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips
					When malfunction present at start of trip: Cumulative Inverter Warmup Time above Inverter Warmup Torque Threshold	>=1.5min >=ABS(20 Nm)		
Drive Motor Inverter Temperature Sensor F Circuit Low	P0BE2	To detect Inverter B Temperature Sensor #3 Out of Range low (voltage).	PIM Temp 2 Temperature	> 125 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips
Drive Motor "B" Inverter Phase U Over Temperature	P0C14	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp 2 Temperature exceeds initial fault threshold, and does not decrease below reset threshold	> 88 deg C initial fault >85 deg C reset	PIM Temperature	IN RANGE	X: 500 cts Y: 650 cts R: 10.4ms T: 5208ms	One Trip
					No Perf Fault; P0BE1	NOT ACTIVE		
Drive Motor "B" Inverter Phase V Over Temperature	P0C15	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp 0 Temperature exceeds initial fault threshold, and does not decrease below reset threshold	> 88 deg C initial fault >85 deg C reset	PIM Temperature	IN RANGE	X: 500 cts Y: 650 cts R: 10.4ms T: 5208ms	One Trip
					No Perf Fault; P0AF3	NOT ACTIVE		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Drive Motor "B" Inverter Phase W Over Temperature	P0C16	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp 1 Temperature exceeds initial fault threshold, and does not decrease below reset threshold	> 88 deg C initial fault >85 deg C reset	PIM Temperature	IN RANGE	X: 500 cts Y: 650 cts R: 10.4ms T: 5208ms	One Trip
					No Perf Fault; P0BD7	NOT ACTIVE		
Motor B Resolver Sensors - Discrete								
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	Resolver Initialization Delay Run/Crank Voltage OR Powertrain Relay Voltage	500ms > 9.5 Volts OR < 18 Volts	X: 140 cts Y: 165 cts R: 0.083 - 0.5 ms T: 11.62 - 70.0 ms	One Trip
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	Resolver Initialization Delay	500ms	X: 140 cts Y: 165 cts R: 0.083 - 0.5 ms T: 11.62 - 70.0 ms	One Trip
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	> 5 deg	Resolver Initialization Delay	500ms	X: 140 cts Y: 165 cts R: 0.083 - 0.5 ms T: 11.62 - 70.0 ms	One Trip
Drive Motor "B" Position Sensor Circuit Overspeed	P1B0E	To detect when Motor B has exceeded operational maximum speed	ABS(Motor speed) initially AND then ABS(Motor Speed)	>10000 rpm >9000 rpm	Wakeup Signal	On	X: 9 cts Y: 12 cts R: 10.4ms T: 93.6 ms	One Trip
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)	>50 rpm	Key Off	TRUE	832ms	Two Trips
			OR: Filtered DC Voltage	< 192 V	Wakeup Signal	ON	start delay	
			OR: ALL Phase Curr Max-Min Delta	<15 A	ABS(Motor Speed)	< 20 rpm	plus	
			For Time Period	> 20% of 0.3s learn time (>60ms)	followed by Start Delay	400 Task 1 Counts (400 * 2.08 ms) =832 ms	300 ms learn time = 1132 ms total	
			OR: Offset Learn Completes AND ABS(Offset Correction Angle)	> 30 deg	Valid Stored Offset	FALSE		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Motor B Resolver Sensors - Circuit								
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: 521ms	One Trip
Drive Motor "A" Position Sensor Circuit "A" High	P0C58	To detect Resolver Circuit S1/3 Out of Range High	Resolver S13 Circuit Reference Voltage	> 3.0 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	One Trip
Drive Motor "A" 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 T: 521ms	One Trip
Drive Motor "A" Position Sensor Circuit "B" High	P0C62	To detect Resolver Circuit S2/4 Out of Range High	Resolver S24 Circuit Reference Voltage	> 3.0 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	One Trip
Torque Security Faults								
Drive Motor B Torque Delivered Performance	P0C1A	Fail Case 1: Test of three phase current correlation	The sum of three phase currents is higher than current threshold during more than threshold time	Current threshold: 75 A Threshold time: 100ms	Ignition switch	in crank or run	48 fail counts out of 60 sample counts Executes in a 2.08ms loop Detects in 100ms	One Trip
		Fail Case 2: Static Variable test	Verify the calculated check sum (CRC) is not equal to previous saved check sum (CRC)		Ignition switch	in crank or run	2.08 ms	
		Fail Case 3: Monitor torque command by checking the SPI communication status	SPI rolling count fails to update more than threshold time	Threshold time: 90msec	Ignition switch	in crank or run	45 fail counts out of 50 sample counts Detects in 90ms 2.08 ms loop	
		Fail Case 4: Check the DC current flow direction with respect to	DC current fails to show correct sign and magnitude more than	Current threshold:	MCP power stage	Active	86 fail counts out of 96 sample	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		torque command/motor speed	current threshold during more than threshold time	10 A to 80 A (function of motor speed.); Time threshold: 200 ms			counts Detects in 200ms 2.08 ms loop	
		Fail Case 5: Check the secured motor torque achieved error with respect to torque command	The absolute error between calculated motor torque achieved and motor torque command is higher than torque threshold during more than threshold time	Torque threshold: 86.18 Nm Time threshold: 200 ms	MCP power stage	Active	86 fail counts out of 96 sample counts Detects in 200ms 2.08 ms loop	
		Fail Case 6: Check the Task1 reported motor torque achieved vs. torque command	The absolute error between Task1 reported motor torque achieved and motor torque command is higher than torque threshold during more than threshold time	Torque threshold: 86.18 Nm Time threshold: 200 ms	Ignition switch	in crank or run	86 fail counts out of 96 sample counts Detects in 200ms 2.08 ms loop	
		Fail Case 7: Check the secured calculated three phase short motor torque vs. the reported task1 motor torque	The absolute error between secured calculated three phase short torque vs. Task1 reported motor torque is higher than torque threshold during more than threshold time	Torque threshold: 52 Nm Time threshold: 200 ms	MCP power stage	Motor 3-phase short	86 fail counts out of 96 sample counts Detects in 200ms 2.08 ms loop	
		Fail Case 8: Check the secured calculated three phase open motor torque vs. the reported task1 motor torque	The absolute error between secured calculated three phase open torque vs. Task1 reported motor torque is higher than torque threshold during more than threshold time	Torque threshold: 52 Nm Time threshold: 200 ms	MCP power stage	Motor 3-phase open	86 fail counts out of 96 sample counts Detects in 200ms 2.08 ms loop	
Drive Motor B Control Module Programmable Logic Device Security Code	P1B01	Fail Case 1: Detect the validity of the Seeds sent by PLD	The number of identical seed in consecutive loops sent from PLD is higher than threshold	191 counts	Ignition switch	in crank or run	191 fail counts out of 250 sample counts 0.083 ms to 0.5 ms (function of motor speed.);	One Trip
		Fail Case 2: Detect the validity of response by PLD when MCP sends repeated bad keys to PLD	The number of bad response from PLD when MCP is sending bad key is higher than threshold	191 counts	Ignition switch	in crank or run	191 fail counts out of 5000 sample counts 0.083 ms to 0.5 ms (function of motor speed.);	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Drive Motor "B" Control Module Shutdown Performance	P1AFE	Detect the duration MCP used to conduct shut down path verification after key-on initialization.	The number of Task 2 loops used in shut down path verification is higher than threshold	40 counts	Initialization	ON	40 fail counts out of 50 sample counts 10 ms loop	One Trip
Communication Diagnostics								
Lost Communication With Battery Pack Control Module	U1878	Detects that CAN serial data communication has been lost with the BPCM on Bus A	Missed BPCM Messages		Ignition switch	Run	X: 12 cts Y: 12 cts R: 10.4ms plus 1 sec cntdwn timer before each cnt incr= T: 12.17 sec total	Two Trips
Lost Communication With ECM/PCM	U1879	Detects that CAN serial data communication has been lost with the ECM	Missed ECM Messages		Ignition switch	Run	X: 12 cts Y: 12 cts R: 10.4ms plus 1 sec cntdwn timer before each cnt incr= T: 12.17 sec total	Two Trips

APPENDIX

GMT9x1/926 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

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

Glossary of Key Terms

Term	Definition
PECM	Power Electronics Control Module
BPCM	Battery Pack Control Module
EBCM	Electrohydraulic Brake Control Module
FSCM	Fuel System Control Module
TCM	Transmission Control Module
HCP	Hybrid Control Processor
MCP	Motor Control Processor