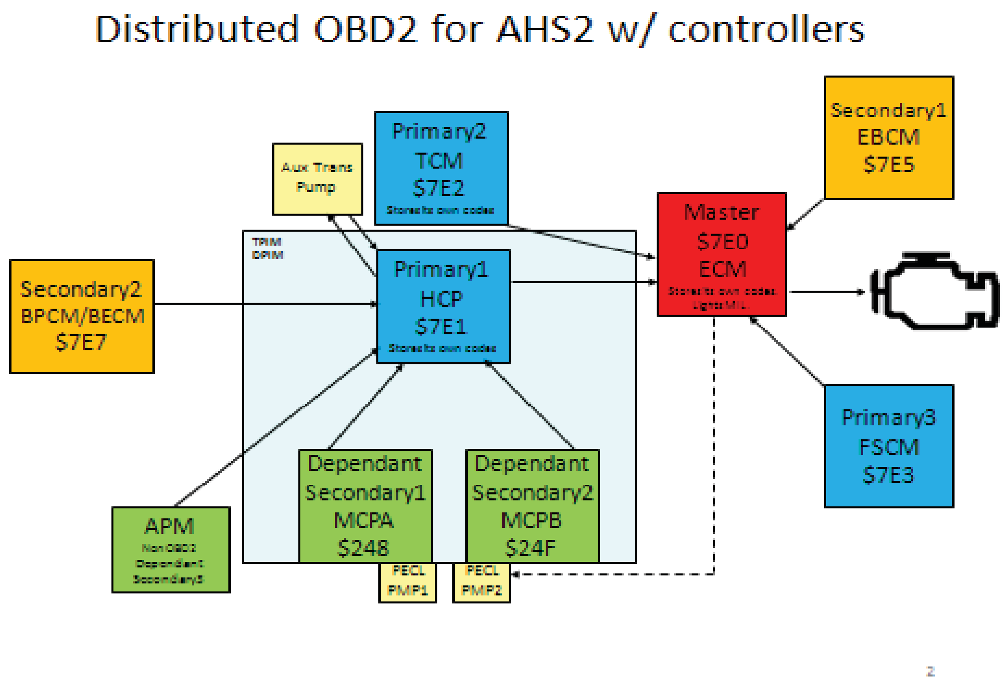


MY12 AHS2 Tahoe/Yukon/Escalade/Sierra/Silverado OBD Cert Application - There are many OBD controllers represented:

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)

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	Trips 2 B Type
Intake Camshaft System Performance – Bank 1	P0011	Detects a VVT system error by comparing the desired and actual cam positions when VVT is activated	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive	(Intake cam Bank 1)Cam Position Error > KtPHSD_phi_CamPosErrorLimIc1 Deg (see Supporting Table)	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 Engine is running VVT is enabled Desired camshaft position > 0 Power Take Off (PTO) not active	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 100 ms /sample	Trips 2 B Type
Crankshaft Position (CKP)-Camshaft Position (CMP) Correlation Bank 1 Sensor A	P0016	Detects cam to crank misalignment by monitoring if cam sensor pulse for bank 1 sensor A occurs during the incorrect crank position	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 Engine is Spinning Cam phaser is in "parked" position No Active DTCs:	P0335, P0336 P0340, P0341	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. There is a delay after the first failed test to allow the camshaft position to return to the park position. This time is defined by the table "Cam Correlation Oil Temperature Threshold".	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Time since last execution of diagnostic	5VoltReferenceA_FA 5VoltReferenceB_FA < 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		Ign Switch position Ignition Voltage	= Crank or Run position 11.0 volts < Ign Voltage < 32.0 volts	20 failures out of 25 samples	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			driver closed state (indicates short to voltage).		Engine Speed	> 400 RPM	250 ms /sample Continuous	
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
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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
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 < 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 2 Sensor 2	P0060	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
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 sec Continuous in primary processor	Trips: 1 Type: A MIL: YES
			2) Absolute difference	Table, f(TPS). See				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			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	supporting tables Table, f(RPM). See supporting tables Table, f(Volts). See supporting tables				
Manifold Absolute Pressure - Barometric Pressure Correlation	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 miles > 25.0 kPa > 0.01 miles	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	P0101	Determines if the MAF	Filtered Throttle Model		Engine Speed	>= 450 RPM	Continuous	Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
System Performance		sensor is stuck within the normal operating range	Error 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 Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) No Active DTCs:	<= 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 2 multiplied by MAP2 Residual Weight Factor based on RPM See table "IFRD Residual Weighting Factors". MAP_SensorCircuitFA EGRValve_FP	Calculation are performed every 12.5 msec	2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA ECT_Sensor_Ckt_FA 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 Error 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	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.
					No Active DTCs:	Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM 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". MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA 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	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
							msec	
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
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:	> 0 seconds < 150 deg C >= 0.00 MPH ECT_Sensor_Ckt_FA ECT_Sensor_Ckt_FP VehicleSpeedSensor Error	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:	> 0 seconds > -40 deg C <= 318.00 MPH <= 512 gm/sec ECT_Sensor_Ckt_FA ECT_Sensor_Ckt_FP VehicleSpeedSensor Error 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		No Active DTC's	VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_Ckt_FA IgnitionOffTimeValid TimeSinceEngineRun	1 failure 500 msec/ sample	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			at power up by an IAT based table lookup value after a minimum 28800 second soak (fast fail).	See "P0116: Fail if power up ECT exceeds IAT by these values" in the Supporting tables section.		ningValid	Once per valid cold start	
					Non-volatile memory initization	= Not occurred		
					Test complete this trip	= False		
			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.		Test aborted this trip	= False		
					IAT	≥ -7 ºC		
					LowFuelCondition Diag	= False		
					Block Heater detection is enabled when either of the following occurs:			
			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		1) ECT at power up > IAT at power up by	> 15.0 ºC		
					2) Cranking time	< 10.0 Seconds		
					Block Heater is detected and diagnostic is aborted when 1) occurs. Diagnostic is aborted when 2) or 3) occurs:			
					1a) Vehicle drive time	> 400 Seconds with		
				= False	1b) Vehicle speed	> 14.9 MPH		
					1c) IAT drops from power up IAT	≥ 8.0 ºC		
					2) Engine run time with vehicle speed below 1b	> 1800 Seconds		
					3) Minimum IAT during test	≤ -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/	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
							sample Continuous	
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	Engine run time Or IAT min	> 10.0 seconds ≥ -7.0 °C	5 failures out of 6 samples 1 sec/ sample Continuous	2 trips Type B
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 #2 error No 5 V reference #2 DTC (P0651)	19/39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	Trips: 1 Type: A MIL: YES
Throttle Position Sensor Performance	P0121	Determines if the Throttle Position Sensor input is stuck within the normal operating range	Filtered Throttle Model Error AND ABS(Measured Flow – Modeled Air Flow) Filtered	> 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	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.
						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 See table "IFRD Residual Weighting Factors".		
					No Active DTCs:	MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA 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	79/159 counts; 57 counts continuous; 3.125 ms /count in the primary processor	Trips: 1 Type: A MIL: YES

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Secondary TPS1 Voltage <	0.325		No 5 V reference #2 error No 5 V reference #2 DTC (P0651)	19/39 counts or 14 counts continuous; 12.5 ms/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	79/159 counts; 57 counts continuous; 3.125 ms /count in the primary processor	Trips: 1 Type: A MIL: YES
			Secondary TPS1 Voltage >	4.75		No 5 V reference #2 error No 5 V reference #2 DTC (P0651)	19/39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	
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: Range #1 (Primary) ECT reaches 75.0 °C	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	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			when IAT min is < 52.0°C and ≥ 10.0°C.		Engine not run time Engine run time Fuel Condition	≥ 1800 seconds ≥ 120 seconds Ethanol ≤ 87%		
			Range #2 (Alternate) ECT reaches 55.0 °C when IAT min is < 10.0°C and ≥ -7.0°C.		**Range #1 (Primary) Test** ECT at start run Average Airflow Vehicle speed	 ≤ 70.0 °C ≥ 10.0 gps > 5 mph for at least 1.5 miles		
					Range #2 (Alternate) Test ECT at start run Average Airflow Vehicle speed	 ≤ 50.0 °C ≥ 10.0 gps > 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		
					3) With AFM active Airflow added to acculmulated is multiplyed by	50.00%		
					4) With Decel Fuel Cut Off active, acculmulated airflow is reduced by multiplying actual airflow by	1.00 times		
					5) With Hybrid Engine Off Active accumulated Airflow is reduced by			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						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_ThrottleAuthorityDefaulted 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	2 trips Type B
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					EGR intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					EGR Device Control	= Not active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					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	No Active DTC's	MAP_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA	100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						FuelInjectorCircuit_FA AIR 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		
					<u>All of the above met for</u>			
					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 caluclated over the test time, and compared to the threshold. Refer to **"P0133 - O2S Slow Response Bank 1 Sensor 1"** Pass/Fail Threshold table in the Supporting Tables tab.		No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault_NA MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA EthanolCompositionS	Sample time is 40 seconds Frequency: Once per trip	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						ensor_FA EngineMisfireDetected_FA		
					Bank 1 Sensor 1 DTC's not active	= P0131, P0132 or P0134		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B1S1)** in Supporting Tables tab.		
					O2 Heater on for	>= 0 seconds		
					Learned Htr resistance	= Valid		
					Engine Coolant	> 55 ºC		
					IAT	> -40 ºC		
					Engine run Accum	> 120 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		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					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 %		
					<u>All of the above met for</u> Time	> 2.5 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 MAF_SensorFA EthanolCompositionSensor_FA	400 failures out of 500 samples. Frequency: Continuous 100msec loop	2 trips Type B
					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		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Fuel	<= 87 % Ethanol		
O2S Heater Performance Bank 1 Sensor 1	P0135	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	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	2 trips Type B
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	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	430 failures out of 540 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					EGR intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9922 ≤ 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	No Active DTC's	MAP_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA	100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						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		
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_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA CatalystTempFA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	1 trips Type A EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					B1S2 Failed this key cycle	P013B, P013E, P013F, P2270 or P2271		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B1S2)** in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		
					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 entered (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_ThrottleAuthorityDefaulted 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	1 trips Type A EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					B1S2 Failed this key cycle	EthanolCompositionSensor_FA CatalystTempFA P013A, P013E, P013F, P2270 or P2271		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B1S2)** in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		
					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 entered.			
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	The EWMA of the Post O2 sensor normalized integral value is greater than the threshold. OR	1) B1S2 EWMA normalized integral value > 8.3 units OR 2) Accumulated air	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR	1 trips Type A EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		is an intrusive test which runs in a DFCO mode to achieve the required response.	The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds) is greater than the airflow threshold.	flow during slow rich to lean test > 75 grams (upper threshold is 450 mvolts and lower threshold is 150 mvolts)		FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA CatalystTempFA	NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	
					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		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B2S2)** in Supporting Tables tab.		
					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 entered (wo driver initiated pedal input).			
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	The EWMA of the Post O2 sensor normalized integral value is greater than the threshold.	1) B1S2 EWMA normalized integral value > 32.0 units	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA	Frequency: Once per trip Note: if NaPOPD_b_ResetF	1 trips Type A EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		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.	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.	OR 2) Accumulated air flow during slow lean to rich test > 175 grams (lower threshold is 350 mvolts and upper threshold is 650 mvolts)		MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA CatalystTempFA	astRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	
					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		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B2S2)** in Supporting Tables tab.		
					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		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						(if applicable))		
					After above conditions are met: Fuel Enrich mode entered.			
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 CatalystTempFA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	2 trips Type B
					B1S2 Failed this key cycle	P013A, P013B, P013F, P2270 or P2271		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B1S2)** in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		
					Post fuel cell	= enabled		
					DTC's Passed	= P2270 and P2272 (if		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						applicable)		
					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 CatalystTempFA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	2 trips Type B
					B1S2 Failed this key cycle	P013A, P013B, P013E, P2270 or P2271		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B1S2)** in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		
					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 DTC's Passed DTC's Passed DTC's Passed	= P2270 (and P2272 (if applicable)) = P013E (and P014A (if applicable)) = P013A (and P013C (if applicable)) = 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 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	590 failures out of 740 samples. Frequency: Continuous 100msec loop	2 trips Type B
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	ECT_Sensor_FA 10.0 volts < system voltage< 32.0 volts = Complete = Not active > zero	8 failures out of 10 samples Frequency: 1 tests per trip 5 seconds delay between tests and 1 second execution rate	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					All of the above met for Time	> 120 seconds		
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_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA CatalystTempFA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	2 trips Type B
					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		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B2S2)** in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		
					Post fuel cell	= enabled		
					DTC's Passed	= P2270 and P2272 (if applicable)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					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 FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA CatalystTempFA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	2 trips Type B
					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		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B2S2)** in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		
					Post fuel cell	= enabled		
					DTC's Passed	= P2270 (and P2272		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						(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 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 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	2 trips Type B
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					EGR intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					EGR Device Control	= Not active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					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 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	2 trips Type B
					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		
					Engine Run Time	> 10 seconds		
					Engine Run Accum	> 300 seconds		
					Fuel Condition	<= 87 % Ethanol		
					No Active DTC's			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						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		
					<u>All of the above met for</u> 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 caluclated 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_ThrottleAuthorityDefaulted 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	2 trips Type B

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		
					Bank 2 Sensor 1 DTC's not active	= P0151, P0152 or P0154		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B2S1)** in Supporting Tables tab.		
					O2 Heater on for	>= 0 seconds		
					Learned Htr resistance	= Valid		
					Engine Coolant	> 55 ºC		
					IAT	> -40 ºC		
					Engine run Accum	> 120 seconds		
					Time since any AFM status change	> 2.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					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	> 2.5 seconds		
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	TPS_ThrottleAuthority Defaulted MAF_SensorFA EthanolCompositionSensor_FA	400 failures out of 500 samples. Frequency: Continuous 100msec loop	2 trips Type B
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					AFM Status	= All Cylinders active		
					Heater Warm-up delay	= Complete		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Predicted Exhaust Temp (by location) Engine Run Time Engine Run Accum Fuel	= Warmed Up > 10 seconds > 300 seconds <= 87 % Ethanol		
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	2 trips Type B
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 EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA	430 failures out of 540 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B

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		
					EGR intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9922 ≤ 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		
					<u>**All of the above met for**</u>			
					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	No Active DTC's	MAP_SensorFA EvapPurgeSolenoidCircuit_FA	100 failures out of 125 samples	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA	Frequency: Continuous in 100 milli - second loop	
					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 Delayed Response Rich to Lean Bank 1 Sensor 1	P015A	This DTC determines if the pre 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.	The EWMA of the Pre O2 sensor normalized R2L time delay value OR [The Accumulated time monitored during the R2L Delayed Response Test (Gross failure). AND	> 0.45 EWMA (sec) ≥ 2.00 Seconds	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	1 trips Type A EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			AND			EvapVentSolenoidCircuit_FA		
			Pre O2 sensor voltage is above]	> 550 mvolts		EvapSmallLeak_FA		
						EvapEmissionSystem_FA		
						FuelTankPressureSnsrCkt_FA		
						FuelInjectorCircuit_FA		
						AIR System FA		
						FuelTrimSystemB1_FA		
						FuelTrimSystemB2_FA		
						EthanolCompositionSensor_FA		
						EngineMisfireDetected_FA		
						P0131		
						P0132		
						P0134		
					System Voltage	10.0 < Volts < 32.0		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Green O2S Condition	= Not Valid, See definition of Green Sensor Delay Criteria for the following locations: B1S1, B2S1 (if applicable) and B1S2 in Supporting Tables tab.		
					O2 Heater (pre sensor) on for	≥ 0 seconds		
						= Valid (the heater resistance has		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Learned Htr resistance	learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's")		
					Engine Coolant	> 55 ºC		
					IAT	> -40 ºC		
					Engine run Accum	> 120 seconds		
					Engine Speed to enable test	900 ≤ RPM ≤ 2500		
					Engine Airflow	3 ≤ gps ≤ 20		
					Vehicle Speed to enable test	43.5 ≤ MPH ≤ 80.8		
					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		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater (post sensor) on Time	≥ 80.0 sec		
					Predicted Catalyst temp	550 ≤ ºC ≤ 900		
					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.			
					Pre O2S voltage B1S1 at end of Cat Rich stage	≥ 700 mvolts		
					Fuel State	= DFCO active		
					Number of fueled cylinders	≤ 6 cylinders		
					After above conditions are met: DFCO Mode entered (wo driver initiated pedal input).			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
O2 Sensor Delayed Response Lean to Rich Bank 1 Sensor 1	P015B	This DTC determines if the pre catalyst O2 sensor has an initial delayed response to an A/F change from Lean to Rich. The diagnostic is an intrusive test which runs in an enriched fuel mode to achieve the required response.	The EWMA of the Pre O2 sensor normalized L2R time delay value OR [The Accumulated time monitored during the L2R Delayed Response Test (Gross failure). AND Pre O2 sensor voltage is below] OR At end of Cat Rich stage the Pre O2 sensor output is	> 0.45 EWMA (sec) ≥ 2.00 Seconds < 350 mvolts < 700 mvolts	No Active DTC's	TPS_ThrottleAuthority Defaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA P0131 P0132 P0134	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	1 trips Type A EWMA
					System Voltage	10.0 < Volts < 32.0		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Green O2S Condition	= Not Valid, See definition of Green Sensor Delay Criteria for the following locations: B1S1, B2S1 (if applicable) and B1S2 in Supporting Tables tab.		
					O2 Heater (pre sensor) on for	≥ 0 seconds		
					Learned Htr resistance	= Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's")		
					Engine Coolant	> 55 ºC		
					IAT	> -40 ºC		
					Fuel State	= DFCO inhibit		
					Number of fueled cylinders	≥ 2 cylinders		
					When above conditions are met: Fuel Enrich mode entered (Test begins)			
					During test: Engine Airflow must stay between:	5 ≤ gps ≤ 18		
O2 Sensor Delayed Response Rich to Lean Bank 2 Sensor 1	P015C	This DTC determines if the pre 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.	The EWMA of the Pre O2 sensor normalized R2L time delay value OR [The Accumulated time monitored during the R2L Delayed Response Test (Gross failure). AND	> 0.45 EWMA (sec) ≥ 2.00 Seconds	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	1 trips Type A EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			AND Pre O2 sensor voltage is above]	> 550 mvolts		EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA P0131 P0132 P0134		
					System Voltage	10.0 < Volts < 32.0		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Green O2S Condition	= Not Valid, See definition of Green Sensor Delay Criteria for the following locations: B1S1, B2S1 and B1S2 in Supporting Tables tab.		
					O2 Heater (pre sensor) on for	≥ 0 seconds		
						= Valid (the heater resistance has learned since NVM		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						reset, see enable conditions for "HO2S Heater Resistance		
					Learned Htr resistance	DTC's")		
					Engine Coolant	> 55 ºC		
					IAT	> -40 ºC		
					Engine run Accum	> 120 seconds		
					Engine Speed to enable test	900 ≤ RPM ≤ 2500		
					Engine Airflow	3 ≤ gps ≤ 20		
					Vehicle Speed to enable test	43.5 ≤ MPH ≤ 80.8		
					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		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater (post sensor) on Time	≥ 80.0 sec		
					Predicted Catalyst temp	550 ≤ ºC ≤ 900		
					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.			
					Pre O2S voltage B1S1 at end of Cat Rich stage	≥ 700 mvolts		
					Fuel State	= DFCO active		
					Number of fueled cylinders	≤ 6 cylinders		
					After above conditions are met: DFCO Mode entered (wo driver initiated pedal input).			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
O2 Sensor Delayed Response Lean to Rich Bank 2 Sensor 1	P015D	This DTC determines if the pre catalyst O2 sensor has an initial delayed response to an A/F change from Lean to Rich. The diagnostic is an intrusive test which runs in an enriched fuel mode to achieve the required response.	The EWMA of the Pre O2 sensor normalized L2R time delay value OR [The Accumulated time monitored during the L2R Delayed Response Test (Gross failure). AND Pre O2 sensor voltage is below] OR At end of Cat Rich stage the Pre O2 sensor output is	> 0.45 EWMA (sec) ≥ 2.00 Seconds < 350 mvolts < 700 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA P0131 P0132 P0134	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	1 trips Type A EWMA
					System Voltage	10.0 < Volts < 32.0		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Green O2S Condition	= Not Valid, See definition of Green Sensor Delay Criteria for the following locations: B1S1, B2S1 and B1S2 in Supporting Tables tab.		
					O2 Heater (pre sensor) on for	≥ 0 seconds		
					Learned Htr resistance	= Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's")		
					Engine Coolant	> 55 ºC		
					IAT	> -40 ºC		
					Fuel State	= DFCO inhibit		
					Number of fueled cylinders	≥ 2 cylinders		
					When above conditions are met: Fuel Enrich mode entered (Test begins)			
					During test: Engine Airflow must stay between:	5 ≤ gps ≤ 18		
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_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA	590 failures out of 740 samples. Frequency: Continuous 100msec loop	2 trips Type B
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					AFM Status	= All Cylinders active		
					Heater Warm-up delay	= Complete		
					Predicted Exhaust Temp			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					(by location) Engine Run Time Engine Run Accum Fuel	= Warmed Up > 10 seconds > 300 seconds <= 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 System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty Cycle **<u>All of the above met for</u>** 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	2 trips Type B
Fuel System Too Lean Bank 1	P0171	Determines if the fuel control system is in a lean condition, based on the filtered long-term fuel trim.	The filtered long-term fuel trim metric	>= **Long Term Trim Lean** Table	Engine speed BARO Coolant Temp MAP Inlet Air Temp MAF Fuel Level Long Term Fuel Trim data accumulation: fuel trim diagnosed during decels? Yes **Long-Term Fuel Trim Cell Usage** Sometimes, certain Long-Term Fuel Trim	375 <rpm< 7000 > 70 kPa -40 <°C< 150 10 <kPa< 255 -20 <°C< 150 1.0 <g/s< 510.0 > 10 % or if fuel sender is faulty > 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.	Frequency: 100 ms Continuous Loop 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	2 Trip(s) Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Cells are not utilized for control or diagnosis. **Please see "Supporting Tables" Tab for a list of cells utilized for diagnosis.**		cycle.	
					Fuel Control Status			
					Closed Loop Long Term FT	Enabled Enabled **Please see "Closed Loop Enable Criteria" and "Long Term FT Enable Criteria" in Supporting Tables.**		
					EGR Flow Diag. Intrusive Test Not Active Catalyst Monitor Intrusive Test Not Active Post O2 Diag. Intrusive Test Not Active Device Control Not Active EVAP Diag. “tank pull down” Not Active			
					No active DTCs:			
					IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSensorCircuit_FA Ethanol Composition Sensor FA FuelInjectorCircuit_FA EngineMisfireDetected_FA EGRValvePerformance_FA EGRValveCircuit_FA MAP_EngineVacuumStatus			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					AmbientAirDefault_NA O2S_Bank_1_Sensor_1_FA			
Fuel System Too Rich Bank 1	P0172	Determines if the fuel control system is in a rich condition, based on the filtered long-term fuel trim metric. There are two methods to determine a Rich fault. They are Passive and Intrusive. The Intrusive test is described below:	**Passive Test:**			Secondary Parameters and Enable Conditions are identical to those for P0171, with the exception that fuel level is not considered.	Frequency: 100 ms Continuous Loop 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.	2 Trip(s) Type B
			The filtered Non-Purge Long Term Fuel Trim metric (a Passive Test decision cannot be made when Purge is enabled)	<= **Non Purge Rich Limit** Table				
			Intrusive Test:					
			The filtered Purge Long Term Fuel Trim metric	<= **Purge Rich Limit** Table				
			AND					
			The filtered Non-Purge Long Term Fuel Trim metric	<= **Non Purge Rich Limit** Table for 3 out of 5 intrusive segments				
		Intrusive Test: When the filtered Purge Long Term fuel trim metric is <= **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 filtered Non-Purge Long Term fuel trim metric.	Segment Def'n: Segments can last up to 30 seconds 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 attempts are allowed for each intrusive test. After an intrusive test report is completed, another intrusive test					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, and the execution frequency of other diagnostics.	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.					
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 BARO Coolant Temp MAP Inlet Air Temp MAF Fuel Level Long Term Fuel Trim data accumulation: fuel trim diagnosed during decels?	375 <rpm< 7000 > 70 kPa -40 <°C< 150 10 <kPa< 255 -20 <°C< 150 1.0 <g/s< 510.0 > 10 % or if fuel sender is faulty > 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. Yes	Frequency: 100 ms Continuous Loop 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	2 Trip(s) Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Long-Term Fuel Trim Cell Usage		actual conditions present during the drive cycle.	
					Sometimes, certain Long-Term Fuel Trim Cells are not utilized for control or diagnosis. **Please see "Supporting Tables" Tab for a list of cells utilized for diagnosis.**			
					Fuel Control Status			
					Closed Loop	Enabled		
					Long Term FT	Enabled **Please see "Closed Loop Enable Criteria" and "Long Term FT Enable Criteria" in Supporting Tables.**		
					EGR Flow Diag. Intrusive Test Not Active Catalyst Monitor Intrusive Test Not Active Post O2 Diag. Intrusive Test Not Active Device Control Not Active EVAP Diag. “tank pull down” Not Active			
					No active DTCs:			
					IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSensorCircuit_FA Ethanol Composition Sensor FA FuelInjectorCircuit_FA EngineMisfireDetected_FA EGRValvePerformance_FA			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					EGRValveCircuit_FA MAP_EngineVacuumStatus AmbientAirDefault_NA O2S_Bank_2_Sensor_1_FA			
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 methods to determine a Rich fault. They are Passive and Intrusive. The Intrusive test is described below:	**Passive Test:** The filtered Non-Purge Long Term Fuel Trim metric (a Passive Test decision cannot be made when Purge is enabled)	<= **Non Purge Rich Limit** Table		Secondary Parameters and Enable Conditions are identical to those for P0174, with the exception that fuel level is not considered.	Frequency: 100 ms Continuous Loop 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.	2 Trip(s) Type B
			Intrusive Test: The filtered Purge Long Term Fuel Trim metric	<= **Purge Rich Limit** Table				
			AND The filtered Non-Purge Long Term Fuel Trim metric	<= **Non Purge Rich Limit** Table for 3 out of 5 intrusive segments				
		Intrusive Test: When the filtered Purge Long Term fuel trim metric is <= **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 filtered Non-Purge Long Term fuel trim	Segment Def'n: Segments can last up to 30 seconds 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 attempts are allowed for each intrusive test. After an intrusive test					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		Purge Long Term fuel trim metric. Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, and the execution frequency of other diagnostics.	After an intrusive test report is completed, another intrusive test cannot occur for 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.					
Injector 1	P0201	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
Injector 2	P0202	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Injector 3	P0203	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
Injector 4	P0204	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
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 ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
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 ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
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 ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
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 ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
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	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	19/39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	Trips: 1 Type: A MIL:

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		primary processor				will be reported for all conditions No 5 V reference #2 error No 5 V reference #2 DTC (P0651)		YES
TPS2 Circuit Low	P0222	Detects a continuous or intermittent short or open 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 ms /count in the primary processor	Trips: 1 Type: A MIL: YES
			Secondary TPS2 Voltage <	0.25		No 5 V reference #2 error No 5 V reference #2 DTC (P0651)	19/39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	
TPS2 Circuit High	P0223	Detects a continuous or intermittent short in TPS1 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 ms /count in the primary processor	Trips: 1 Type: A MIL: YES
			Secondary TPS2 Voltage >	4.59		No 5 V reference #2 error No 5 V reference #2	19/39 counts or 14 counts continuous; 12.5 ms/count in the secondary	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						DTC (P0651)	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	2 trips Type B
Random Misfire Detected Cylinder 1 Misfire Detected Cylinder 2 Misfire Detected Cylinder 3 Misfire Detected Cylinder 4 Misfire Detected Cylinder 5 Misfire Detected Cylinder 6 Misfire Detected Cylinder 7 Misfire Detected Cylinder 8 Misfire Detected	P0300 P0301 P0302 P0303 P0304 P0305 P0306 P0307 P0308	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. Undetectable region at a given speed/load point is where all tables are max of range point. see Algorithm Description Document for additional details.	**(>**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) **OR** (>Cyl Mode AND > Cyl Mode ddt Tables) **OR** (>Rev Mode Table) **OR** (> AFM Table in Cyl Deact mode)	Engine Run Time ECT If ECT at startup ECT System Voltage + Throttle delta - Throttle delta	> 2 crankshaft revolutions -7 ºC < ECT < 130 ºC < -7ºC 21 ºC < ECT < 130 ºC 9.00 <volts < 32.00 < 75.00 % per 25 ms < 75.00 % per 25 ms	Emission Exceedence = any (5) failed 200 rev blocks out of (16) 200 rev block tests Failure reported for (1) Exceedence in 1st (16) 200 rev block tests, or (4) Exceedences thereafter. any Catalyst Exceedence = (1) 200 rev block as data supports for catalyst damage. Failure reported with	2 Trips Type B (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.
			Misfire Percent Emission Failure Threshold	≥ 1.24 % P0300 ≥ 1.56 % emission			(1 or 3) Exceedences in FTP, or (1) Exceedence outside FTP.	
			Misfire Percent Catalyst Damage	>"Catalyst Damaging Misfire Percentage" Table whenever secondary conditions are met.	Engine Speed Engine Load Misfire counts (at low speed/loads, one cylinder may not cause cat damage)	> 1200 rpm AND > 20 % load AND < 180 counts on one cylinder		
			When engine speed and load are less than the FTP cals (3) catalyst damage exceedences are allowed.	≤ 0 FTP rpm AND ≤ 0 FTP % load			Continuous	
					Engine Speed	375 < rpm < 6000 - 400 Engine speed limit is a function of inputs like Gear and temperature typical Engine Speed Limit = 6000 rpm	4 cycle delay	
				disable conditions:	No active DTCs:	TPS_FA EnginePowerLimited	4 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						MAF_SensorTFTKO MAP_SensorTFTKO IAT_SensorTFTKO ECT_Sensor_Ckt_TFTKO 5VoltReferenceB_FA CrankSensorTestFailedTKO CrankSensorFaultActive CrankIntakeCamCorrelationFA CrankExhaustCamCorrelationFA CrankCamCorrelationTFTKO AnyCamPhaser_FA AnyCamPhaser_TFTKO		
						If Monitor Rough Road=1 and RoughRoadSource=" TOSS"		
						TOSS_Fault (Auto Trans only) Clutch Sensor FA (Manual Trans only)		
						Trans_Gear_Defaulted (Auto Trans only)		
					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	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					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: TPS (area) Veh Speed	 ≤ 0% > 48 KPH	4 cycle delay	
					EGR Intrusive test	Active	0 cycle delay	
					Manual Trans Throttle Position AND Automatic transmission shift	Clutch shift > 95.00 %	4 cycle delay 7 cycle delay	
					Driveline Ring Filter active After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early.			
					Filter Driveline ring: Stop filter early:	4 engine cycles after misfire 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	> 1 %		
					Engine Speed	> 950 rpm		
					Veh Speed	> 5 kph		
					SCD	= 4 consecutive cyls		
					Cyl Mode	= 4 consecutive cyls		
					Rev Mode	= 4 consecutive cyls		
					Rough Road Section:			
					Monitor Rough Road	1 (1=Yes)		
					RoughRoadSource	FromABS		
					IF Rough Road is monitored, then ONE of the following Rough Road Sources will be used:			
					Rough Road Source = "TOSS"			
					Rough Road	detected		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Rough Road Source = "WheelSpeedInECM" ABS/TCS system RoughRoad VSES Rough Road Source = "FromABS" ABS/TCS system RoughRoad VSES	active detected active active detected active		
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	1 Trips Type A
Knock Sensor (KS) Module Performance	P0324	This diagnostic will detect a failed internal ECM component associated with knock control			Diagnostic Enabled (1 = Enabled)	= 1	50 Failures out of 63 Samples 100 msec rate	Type: A MIL: YES Trips: 1
			Any Cylinder's Avg Gain Signal	> 4.50 Volts	Engine Speed Cylinder Air Mass	≥ 400 RPM > 60 milligrams		
			or					
			All Cylinder's Raw Signals	≤ 0.20 Volts	Engine Speed Cylinder Air Mass	≥ 400 RPM > 60 milligrams		
					Power Take Off	= Not Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Knock Sensor (KS) Circuit Bank 1	P0325	This diagnostic checks for an open in the knock sensor circuit	Gated Low Pass Filter Voltage	> 4.0 Volts or < 1.24 Volts	Diagnostic Enabled (1 = Enabled) Engine Speed ECT Enginer Run Time Power Take Off	= 1 ≥ 400 RPM ≥ -40 deg. C ≥ 2 seconds = Not Active	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
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)	> (FastRtdMax + 6.0 - 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_ThrottleAuthority Defaulted = Not Active	31 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Knock Sensor (KS) Circuit Low Bank 1	P0327	This diagnostic checks for an out of range low knock sensor signal	Sensor Input Signal Line	> 2.86 Volts	Diagnostic Enabled (1 = Enabled) ECT Engine Run Time	= 1 ≥ -40 deg. C ≥ 2 seconds	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			or					
			Sensor Return Signal Line	< 1.48 Volts	Valid Oil Temp Required? (1= Yes, 0 = No) <u>If Yes:</u> Engine Oil Temp and ValidOilTemp Model or No OilTemp Sensor DTC's <u>If No:</u> No Eng Oil Temp enable criteria	= 0 < 256 deg. C EngOilModeledTemp Valid EngOilTempSensor CircuitFA		
Knock Sensor (KS) Circuit High Bank 1	P0328	This diagnostic checks for an out of range high knock sensor signal			Diagnostic Enabled (1 = Enabled)	= 1	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
			Sensor Input Signal Line	< 2.02 Volts	ECT Enginer Run Time	≥ -40 deg. C ≥ 2 seconds		
			or					
			Sensor Return Signal Line	> 3.76 Volts	Valid Oil Temp Required? (1= Yes, 0 = No) <u>If Yes:</u> Engine Oil Temp and ValidOilTemp Model or No OilTempSensor DTC's <u>If No:</u> No Eng Oil Temp enable criteria	= 0 < 256 deg. C EngOilModeledTemp Valid EngOilTempSensor CircuitFA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
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 Enginer Run Time Power Take Off	= 1 ≥ 400 RPM ≥ -40 deg. C ≥ 2 seconds = Not Active	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Knock Sensor (KS) Circuit Low Bank 2	P0332	This diagnostic checks for an out of range low knock sensor signal			Diagnostic Enabled (1 = Enabled)	= 1	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
			Sensor Input Signal Line	> 2.86 Volts	ECT Enginer Run Time	≥ -40 deg. C ≥ 2 seconds		
			or					
			Sensor Return Signal Line	< 1.48 Volts	Valid Oil Temp Required? (1= Yes, 0 = No) If Yes: Engine Oil Temp and ValidOilTemp Model or No OilTempSensor DTC's If No: No Eng Oil Temp enable criteria	= 0 < 256 deg. C EngOilModeledTemp Valid EngOilTempSensor CircuitFA		
Knock Sensor (KS) Circuit High Bank 2	P0333	This diagnostic checks for an out of range high knock sensor signal			Diagnostic Enabled (1 = Enabled) ECT Engine Run Time	= 1 ≥ -40 deg. C ≥ 2 seconds	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
			Sensor Input Signal Line	< 2.02 Volts				
			or					
			Sensor Return Signal Line	> 3.76 Volts	Valid Oil Temp Required? (1= Yes, 0 = No)	= 0		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					If Yes: Engine Oil Temp and ValidOilTemp Model or No OilTempSensor DTC's If No: No Eng Oil Temp enable criteria	< 256 deg. C EngOilModeledTemp Valid EngOilTempSensor CircuitFA		
Crankshaft Position (CKP) Sensor A Circuit	P0335	Determines if a fault exists with the crank position sensor signal	Engine-Cranking Crankshaft Test: Time since last crankshaft position sensor pulse received Time-Based Crankshaft Test: No crankshaft pulses received	>= 4.0 seconds >= 0.1 seconds	Engine-Cranking Crankshaft Test: Starter engaged AND (cam pulses being received OR (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow Time-Based Crankshaft Test: Engine is Running Starter is not engaged No DTC Active:	= FALSE = FALSE = FALSE > 3.0 grams/second)) 5VoltReferenceB_FA	Engine-Cranking Crankshaft Test: Continuous every 100 msec Time-Based Crankshaft Test: Continuous every 12.5 msec	Type A 1 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Event-Based Crankshaft Test: No crankshaft pulses received		Event-Based Crankshaft Test: Engine is Running OR Starter is engaged No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA P0340 P0341	Event-Based Crankshaft Test: 2 failures out of 10 samples One sample per engine revolution	
Crankshaft Position (CKP) Sensor A Performance	P0336	Determines if a performance fault exists with the crank position sensor signal	Crank Re-synchronization Test: Time in which 25 or more crank re-synchronizations occur Time-Based Crankshaft Test: No crankshaft synchronization gap found Engine Start Test during Crank: Time since starter engaged without detecting	< 20.0 seconds >= 0.4 seconds	Crank Re-synchronization Test: Engine Air Flow Cam-based engine speed No DTC Active: Time-Based Crankshaft Test: Engine is Running Starter is not engaged No DTC Active: Engine Start Test during Crank: Starter engaged	>= 3.0 grams/second > 450 RPM 5VoltReferenceB_FA P0335 5VoltReferenceB_FA	Crank Re-synchronization Test: Continuous every 250 msec Time-Based Crankshaft Test: Continuous every 12.5 msec Engine Start Test during Crank: Continuous every 100 msec	Type A 1 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			crankshaft synchronization gap Event-Based Crankshaft Test: Crank Pulses received in one engine revolution OR Crank Pulses received in one engine revolution	>= 1.5 seconds < 53 > 63	AND (cam pulses being received OR (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow Event-Based Crankshaft Test: Engine is Running OR Starter is engaged No DTC Active:	= FALSE = FALSE = FALSE > 3.0 grams/second)) 5VoltReferenceA_FA 5VoltReferenceB_FA P0340 P0341	Event-Based Crankshaft Test: 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: Time since last camshaft position sensor pulse received OR Time that starter has been engaged without a camshaft sensor pulse	>= 5.5 seconds	Engine Cranking Camshaft Test: Starter engaged AND (cam pulses being received OR (DTC P0101 AND DTC P0102	= FALSE	Engine Cranking Camshaft Test: Continuous every 100 msec	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
				>= 4.0 seconds	AND DTC P0103 AND Engine Air Flow	= FALSE = FALSE > 3.0 grams/second))		
			<u>Time-Based Camshaft Test:</u> Fewer than 4 camshaft pulses received in a time	> 3.0 seconds	<u>Time-Based Camshaft Test:</u> Engine is Running Starter is not engaged No DTC Active:	GetVLTR_b_V5A_FA	<u>Time-Based Camshaft Test:</u> Continuous every 100 msec	
			<u>Fast Event-Based Camshaft Test:</u> No camshaft pulses received during first 24 MEDRES events (There are 24 MEDRES events per engine cycle)		<u>Fast Event-Based Camshaft Test:</u> Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	<u>Fast Event-Based Camshaft Test:</u> Continuous every MEDRES event	
			<u>Slow Event-Based Camshaft Test:</u>		<u>Slow Event-Based Camshaft Test:</u>		<u>Slow Event-Based Camshaft Test:</u>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			The number of camshaft pulses received during 100 engine cycles	= 0	Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	8 failures out of 10 samples Continuous every engine cycle	
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor A	P0341	Determines if a performance fault exists with the cam position bank 1 sensor A signal	Fast Event-Based Camshaft Test: The number of camshaft pulses received during first 24 MEDRES events is less than 2 or greater than 8 (There are 24 MEDRES events per engine cycle)		Fast Event-Based Camshaft Test: Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Fast Event-Based Camshaft Test: Continuous every MEDRES event	Type B 2 trips
			Slow Event-Based Camshaft Test: The number of camshaft pulses received during 100 engine cycles	< 398	Slow Event-Based Camshaft Test: Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA	Slow Event-Based Camshaft Test: 8 failures out of 10 samples	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			OR	> 402		CrankSensor_FA Crank circuit	Continuous every engine cycle	
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)	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
IGNITION CONTROL #2 CIRCUIT	P0352	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 2 (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	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
IGNITION CONTROL #3 CIRCUIT	P0353	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 3 (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	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
IGNITION CONTROL #4 CIRCUIT	P0354	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 4 (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	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
IGNITION CONTROL #5 CIRCUIT	P0355	This diagnostic checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state		Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples	Type: B MIL: YES

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		Monitors EST for Cylinder 5 (if applicable)	of the control circuit do not match.				100 msec rate	Trips: 2
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	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
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	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
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	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
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)
		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		Test Completion: HO2S1 ≥ 600 mV and HO2S2 ≥ 200 mV OR	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			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		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.		HO2S2 Response Time - HO2S1 Response Time > 1.10 seconds	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 > 26.72 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	≥ 10 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.			
					Percent Throttle	≤ 1.00 %		
					Valid DFCO Period Criteria			
					Prior Enable Criteria Met			
					Decel Fuel Cutoff Time	≥ 2.35 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					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		
					Equivalence Ratio	≥ 1.00		
					General Enable			
					DTC's Not Set			
					MAF_SensorFA			
					MAF_SensorTFTKO			
					AmbPresDfltdStatus			
					IAT_SensorCircuitFA			
					IAT_SensorCircuitTFTKO			
					ECT_Sensor_FA			
					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			
					EGRValvePerformance_FA			
					EGRValveCircuit_FA			
					CamSensorAnyLocationFA			
					CrankSensor_FA			
					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	***<u>Diagnostic Enable Conditions</u>***		Minimum of 1 test per trip Maximum of 10 tests per trip Frequency:	Type A 1 Trip(s)
		The catalyst washcoat contains Cerium Oxide. Cerium Oxide reacts with NO and O2 during lean A/F		Test Completion:	This diagnostic has the ability to run as a stand alone diagnostic or following the Post O2			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		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.		HO2S1 ≥ 600 mV and HO2S2 ≥ 200 mV OR HO2S2 Response Time - HO2S1 Response Time > 1.10 seconds	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.		12.5 ms continuous	
		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 > 26.72 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	≥ 10 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. Note: this feature is only enabled when the vehicle is new and cannot be enabled in service			
					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.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Percent Throttle	≤ 1.00 %		
					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		
					Equivalence Ratio	≥ 1.00		
					General Enable			
					DTC's Not Set			
					MAF_SensorFA			
					MAF_SensorTFTKO			
					AmbPresDfltdStatus			
					IAT_SensorCircuitFA			
					IAT_SensorCircuitTFTKO			
					ECT_Sensor_FA			
					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			
					EGRValvePerformance_FA			
					EGRValveCircuit_FA			
					CamSensorAnyLocationFA			
					CrankSensor_FA			
					TPS_Performance_FA			
					EnginePowerLimited			
					VehicleSpeedSensor_FA			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
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 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.	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 pressure - peak vacuum) / pressure threshold. The normalized value is entered into EWMA (with 0= perfect pass and 1= perfect fail).		Fuel Level	10 % ≤ Percent ≤ 90 %	Once per trip, during hot soak (up to 2400 sec.). No more than 2 unsuccessful attempts between completed tests.	1 trip Type A EWMA Average run length is 6 under normal conditions Run length is 3 to 6 trips after code clear or non-volatile reset
					Drive Time	≥ 600 seconds		
					Drive length	≥ 4.97 miles		
					ECT	≥ 70 °C		
					Baro	≥ 70 kPa		
					Odometer	≥ 10.0 miles		
					Engine not run time before key off must be	≤ refer to "P0442: Engine Off Time Before Vehicle Off Maximum as a Function of Estimated Ambient Temperature table" in Supporting Tables.		
					Time since last complete test if normalized result and EWMA is passing	≥ 7 hours		
					OR Time since last complete test if normalized result or EWMA is failing	≥ 7 hours		
					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	**Conditions for Estimate of Ambient Air**			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			, the DTC light is illuminated.	Threshold)	**Temperature to be valid:**			
		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 can be turned off if the EWMA is and stays below the EWMA fail threshold for 2 additional consecutive trips.	≤ 0.35 (EWMA Re-Pass Threshold)	**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			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					4. Not a Cold Start and greater than a Short Soak			
					Previous time since engine off AND	> 7200 seconds		
					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**			
					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.			

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
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.		PT Relay Voltage	11 volts ≤ Voltage ≤ 32 volts	20 failures out of 25 samples 250 ms / sample Continuous with solenoid operation	2 trips Type B
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: Vented Vacuum OR Vented Vacuum for 60 seconds Vent Restriction Test: Tank Vacuum for 5 seconds BEFORE Purge Volume After setting the DTC for the first time, 2 liters of fuel must be consumed before setting the DTC for the second time.	< -623 Pa > 1245 Pa > 2989 Pa ≥ 10 liters	Fuel Level System Voltage Startup IAT Startup ECT BARO No active DTCs:	10% ≤ Percent ≤ 90% 11 volts ≤ Voltage ≤ 32 volts 4 °C ≤ Temperature ≤ 30 °C ≤ 35 °C ≥ 70 kPa MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorCircuitFA ECT_Sensor_FA AmbientAirDefault_NA EnginePowerLimited P0443 P0449 P0452 P0453 P0454	Once per Cold Start Time is dependent on driving conditions Maximum time before test abort is 1000 seconds	2 trips Type B
Evaporative Emission (EVAP)	P0449	This DTC checks the circuit for electrical	The ECM detects that the commanded state of the		Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	20 failures out of 25 samples	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Vent Solenoid Control Circuit (ODM)		integrity during operation. If the P0449 is active, an intrusive test is performed with the vent solenoid commanded closed for 15 seconds.	driver and the actual state of the control circuit do not match.		Run/Crank voltage goes to 0 volts at key off		250 ms / sample Continuous with solenoid operation	
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) Lower voltage threshold (voltage subtraction below the nominal voltage) 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).	0.2 volts 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. The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete.	1 trip Type A EWMA Average run length: 6 Run length is 2 trips after code clear or non- volatile reset

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			When EWMA is , the DTC light is illuminated. The DTC light can be turned off if the EWMA is and stays below the EWMA fail threshold for 2 additional consecutive trips.	> 0.73 (EWMA Fail Threshold) ≤ 0.40 (EWMA Re-Pass Threshold)				
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 Stops 6.0 seconds after key-off	is 0.10 seconds	80 failures out of 100 samples 100 ms / sample Continuous	2 trips Type B
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	> 4.85 volts (97% of Vref or ~ -4172 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	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			volts (~ -3736 Pa).		Stops 6.0 seconds after key-off		Continuous	
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.	1 trips Type A
			An abrupt change is defined as a change in vacuum:				The test will report a failure if 2 out of 3 samples are failures.	
			in the span of 1.0 seconds.	>112 Pa				
			But in 12.5 msec.	< 249 Pa			12.5 ms / sample	
			A refueling event is confirmed if the fuel level has a persistent change				Continuous when vent solenoid is	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			for 30 seconds.	of 15 %			closed.	
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 while Tank vacuum After setting the DTC for the first time, 2 liters of fuel must be consumed before setting the DTC for the second time. Weak Vacuum Follow-up Test (fuel cap replacement test) Weak Vacuum Test failed. Passes if tank vacuum Note: Weak Vacuum Follow-up Test can only report a pass.	> 17 liters ≤ 2740 Pa ≥ 2740 Pa	Fuel Level System Voltage BARO Purge Flow No active DTCs: Cold Start Test If ECT > IAT, Startup temperature delta (ECT-IAT): Cold Test Timer Startup IAT Startup ECT	10% ≤ Percent ≤ 90% 11 volts ≤ Voltage ≤ 32 volts ≥ 70 kPa ≥ 3.75 % MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorCircuitFA ECT_Sensor_FA AmbientAirDefault_NA EnginePowerLimited P0443 P0449 P0452 P0453 P0454 ≤ 8 °C ≤ 1000 seconds 4 °C ≤ Temperature ≤ 30 °C ≤ 35 °C	Once per cold start Time is dependent on driving conditions Maximum time before test abort is 1000 seconds 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.	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Weak Vacuum Follow-up Test This test can run following a weak vacuum failure or on a hot restart.			
Fuel Level Sensor 1 Performance (For use on vehicles with a single fuel tank)	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	2 trips Type B
Fuel Level Sensor 1 Circuit Low Voltage	P0462	This DTC will detect a fuel sender stuck out of range low in the primary fuel tank.	Fuel level Sender % of 5V range	< 10 %	Run/Crank Voltage Run/Crank voltage goes to 0 volts at key off	11 volts ≤ Voltage ≤ 32 volts	100 failures out of 125 samples 100 ms / sample Continuous	2 trips Type B
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 Run/Crank voltage goes to 0 volts at key off	11 volts ≤ Voltage ≤ 32 volts	100 failures out of 125 samples 100 ms / sample Continuous	2 trips Type B
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-fueling event.	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 refueling rationality test is executed to confirm that an actual refueling event		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.	1 trips Type A

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			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. An intermintant change in fuel level is defined as: The fuel level changes and does not remain for 30 seconds during a 600 second refueling rationality test.	by 15 % > 15 %			The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete. The test will report a failure if 2 out of 3 samples are failures. 100 ms / sample	
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	2 trips Type B
Cooling Fan 2 Relay Control Circuit	P0481	This DTC checks the circuit for electrical	The ECM detects that the commanded state of the		Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	20 failures out of 25 samples	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
(ODM)		integrity during operation.	driver and the actual state of the control circuit do not match.		Engine Speed	≥ 0 RPM	250 ms / sample Continuous with fan operation	
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 Engine Speed	11 volts ≤ Voltage ≤ 32 volts ≥ 0 RPM	20 failures out of 25 samples 250 ms / sample Continuous with fan operation	2 trips Type B
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 Startup ECT Engine Off Time No active DTCs:	10% ≤ Percent ≤ 90% 11 volts ≤ Voltage ≤ 32 volts ≥ 70 kPa 4 °C ≤ Temperature ≤ 30 °C ≤ 35 °C ≥ 28800.0 seconds MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorCircuitFA ECT_Sensor_FA AmbientAirDefault_NA	Once per cold start Cold start: max time is 1000 seconds	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						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:** 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	Diagnostic enabled / disabled	Enabled	Performed every 100 msec	2 trip(s) Type B
					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	2 trip(s) Type B
					Ignition Voltage	<= 32.0 V and >= 11.0 V		
					Sensor Present	Yes	Performed every	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Diagnostic enabled / disabled	Enabled	100 msec	
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	2 trip(s) Type B
Cruise Control Mutil-Functon Switch Circuit	P0564	Detect when cruise control multi-function switch circuit (analog) voltage is in an illegal range	Cruise Control analog circuit voltage must be in an "illegal range" for greater than a calibratable period of time for cruise switch states that are received over serial data		CAN cruise switch diagnostic enable in ECM	TRUE -1	fail continuously for greater than 0.700 seconds	Type: C MIL: NO Trips: 1
Cruise Control Resume Circuit	P0567	Detects a failure of the cruise resume switch in a continously applied state	Cruise Control Resume switch remains applied for greater than a calibratable period of time for architecture where cruise switch states are received over serial data		CAN cruise switch diagnostic enable in ECM	TRUE -1	fail continuously for greater than 90.000 seconds	Type: C MIL:

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
								NO
								Trips: 1
Cruise Control Set Circuit	P0568	Detects a failure of the cruise set switch in a continously applied state	Cruise Control Set switch remains applied for greater than a calibratable period of time for architecture where cruise switch states are received over serial data		CAN cruise switch diagnostic enable in ECM	TRUE -1	fail continuously for greater than 90.000 seconds	Type: C
								MIL: NO
								Trips: 1
Cruise Control Input Circuit	P0575	Detects rolling count or protection value errors in Cruise Control Switch Status serial data signal	If x of y rolling count / protection value faults occur, disable cruise for duration of fault		Cruise Control Switch Serial Data Error Diagnostic Enable	TRUE -1	10 out of 16 counts	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	Type A 1 trips
							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.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Control Module Not Programmed	P0602	This DTC will be stored if the PCM is a service PCM that has not been programmed.	Output state invalid		PCM State	= crank or run	Diagnostic runs at powerup	Type A 1 trips
						PCM is identified through calibration as a Service PCM		
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	Type A 1 trips
							Diagnostic reports a fault if 1 failure occurs	
ECM RAM Failure	P0604	Indicates that the ECM is unable to correctly read data from or write data to RAM	Primary processor data pattern written doesn't match the pattern read for a count >	1 count if found on first memory scan. 5 counts if found on subsequent scans.			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously	Trips: 1 Type: A MIL: YES
			Secondary processor battery backed RAM failed checksum twice for original values at power up and the defaulted values				Completion at intilization, <500 ms	
			Secondary processor copy of calibration area to RAM failed for a count >	2 counts			Completion at intilization, <500 ms	
			Secondary Processor data pattern written doesn't match the pattern read consecutive times				Will finish within 30 seconds at all engine conditions.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Secondary Processor TPS or APPS minimum learned values fail compliment check continuously				0.0625 sec continuous	
ECM Processor	P0606	Indicates that the ECM has detected an internal processor integrity fault	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 No errors exist in intercommunication between primary and secondary processors	3/4 counts; 50.0 ms/count	Trips: 1 Type: A MIL: YES
			Software tasks on the Primary Processor in the 12.5 ms loop were not executed or were not executed in the correct order.	0.0625 sec continuous		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.0625 sec continuous	
			Software tasks on the Primary Processor in the 25 ms loop were not executed or were not executed in the correct order.	0.1250 sec continuous		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.1250 sec continuous	
			Software tasks on the Primary Processor in the 50 ms loop were not executed or were not executed in the correct order.	0.2500 sec continuous		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all	0.2500 sec continuous	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						conditions		
			Software tasks on the Primary Processor in the 100 ms loop were not executed or were not executed in the correct order.	0.5000 sec continuous		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.5000 sec continuous	
			The first completion of the RAM diagnostic on the Primary Processor was completed > the amount of time	360.0000 sec continuous		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	360.0000 sec continuous	
			The first completion of the ROM diagnostic on the Primary Processor was completed > the amount of time	360.0000 sec continuous		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	360.0000 sec 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		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	25 ms	
			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 recieved by the Primary 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	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			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 recieved 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 secondary processor 0.4750 sec at initialization, 0.1750 sec continuous or 20/200 intermittent.	
			Primary processor check of the secondary processor by verifing the hardware line toggle between the two processors toggles within the threshold values	9.3750 ms and 15.6250 ms		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	9 counts continuous at initialization or 9 counts continuous; 12.5 ms /count in the primary processor	
			Primary Processor TPS or APP 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	0.1000 sec continuous	
			The ocillator failed for the Primary processor where the clock is outside the	27.85 kHz and 37.68 kHz		Run/crank voltage or Powertrain relay voltage > 6.00 and	100 ms continuous	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			threshold			reduced power is false, else the failure will be reported for all conditions		
			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	12.5 ms continuous	
			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	12.5 ms continuous	
			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	
			Secondary processor check that the Primary processor hasen'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	
			The primary processor check of the ALU failed to compute the expected result	Two Consecutive Times		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	
			Primary processor failed configuration check of the			Run/crank voltage or Powertrain relay	12.5ms continuous	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			registers.			voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions		
Main & MHC state of health fault	P0607		Primary state of health (SOH) discrete line is not toggling between the two processors for a time >	0.4875 sec		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.4875 sec continuous	Trips: 1 Type: C MIL: NO
Control Module Accelerator Pedal Position (APP) System Performance	P060D	Verify that the indicated accelerator pedal position calculation is correct	PPS sensor switch fault - When the APP sensor 2 is shorted to ground, the sensor value is >	41		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; 175 ms/count	Trips: 1 Type: A MIL: YES
			Difference between primary processor indicated accelerator pedal position and secondary indicated accelerator pedal position is >	5		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	44/40 counts or 39 counts continuous; 12.5 ms/count in the secondary processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						FALSE		
Control Module EEPROM Error	P062F	Indicates that the NVM Error flag has not been cleared	Last EEPROM write did not complete		Ignition State	= unlock/accesory, run, or crank	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 th 5 volt reference circuit #1	Primary Processor Vref1 < or 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 0.1875 continuous; 12.5 ms/count in primary processor	Trips: 1 Type: A MIL: YES
			Secondary Processor Vref1 < or Secondary Processor Vref1 >	4.875 5.125			19/39 counts or 15 counts continuous; 12.5 ms/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	2 trip Type B NO MIL
5 Volt Reference #2 Circuit	P0651	Detects a continuous or intermittent short on th 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 0.1875 sec continuous; 12.5 ms/count in primary processor	Trips: 1 Type: A MIL: YES
			Secondary Processor Vref2 < or Secondary Processor	4.875			19/39 counts or 15 counts continuous; 12.5 ms/count in	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Vref2 >	5.125		conditions	secondary processor	
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	2 trips Type B
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 > 2.5 volts	Powertrain relay commanded "ON" No active DTCs:	PowertrainRelayState On_FA	5 failures out of 6 samples 1 second / sample Stuck Test: 100 ms/ sample Continous failures ≥ 2 seconds	2 trips Type B
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	1 trips Type A (No MIL)
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 Control Module Emissions-Related DTC set			Time since power-up > 3 seconds	Continuous	1 trips Type A (No MIL)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Traction Control Torque Request Circuit	P0856	Determines if torque request from the EBTCM is valid	Serial Communication 2's complement message - ($140 for PPEI2 or $1C9 for PPEI3, $1CA for Hybrid) **OR** Serial Communication message ($140 for PPEI2 or $1C7 or $1C9 for PPEI3, $1CA for Hybrid) rolling count value **OR** Too many minimum limit torque request transitions occur from TRUE to FALSE to TRUE within a time period	Message <> 2's complement of message Message rolling count value <> previous message rolling count value plus one Requested torque intervention type toggles from not increasing request to increasing request	Serial communication to EBTCM (U0108) Power Mode Propulsion System Status of traction in GMLAN message ($4E9)	No loss of communication = Run = Active = Traction Present	**All except Class2 PWM:** Count of 2's complement values not equal >= 10 Performed every 25 msec 6 rolling count failures out of 10 samples Performed every 25 msec >= 3 multi-transitions out of 5 samples Performed every 200 msec	1 trip(s) Special Type C
Motor Electronics Coolant Temperature Sensor Circuit Range/Performance	P0A01	Range/Performance	Cold Start Fail: Delta between powerup PECL temp and coolant temp & Delta between powerup ECT and IAT	> 30.0° C <= 15.75 ° C	Engine off time	> 28800.0 seconds		Type B 2 Trip(s)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Cold Start Pass: Delta between powerup PECL temp and coolant temp & Delta between powerup ECT and IAT	<= 15.75° C <= 15.75° C	No active DTC's:	IAT_SensorFA ECT_Sensor_Ckt_FA MAF_SensorFA P0A01 P0A02		
Motor Electronics Coolant Temperature Sensor Circuit Low	P0A02	Out of range low	Motor Electronics Coolant Temperature	≤ 162.1°C	Minimum IAT Propulsion active time No active DTC's:	< 70.0ºC > 10.0 seconds P0112 P0113	(30.0 fail/50.0 sample; 100 ms frequency)	Type B 2 Trip(s)
Motor Electronics Coolant Temperature Sensor Circuit Hi	P0A03	Out of range high	Motor Electronics Coolant Temperature	≤ -59.1°C	Minimum IAT Propulsion active time No active DTC's:	< 200000.0ºC > 10.0 seconds P0112 P0113	(30.0 fail/50.0 sample; 100 ms frequency)	Type B 2 Trip(s)
Hybrid Prowtrain 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 2.5000 sec All other parameters and enable conditions are controlled by the PLD and MCPA processors in the HCP.	3/4 counts; 12.5ms /count	Trips: 2 Type: B MIL: YES
Hybrid Prowertrain 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	Continuous 100 msec	1 trips Type A (No MIL)
Inlet Airflow System Performance (naturally aspirated	P1101	Determines if there are multiple air induction problems affecting airflow	Filtered Throttle Model Error	<= 150 kPa*(g/s)	Engine Speed Engine Speed Coolant Temp	>= 450 RPM <= 5700 RPM > -7 Deg C	Continuous Calculation are	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
applications)		and/or manifold pressure.	AND (ABS(Measured Flow – Modeled Air Flow) Filtered OR ABS(Measured MAP – MAP Model 1) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	> 10 grams/sec > 15.0 kPa) > 15.0 kPa	Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	< 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 See table "IFRD Residual Weighting Factors".	performed every 12.5 msec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					No Active DTCs:	MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_sensor_FA ECT_Sensor_FP IAT_SensorFA IAT_SensorCircuitFP CylDeacSystemTFTKO		
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	Engine Coolant For	≥ 132 °C ≥ 10 seconds	Engine Run Time 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.	≥ 10 Seconds	Fault present for ≥ 0 seconds	1 trips Type A
ABS Rough Road malfunction IF KeMSFD_b_MonitorRoughRoad and not GetRRDR_b_TOS_BasedRoughRoad	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 Engine Speed Engine Load RunCrankActive Active DTC	VSS ≥ 3 mph rpm < 8192 load < 60 = TRUE P0300, MIL Request	40 failures out of 80 samples 250 ms /sample Continuous	1 Trips Type C "Special Type C"
ABS System Rough Road Detection Communication Fault IF KeMSFD_b_MonitorRoughRoad and not GetRRDR_b_TOS_BasedRoughRoad	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 Engine Speed Engine Load RunCrankActive Active DTC	VSS ≥ 3 mph rpm < 8192 load < 60 = TRUE P0300, MIL Request	40 failures out of 80 samples 250 ms /sample Continuous	1 Trips Type C "Special Type C"

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	< 1.24 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			
					AcceleratorPedalFailure			
					ECT_Sensor_FA			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					IAT_SensorCircuitFA			
					IAT2_SensorCircuitFA			
					CrankSensorFaultActive			
					FuelInjectorCircuit_FA			
					MAF_SensorFA			
					MAP_SensorFA			
					EngineMisfireDetected_FA			
					Clutch Sensor FA			
					IAC_SystemRPM_FA			
					IgnitionOutputDriver_FA			
					TPS_FA			
					VehicleSpeedSensor_FA			
					5VoltReferenceMAP_OOR_Flt			
					TransmissionEngagedState_FA			
					EngineTorqueEstInaccurate			
Throttle Actuator Control - Position Performance	P1516	Detect a throttle positioning error	The throttle model and actual Throttle position differ by > or The actual Throttle position and throttle model differ by >	7.196%. 7.196%.	Engine Running or Ignition Voltage > and Ignition Voltage > 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)	Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions 11 5.4	0.1875 sec in the secondary processor	Trips: 1 Type: A MIL: YES

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		Detect throttle control is driving the throttle in the incorrect direction	Thottle Position >	39.761	(Throttle is being Controlled and TPS minimum learn is active) or Reduce Engine Power is Active	Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.1375 sec continuous	
		Degraded Motor	Desired throttle position is stable within 0.25% for 4.0000 sec and the delta between Indicated throttle position and desired throttle position in greater than 2.00%		Engine Running or Ignition Voltage > and Ignition Voltage > 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)	Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions 11 5.4	0.4875 sec continuous on secondary processor	
Hybrid Control Torque Request Circuit	P15F2	Determines if torque request from the HCP is valid	1. Serial Communication 2’s complement not equal for message $0A9	Message <> 2's complement of	Secondary High Speed Bus is Present		>= 10 Password Protect errors out of 16 samples	1 trip(s) Type A

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			OR 2. Serial Communication rolling count value shall be + 1 from previous $0A9 message	message Message rolling count value <> previous message rolling count value plus one	No Serial communication loss to HCP (U1817) Run Crank Active	>= 0.50 Sec	OR >= 10 Rolling count errors out of 16 samples Performed every 12.5 msec	
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 Message <> previous message rolling count value + one	Vehicle Requested Speed Limit	< 217 Kph	>= 10 Password Protect errors out of 10 samples >= 10 Rolling count errors out of 10 samples Performed every 25 msec	1 trip(s) Type C
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| >	3.00 Volts	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 or 0.1750 sec continuous; 12.5 msec/count in main processor	Trips: 1 Type: A MIL: YES

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions		
Internal Control Module Redundant Memory Performance	P16F3	Detect Processor Calculation faults due to RAM corruptions, ALU failures and ROM failures						Trips: 1 Type: A MIL: YES
			Desired engine torque request greater than redundant calculation plus threshold	61.77 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
			Cylinders active greater than commanded	1 cylinder		Engine speed greater than 0rpm and less than 3200 rpm	11/12 counts; each cylinder firing event/count	
			Engine min capacity above threshold	61.77 Nm		Ignition in unlock/accessory, run or crank	3/4 counts; 12.5 ms/count	
			No fast unmanaged retarded spark above the applied spark plus the threshold	Table, f(Erpm). See supporting tables		LoRes if engine rpm < 4500/4700 rpm (hysteresis pair) 6.25ms if engine rpm >= 4500/4700 rpm (hysteresis pair)	6/8 counts; each cylinder firing event/count	
			Absolute difference of adjustment factor based on temperature and its dual store above threshold	3.99 m/s		Ignition in unlock/accessory, run or crank	2/4 counts; 100.0 ms/count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			1) Absolute difference of redundant calculated engine speed above threshold 2)Time between lores events and its dual store do not equal	1) Table, f(Erpm). See supporting tables		Engine speed greater than 0 rpm	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; 12.5 ms/count	
			Engine oil temperature and its dual store do not equal	N/A		Ignition in unlock/accessory, run or crank	3/4 counts; 50.0 ms/count	
			Desired throttle position greater than redundant calculation plus threshold	7.20 %.		Ignition in unlock/accessory, run or crank	8/16 counts; 12.5 ms/count	
			Absolute difference of the rate limited pre-throttle pressure and its redundant calculation greater than threshold	0.72 kpa/sec		Ignition in unlock/accessory, run or crank	8/16 counts; 12.5 ms/count	
			Throttle desired torque above desired torque plus threshold	0.00 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
			Desired filtered throttle	62.77 Nm		Ignition in	4/8 counts; 25.0	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			torque exceeds the threshold plus the higher of desired throttle torque or modeled throttle torque			unlock/accessory, run or crank	ms/count	
			Torque feedback proportional term is out of allowable range or its dual store copy does not match	High Threshold 31.39 Nm Low Threshold -31.39 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/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 62.77 Nm Low Threshold -62.77 Nm Rate of change threshold 7.85Nm/loop		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
			Difference of Final Torque feedback proportional plus integral term and its redundant calculation is out of bounds given by threshold range	High Threshold 0.00 Nm Low Threshold 0.00 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/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; 25.0 ms/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; 25.0 ms/count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Difference of base friction torque and its redundant calculation is out of bounds given by threshold range	High Threshold 1.00 Nm Low Threshold 1.00 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
			Accessory drive friction torque is out of bounds given by threshold range	High Threshold 62.77 Nm Low Threshold 0.00 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
			AC friction torque is out of bounds given by threshold range	High Threshold 62.77 Nm Low Threshold 0.00 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
			Difference of Oil temperature delta friction torque and its redundant calculation is out of bounds given by threshold range	High Threshold 1.00 Nm Low Threshold 1.00 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
			Generator friction torque is out of bounds given by threshold range	High Threshold 62.77 Nm Low Threshold 0.00 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
			Supercharger friction torque is out of bounds given by threshold range	High Threshold 62.77 Nm Low Threshold 0.00 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			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 62.77 Nm Low Threshold -62.77 Nm Rate of change threshold 7.85 Nm/loop		Engine speed >0rpm MAF, MAP and Baro DTCs are false	4/8 counts; 25.0 ms/count	
			Torque error compensation is out of bounds given by threshold range	High Threshold 62.77 Nm Low Threshold 0.00 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
			Delta Torque Baro compensation is out of bounds given by threshold range	High Threshold 16.70 Nm Low Threshold -12.68 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/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 exeed threshold 3) Rate of change of reserve torque exceeds threshold, increasing direction only 4) Reserve engine torque above allowable capacity by the threshold	1) 61.77 Nm 2) NA 3) 61.77 Nm 4) 61.77 Nm		1&2) Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 62.77 Nm 3&4) Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			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< 2900.00 rpm, each cylinder firing event/count or if engine rpm >= 2900.00 rpm, 12.5 ms/count	
			Engine Vacuum and its dual store do not match	N/A		Ignition in unlock/accessory, run or crank	8/16 counts; 12.5 ms/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	1946.19 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
			Predicted torque for zero pedal determination is greater than threshold	62.77 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
			Commanded Predicted Axle Torque and its dual	1 Nm		Ignition in unlock/accessory, run	4/8 counts; 25.0 ms/count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			store do not match			or crank		
			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; 25.0 ms/count	
			Difference of Weighting factor for number of cylinders fueled and its redundant calculation is above threshold	0.26		Engine run flag = TRUE > 1.00 s	6/8 counts; 25.0 ms/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< 4500 rpm, 12.5msec/count or if engine rpm >= 4500 rpm, 50 ms/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< 4500/4700 rpm (hysteresis pair), each cylinder firing event/count or if engine rpm >= 4500/4700 rpm (hysteresis pair), 6.25 ms/count	
			Estimated Engine Torque	62.77 Nm		Engine speed >0rpm	4/8 counts; 25.0	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			and its dual store are not match				ms/count	
			Estimated Engine Torque without reductions due to torque control and its dual store are not match	62.77 Nm		Engine speed >0rpm	4/8 counts; 25.0 ms/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; 12.5 ms/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) > 62.77 Nm	6/8 counts; if engine rpm< 4500/4700 rpm (hysteresis pair), each cylinder firing event/count or if engine rpm >= 4500/4700 rpm (hysteresis pair), 6.25 ms/count	
			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	62.77 Nm		Engine speed >0rpm	4/8 counts; 25.0 ms/count	
			One step ahead calculation of air-per-	41.00 g/s		Engine speed >0rpm	6/8 counts; each cylinder firing	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			cylinder and its dual store do not match				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: 100 ms Fault Active Threshold: 175 ms		Engine speed > 500 rpm	175.0000 ms contiuous	
			Rate limited cruise axle torque request and its dual store do not match	243.27 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/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	1) 1.00 % 2) NA 3) NA		Ignition in unlock/accessory, run or crank	8/16 counts; 12.5 ms/count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			learn and error conditions and its dual store do not equal 3) Absolute difference of Calculated accelerator pedal position and its dual store do not equal					
			Commanded axle torque is greater than its redundant calculation by threshold	1946.00 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
			Commanded axle torque is less than its redundant calculation by threshold	-1460.00 Nm		Ignition in unlock/accessory, run or crank Redundant commanded axle torque < -1460.00 Nm	4/8 counts; 25.0 ms/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	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			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; 25.0 ms/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; 25.0 ms/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; 25.0 ms/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; 25.0 ms/count	
			Shaped driver axle torque is out of bounds given by threshold range	High Threshold 1946.00 Nm Low Threshold -2920.00 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			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; 12.5 ms/count	
			Rate limited vehicle speed and its dual store do not equal	NA		Time since first CAN message with vehicle speed >= 0.500 sec	4/8 counts; 25.0 ms/count	
			transfer case neutral and its dual store do not equal	NA		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
			Throttle progression mode and its dual store do not equal	NA		Ignition in unlock/accessory, run or crank	8/16 counts; 12.5 ms/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; 25.0 ms/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; 25.0 ms/count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Cylinders active greater than commanded	2 cylinders		Engine run flag = TRUE > 2.00 s 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	62.77 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
			Absolute difference of Accessory torque and its redundant calculation is out of bounds given by threshold range	62.77 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
			Absolute difference of Filtered Air-per-cylinder and its redundant calculation is out of bounds given by threshold range	41.00 mg		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/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	3.17 degrees			6/8 counts; if engine rpm< 4500/4700 rpm (hysteresis pair), each cylinder firing event/count or if engine rpm >= 4500/4700 rpm	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
							(hysteresis pair), 6.25 ms/count	
			Equivance Ratio torque compensation exceeds threshold	-62.77 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
			Absolute difference between Equivance Ratio torque compensation and its dual store out of bounds given bt threshold	62.77 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
			Zero pedal axle torque is out of bounds given by threshold range	High Threshold 1946.00 Nm Low Threshold -1500.00 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
			Creep Coast Axle Torque is out of bounds given by threshold range	High Threshold 1946.00 Nm Low Threshold -1500.00 Nm		Ignition in unlock/accessory, run or crank	4/8 counts; 25.0 ms/count	
Throttle Actuator Control - Position Performance	P2101	Detect a throttle positioning error	The throttle model and actual Throttle position differ by > or The actual Throttle position and throttle model 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	15/15 counts; 12.5 ms/count in the primary processor	Trips: 1 Type: A MIL: YES

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			differ by >	7.196 %.	Engine Running or Ignition Voltage > and Ignition Voltage > 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)	11 5.5		
		Detect throttle control is driving the throttle in the incorrect direction or exceed the reduced power limit	Thottle Position >	39.26 %.	TPS minimum learn is active	Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	11 counts; 12.5 ms/count in the primary processor	
			Thottle Position >	39.06 %.	Reduce Engine Power is Active			
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	0.4969 sec continuous	Trips: 1 Type: C MIL: NO
APP1 Circuit	P2120	Detects a continuous or intermittent short or open in APP1 circuit on the secondary processor but sensor is in range on the	Secondary APP1 Voltage < or Secondary APP1 Voltage >	0.463 4.75		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure	19/39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	Trips: 1 Type: A MIL:

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		primary processor				will be reported for all conditions No 5 V reference #2 error No 5 V reference #2 DTC (P0651)		YES
APP1 Circuit Low	P2122	Detects a continuous or intermittent short or open in APP1 circuit on both processors or just the primary processor	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	19/39 counts or 14 counts continuous; 12.5 ms/count in the primary processor	Trips: 1 Type: A MIL: YES
			Secondary APP1 Voltage <	0.463		No 5 V reference #2 error No 5 V reference #2 DTC (P0651)	19/39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	
APP1 Circuit High	P2123	Detects a continuous or intermittent short in APP1 circuit on both processors or just the primary processor	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	19/39 counts or 14 counts continuous; 12.5 ms/count in the primary processor	Trips: 1 Type: A MIL: YES
			Secondary APP1 Voltage >	4.75		No 5 V reference #2 error	19/39 counts or 14 counts continuous; 12.5 ms/count in the	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						No 5 V reference #2 DTC (P0651)	secondary processor	
APP2 Circuit	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 < or Secondary APP2 Voltage >	0.325 2.6		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 #1 error No 5 V reference #1 DTC (P0641)	19/39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	Trips: 1 Type: A MIL: YES
APP2 Circuit Low	P2127	Detects a continuous or intermittent short or open in APP2 circuit on both processors or just the primary processor	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 No 5 V reference #1 error No 5 V reference #1 DTC (P0641)	19/39 counts or 14 counts continuous; 12.5 ms/count in the primary processor	Trips: 1 Type: A MIL: YES
			Secondary APP2 Voltage <	0.325			19/39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	
APP2 Circuit High	P2128	Detects a continuous or intermittent short in APP2 circuit on both processors or just the primary	Primary APP2 Voltage >	2.6		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is	19/39 counts or 14 counts continuous; 12.5 ms/count in the primary processor	Trips: 1 Type: A

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		processor				false, else the failure will be reported for all conditions		MIL: YES
			Secondary APP2 Voltage >	2.6		No 5 V reference #1 error No 5 V reference #1 DTC (P0641)	19/39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	
Throttle Position (TP) Sensor 1-2 Correlation	P2135	Detects a continuous or intermittent correlation fault between TPS sensors #1 and #2 on primary or secondary processor	Difference between TPS1 displaced and TPS2 displaced >	6.999 % offset at min. throttle position with a linear threshold to 9.699 % at max. throttle position		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 ms/count in the primary processor	Trips: 1 Type: A MIL: YES
			Difference between (normalized min TPS1) and (normalized min TPS2) >	5.000 % Vref		No TPS sensor faults (P0120, P0122, P0123, P0220, P0222, P0223) No 5V reference error or fault for # 2 5V reference circuit (P0651)		
			Difference between TPS1 displaced and TPS2 displaced >	6.998 % offset at min. throttle position with a linear threshold to 9.698 % at max. throttle position		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 ms/count in the secondary processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Difference between (normalized min TPS1) and (normalized min TPS2) >	5.000 % Vref		No TPS sensor faults (P0120, P0122, P0123, P0220, P0222, P0223) No 5V reference error or fault for # 2 5V reference circuit (P0651)		
Throttle Position (TP) Sensor 1-2 Correlation	P2138	Detects a continuous or intermittent correlation fault between APP sensors #1 and #2 on primary or secondary processor	Difference between APP1 displaced and APP2 displaced >	9.509 % offset at min. pedal position with a linear threshold to 10.009 % 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	19/39 counts or 15 counts continuous; 12.5 ms/count in the primary processor	Trips: 1 Type: A MIL: YES
			Difference between (normalized min APP1) and (normalized min APP2) >	5.000 % Vref		No APP sensor faults (P2120, P2122, P2123, P2125, P2127, P2128) No 5V reference error or fault for #1 or # 2 5V reference circuits (P0641, P0651)		
			Difference between APP1 displaced and APP2 displaced >	9.509 % offset at min. pedal position with a linear threshold to 10.009 % 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	19/39 counts or 15 counts continuous; 12.5 ms/count in the secondary processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Difference between (normalized min APP1) and (normalized min APP2) >	5.000 % Vref		No APP sensor faults (P2120, P2122, P2123, P2125, P2127, P2128) No 5V reference error or fault for #1 or # 2 5V reference circuits (P0641, P0651)		
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 MPH	Vehicle speed correlation diagnostic enabled	Enabled	400/800 counts for wheel speed correlation or 400/800 counts for TOS correlation or 1600/800 for Motor correlation	1 Trip(s)
			Secure vehicle speed source is unavailable		CAN timer	> 1 seconds	Performed every 25 msec	Type A
						Secure vehicle speed source is TOS, wheel speed or Motor Speed		
						Trans engaged state is engaged.		
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 RPM		
					Wheel Speed RPM Low	>= 100 RPM		
					Input Speed	>= 1000 RPM		
					Transmission Range ≠ Park or Neutral			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					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 minmum 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	2.0 secs continuous	Trips: 1 Type: A MIL: YES
			or					
			During TPS min learn on the Secondary processor, TPS Voltage >		No TPS circuit errors			
					No TPS circuit faults			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
				18.700 %.	P1682 is not active			
					Minimum TPS learn active			
			and					
			Number of learn attempts >	10 counts				
			AND					
			TPS2 Voltage >	1.789	Throttle de-energized			
			On the Primary processor					
					No TPS circuit faults			
			OR					
			TPS1 Voltage >	1.689	PT Relay Voltage >	5.5		
			AND					
			TPS2 Voltage >	1.789				
			On the Secondary processor					
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	> 0.85	System Voltage	*10 <= V <= 32 for >= 4 seconds*	Frequency: Continuous Monitoring of O2 voltage signal in 12.5ms loop	2 Trip(s) Type B
					ECT	> -20 oC		
					Engine speed	*425 <= rpm <= 6000*		
			OR		Mass Airflow	*0.5 <= g/s <= 510.0*		
			Bank 1 AFM (DoD) Filtered Length Ratio variable (AFM applications only)	> 0.85	Air Per Cylinder	*0 <= mg/cylinder <= 2000*		
					% Ethanol	<= 87 %		
		To improve S/N, pre-	AND		Positive (rising) Delta O2 voltage during previous 12.5ms is	> 0.0 millivolts	The AFIM Filtered Length Ratio variable is updated	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		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.	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.	1000 and 0 millivolts	OR Negative (falling) Delta O2 voltage during previous 12.5ms is		after every 2.50 seconds of valid data.	
					OR			
					Negative (falling) Delta O2 voltage during previous 12.5ms is	< 0.0 millivolts		
					For AFM (Cylinder Deactivation) vehicles only	No AFM state change during current 2.50 second sample period.	The first report is delayed for 85 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.	
					O2 sensor switches	>= 1 times during current 2.50 second sample period		
					Quality Factor	>= 0.80 in the current operating region		
					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			
		Monitor Strategy Notes: The AFIM Filtered Length Ratio is derived from the pre-O2 sensor voltage metric known as String Length. String Length is simply the curve length of	The AFIM Filtered Length Ratio is the difference between the measured String Length and a 17x17 table lookup value,divided by the same lookup value, and finally multiplied by a	The Quality Factor (QF) calibrations are located in a 17x17 lookup table versus engine speed and load (see Supporting	No EvapFlowDuringNonPurge_FA			
					No EvapVentSolenoidCircuit_FA			
					No EvapSmallLeak_FA			
					No EvapEmissionSystem_FA			
					No FuelTankPressureSensorCircuit_FA			
					Device Control Not Active			
					Intrusive Diagnostics Not Active			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		the O2 sensor voltage over a fixed time period of 2.50 seconds. The reason we use String Length is because it comprehends both O2 signal frequency and amplitude in one metric. The busier the O2 voltage (an indication of imbalance), the longer the String Length will be.	Quality Factor (the latter ranges between 0 and 1, based on robustness to false diagnosis in the current operating region). The reason we use a ratio of the String Lengths is so that we can normalize the failure metric over various engine speed and load regions since engine speed and load directly impact pre-O2 String Length, especially when AFIM failures are present. In order to filter out signal noise (to avoid false failures), the Length Ratio is filtered using a common first-order lag filter. The result is the AFIM Filtered Length Ratio.	Tables). A QF of “1” is an indication that we were able to achieve at least 4sigma/2sigma robustness in that speed/load region. QF values less than “1” indicate that we don’t have 4sigma/2sigma robustness in that region. The quality of the data is determined via statistical analysis of String Length data. QF values less than 0.80 identify regions where diagnosis is not possible.	Engine OverSpeed Protection Not Active			
					Reduced Power Mode (ETC DTC) Not Active			
					PTO Not Active			
					Traction Control Not Active			
					Fuel Control Status			
					Closed Loop Long Term FT	for >= 2.0 seconds, and Enabled **Please see "Closed Loop Enable Criteria" and "Long Term FT Enable Criteria" in Supporting Tables.**		
					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* *Note: This protects against false diagnosis during severe transient maneuvers.*		
					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		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						transitions from Disabled to Enabled		
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	> 0.50	System Voltage	*10 <= V <= 32 for >= 4 seconds*	Frequency: Continuous Monitoring of O2 voltage signal in 12.5ms loop	2 Trip(s) Type B
					ECT	> -20 oC		
					Engine speed	*425 <= rpm <= 6000*		
			OR		Mass Airflow	*0.5 <= g/s <= 510.0*		
			Bank 2 AFM (DoD) Filtered Length Ratio variable (AFM applications only)	> 0.50	Air Per Cylinder	*0 <= mg/cylinder <= 2000*		
					% Ethanol	<= 87 %		
		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.	**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.	1000 and 0 millivolts	Positive (rising) Delta O2 voltage during previous 12.5ms is OR Negative (falling) Delta O2 voltage during previous 12.5ms is	> 0.0 millivolts	The AFIM Filtered Length Ratio variable is updated after every 2.50 seconds of valid data.	
					OR			
					Negative (falling) Delta O2 voltage during previous 12.5ms is	< 0.0 millivolts		
					For AFM (Cylinder Deactivation) vehicles only	No AFM state change during current 2.50 second sample period.	The first report is delayed for 90 seconds to allow time for the AFIM Filtered Length Ratio variable to saturate. This minimizes the possibility of reporting a pass before a potential	
					O2 sensor switches	>= 1 times during current 2.50 second sample period		
					Quality Factor	>= 0.80 in the current		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						operating region	before a potential failure could be detected.	
					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			
		Monitor Strategy Notes: The AFIM Filtered Length Ratio is derived from the pre-O2 sensor voltage metric known as String Length. String Length is simply the curve length of the O2 sensor voltage over a fixed time period of 2.50 seconds. The reason we use String Length is because it comprehends both O2 signal frequency and amplitude in one metric. The busier the O2 voltage (an indication of imbalance), the longer the String Length will be.	The AFIM Filtered Length Ratio is the difference between the measured String Length and a 17x17 table lookup value,divided by the same lookup 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 reason we use a ratio of the String Lengths is so that we can normalize the failure metric over various engine speed and load regions since engine speed and load directly impact pre-O2 String Length, especially when AFIM failures are present. In order to filter out signal noise (to avoid false failures), the Length Ratio is filtered using a common first-order lag filter. The result is the AFIM Filtered Length Ratio.	The Quality Factor (QF) calibrations are located in a 17x17 lookup table versus engine speed and load (see Supporting Tables). A QF of “1” is an indication that we were able to achieve at least 4sigma/2sigma robustness in that speed/load region. QF values less than “1” indicate that we don’t have 4sigma/2sigma robustness in that region. The quality of the data is determined via statistical analysis of String Length data. QF values less than 0.80 identify regions where diagnosis is not possible.	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			
					Fuel Control Status			
					Closed Loop Long Term FT	for >= 2.0 seconds, and Enabled **Please see "Closed Loop Enable Criteria" and "Long Term FT Enable Criteria" in Supporting Tables.**		
					Cumulative (absolute) delta MAF during the current 2.50 second	*< 150 g/s* *Note: This protects*		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					sample period is Note: This protects against false diagnosis during severe transient maneuvers.	*against false diagnosis during severe transient maneuvers.*		
					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		
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 < 100 KPH > 30.00 seconds AmbientAirPressCktFA ECT_Sensor_FA IAT_SensorFA MAF_SensorFA AfterThrottlePressure_NA or 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	P2228	Detects a continuous short to low or open in	BARO Voltage	< 40.0 % of 5 Volt Range (2.0 Volts =	Engine Run Time	> 30.00 seconds	20 failures out of 25 samples	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Circuit Low		either the signal circuit or the BARO sensor.		50.9 kPa)			1 sample every 12.5 msec	
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 (during coast) which increases the delivered fuel to achieve the required rich threshold.	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 threshold before the above voltage threshold is met.	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 AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA CatalystTempFA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	2 trips Type B
					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		
					ICAT MAT Burnoff delay	= Not Valid		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B1S2)** in Supporting Tables tab.		
					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		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater on Time	>= 80.0 sec		
					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 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	Post O2 sensor cannot achieve the lean threshold voltage. AND AND	1) Post O2S signal > 100 mvolts AND 2) Accumulated air	No Active DTC's	TPS_ThrottleAuthority Defaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		sensor fuel control or for catalyst monitoring. The diagnostic is an intrusive test which requests the DFCO mode to achieve the required lean threshold.	The Accumulated mass air flow monitored during the Stuck Rich Voltage Test is greater than the threshold before the above voltage threshold is met.	flow during stuck rich test > 90 grams.		AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA CatalystTempFA	Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	
					B1S2 Failed this key cycle	P013A, P013B, P013E, P013F or		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B1S2)** in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		
					Engine Speed	900 <= RPM <= 2500		
					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		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					EGR Intrusive diagnostic All post sensor heater delays O2S Heater on Time Predicted Catalyst temp Fuel State DTC's Passed DTC's Passed DTC's Passed	= not active = not active >= 80.0 sec 550 ºC <= Cat Temp <= 900 ºC = DFCO possible = P2270 (and P2272 (if applicable)) = P013E (and P014A (if applicable)) = P013A (and P013C (if applicable))		
					After above conditions are met: DFCO mode entered (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 delivered fuel to achieve the required rich threshold.	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 threshold before the above voltage threshold is met.	1) Post O2S signal < 791 mvolts AND 2) Accumulated air flow during stuck lean test > 160 grams.	No Active DTC's B2S2 Failed this key cycle	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 CatalystTempFA P013C, P013D, P014A, P014B, P2272 10.0 volts < system	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					System Voltage	voltage< 32.0 volts		
					Learned heater resistance	= Valid		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B2S2)** in Supporting Tables tab.		
					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		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater on Time	>= 80.0 sec		
					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	P2273	This DTC determines if the post catalyst O2	Post O2 sensor cannot achieve the lean threshold	1) Post O2S signal > 100 mvolts	No Active DTC's	TPS_ThrottleAuthority Defaulted	Frequency: Once per trip	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Sensor 2		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.	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.	AND 2) Accumulated air flow during stuck rich test > 90 grams.		ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA CatalystTempFA	Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	
					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		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B2S2)** in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		
					Engine Speed	900 <= RPM <= 2500		
					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		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Evap	not in control of purge		
					Ethanol	not in estimate mode		
					Post fuel cell	= enabled		
					Power Take Off	= not active		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater on Time	>= 80.0 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 entered (wo driver initiated pedal input).			
Engine Hood Switch Circuit	P254F	Circuit Performance	Hood Switch 1 State ≠ Hood Switch 2 State		Run/crank voltage is in range	<= 32.0 V and >= 11.0 V	0.5 seconds	2 Trip(s)
					Hood switch diagnostic enabled	Enabled	Performed every 25 msec	Type B
ECM/PCM Internal Engine Off Timer Performance	P2610	This DTC determines if the engine off timer does not initialize or count properly. Clock rate test: Checks the accuracy of the 1 second timer by comparing it with the 12.5 ms timer	Initial value test: Initial ignition off timer value OR Initial ignition off timer value Clock rate test: Time between ignition off	< 0 seconds > 10 seconds	ECM is powered down IAT Temperature	-40 °C ≤ Temperature ≤ 125 °C	Initial value test: 3 failures 1.375 sec / sample Clock rate test:	2 trips Type B DTC sets on next key cycle if failure detecte d

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			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	< 0.8 seconds > 1.2 seconds ≥ 1.375 seconds ≠ 1			8 failures out of 10 samples 1 second / sample test runs once each key-off	
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 C 1 Trip(s) 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	>= (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 C 1 Trip(s) 4 Wheel Drive Only

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Supporting Tables Tab					
Four Wheel Drive (4WD) u Range Performance	P279C	Transfer Case Mode in GMLAN frame $2D1 = NEUTRAL	Transfer Case Measured Ratio ≠ High Range AND ≠ Low Range Please see "See NETURAL ratio margin" in Supporting Tables Tab		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 C 1 Trip(s) 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** Total filtered residual weight factors ECT IAT Engine RPM	 >= 0 factor > -7 and < 125 Deg C > -20 and < 125 Deg C > 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	2 trip(s)
					Engine running	> 20.0 seconds		Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						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	
					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	>= 28 KPH		
					FCO not active for	>= 3.0 Seconds		
					Time since last cylinder deac mode event	>= 3.0 Seconds		
					Gear Shift	Not currently in progress		
						Not currently in		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					AC Clutch transition	progress		
					Stored Oxygen Retreival 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.		
					PRNDL state	HalfCylDisabledPRNDL and HalfCylDisabledPRNDLDeviceControl tables (when in device control) - See details on Supporting Tables Tab (P3400 Section)		
					Oil aeration present	Aeration enabled by engine RPM > 3100 for 10 seconds, disabled by engine RPM < 3000 for 50 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	Not currently in fuel		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					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	< 18 Deg C or > 130 Deg C		
					Engine Oil Pressure	< 172 kPa or > 470 kPa		
					Oil aeration present	Aeration enabled by engine RPM > 3100 for 10 seconds, disabled by engine RPM < 3000 for 50 seconds		
					Engine Metal Overtemp Protection			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						Active		
					In device control only, when in Park or Neutral, vehicle speed	<= 8.0 KPH		
					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	< 22.0 KPH		
					Brake booster vacuum	< 0.0 kPa		
					Filtered engine vacuum	> HalfCylToAllCylVacuum - See details on Supporting Tables Tab (P3400 Section) for 0.00 sec.		
					ETC Power management mode	Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					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 IAT_SensorFA CylnderDeacDriverTFTKO FourWheelDriveLowStateInvalid EngineTorqueEstInaccurate TransmissionGearDefaulted EnginePowerLimited		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
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 Volts Enabled	20 failures out of 25 samples Performed every 250 msec	2 trip(s) Type B
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 Volts Enabled	20 failures out of 25 samples Performed every 250 msec	2 trip(s) Type B
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 Diagnostic enabled/ disabled	>= 400.0 RPM <= 32.0 and >= 11.0 Volts Enabled	20 failures out of 25 samples Performed every 250 msec	2 trip(s) Type B
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 Ignition Voltage Diagnostic enabled/ disabled	>= 400.0 RPM <= 32.0 and >= 11.0 Volts Enabled	20 failures out of 25 samples Performed every 250 msec	2 trip(s) Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Control Module Communication Bus A Off	U0073	This DTC monitors for a BUS A off condition	Bus off failures	≥ 4 counts	CAN hardware is bus OFF for	> 0.1125 seconds	Diagnostic runs in 12.5 ms loop	1 Trip(s)
			out of these samples	≥ 5 counts	Diagnostic enable timer	> 3.0000 seconds		Type A
Control Module Communication Bus B Off	U0074	This DTC monitors for a BUS B off condition	Bus off failures	≥ 4 counts	CAN hardware is bus OFF for	> 0.1125 seconds	Diagnostic runs in 12.5 ms loop	1 Trip(s)
			out of these samples	≥ 5 counts	Diagnostic enable timer	> 3.0000 seconds		Type A
					Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts		
Lost Communication With TCM	U0101	This DTC monitors for a loss of communication with the transmission control module	Message is not received from controller for this amount of time.	Type B time = 10s Type C time = 12s Torque Security Ucode = varied and possibly much shorter time.	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	The fail diagnostic runs in the 6.25 ms loop with pass conditions reported to the DFIR in the 1000ms loop.	1 Trip(s)
					Power mode is RUN			Type A
					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.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
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.	Type B time = 10s Type C time = 12s Torque Security Ucode = varied and possibly much shorter time.	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	The fail diagnostic runs in the 6.25 ms loop with pass conditions reported to the DFIR in the 1000ms loop.	2 Trip(s)
					Power mode is RUN			Type B
					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.	Type B time = 10s Type C time = 12s Torque Security Ucode = varied and possibly much shorter time.	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	The fail diagnostic runs in the 6.25 ms loop with pass conditions reported to the DFIR in the 1000ms loop.	2 Trip(s)
					Power mode is RUN			Type B
					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		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					A message has been selected to monitor.			
Lost Communication With Brake System Control Module	U0129	This DTC monitors for a loss of communication with the Brake System Control Module.	Message is not received from controller for this amount of time.	Type B time = 10s Type C time = 12s Torque Security Ucode = varied and possibly much shorter time.	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	The fail diagnostic runs in the 6.25 ms loop with pass conditions reported to the DFIR in the 1000ms loop.	2 Trip(s)
					Power mode is RUN			Type B
					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 Body Control Module	U0140	This DTC monitors for a loss of communication with the Body Control Module.	Message is not received from controller for this amount of time.	Type B time = 10s Type C time = 12s Torque Security Ucode = varied and possibly much shorter time.	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	The fail diagnostic runs in the 6.25 ms loop with pass conditions reported to the DFIR in the 1000ms loop.	1 Trip(s)
					Power mode is RUN			Type C
					Communication bus is not OFF			Special Type C
					or is typed as a C code			
					Normal Communication is enabled			
					Normal Transmit capability is TRUE			
					The diagnostic system is not disabled			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					The bus has been on for	> 3.0000 seconds		
					A message has been selected to monitor.			
Lost Communication With Hybrid Powertrain Control Module	U0293	This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module.	Message is not received from controller for this amount of time.	Type B time = 10s Type C time = 12s Torque Security Ucode = varied and possibly much shorter time.	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	The fail diagnostic runs in the 6.25 ms loop with pass conditions reported to the DFIR in the 1000ms loop.	1 Trip(s)
					Power mode is RUN			Type A
					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 MCP A on Bus B	U1815	This DTC monitors for a loss of communication with the MCP A Module on Bus B.	Message is not received from controller for this amount of time.	Type B time = 10s Type C time = 12s Torque Security Ucode = varied and possibly much shorter time.	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	The fail diagnostic runs in the 6.25 ms loop with pass conditions reported to the DFIR in the 1000ms loop.	2 Trip(s)
					Secondary CAN BUS is enabled	Enabled		Type B
					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 Hybrid Powertrain Control Module on Bus B	U1817	This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module on Bus B.	Message is not received from controller for this amount of time.	Type B time = 10s Type C time = 12s Torque Security Ucode = varied and possibly much shorter time.	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	The fail diagnostic runs in the 6.25 ms loop with pass conditions reported to the DFIR in the 1000ms loop.	1 Trip(s)
					Secondary CAN BUS is enabled	Enabled		Type A
					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 on Bus B	U1820	This DTC monitors for a loss of communication with the Brake System Control Module on Bus B.	Message is not received from controller for this amount of time.	Type B time = 10s Type C time = 12s Torque Security Ucode = varied and possibly much shorter time.	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	The fail diagnostic runs in the 6.25 ms loop with pass conditions reported to the DFIR in the 1000ms loop.	2 Trip(s)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Secondary CAN BUS is enabled	Enabled		Type B
					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.			

ECM Supporting Tables

Closed Loop Enable Criteria

Engine run time greater than
KtFSTA_t_ClosedLoopAutostart **(HYBRID ONLY)**

AutoStart Coolant	-40	-28	-16	-4	8	20	32	44	56	68
Close Loop Enable Time	120.0	90.0	65.0	45.0	25.0	10.0	10.0	0.0	0.0	0.0

80	92	104	116	128	140	152
0.0	0.0	0.0	0.0	0.0	0.0	0.0

and
KtFSTA_t_ClosedLoopTime

Start-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68
Close Loop Enable Time	120.0	90.0	65.0	45.0	25.0	10.0	10.0	10.0	10.0	10.0

80	92	104	116	128	140	152
10.0	10.0	10.0	10.0	10.0	10.0	10.0

and pre converter 02 sensor voltage less than
KfFULC_U_O2_SensorReadyThrshLo

Voltage	*< 350 milliVolts*

for
KcFULC_O2_SensorReadyEvents

Time (events * 12.5 milliseconds)	*> 10 events*

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

Long Term FT Enable Criteria

Closed Loop Enable and
Coolant greater than
KfFCLL_T_AdaptiveLoCoolant

Coolant	*> 39 Celcius*

or less than
KfFCLL_T_AdaptiveHiCoolant

Coolant	*< 140 Celcius*

and
KtFCLL_p_AdaptiveLowMAP_Limit

Barometric Pressure	65	70	75	80	85	90	95	100	105
Manifold Air Pressure	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0

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

Secondary Fuel Trim Enable Criteria

Closed Loop Enable and
KfFCLP_U_O2ReadyThrshLo

Voltage	*< 350 milliVolts*

ECM Supporting Tables

for
KcFCLP_Cnt_O2RdyCyclesThrsh

Time (events * 12.5 milliseconds)	*> 10 events*

Long Term Secondary Fuel Trim Enable Criteria

KtFCLP_t_PostIntglDisableTime

										X10	X11	X12	X13	X14	X15	X16	X17
										Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17
Start-Up Coolant	-40	-29	-18	-6	5	16	28	39	50	61	73	84	95	106	118	129	140
Post Integral Enable Time	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0

Plus
KtFCLP_t_PostIntglRampInTime

										X10	X11	X12	X13	X14	X15	X16	X17
										Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17
Start-Up Coolant	-40	-29	-18	-6	5	16	28	39	50	61	73	84	95	106	118	129	140
Post Integral Ramp In Time	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

and
KeFCLP_T_IntegrationCatalystMax

Modeled Catalyst Temperature	*< 950 Celcius*

and
KeFCLP_T_IntegrationCatalystMin

Modeled Catalyst Temperature	*> 500 Celcius*

and
PO2S_Bank_1_Snsr_2_FA and PO2S_Bank_2_Snsr_2_FA = False

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

ECM Supporting Tables

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

ECM Supporting Tables

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	1.00	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

FASD Section

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 Threshc	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

ECM Supporting Tables

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 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.	FASD Cell Usage	FASD Enabled In Cell?
CeFADR_e_Cell00_PurgOnAirMode5	CeFADD_e_SelectedPurgeCell	Yes
CeFADR_e_Cell01_PurgOnAirMode4	CeFADD_e_SelectedPurgeCell	Yes
CeFADR_e_Cell02_PurgOnAirMode3	CeFADD_e_SelectedPurgeCell	Yes
CeFADR_e_Cell03_PurgOnAirMode2	CeFADD_e_SelectedPurgeCell	Yes
CeFADR_e_Cell04_PurgOnAirMode1	CeFADD_e_SelectedPurgeCell	Yes
CeFADR_e_Cell05_PurgOnAirMode0	CeFADD_e_SelectedPurgeCell	Yes
CeFADR_e_Cell06_PurgOnIdle	CeFADD_e_SelectedPurgeCell	Yes
CeFADR_e_Cell07_PurgOnDecel	CeFADD_e_SelectedPurgeCell	Yes
CeFADR_e_Cell08_PurgOffAirMode5	CeFADD_e_SelectedNonPurgeCell	Yes
CeFADR_e_Cell09_PurgOffAirMode4	CeFADD_e_SelectedNonPurgeCell	Yes
CeFADR_e_Cell10_PurgOffAirMode3	CeFADD_e_SelectedNonPurgeCell	Yes
CeFADR_e_Cell11_PurgOffAirMode2	CeFADD_e_SelectedNonPurgeCell	Yes
CeFADR_e_Cell12_PurgOffAirMode1	CeFADD_e_SelectedNonPurgeCell	Yes
CeFADR_e_Cell13_PurgOffAirMode0	CeFADD_e_SelectedNonPurgeCell	Yes
CeFADR_e_Cell14_PurgOffIdle	CeFADD_e_SelectedNonPurgeCell	Yes
CeFADR_e_Cell15_PurgOffDecel	CeFADD_e_SelectedNonPurgeCell	Yes

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

Axis	Curve
14400	360
15300	340
16200	320
17100	300
18000	280
19200	260
20400	240
21600	220
22800	200
24000	200
25200	200

ECM Supporting Tables

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

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

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

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

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

Axis	Curve
0	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

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

ECM Supporting Tables

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
FastAttack CoolGain:	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
FastAttack BaroGain:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

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

ECM Supporting Tables

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

Green Sensor Delay Criteria:

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

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

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

ECM Supporting Tables

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

ECM Supporting Tables

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

ECM Supporting Tables

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

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

ECM Supporting Tables

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

P0068: MAP / MAF / TPS Correleation

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								
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								
Data	0.0000	18.0000	40.0000	75.0000	135.0000	250.0000	500.0000	500.0000	500.0000

P1682: Ignition Voltage Correleation

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 Clyinder (mg)
Data is spark delta threshold (kPa)

KtSPRK_phi_DeltTorqueScrtyAdv

APC/Erpm	500.00	980.74	1461.48	1942.23	2422.97	2903.71	3384.45	3865.20	4345.94	4826.68	5307.42	5788.16	6268.91	6749.65	7230.39	7711.13	8191.88
80.00	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

ECM Supporting Tables

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

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

ECM Supporting Tables

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

ECM Supporting Tables

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

ECM Supporting Tables

P0300-P0308: Idle SCD

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

load
Load

	400	500	600	700	800	900	1000	1100	1200				
8	675	575	475	325	250	170	135	100	70				
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

load

	400	500	600	700	800	900	1000	1100	1200				
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))

load
Load

	400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000
8	675	575	475	325	250	170	135	100	70	35	32767	32767	32767
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

ECM Supporting Tables

P0300-P0308: SCD Delta ddt

load

	400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000
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))

load
Load

	400	500	600	700	800	900	1000	1100	1200				
8	1550	1350	1150	900	650	600	450	220	200				
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

load

	400	500	600	700	800	900	1000	1100	1200				
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))

load
Load

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

	3000	3500	4000	4500	5000	5500	6000	6500	7000
8	11	10	9	9	9	9	9	32767	32767
9	10	9	8	8	8	8	8	32767	32767
11	10	8	8	8	8	8	8	32767	32767
12	10	8	7	7	7	7	7	32767	32767
13	12	7	7	7	6	6	6	32767	32767
15	13	8	7	6	6	6	6	32767	32767
17	14	8	7	6	5	5	5	32767	32767
19	16	9	8	6	5	5	5	32767	32767
22	18	10	8	6	5	4	4	32767	32767
25	20	10	9	7	5	4	4	32767	32767
29	25	11	10	7	5	4	4	32767	32767
33	28	13	11	8	5	5	4	32767	32767
38	30	16	12	8	6	5	5	32767	32767
42	33	19	14	9	6	6	5	32767	32767
48	40	22	16	10	7	6	6	32767	32767
54	43	25	18	11	7	7	6	32767	32767
61	45	28	20	13	9	8	7	32767	32767

ECM Supporting Tables

P0300-P0308: Cyl Mode ddt

load

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

	3000	3500	4000	4500	5000	5500	6000	6500	7000
8	12	0	0	0	0	0	0	32767	32767
9	11	0	0	0	0	0	0	32767	32767
11	9	0	0	0	0	0	0	32767	32767
12	10	0	0	0	0	0	0	32767	32767
13	10	0	0	0	0	0	0	32767	32767
15	11	0	0	0	0	0	0	32767	32767
17	11	0	0	0	0	0	0	32767	32767
19	13	0	0	0	0	0	0	32767	32767
22	16	0	0	0	0	0	0	32767	32767
25	20	0	0	0	0	0	0	32767	32767
29	28	0	0	0	0	0	0	32767	32767
33	30	0	0	0	0	0	0	32767	32767
38	35	0	0	0	0	0	0	32767	32767
42	38	0	0	0	0	0	0	32767	32767
48	40	0	0	0	0	0	0	32767	32767
54	43	0	0	0	0	0	0	32767	32767
61	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
8	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
9	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
11	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
12	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
13	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
15	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
17	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
19	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
22	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
25	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
29	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
33	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
38	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
42	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
48	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
54	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
61	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767

ECM Supporting Tables

	3000	3500	4000	4500	5000	5500	6000	6500	7000
8	160	140	115	100	120	120	120	32767	32767
9	145	120	100	75	100	100	100	32767	32767
11	130	100	90	55	80	80	80	32767	32767
12	120	90	85	50	50	55	60	32767	32767
13	95	80	75	55	42	42	40	32767	32767
15	90	85	65	60	40	40	35	32767	32767
17	100	88	80	65	50	35	30	32767	32767
19	150	95	90	70	60	40	35	32767	32767
22	170	105	100	80	70	50	40	32767	32767
25	190	115	110	90	80	60	50	32767	32767
29	225	125	120	100	90	70	60	32767	32767
33	250	140	130	110	100	80	70	32767	32767
38	300	170	140	125	110	90	80	32767	32767
42	350	200	160	140	120	100	90	32767	32767
48	400	250	180	160	130	115	100	32767	32767
54	450	300	200	175	140	125	110	32767	32767
61	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
11	1350	1250	1150	900	750	600	500	350	250	160	125	80	65	50	35	30	25
12	1300	1200	1100	800	700	550	450	310	230	145	110	70	55	45	30	25	23
13	1250	1150	1050	750	650	500	420	275	215	130	100	60	53	43	28	23	20
14	1200	1100	1000	700	600	450	385	240	205	125	95	55	50	40	26	21	19
16	1150	1050	950	675	550	435	350	250	190	120	80	53	48	38	28	20	18
18	1100	1000	900	650	525	425	340	265	200	130	85	50	45	35	29	21	17
21	1150	1050	950	625	450	415	345	275	215	140	95	65	48	38	30	22	18
23	1200	1100	1000	600	440	405	350	300	240	160	115	80	50	45	33	24	20
27	1250	1150	1050	675	460	415	375	325	270	180	140	100	55	50	40	30	22
30	1400	1250	1100	750	500	425	400	350	300	200	160	120	65	60	45	35	25
35	1450	1300	1150	825	550	450	450	400	350	225	180	130	75	65	50	40	30
40	1500	1350	1200	900	600	500	500	450	400	250	200	140	90	70	55	45	35
45	1550	1400	1250	950	625	550	550	500	450	300	220	150	110	80	60	50	40
51	1600	1450	1300	1000	650	600	600	550	500	350	240	160	120	85	65	55	45
58	1650	1500	1350	1075	675	650	650	600	550	400	260	170	130	90	70	60	50
65	1700	1550	1400	1150	700	700	700	650	600	450	280	180	140	95	75	65	55
74	1750	1600	1450	1250	750	750	750	700	650	500	300	190	150	100	80	70	60

	3000	3500	4000	4500	5000	5500	6000	6500	7000
11	20	32767	32767	32767	32767	32767	32767	32767	32767
12	19	32767	32767	32767	32767	32767	32767	32767	32767
13	18	32767	32767	32767	32767	32767	32767	32767	32767
14	17	32767	32767	32767	32767	32767	32767	32767	32767
16	16	32767	32767	32767	32767	32767	32767	32767	32767
18	15	32767	32767	32767	32767	32767	32767	32767	32767
21	16	32767	32767	32767	32767	32767	32767	32767	32767
23	17	32767	32767	32767	32767	32767	32767	32767	32767
27	18	32767	32767	32767	32767	32767	32767	32767	32767
30	22	32767	32767	32767	32767	32767	32767	32767	32767
35	25	32767	32767	32767	32767	32767	32767	32767	32767
40	30	32767	32767	32767	32767	32767	32767	32767	32767
45	35	32767	32767	32767	32767	32767	32767	32767	32767
51	40	32767	32767	32767	32767	32767	32767	32767	32767
58	45	32767	32767	32767	32767	32767	32767	32767	32767
65	50	32767	32767	32767	32767	32767	32767	32767	32767
74	55	32767	32767	32767	32767	32767	32767	32767	32767

ECM Supporting Tables

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)

Catalyst Damaging Misfire Percentage

load
Load

	0	1000	2000	3000	4000	5000	6000	7000
0	10.625	10.625	10.625	9.750	6.875	5.000	4.875	4.875
10	10.625	10.625	10.625	9.750	6.875	4.875	4.875	4.875
20	10.625	10.625	9.750	6.875	5.000	4.875	4.875	4.875
30	9.750	9.750	9.750	6.250	4.875	4.875	4.875	4.875
40	6.875	6.875	6.875	5.000	4.875	4.875	4.875	4.875
50	6.000	6.000	6.000	4.875	4.875	4.875	4.875	4.875
60	5.000	5.000	5.000	4.875	4.875	4.875	4.875	4.875
70	4.875	4.875	4.875	4.875	4.875	4.875	4.875	4.875
80	4.875	4.875	4.875	4.875	4.875	4.875	4.875	4.875
90	4.875	4.875	4.875	4.875	4.875	4.875	4.875	4.875
100	4.875	4.875	4.875	4.875	4.875	4.875	4.875	4.875

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
-200.0	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
-150.0	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
-100.0	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
-50.0	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
0.0	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
50.0	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
100.0	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
150.0	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
200.0	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
-200.0	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
-150.0	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
-100.0	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
-50.0	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
0.0	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
50.0	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
100.0	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
150.0	8.0	8.0	8.0	0.1	0.1	0.1	0.1	0.1	0.1
200.0	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
-200.0	8.0	8.0	8.0	1.0	0.1	0.1	0.1	0.1	0.1
-150.0	8.0	8.0	8.0	1.0	1.0	1.0	0.5	0.5	0.5
-100.0	8.0	8.0	8.0	2.0	2.0	2.0	1.0	1.0	1.0
-50.0	8.0	8.0	8.0	4.0	4.0	4.0	2.0	2.0	2.0
0.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
50.0	8.0	8.0	8.0	4.0	4.0	4.0	2.0	2.0	2.0
100.0	8.0	8.0	8.0	2.0	2.0	2.0	1.0	1.0	1.0
150.0	8.0	8.0	8.0	1.0	1.0	1.0	0.5	0.5	0.5
200.0	8.0	8.0	8.0	1.0	0.1	0.1	0.1	0.1	0.1

ECM Fault Bundle Definitions

Cert Doc Bundle Name	Pcodes											
CatalystSysEfficiencyLoB1_FA	P0420											
CatalystSysEfficiencyLoB2_FA	P0430											
A/F Imbalance Bank1	P219A											
A/F Imbalance Bank2	P219B											
FuelTrimSystemB1_FA	P0171	P0172										
FuelTrimSystemB2_FA	P0174	P0175										
FuelTrimSystemB1_TFTKO	P0171	P0172										
FuelTrimSystemB2_TFTKO	P0174	P0175										
EvapPurgeSolenoidCircuit_FA	P0443											
EvapFlowDuringNonPurge_FA	P0496											
EvapVentSolenoidCircuit_FA	P0449											
EvapSmallLeak_FA	P0442											
EvapEmissionSystem_FA	P0455	P0446										
FuelTankPressureSnsrCkt_FA	P0452	P0453										
CoolingFanSpeedTooHigh_FA	P0495											
FanOutputDriver_FA	P0480	P0481	P0482									
FuelLevelDataFault	P0461	P0462	P0463	P2066	P2067	P2068						
PowertrainRelayFault	P1682											
PowertrainRelayStateOn_FA	P0685											
PowertrainRelayStateOn_Error	P0685											
IgnitionOffTimer_FA	P2610											
IgnitionOffTimeValid	P2610											
EngineModeNotRunTimerError	P2610											
EngineModeNotRunTimer_FA	P2610											
VehicleSpeedSensor_FA	P0502	P0503	P0722	P0723								
VehicleSpeedSensorError	P0502	P0503	P0722	P0723								
KS_Ckt_Perf_B1B2_FA	P0324	P0325	P0326	P0327	P0328	P0330	P0332	P0333				
IgnitionOutputDriver_FA	P0351	P0352	P0353	P0354	P0355	P0356	P0357	P0358				
ECT_Sensor_Ckt_FA	P0117	P0118	P0119									
ECT_Sensor_Ckt_TPTKO	P0117	P0118	P0119									
ECT_Sensor_Ckt_TFTKO	P0117	P0118	P0119									
ECT_Sensor_DefaultDetected	P0117	P0118	P0116	P0125								
ECT_Sensor_FA	P0117	P0118	P0116	P0125	P0128							
ECT_Sensor_TFTKO	P0117	P0118	P0116	P0125	P0119							
ECT_Sensor_Perf_FA	P0116											
ECT_Sensor_Ckt_FP	P0117	P0118										
ECT_Sensor_Ckt_High_FP	P0118											
ECT_Sensor_Ckt_Low_FP	P0117											
THMR_Insuff_Flow_FA	P00B7											
THMR_Therm_Control_FA	P0597	P0598	P0599									
THMR_RCT_Sensor_Ckt_FA	P00B3	P00B4										
THMR_ECT_Sensor_Ckt_FA	P0117	P0118	P0116	P0125	P00B6							
O2S_Bank_ 1_TFTKO	P0131	P0132	P0134	P2A00								
O2S_Bank_ 2_TFTKO	P0151	P0152	P0154	P2A03								
O2S_Bank_1_Sensor_1_FA	P2A00	P0131	P0132	P0133	P0134	P0135	P0053	P1133	P015A	P015B	P0030	
O2S_Bank_1_Sensor_2_FA	P013A	P013B	P013E	P013F	P2270	P2271	P0137	P0138	P0140	P0141	P0054	P0036
O2S_Bank_2_Sensor_1_FA	P2A03	P0151	P0152	P0153	P0154	P0155	P0059	P1153	P015C	P015D	P0050	
O2S_Bank_2_Sensor_2_FA	P013C	P013D	P014A	P014B	P2272	P2273	P0157	P0158	P0160	P0161	P0060	P0056
PO2S_Bank_1_Snsr_2_FA	P0137	P0138	P0140	P0036	P0054	P0141	P2270	P2271				
PO2S_Bank_2_Snsr_2_FA	P0157	P0158	P0160	P0056	P0060	P0161	P2272	P2273				
If sensor application	EngOilTempSensorCircuitFA	P0197	P0198									
if modeled	EngOilModeledTempValid	ECT_Sensor_FA	IAT_SensorCircuitFA									
EngOilPressureSensorCktFA	P0522	P0523										
EngOilPressureSensorFA	P0521	P0522	P0523									
CylnderDeacDriverTFTKO	P3401	P3409	P3417	P3425	P3433	P3441	P3449					
BrakeBoosterSensorFA	P0556	P0557	P0558									
if modeled	GetBBVR_b_BrkBoostVacVld	BrakeBoosterVacuumValid	VehicleSpeedSensor_FA	MAP_SensorFA								
CylnderDeacDriverTFTKO	P3401	P3409	P3417	P3425	P3433	P3441	P3449					

ECM Fault Bundle Definitions

Cert Doc Bundle Name	Pcodes							
EngineTorqueEstInaccurate	EngineMisfireDetected_FA	FuelInjedtorCircuit_FA	FuelInjedtorCircuit_TFTKO	FuelTrimSystemB1_FA	FuelTrimSystemB2_FA	MAF_SensorTFTKO	MAP_SensorTFTKO	EGRValuePerforamnce_FA
AmbientAirPressCktFA	P2228	P2229						
AmbientAirPressCktFA_NoSnsr	P0106	P0107	P0108					
AmbientAirDefault_NA	P0106	P0107	P0108	P2227	P2228	P2229		
AmbientAirDefault_SC	P012B	P012C	P012D	P2227	P2228	P2229		
AmbientAirDefault_NoSnsr	P0106	P0107	P0108					
AmbientAirDefault	NA is has Baro Sensor and Normally Aspirated, SC if suprecharged, NoSnsr is Normally Aspirated with no Baro Sensor							
IAT_SensorCircuitTFTKO	P0112	P0113						
IAT_SensorCircuitFA	P0112	P0113						
IAT_SensorCircuitFP	P0112	P0113						
IAT_SensorTFTKO	P0111	P0112	P0113					
IAT_SensorFA	P0111	P0112	P0113					
IAT2_SensorCktTFTKO	P0097	P0098						
IAT2_SensorCktTFTKO_NoSnsr	P0112	P0113						
IAT2_SensorCircuitFA	P0097	P0098						
IAT2_SensorCircuitFA_NoSnsr	P0112	P0113						
IAT2_SensorcircuitFP	P0097	P0098						
IAT2_SensorcircuitFP_NoSnsr	P0112	P0113						
IAT2_SensorTFTKO	P0096	P0097	P0098					
IAT2_SensorTFTKO_NoSnsr	P0111	P0112	P0113					
IAT2_SensorFA	P0096	P0097	P0098					
IAT2_SensorFA_NoSnsr	P0111	P0112	P0113					
SuperchargerBypassValveFA	P2261							
CylDeacSystemTFTKO	P3400							
MAF_SensorPerfFA	P0101							
MAF_SensorPerfTFTKO	P0101							
MAP_SensorPerfFA	P0106							
MAP_SensorPerfTFTKO	P0106							
SCIAP_SensorPerfFA	P012B							
SCIAP_SensorPerfTFTKO	P012B							
ThrottlePositionSnsrPerfFA	P0121							
ThrottlePositionSnsrPerfTFTKO	P0121							
MAF_SensorFA	P0101	P0102	P0103					
MAF_SensorTFTKO	P0101	P0102	P0103					
MAF_SensorFP	P0102	P0103						
MAF_SensorCircuitFA	P0102	P0103						
MAF_SensorCircuitTFTKO	P0102	P0103						
MAP_SensorTFTKO	P0106	P0107	P0108					
MAP_SensorFA	P0106	P0107	P0108					
SCIAP_SensorFA	P012B	P012C	P012D					
SCIAP_SensorTFTKO	P012B	P012C	P012D					
SCIAP_SensorCircuitFP	P012C	P012D						
AfterThrottlePressureFA_NA	P0106	P0107	P0108					
AfterThrottlePressureFA_SC	P012B	P012C	P012D					
AfterThrottleVacuumTFTKO_NA	P0106	P0107	P0108					
AfterThrottleVacuumTFTKO_SC	P012B	P012C	P012D					
SCIAP_SensorCircuitFA	P012C	P012D						
AfterThrottlePressTFTKO_NA	P0106	P0107	P0108					
AfterThrottlePressTFTKO_SC	P012B	P012C	P012D					
MAP_SensorCircuitFA	P0107	P0108						
MAP_EngineVacuumStatus	MAP_SensorFA OR P0107, P0108 Pending							
PPS1_OutOfRange_Composite	P2122	P2123	P0651					
PPS2_OutOfRange_Composite	P2127	P2128	P0641					
PPS1_OutOfRange_Composite	P2122	P2123	P0651					
PPS2_OutOfRange_Composite	P2127	P2128	P0641					
PPS1_OutOfRange	P2122	P2123						
PPS2_OutOfRange	P2127	P2128						
PPS1_OutOfRange	P2122	P2123						
PPS2_OutOfRange	P2127	P2128						
AcceleratorPedalFailure	P2122	P2123	P2127	P2128	P2138	P0641	P0651	
ControllerRAM_Error_FA	P0604							
ControllerProcessorPerf_FA	P0606							
TPS1_OutOfRange_Composite	P0122	P0123	P0651					
TPS2_OutOfRange_Composite	P0222	P0223	P0652					

ECM Fault Bundle Definitions

Cert Doc Bundle Name	Pcodes										
TPS_FA	P0120	P0122	P0123	P0220	P0222	P0223	P2135				
TPS_TFTKO	P0120	P0122	P0123	P0220	P0222	P0223	P2135				
TPS_Performance_FA	P0068	P0121	P1516	P2101							
TPS_Performance_TFTKO	P0068	P0121	P1516	P2101							
TPS_FaultPending	P0120	P0122	P0123	P0220	P0222	P0223	P2135				
TPS_ThrottleAuthorityDefaulted	P0068	P0120	P0122	P0123	P0220	P0222	P0223	P1516	P2135	P2176	
EnginePowerLimited	P0068	P0606	P0120	P0122	P0123	P0220	P0222	P0223	P0641	P0651	
	P1516	P2101	P2120	P2122	P2123	P2125	P2127	P2128	P2135	P2138	P2176
5VoltReferenceA_FA	P0641										
5VoltReferenceB_FA	P0651										
AnyCamPhaser_FA	P0010	P0011	P0013	P0014	P0020	P0021	P0023	P0024			
AnyCamPhaser_TFTKO	P0010	P0011	P0013	P0014	P0020	P0021	P0023	P0024			
IntkCamPhaser_FA	P0010	P0011	P0020	P0021							
EGRValvePerformance_FA	P0401	P042E									
EGRValveCircuit_FA	P0403	P0404	P0405	P0406							
EGRValve_FP	P0405	P0406	P042E								
EGRValveCircuit_TFTKO	P0403	P0404	P0405	P0406							
EGRValvePerformance_TFTKO	P0401	P042E									
CrankIntakeCamCorrelationFA	P0016	P0018									
IntakeCamSensorTFTKO	P0016	P0018	P0340	P0341	P0345	P0346					
CrankSensorTFTKO	P0335	P0336									
CrankExhaustCamCorrelationFA	P0017	P0019									
ExhaustCamSensorTFTKO	P0017	P0019	P0365	P0366	P0390	P0391					
MAP_SensorFA	P0106	P0107	P0108								
MAF_SensorFA	P0101	P0102	P0103								
MAF_SensorTFTKO	P0101	P0102	P0103								
FuelInjectorCircuit_FA	P0201	P0202	P0203	P0204	P0205	P0206	P0207	P0208			
IAT_SensorFA	P0111	P0112	P0113								
ECT_Sensor_Ckt_FA	P0117	P0118	P0119								
EngineMisfireDetected_FA	P0300	P0301	P0302	P0303	P0304	P0305	P0306	P0307	P0308		
Ethanol Composition Sensor FA	P0178	P0179	P2269								
IAC_SystemRPM_FA	P0506	P0507									
ControllerProcessorPerf_FA	P0606										
ControllerRAM_Error_FA	P0604										
5VoltReferenceB_FA	P0651										
5VoltReferenceMAP_OOR_Flt	P0697										
VehicleSpeedSensor_FA	P0502	P0503	P0722	P0723							
CrankSensorFA	P0335	P0336									
EngineMisfireDetected_TFTKO	P0300	P0301	P0302	P0303	P0304	P0305	P0306	P0307	P0308		
EngineMisfireDetected_FA	P0300	P0301	P0302	P0303	P0304	P0305	P0306	P0307	P0308		

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

ECM Gasoline Checklist

Gasoline COMPONENT/SYSTEM	List DTC of monitor that detects the following failure malfunction: MONITORING REQUIREMENTS										
Catalyst	(e)(1.2.2) Conversion Efficiency P0420 P0430										
Heated Catalyst	(e)(2.2) Heating Performance N/A										
Misfire	(e)(3.2.1) Catalyst damage misfire P0300	(e)(3.2.2) FTP level misfire -First 1000 revs P0300	(e)(3.2.2) FTP level misfire- 4 x 1000 revs P0300								
Evaporative System	(e)(4.2.2)(A) No purge flow P0455	(e)(4.2.2)(B) 0.040" leak P0442	(e)(4.2.2)(C) 0.020" leak P0442	(e)(4.2.5) 0.090" leak in lieu of 0.040" P0455							
Secondary Air	(e)(5.2.3) Insufficient flow threshold NA	(e)(5.2.4) Insufficient flow functional in lieu of threshold NA									
Fuel System	(e)(6.2.1)(A) FTP emission threshold P0171 P0172 P0174 P0175	(e)(6.2.1)(B) Secondary fuel trim FTP emission threshold N/A - Covered by (e)(6.2.1)(C)	(e)(6.2.1)(C) Air-fuel ratio cylinder imbalance P219A P219B	(e)(6.2.2) Adaptive limits reached P0171 P0172 P0174 P0175	(e)(6.2.3) Secondary fuel trim adaptive limits N/A - Covered by (e)(6.2.1)(C)	(e)(6.2.4) Fails to enter closed loop NA					
Upstream O2/Exhaust Gas Sensor Monitoring	(e)(7.2.1)(A) FTP emission threshold-slow response P0133, P0153	(e)(7.2.1)(A) FTP emission threshold- other characteristic P015A, P015B, P015C, P015D (ESPD)	(e)(7.2.1)(B) open circuit P0134, P0154	(e)(7.2.1)(B) out-of-range high P0132, P0152	(e)(7.2.1)(B) shorted high P0132, P0152	(e)(7.2.1)(B) out-of-range low P0131, P0151	(e)(7.2.1)(B) shorted low P0131, P0151	(e)(7.2.1)(C) Feedback: fails to enter, defaults out P0134, P0154	(e)(7.2.1)(D) Sufficient for other diagnostics P0131, P0151, P0132, P0152, P0134, P0154, P0133, P0153, P015A, P015B, P015C, P015D	(e)(7.2.3)(A) Heater Performance P0053, P0059, P0135, P0155	(e)(7.2.3)(B) Heater Circuit Continuity P0030, P0050

ECM Gasoline Checklist

Gasoline

List DTC of monitor that detects the following failure malfunction:

COMPONENT/SYSTEM	MONITORING REQUIREMENTS									
Downstream O2/Exhaust Gas Sensor Monitoring	(e)(7.2.2)(A)	(e)(7.2.2)(B)	(e)(7.2.2)(D)	(e)(7.2.2)(B)	(e)(7.2.2)(D)	(e)(7.2.2)(B)	(e)(7.2.2)(C)	(e)(7.2.3)(A)	(e)(7.2.3)(B)	(d)(2.2.3) & (e)(6.2.4)
	Emissions threshold	open circuit	out-of-range high	shorted high	out-of-range low	shorted low	Sufficient for other diagnostics	Heater Performance	Heater Circuit Continuity	Feedback: fails to enter, defaults out
	P013A, P013B, P013C, P013D, P013E, P013F, P014A, P014B	P0140, P0160	P2271, P2273	P0138, P0158	P2270, P2272	P0137, P0157	P013A, P013B, P013C, P013D, P013E, P013F, P014A, P014B, P2270, P2271, P2272, P2273	P0054, P0060 P0141, P0161	P0036, P0056	P0054, P0060, P0137, P0157, P0138, P0158, P0140, P0160, P0141, P0161, P013A, P013B, P013C, P013D, P013E, P013F, P014A, P014B, P2270, P2271, P2272, P2273
EGR	(e)(8.2.1)	(e)(8.2.1)	(e)(8.2.2)	(e)(8.2.2)						
	Low Flow Threshold	High Flow Threshold	Low Flow Functional in lieu of Threshold	High Flow Functional in lieu of Threshold						
	NA	N/A	N/A	NA						
Crankcase Ventilation	(e)(9.2.2)									
	Disconnection									
	P0106, P0171 P0174, P0300									
Engine Cooling System	(e)(10.2.1)	(e)(10.2.2)(A)	(e)(10.2.2)(A)	(e)(10.2.2)(A)	(e)(10.2.2)(A)	(e)(10.2.2)(A)	(e)(10.2.2)(B)	(e)(10.2.2)(C)	(e)(10.2.2)(D)	
	Time to reach threshold temp	open circuit	out-of-range high	shorted high	out-of-range low	shorted low	Time to reach closed loop	Stuck below the highest minimum enable temp	Stuck above the lowest maximum enable temp	
	P0128	P0118	P0118	P0118	P0117	P0117	N/A - Cool Temp not used for C/L	P0128	P0116	
Cold start strategy	(e)(11.2.1)(A)	(e)(11.2.1)(B)	(e)(11.2.2)(A)	(e)(11.2.2)(B)						
	Threshold monitor	Functional monitor in lieu of threshold	Single element functional fail	Threshold monitor						
	P1400	P1400	N/A	N/A						
VVT system	(e)(13.2.1)	(e)(13.2.2)	(e)(13.2.3)							
	Target error threshold monitor	Slow Response threshold monitor	Target error or slow response functional monitor in lieu of threshold							
	P0011	P0011	P0011							
Direct Ozone Reduction (DOR) System	(e)(14.2.1)	(e)(14.2.2)								
	Functional monitor for <50% std credit DOR systems	Threshold monitor for >50% std credit DOR systems								
	N/A	N/A								

ECM Gasoline Checklist

List DTC of monitor used that detects the following failure mode:

Monitor/System		OOR-low	Circuit low	OOR- high	Circuit high	open circuit	Rationality-low	Rationality-high	Other Rationality	Functional #1	Functional #2	Other Functional
4wd Low		P279B		P279A			P279B	P279A	P279C			
Barometric Pressure		P2228	P2228	P2229	P2229	P2228	P0069/P006D	P0069/P006D	P2227			
CAM Phase Control Bank 1 Intake										P0011		P0010
Cam Position Bank1 Intake		P0340	P0340	P0340	P0340	P0340	P0341	P0341	P0016			
CAN Bus A									U0073, U0101, U0102, U0109, U0129, U0140, U0293, U186A, U186B			U0073, U0101, U0102, U0109, U0129, U0140, U0293, U186A, U186B
CAN Bus B									U0074, U180F, U1815, U1817, U1820, U1842, U1843			U0074, U180F, U1815, U1817, U1820, U1842, U1843
Canister Vent Solenoid										P0446		P0449
Control Canister Purge										P0496		P0443
Crank Position		P0335	P0335	P0335	P0335	P0335	P0336	P0336				
Cylinder Deactivate A										P3400		P3401
Cylinder Deactivate B										P3400		P3425
Cylinder Deactivate C										P3400		P3441
Cylinder Deactivate D										P3400		P3449
Engine Oil Pressure		P0522	P0522	P0523	P0523	P0523	P0521	P0521				
EST A												P0351
EST B												P0352
EST C												P0353
EST D												P0354
EST E												P0355
EST F												P0356
EST G												P0357
EST H												P0358
ETC Motor Close										P2101	P1516	P2176
ETC Motor Open										P2101	P1516	P2176
Fan Control #1												P0480
Fan Control #2												P0481
Fan Control #3												P0482
Fuel Injector A												P0201
Fuel Injector B												P0202
Fuel Injector C												P0203
Fuel Injector D												P0204
Fuel Injector E												P0205
Fuel Injector F												P0206
Fuel Injector G												P0207
Fuel Injector H												P0208
Fuel Level		P0462	P0462	P0463	P0463	P0463	P0461	P0461	P0464			
Fuel Level 2		P2067	P2067	P2068	P2068	P2068	P2066	P2066	P0464			
Fuel Pump Control												P0230
Fuel Tank Vapor Pressure		P0452	P0452	P0453	P0453	P0452	P0451	P0451	P0454			
Ignition Off Timer										P2610		
Intake Air Temperature		P0112	P0112	P0113	P0113	P0112	P0111	P0111				
Knock Sensor-Flat		P0327	P0327	P0328	P0328	P0325		P0326	P0324			
Knock Sensor-Flat #2		P0332	P0332	P0333	P0333	P0330			P0324			
Mainifold Absolute Pressure		P0107	P0107	P0108	P0108	P0107	P0106	P0106	P1101			
Mass Air Flow		P0102	P0102	P0103	P0102	P0102	P0101	P0101	P1101			
Pedal Position 1		P2122	P2122	P2123	P2123	P2122	P2138	P2138	P060D			
Pedal Position 2		P2127	P2127	P2128	P2128	P2127	P2138	P2138	P060D			
Motor Electronics Coolant Temperature Sensor			P0A02		P0A03				P0A01			

ECM Gasoline Checklist

List DTC of monitor used that detects the following failure mode:

Powertrain Relay Control										P0690		P0685
Powertrain Relay Feedback									P0690			
Requested Torque									P15F2, P0856			
Throttle Position 1		P0122	P0122	P0123	P0123	P0122	P2135	P2135	P0121 P0068 P2119			
Throttle Position 2		P0222	P0222	P0223	P0223	P0223	P2135	P2135	P0121 P0068 P2119			
Traction Control Delivered Torque Output Circuit												P1689

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, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		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 ** Common Enables	Fault Active	Pass condition met for 15 seconds	
Idle Air Control (IAC) System - RPM Too High	P0507	This DTC sets when the idle speed is higher than the targeted idle speed	Idle speed	Filtered input speed error (desired - actual) is less than fail threshold -190 RPM. Filter coefficient for engine speed = 0.00375	** Common Enables		1 loop execution at 100 ms rate	Two Trips, Type B
		DTC Pass	Idle speed		** Common Enables		Pass condition met for 15 seconds	
		DTC RePass after failure	Idle Speed	Filtered input speed error (desired - actual), is 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	

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	Ignition Key Status Engine Speed	RUN/CRANK >= 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	Ignition Key Status	RUN/CRANK	5 seconds in a 6 second window	Special Type C
		DTC Pass		Ignition Voltage < 18 Volts			1 second	
Ignition Switch Run/Start Position Circuit Low	P2534	Detects a run crank relay open circuit	Runk Crank Line voltage	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, Type A
		DTC Pass	Run Crank Line Voltage	Ignition Run Crank line voltage > 2 Volts			5 seconds (200 * 0.025)	
Stuck Clutch Diagnostics								
Common Stuck Clutch diagnostic secondary enables for codes P07A3, P07A5, P07A7, P07A9	***				|Input speed - Input speed profile|	> 200 Rpm		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
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 *** Common Enables	Mode 2 <= 30 RPM/s > 320 Nm FOR 0.25 seconds (10 * 0.025)	4.5 seconds ((60 + 120) * 0.025)	Two Trips, Type B
		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 *** Common Enables	Mode 1 <= 10000 RPM/s > 320 Nm FOR 0.125 seconds (5 * 0.025)	3.2 seconds ((8 + 120) * 0.025)	Two Trips, Type B
		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 *** Common Enables	Mode 2 <= 30 RPM/s > 140 Nm FOR 0.25 seconds (10 * 0.025)	4.5 seconds ((60 + 120) * 0.025)	Two Trips, Type B
		DTC Pass	C3 Slip Speed	C3 Slip Speed > 45 RPM	Operating Mode	Neutral, Mode 1, Mode 2, Gear 1, Gear 2, Gear 3	0.375 seconds (15 * 0.025)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
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 *** Common Enables	Mode 1 <= -1900 RPM/s > 700 Nm FOR 0.125 seconds (10 * 0.025)	3.2 seconds ((8 + 120) * 0.025)	Two Trips, Type B
				Fail Case 2: C4 slip speed <= 80 RPM	Range State C4 slip acceleration Excess torque on C4 *** Common Enables	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)	
Transm'n Auxilary 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, Type B
		DTC Pass	Complete communication with TAOP controller	A complete fault status message must be received every 1.5 seconds			1.75 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Auxiliary Transmission Fluid Pump Performance	P2797	This diagnostic monitors the aux pump performance based on aux pump filtered desired and actual speed values	Aux pump speed	|Aux pump speed - Commanded Aux pump Speed| > 650 RPM for >.7s	Speed Command Filter Coefficient Aux Pump Speed Command RunCrankActive Fault Pending Condition Met	0.1 >= 650 RPM FOR 0.5 seconds = 1 for more than 0.2 seconds > 3 times	Fail Condition met for 0.75 seconds (30 * 0.025) in a 1.25 second (50 * 0.025) window 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)	Two Trips, Type B
		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, Type A

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	
Transm'n Output Speed Sensor								
Output Speed Sensor Circuit Direction Error	P077B	The DTC detects if the Transmission Output Speed Sensor Direction is Incorrect by Comparing with Calculated Direction from Motor Speed Sign	Transmission Output Speed Direction Raw	≠ Motor Direction	Transmission Output Speed Hybrid Motor Speed based Estimated Output Speed is Valid Transmission Output Speed and Motor Output Speed Difference Motor Estimated Transmission Output Speed	Not FAULT ACTIVE Calculated based on M1 or M2 Speed Equation ≤ 50 RPM ≥ 50 RPM	0.325 seconds (13 counts at 25ms) **Pass Conditions** Opposite of FAIL for 5 seconds (200 counts at 25ms)	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
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 AND Directional IMS R1	Transitional 17 R1 Circuit Has Not Been Observed High	Ignition Voltage Converted Directional IMS AND Directional IMS R1	≥ 6.0 V for 2 consecutive samples Transitional 2 R1 Circuit NOT High for 5 seconds	2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS R1 Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 R1 Circuit High Voltage	P181D	The DTC Monitors if the IMS R1 Circuit is Shorted to a High Voltage	Converted Directional IMS AND Directional IMS R1	Transitional 30 R1 Circuit Has Not Been Observed Low	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS R1 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 R2 Circuit Low Voltage	P181E	The DTC Monitors if the IMS R2 Circuit is Shorted to a Low Voltage	Converted Directional IMS AND Directional IMS R2	DRIVE R2 Circuit Has Not Been Observed High	Ignition Voltage Converted Directional IMS AND Directional IMS R2 Directional IMS R2	≥ 6.0 V for 2 consecutive samples PARK R2 Circuit Low for 5 seconds	2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS R2 Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Internal Mode Switch 2 R2 Circuit High Voltage	P181F	The DTC Monitors if the IMS R2 Circuit is Shorted to a High Voltage	Converted Directional IMS AND Directional IMS R2	Transitional 14 OR Transitional 29 R2 Circuit Has Not Been Observed Low	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS R2 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 D1 Circuit Low Voltage	P183A	The DTC Monitors if the IMS D1 Circuit is Shorted to a Low Voltage	Converted Directional IMS AND Directional IMS D1	Transitional 8 OR Transitional 20 D1 Circuit Has Not Been Observed High	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS D1 Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 D1 Circuit High Voltage	P183B	The DTC Monitors if the IMS D1 Circuit is Shorted to a High Voltage	Converted Directional IMS AND Directional IMS D1	Transitional 27 D1 Circuit Has Not Been Observed Low	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS D1 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Internal Mode Switch 2 D2 Circuit Low Voltage	P183C	The DTC Monitors if the IMS D2 Circuit is Shorted to a Low Voltage	Converted Directional IMS AND Directional IMS D1	Transitional 24 D2 Circuit Has Not Been Observed High	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS D2 Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 D2 Circuit High Voltage	P183D	The DTC Monitors if the IMS D2 Circuit is Shorted to a High Voltage	Converted Directional IMS AND Directional IMS D2	Transitional 11 AND Transitional 23 D2 Circuit Has Not Been Observed Low	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS D2 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2-Invalid Range	P183E	The DTC Monitors if the IMS is in an Invalid Range	Converted Directional IMS	Illegal (All Circuits Open)	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms) **Pass Conditions** Opposite of Fail for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Internal Mode Switch 1-2 Correlation	P183F	The DTC Monitors if the IMS Direction and Range Correlation is Invalid	Converted Directional IMS	Correlation Fault Neutral (With No IMS Faults the Direction IMS and Range IMS Indicate Different Detent Postions)	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	1.25 seconds (50 counts at 25ms) **Pass Conditions** Opposite of Fail for 1.7 seconds (68 counts at 25ms)	One Trip, Type A
Internal Mode Switch 2 S Circuit Low Voltage	P184A	The DTC Monitors if the IMS S Circuit is Shorted to a Low Voltage	Converted Directional IMS AND Directional IMS S	Transitional 9 S Circuit Has Not Been Observed High	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS S Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 S Circuit High Voltage	P184B	The DTC Monitors if the IMS S Circuit is Shorted to a High Voltage	Converted Directional IMS AND Directional IMS S AND Directional IMS R1	Transitional 26 AND DRIVE S Circuit Has Not Been Observed Low R1 Has Been Observed Low	Ignition Voltage	≥ 6.0 V for 2 consecutive samples	2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS S Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Transm'n 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 Secured Vehicle Speed Use Transmission Output Speed Secured Vehicle Speed Use Wheel Speed	2 TRUE TRUE	10 seconds (400 counts at 25ms) **Pass Conditions** Opposite of Fail for 20 seconds (800 counts at 25ms)	Two Trips, Type B
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, Type A
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, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Long Term Memory Reset	P0603	Non-volatile memory checksum error 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, Type A
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, Type A
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 Run/Crank Voltage OR Powertrain Relay Voltage	Accessory, Run, Crank > 9.5 Volts OR < 18 Volts	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 of 10 sample counts Executes: 50ms loop	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Long Term Memory 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, Type A
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, Type A
		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	>678 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	>2088 Nm	Regenerative Braking Torque	> 0 Nm	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
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, Type A
		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	678Nm (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	508Nm (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	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		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	
		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.	-339Nm (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.	339Nm (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	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		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	
Torque Management System – Forced Engine Shutdown	P06AF	The main processor monitor ring compares the ECM 2nd pattern (nibble pattern) to known good pattern to determine ECM state of health.	The nibble pattern is incorrect	The pattern does not match (F, 5, B, D, A, 6, 3, 0)	Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts OR < 18 Volts	8 fail counts out of 12 sample counts Executes in a 12.5 ms Loop Detects in 200ms	One Trip, Type A
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 OR The primary signal value does not equal the protection value	Current ARC ≠ Previous ARC +1 Primary Value ≠ Protection Value	Ignition Key Status	Run/Crank for > 0.5 seconds	20 fail counts out of 30 sample counts Executes in a 6.25 ms Loop Detects in 200ms	One Trip, Type A
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 Steady State	The current alive rolling count value does not equal the previous alive rolling count value incremented by 1 OR The primary signal value does not equal the protection value	Current ARC ≠ Previous ARC +1 Primary Value ≠ Protection Value	Ignition Key Status	Run/Crank for > 0.5 seconds	10 fail counts out of 16 sample counts Executes in a 12.5 ms Loop Detects in 200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Alive Rolling Count / Protection Value fault 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 OR The primary signal value does not equal the protection value	Current ARC ≠ Previous ARC +1 Primary Value ≠ Protection Value	Ignition Key Status	Run/Crank for > 0.5 seconds	10 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	One Trip, Type A
Internal Control Module Transmission Direction Range Switch	P16F2	Detect transmission direction errors by reading the states of the Direction IMS switches as well as determining a transmission direction and comparing it to the transmission direction from the primary controls path.						One Trip, Type A
		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 Detects in 200ms	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		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 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 12.5ms 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 6.25 ms Loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		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 6.25 ms Loop Detects in 200ms	
		Fail Case 6: Detect the dual store memory fault by comparing the primary value and the dual store value of the Motor A torque achieved	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 Executes in a 6.25 ms 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 not equal (MTQR)			Runs continuously	20 fail counts out of 30 sample counts Executes in a 6.25 ms 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 6.25 ms Loop Detects in 200ms	

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

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

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

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

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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Internal Control Module Transmission Range Control Performance	P16F4	Detect transmission range errors by comparing the Direction IMS switches with the Range IMS information from the TCM.						One Trip, Type A
		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 corrected transmission position, 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 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	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							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 sends bad keys			Does not run during shutdown test (see P16F9)	4 fail counts out of 6 sample counts	One Trip, Type A
					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, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		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, Type B
		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 High Voltage Contactor Status 2. Ignition Key Status AND P16F9 Status	OFF OPEN Run/Crank Test Failed on Previous Key Cycle	Executes in a 12.5 ms Loop 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 High Voltage Contactor Status 2. Ignition Key Status AND P16F9 Status	OFF OPEN Run/Crank Test Failed on Previous Key Cycle	Executes in a 12.5 ms Loop Detects in 350ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
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 PECM State Machine State Discharge Time	"= RUN" "= Bus Discharge" ≥ 1000ms	2 Failures out of 2 Samples Frequency: Runs Once per Key-Cycle, 1000ms	Special Type C
Hybrid Battery Contactor Control Sequence Incorrect	P1A21	Contactor control functionality	Contactors closed this key on AND Shutdown in process AND Battery contactor state	= TRUE = FALSE ≠ CLOSED			50 ms	One Trip, Type A
Hybrid Battery Pack Overtemperature	P0A7E	High voltage battery overtemperature	Battery temperature	> 61°C			3000 Failures out of 3600 Samples Frequency: 100ms	One Trip, Type A
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, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
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 HV_ManageVN_Actv PowerMode BusOffFaultActive NormalCommEnabled NormalMsgTransmission DiagSystemDsbl DiagEnblTmr	> 9.5 Volts =FALSE =RUN =FALSE =TRUE =TRUE =FALSE >=3 sec	3 failures out of 5 samples Detects in 450 msec at loop rate of 12.5 msec	One Trip, Type A
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 HV_ManageVN_Actv PowerMode BusOffFaultActive	> 9.5 Volts =FALSE =RUN =FALSE	3 failures out of 5 samples Detects in 450 msec at loop rate of 12.5 msec	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					NormalCommEnabled	=TRUE		
					NormalMsgTransmission	=TRUE		
					DiagSystemDsbl	=FALSE		
					DiagEnblTmr	>=3 sec		
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	Detects within 500 msec at 6.25 msec loop rate	One Trip, Type A
					HV_ManageVN_Actv	=FALSE		
					PowerMode	=RUN		
					BusOffFaultActive	=FALSE		
					NormalCommEnabled	=TRUE		
					NormalMsgTransmission	=TRUE		
					DiagSystemDsbl	=FALSE		
					DiagEnblTmr	>=3 sec		
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	Detects within 500 msec at 6.25 msec loop rate	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HV_ManageVN_Actv	=FALSE		
					PowerMode	=RUN		
					BusOffFaultActive	=FALSE		
					NormalCommEnabled	=TRUE		
					NormalMsgTransmission	=TRUE		
					DiagSystemDsbl	=FALSE		
					DiagEnblTmr	>=3 sec		
Lost Communication With Transfer Case Control Module (supported when applicable)	U0102	Detects that CAN serial data communication has been lost with the TCCM on Bus A	Missed TCCM Messages		Ignition switch System Voltage	Run 10 V to 18 V	Detects within 500 msec at 6.25 msec loop rate	Two Trips, Type B
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		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Detects within 500 msec at 6.25 msec loop rate	Two Trips, Type B
					HV_ManageVN_Actv	=FALSE		
					PowerMode	=RUN		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					BusOffFaultActive	=FALSE		
					NormalCommEnabled	=TRUE		
					NormalMsgTransmission	=TRUE		
					DiagSystemDsbl	=FALSE		
					DiagEnblTmr	>=3 sec		
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		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Detects within 500 msec at 6.25 msec loop rate	Two Trips, Type B
					HV_ManageVN_Actv	=FALSE		
					PowerMode	=RUN		
					BusOffFaultActive	=FALSE		
					NormalCommEnabled	=TRUE		
					NormalMsgTransmission	=TRUE		
					DiagSystemDsbl	=FALSE		
					DiagEnblTmr	>=3 sec		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
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	Detects within 500 msec at 6.25 msec loop rate	One Trip, Type A
					HV_ManageVN_Actv	=FALSE		
					PowerMode	=RUN		
					BusOffFaultActive	=FALSE		
					NormalCommEnabled	=TRUE		
					NormalMsgTransmission	=TRUE		
					DiagSystemDsbl	=FALSE		
					DiagEnblTmr	>=3 sec		
Lost Communication With LostCommGateway_A_BusB	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	Detects within 500 msec at 6.25 msec loop rate	Special Type C
					HV_ManageVN_Actv	=FALSE		
					PowerMode	=RUN		
					BusOffFaultActive	=FALSE		
					NormalCommEnabled	=TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					NormalMsgTransmission DiagSystemDsbl DiagEnblTmr	=TRUE =FALSE >=3 sec		
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 HV_ManageVN_Actv PowerMode BusOffFaultActive NormalCommEnabled NormalMsgTransmission DiagSystemDsbl DiagEnblTmr	> 9.5 Volts =FALSE =RUN =FALSE =TRUE =TRUE =FALSE >=3 sec	Detects within 500 msec at 6.25 msec loop rate	One Trip, Type A

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 DTC Pass	Ignition Voltage	Ignition Voltage <= 10 Volts Ignition Voltage > 10 Volts	RunCrankActive Engine Speed	= 1 >= 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	RunCrankActive	= 1	5 seconds in a 6 second window 1 second	Special Type C
Shift Solenoid Hydraulic Diagnostics								
Shift Solenoid Hydraulic Diagnostics P0751, P0752, P0756, P0757 have the following common enable criteria	***				LinePressureEstimate Propulsion System Active	> 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 =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 Type B
		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 Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		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 PCS2 and PCS4 faults	EVT Lo **OR** EVT Hi 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	Fail Conditions met for 2 seconds	
		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	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Y valve completes High to Low transition without failure		Y Command Y Position	0 0 (as indicated by YPSw showing 1 value)	Pass conditions met for 2 seconds	
Pressure Control Solenoid Hydraulic Diagnostics								
Pressure Control Solenoid hydraulic diagnostics P0776, P0777, P0796, P0797 P2714, P2715, share these common secondary parameter enable conditions	***				Engine speed	(> 550 RPM **FOR** > 1.25 seconds (100 * .0125)) **OR** (<= 50 RPM **FOR** 1.375 seconds **(**110 * 0.0125))		
					Xvalve transition	X valve is 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		
					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		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						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 exhuast when the PCS has been commanded full feed.	**Fail Case 1:** PCS2PS (PSw3) indicates low hydraulic pressure	PCS commanded pressure *** Common Hydraulic Enables	>= 1800 kpa for >= (PSReDelay + 0.1) seconds Where PSReDelay: Fluid Temp Time -50 4.50 -30 1.80 -24 1.2 -17 0.80 4 0.20 40 0.1	Failure exists for 30 seconds (2400 * 0.0125)	Two Trips, Type B
		DTC Pass	Pass when PCS2PS and PCS2Cmnd are in agreement (Full Feed)	PCS2PS (PSw3) indicates hi hydraulic pressure			1.25 seconds ((2500 - 2400) * 0.0125)	
			The warning threshold for Fail Case 1 has been met 5 times in a single key cycle	**Fail Case 2:** Fail case 1 criteria met for at least 0.5 seconds (40 * 0.0125), more than 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.	Tthe 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, Type B
		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 exhuast when the PCS has been commanded full feed.	**Fail Case 1:** PCS3PS (PSw1) indicates low hydraulic pressure	PCS commanded pressure *** Common Hydraulic Enables	>= 1800 kpa for >= (PSReDelay + 0.1) seconds Where PSReDelay: Temp Time -50 4.50 -30 1.80 -24 1.2 -17 0.80	Failure exists for 30 seconds (2400 * 0.0125)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						4 0.20 40 0.1		
		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	
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, Type B
		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)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			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 exhuast when the PCS has been commanded full feed.	**Fail Case 1:** PCS4PS (PSw4) indicates low hydraulic pressure	PCS commanded pressure *** Common Hydraulic Enables	>=1800 kpa for >= (KtHCCD_t_PCS_PSReDelay + 0.1) seconds	Failure exists for 30 seconds (2400 * 0.0125)	Two Trips, Type B
		DTC Pass	Pass when PCS4PS and PCS4Cmnd are in agreement (Full Feed)	PCS4PS (PSw4) indicates hi hydraulic pressure			1.25 seconds ((2500 - 2400) * 0.0125)	
			The warning threshold for Fail Case 1 has been met 5 times in a single key cycle	**Fail Case 2:** Fail case 1 criteria met for at least 0.5 seconds (40 * 0.0125), more than 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, Type B
		DTC Pass	Pass when PCS4PS and PCS4Cmnd are in agreement (Reg Exhaust)	PCS4PS (PSw4) indicates Low hydraulic pressure			1.25 seconds ((2500 - 2400) * 0.0125)	
			The warning threshold for Fail Case 1 has been met 5 times in a single key cycle	**Fail Case 2:** Fail case 1 criteria met for at least 0.2 seconds (16 * 0.0125), more than 5 times in a given key cycle	Same as **Fail Case 1.**		N/A	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
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		
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 C1 Torq Estimate C1 Fill detected	> = 1800 kpa > = 200 Nm =1	3 seconds (240 * 0.0125)	One Trip, Type A
		DTC Pass	Clutch 1 Slip Speed	C1 Slip < 50 RPM	C1 Pressure Command C1 Torq Estimate C1 Fill detected	> = 1800 kpa > = 20 Nm =1	0.125 seconds (10 * 0.0125)	
Clutch 2 Slip	P079B	This DTC sets when excessive slip is observed on C2 while C2 has been commanded on	Clutch 2 Slip Speed	C2 Slip > 200 RPM	C2 Pressure Command C2 Torq Estimate C2 Fill detected	> = 1800 kpa > = 200 Nm =1	1 second (80 * 0.0125)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	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, Type B
					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, Type B
					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 Diagnostics								
All Pressure Control Solenoid electrical diagnostics P0961, P0962, P0963, P0965, P0966, P0967, P0969, P0970, P0971, P2719, P2720, P2721, P2728, P2729, P2730, P0973, P0974, P0976, P0977 share these common secondary parameter enable conditions	***				Ignition voltage Engine Speed Vehicle Speed 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	PCS1 electrical status	HWIO circutry detects out of range error is present	DTC P0961 *** Common Electrical Enables	Not failed this key on	Failure detected for 4 seconds (320 * 0.0125) out of a 5 second (400 * 0.0125) window	Two Trips, Type B

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 A Control Circuit Low Voltage	P0962	This DTC sets when the PCS1 control circuit has been detected to be shorted to ground	PCS1 electrical status	HWIO circuitry detects an electrical low pressure error is present	DTC P0962 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Pressure Control (PC) Solenoid A Control Circuit High Voltage	P0963	This DTC sets when PCS1 has been detected to be shorted to power or open circuited.	PCS1 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P0963 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Pressure Control (PC) Solenoid B System Performance	P0965	This DTC sets when an invalid voltage in PCS2 control circuit has been detected	PCS2 electrical status	HWIO 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, Type B

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

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, Type A
		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, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Pressure Control (PC) Solenoid D System Performance	P2719	This DTC sets when an invalid voltage in PCS4 control circuit has been detected	PCS4 electrical status	HWIO circutry detects out of range error is present.	DTC P2719 *** Common Electrical Enables	Not failed this key on	Failure detected for 4 seconds (320 * 0.0125) out of a 5 second (400 * 0.0125) window	Two Trips, Type B

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 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 DTC Pass	PCS4 electrical status	HWIO circuitry detects an electrical low pressure error is present. HWIO circuitry detects an electrical low pressure error is not 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 0.1 seconds ((40 - 32) * 0.0125)	One Trip, Type A
Pressure Control (PC) Solenoid D Control Circuit High Voltage	P2721	This DTC sets when PCS4 has been detected to be shorted to ground DTC Pass	PCS4 electrical status	HWIO circuitry detects an electrical hi pressure error is present. HWIO circuitry detects an electrical hi pressure error is not 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 0.1 seconds ((40 - 32) * 0.0125)	One Trip, Type A
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, Type B

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 E Control Circuit Low Voltage	P2729	This DTC sets when the PCS5 control circuit has been detected to be open circuit or shorted to power	PCS5 electrical status	HWIO circuitry detects an electrical low pressure error is present.	DTC P2720 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Pressure Control (PC) Solenoid E Control Circuit High Voltage	P2730	This DTC sets when PCS5 has been detected to be shorted to ground	PCS5 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P2721 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Shift Solenoid A Control Circuit Low	P0973	This DTC detects a short to power or open circuit in the X valve control circuit.	X Valve Electrical Status	HWIO circuitry detects an open circuit or short to power error is present.	DTC P0973 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (16 * 0.025) out of a 0.5 second (20 * 0.025) window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass		HWIO circuitry detects an open circuit or short to power error is not present.			0.1 seconds ((20 - 16) * 0.025)	
Shift Solenoid A Control Circuit High	P0974	This DTC detects a short to ground in the X valve control circuit.	X Valve Electrical Status	HWIO circuitry detects short to ground error is present.	DTC P0974 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (16 * 0.025) out of a 0.5 second (20 * 0.025) window	One Trip, Type A
		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 *** Common Electrical Enables	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, Type A
		DTC Pass		HWIO circuitry detects an open circuit or short to power error is not present.			0.1 seconds ((20 - 16) * 0.025)	
Shift Solenoid 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 *** Common Electrical Enables	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, Type A

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 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, Type A
Transm'n 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 **Pass Conditions** Transm'n Sump Temp ≤ 130 °C for 5 seconds	Two Trips, Type B
TCM Substrate Temp Sensor								
Transmission Control Module (TCM) Internal Temperature Too High	P0634	The DTC detects the electronic circuitry is at high operating temperature.	Transmission Substrate Temperature	≥ 142 °C	Transmission Substrate Temperature	-50 °C ≤ Transmission Substrate Temperature ≤ 146 °C for 0.25 seconds	≥ 5 seconds	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			OR Ignition Voltage AND Substrate Temperature	 ≥ 18 V ≥ 50 °C			 ≥ 2 seconds **Pass Conditions** Transm'n Substrate Temp ≤ 142 °C and Ignition Voltage is ≤ 18 V for 10 seconds **OR** Transm'n Substrate Temp ≤ 50 °C and Ignition Voltage is ≥ 18 V for 10 seconds	
Transmission Control Module (TCM) Substrate Temperature Sensor Circuit Range/Performance	P0667	The DTC detects the TCM substrate temperature sensor is reporting an incorrect value	Delta between TCM substrate temperature sensor and transmission fluid temperature sensor (TFT) AND	> Highest of transmission temperature sensors Temp Delta -40.1 256 -40 50 -20 20 0 20 30 15 60 15 100 15 149.0 15 149.1 256	IF vehicle speed is < 8 kph and accelerator position is > 20% for more than 7 seconds, then diagnostic is disabled. Once above conditions are removed > 20 seconds, diagnostic is re-enabled		> 300 seconds (3000 counts at 100ms)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Delta between TCM substrate temperature sensor and TCM powerup temperature sensor	> Highest of transmission temperature sensors Temp Delta -40.1 256 -40 10 -20 8 0 8 30 8 60 8 100 8 149.0 8 149.1 256	Transmission state Engine Torque Inaccurate Accelerator Position Sensor Failure P0721, P0722, P0723, P215C, P0658, P0668, P0669, P0712, P0713, P06AD, P06AE Engine Speed Vehicle Speed	NOT in park/neutral Must be FALSE Must be FALSE NOT Fault Active OR Failed This Key On 0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds Vehicle Speed ≤ 200 KPH for 5 seconds		
		DTC Pass	Transm'n substrate temp delta between powerup temp sensor AND fluid temp sensor	< value in fail criteria table			> 70 sec (700 counts at 100ms)	
Transmission Control Module (TCM) Substrate Temperature Sensor Circuit Low (Failed at a low temperature - circuit short to ground).	P0668	The DTC detects TCM substrate temperature sensor short to ground error.	TCM Substrate Temperature Sensor	≤ -60 °C	Engine Speed Vehicle Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 200 KPH for 5 seconds	≥ 60 seconds **Pass Conditions** Transm'n Substrate Temp ≥ -55 °C for 4 seconds	Two Trips, Type B

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 High (Failed at a high temperature - circuit open or short to power).	P0669	The DTC detects TCM substrate temperature sensor open or short to power error.	TCM Substrate Temperature Sensor	≥ 160 °C	Engine Speed Vehicle Speed Transmission Output Speed Estimated Motor Power Loss	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds Vehicle Speed ≤ 200 KPH for 5 seconds Transmission Output Speed ≥ 200 RPM for 5 seconds cumulative. Estimated Motor Power Loss ≥ 0.4 kW for 200 seconds cumulative.	≥ 60 seconds **Pass Conditions** Transm'n Substrate Temp ≤ 150 °C for 4 seconds	Two Trips, Type B
TCM Powerup Temp Sensor								
Transmission Control Module (TCM) Powerup Temperature Sensor Circuit Range/Performanc e	P06AC	The DTC detects the TCM powerup temperature sensor is reporting an incorrect value	Delta between TCM powerup temperature sensor and transmission fluid temperature sensor (TFT)	>Highest of transmission temperature sensors Temp Delta -40.1 256 -40 50 -20 20 0 20 30 15 60 15 100 15 149.0 15 149.1 256	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, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			AND Delta between TCM powerup temperature sensor and TCM substrate temperature sensor	>Highest of transmission temperature sensors Temp Delta -40.1 256 -40 10 -20 8 0 8 30 8 60 8 100 8 149.0 8 149.1 256	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		
		DTC Pass	Transm'n substrate temp delta between powerup temp sensor AND fluid temp sensor	< value in fail criteria table			> 70 sec (700 counts at 100ms)	
Transmission Control Module (TCM) Powerup Temperature Sensor Low (Failed at a low temperature - circuit short to ground).	P06AD	The DTC detects TCM powerup sensor short to ground error.	TCM Power Up Temperature Sensor	≤ -59 °C	Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds	≥ 60 seconds	Two Trips, Type B
					Vehicle Speed	Vehicle Speed ≤ 200 KPH for 5 seconds		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Estimated Motor Power Loss P0721, P0722, P0723, P215C	Estimated Motor Power Loss ≥ 0.4 kW for 200 seconds cumulative. NOT Fault Active OR Failed This Key On	**Pass Conditions** Transm'n Substrate Temp ≥ -40 °C for 4 seconds	
Transmission Control Module (TCM) Powerup Temperature Sensor Circuit High (Failed at a high temperature - circuit open or short to power).	P06AE	The DTC detects TCM powerup sensor open or short to power error.	TCM Power Up Temperature Sensor	≥ 164 °C	Engine Speed Vehicle Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds Vehicle Speed ≤ 200 KPH for 5 seconds	≥ 60 seconds **Pass Conditions** Transm'n Substrate Temp ≤ 150 °C for 4 seconds	Two Trips, Type B
Transm'n Fluid Temp Sensor								
Transmission Fluid Temperature Sensor Circuit Range/Performance	P0711	The DTC detects the transmission fluid temperature is reporting an incorrect value	Delta between transmission fluid temperature (TFT) and TCM powerup temperature sensor	> Highest of transmission temperature sensors Temp Delta -40.1 256 -40 50 -20 20	IF vehicle speed is < 8 kph and accelerator position is > 20% for more than 7 seconds, then diagnostic is disabled. Once conditions are		> 300 seconds (3000 counts at 100ms)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				0 20 30 15 60 15 100 15 149.0 15 149.1 256	removed > 20 seconds, diagnostic is re-enabled			
			AND					
			Delta between transmission fluid temperature (TFT) and TCM substrate temperature sensor	> Highest of transmission temperature sensors Temp Delta -40.1 256 -40 50 -20 20 0 20 30 15 60 15 100 15 149.0 15 149.1 256	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		
		DTC Pass	Transm'n substrate temp delta between powerup temp sensor AND fluid temp sensor	< value in fail criteria table			> 70 sec (700 counts at 100ms)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Transmission Fluid Temperature Sensor Circuit Low (Failed at a low temperature - circuit short to ground).	P0712	The DTC detects transmission fluid sensor short to ground error.	Transmission Sump Temperature Sensor	≤ -60 °C	P0721, P0722, P0723, P077B, P215C Engine Speed Vehicle Speed Estimated Motor Power Loss	NOT Fault Active OR Failed This Key On 0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds Vehicle Speed ≤ 200 KPH for 5 seconds Estimated Motor Power Loss ≥ 0.4 kW for 200 seconds cumulative.	≥ 60 seconds **Pass Conditions** Transm'n Sump Temp ≥ -50 °C for 4 seconds	One Trip, Type A
Transmission Fluid Temperature Sensor Circuit High (Failed at a high temperature - circuit open or short to power).	P0713	The DTC detects substrate sensor open or short to power error.	Transmission Sump Temperature Sensor	≥ 160 °C	P0721, P0722, P0723, P077B, P215C Engine Speed Vehicle Speed	NOT Fault Active OR Failed This Key On 0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds Vehicle Speed ≤ 200 KPH for 5 seconds	≥ 60 seconds **Pass Conditions** Transm'n Substrate Temp ≤ 149 °C for 4 seconds	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Transm'n Output Speed Sensor								
Transmission Output Speed (TOS) Sensor Wrong Direction	P0721	The DTC detects incorrect TOS direction.	TOS Raw Direction	TOS Direction Raw is not Forward or Reverse	TOS Sample Period	≠ 0	≥ 2.5 seconds (100 counts at 25ms) **Pass Conditions** TOS Direction Raw = Forward or Reverse for 3.125 seconds (125 counts at 25ms)	One Trip, Type A
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 Axle Torque	150 ≤ Motor Estimated Transmission Output Speed ≤ 5200 RPM 110 ≤ Axle Torque ≤ 5000 Nm	≥ 1.5 seconds **Pass Conditions** TOS ≥ 150 RPM for 4.5 seconds	Two Trips, Type B
Transmission Output Speed (TOS) Sensor Intermittent	P0723	The DTC detects an unrealistically large drop in TOS signal	TOS delta	≥ 1000 RPM	Engine Speed Vehicle Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds Vehicle Speed ≤ 200 KPH for 5 seconds	≥ 6 seconds	One Trip, Type A

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Output Shaft Speed (OSS) - Wheel Speed Correlation	P215C	The DTC 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, Type B
					Output Speed Calculated from Motor Speeds AND Output Speed Calculated from Wheel Speeds Difference	≤ 100 RPM	**Pass Conditions** Difference between Transm'n 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)	
					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		
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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		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	**Pass Conditions** Tap Up Switch Request not active in NonTap Mode for 3 seconds	
					Vehicle Speed	Vehicle Speed ≤ 200 KPH for 5 seconds		
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		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Fail Case 2: Switch stuck on in D6, N, R, P	Tap Down Switch Request	Request in D6, N, R, P	P0826 Engine Speed Vehicle Speed	NOT Fault Active OR Failed This Key On 0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds Vehicle Speed ≤ 200 KPH for 5 seconds	≥ 600 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 Vehicle Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds Vehicle Speed ≤ 200 KPH for 5 seconds	≥ 8 seconds **Pass Conditions** Tap Up/Tap Down switch status not illegal for 1 second	Special Type C
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 Vehicle Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds Vehicle Speed ≤ 200 KPH for 5 seconds	≥ 10 seconds **Pass Conditions** No Rolling Count Errors for 0.1 seconds	Special Type C

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Transm'n 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 AND PRNDL P Circuit Sensed	PARK PRNDL P Circuit Has Not Been Observed Low	P1824 Transmission Direction State Fault Active	NOT Fault Active OR Failed This Key On FALSE	2.5 seconds + 1 count at 6.25ms **Pass Conditions** PRNDL P Circuit Has Been Observed Low for 1.5875 seconds	Two Trips, Type B
Internal Mode Switch A Circuit Low Voltage	P182A	The DTC monitors if the IMS A Circuit is shorted to a Low Voltage	PRNDL State AND Trans Direction State	Transitional 1 Trans Direction DRIVE	Automatic Transmission Type P182A PRNDL State AND PRNDL A Circuit Sensed Trans Direction State Fault Active	EVT NOT Fault Active OR Failed This Key On PARK AND NOT PRNDL A Circuit Has Been Observed High for 1 second FALSE	8 seconds + 1 count at 6.25ms **Pass Conditions** PRNDL A Circuit Has Been Observed High for 1.5875 seconds	Two Trips, Type B
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 AND	PARK	P182B	NOT Fault Active OR Failed This Key On	2.5 seconds + 1 count at 6.25ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			PRNDL B Circuit Sensed	PRNDL B Circuit Has Not Been Observed High	Transmission Direction State Fault Active	FALSE	**Pass Conditions** PRNDL B Circuit Has Been Observed High for 1.5875 seconds	
Internal Mode Switch B Circuit High Voltage	P182C	The DTC monitors if the IMS B Circuit is shorted to a High Voltage	PRNDL State AND Trans Direction State	Transitional 13 Trans Direction DRIVE	Automatic Transmission Type P182C PRNDL State AND PRNDL B Circuit Sensed Trans Direction State Fault Active	EVT NOT Fault Active OR Failed This Key On PARK PRNDL B Circuit Has Been Observed High for 1 second FALSE	8 seconds + 1 count at 6.25ms **Pass Conditions** PRNDL B Circuit Has Been Observed Low for 1.5875 seconds	Two Trips, Type B
Internal Mode Switch P Circuit Low Voltage	P182D	The DTC monitors if the IMS P Circuit is shorted to a Low Voltage	PRNDL State AND Trans Direction State	Transitional 8 Trans Direction DRIVE	Automatic Transmission Type P182D PRNDL State AND PRNDL P Circuit Sensed	EVT NOT Fault Active OR Failed This Key On PARK AND PRNDL P Circuit Has Been Observed Low for 1 second	8 seconds + 1 count at 6.25ms **Pass Conditions** PRNDL P Circuit Has Been Observed High for 1.5875 seconds	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					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 Vehicle Speed P182E P182E	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds Vehicle Speed ≤ 200 KPH for 5 seconds NOT Fault Active OR Failed This Key On NOT Fault Active OR Failed This Key On	5 seconds **Pass Conditions** PRNDL State is NOT Illegal for 5 seconds	Two Trips, Type B
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 AND PRNDL C Circuit Sensed	DRIVE PRNDL C Circuit Has Not Been Observed Low	Automatic Transmission Type P182F Trans Direction State Fault Active	EVT NOT Fault Active OR Failed This Key On FALSE	2.5 seconds + 1 count at 6.25ms **Pass Conditions** PRNDL C Circuit Has Been Observed Low for 4 seconds + 1 count at 6.25ms	Two Trips, Type B
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 AND PRNDL A Circuit Sensed	PARK PRNDL A Circuit Has Not Been Observed Low	P1838 Trans Direction State Fault Active	NOT Fault Active OR Failed This Key On FALSE	2.5 seconds + 1 count at 6.25ms **Pass Conditions** PRNDL A Circuit Has Been Observed Low for 1.5875 seconds	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Internal Mode Switch C Circuit Low Voltage	P1839	The DTC monitors if the IMS C Circuit is shorted to a Low Voltage	Transmission Direction State AND PRNDL C Circuit Sensed	PARK PRNDL C Circuit Has Not Been Observed High	P1839 Trans Direction State Fault Active	NOT Fault Active OR Failed This Key On FALSE	2.5 seconds + 1 count at 6.25ms **Pass Conditions** PRNDL C Circuit Has Been Observed Low for 1.5875 seconds	Two Trips, Type B
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, Type A
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, Type A
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, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Random Access Memory (RAM) Failure	P0604	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, Type A
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, Type A
		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.		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
			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				
		Fail Case 4: WD error counter doesn't reach its desired level (sdi_Ufet = 1)	WD error count is higher than threshold	- WD error count: 0	IPT test started	end of Initialization	3.125ms loop	
		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 equal or higher than threshold	- WD error count: 6	IPT test started	end of Initialization	3.125ms loop	One Trip, Type A
		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	- WD error counter: > 0	IPT test started	end of Initialization	3.125ms loop	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Actuator supply voltage is within range	- actuator supply voltage: >1.5 volts and <= 5.5 volts				
		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	

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

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, Type A
		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		Ignition switch	in crank or run	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
			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				
		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	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Fail Case 4	Transmission is 2nd Gear position AND Range State is 5 AND X Valve Command is 1 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	- 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 5	Transmission is in 4th Gear position AND Range State is 7 AND X Valve Command is 1 AND Y Valve Command is 1 AND PCS2 Command is higher than threshold AND	- PCS2 Command > 1800kpa	Ignition switch	in crank or run	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
			PCS3 Command is higher than threshold AND PCS4 Command has been corrupted to equal 2000kpa during more than time threshold	- PCS3 Command > 1800kpa -time threshold: 200msec				
		Fail Case 6	Transmission is in 2nd Gear position AND Range State is 5 AND X Valve Command is 1 AND Y Valve Command has been corrupted to equal 1 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	- 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 7	Transmission is in 1st Gear position AND Range State is 4 AND X Valve Command is 1		Ignition switch	in crank or run	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
			AND Y Valve Command is 0 AND PCS2 Command has been corrupted to equal 2000kpa AND PCS3 Command is higher than threshold AND PCS4 Command is higher than threshold during more than time threshold	-PCS3 Command > 1800kpa - PCS4 Command > 1800kpa -time threshold: 200msec				
		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	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		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		Ignition switch	in crank or run	Executes in a 12.5ms loop Detects in 200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			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				
		Fail Case 2	Transmission is in 2nd 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	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Alive Rolling Count / Protection Value fault	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, Type A
Commun'n 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 HV_ManageVN_Actv PowerMode BusOffFaultActive NormalCommEnabled NormalMsgTransmission DiagSystemDsbl DiagEnblTmr	> 9.5 Volts =FALSE =RUN =FALSE =TRUE =TRUE =FALSE >=3 sec	3 failures out of 5 samples Detects in 450 msec at loop rate of 12.5 msec	One Trip, 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 HV_ManageVN_Actv PowerMode	> 9.5 Volts =FALSE =RUN	Detects within 500 msec at 6.25 msec loop rate	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					BusOffFaultActive	=FALSE		
					NormalCommEnabled	=TRUE		
					NormalMsgTransmission	=TRUE		
					DiagSystemDsbl	=FALSE		
					DiagEnblTmr	>=3 sec		
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	Detects within 500 msec at 6.25 msec loop rate	One Trip, Type A
					HV_ManageVN_Actv	=FALSE		
					PowerMode	=RUN		
					BusOffFaultActive	=FALSE		
					NormalCommEnabled	=TRUE		
					NormalMsgTransmission	=TRUE		
					DiagSystemDsbl	=FALSE		
					DiagEnblTmr	>=3 sec		

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.
Fuel Rail Pressure (FRP) Sensor Performance (rationality)	P018B	This DTC detects a fuel pressure sensor response stuck within the normal operating range	Absolute value of change in fuel pressure as sensed during intrusive test.	<= 30 kPa			Frequency: 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	DTC Type A 1 trip
					1. FRP Circuit Low DTC (P018C)	not active		
					2. FRP Circuit High DTC (P018D)	not active		
					3. FuelPump Circuit Low DTC (P0231)	not active	Duration of intrusive test is fueling related (5 to 12 seconds).	
					4. FuelPump Circuit High DTC (P0232)	not active		
					5. FuelPump Circuit Open DTC (P023F)	not active	Intrusive test is run when fuel flow is below Max allowed fuel flow rate (Typical values in the range of 11 to 50 g/s)	
					6. Reference Voltage DTC (P0641)	not active		
					7. Fuel Pump Control Module Driver Over-temperature DTC’s (P064A, P1255)	not active		
					8. Control Module Internal Performance DTC (P0606)	not active		
					9. Engine run time	>=5 seconds		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					10. Emissions fuel level (PPEI $3FB) AND Engine Run Time 11. Fuel pump control 12. Fuel pump control state 13. Engine fuel flow 14. ECM fuel control system failure (PPEI $1ED)	not low > 30 sec 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 < 32V	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 1 trip
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	0% duty cycle (off)	36 test failures in 40 test samples; 1 sample/12.5ms	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Fuel pump control enable Time that above conditions are met	False >=4.0 seconds	Pass/Fail determination made only once per trip **EXCEPT Hybrid vehicles in AutoStop mode.** In Hybrid AutoStop, operation is continuous.	
Fuel Pump Control Circuit (Open)	P023F	This DTC detects if the fuel pump control circuit is open	Fuel Pump Current AND Fuel Pump Duty Cycle	<=0.5A > 20%	Ignition OR HS Comm OR Fuel Pump Control AND Ignition Run/Crank voltage	Run or Crank Enabled Enabled 9V <voltage< 32V	72 test failures in 80 test samples; 1 sample/12.5ms	DTC Type A 1 trip
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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Not Programmed	P0602	Indicates that the FSCM needs to be programmed	This DTC is set via calibration, when KeMEMD_b_NoStartCal	TRUE	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	Runs once at power up	DTC Type A 1 trip
Control Module Long Term Memory Reset	P0603	Non-volatile memory checksum error at controller power-up	Checksum at power-up	≠ checksum at power-down	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	1 failure Frequency: Once at power-up	DTC Type A 1 trip
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: •Register contents	 Incorrect value.	 Ignition OR HS Comm OR	 Run or Crank enabled	Tests 1 and 2 1 failure Frequency: Continuously (12.5ms)	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
2. Processor clock test 3. External watchdog test			2. For Processor Clock Fault: •EE latch flag in EEPROM. OR • RAM latch flag. 3. For External Watchdog Fault: • Software control of fuel pump driver	0x5A5A 0x5A Control Lost	Fuel Pump Control 1. For all I/O configuration register faults: •KeMEMD_b_ProcFltCfgRegEnbl 2. For Processor Clock Fault: •KeMEMD_b_ProcFltCLKDiagEnbl 3. For External Watchdog Fault: •KeFRPD_b_FPExtWDogDiagEnbl 3. For External Watchdog Fault: •Control Module ROM(P0601) 3. For External Watchdog Fault: •Control Module RAM(P0604)	enabled TRUE TRUE TRUE not active not active	Test 3 3 failures out of 15 samples 1 sample/12.5 ms	
Control Module Long Term Memory (EEPROM) Performance	P062F	Indicates that the NVM Error flag has not been cleared	Last EEPROM write	Did not complete	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	1 test failure Once on controller power-up	DTC Type A 1 trip
5Volt Reference Circuit (Short High/Low/Out of Range)	P0641	Detects continuous short or out of range on the #1 5V sensor reference circuit	Reference voltage AND Output	>= 0.5V inactive .	Ignition	Run or Crank	15 failures out of 20 samples 1 sample/12.5 ms	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			OR Reference voltage AND Output	 >= 5.5V active				
			OR Reference voltage AND Output	 <= 4.5V active				
			OR Reference voltage	 > 102.5% nominal (i.e., 5.125V) OR <97.5% nominal (i.e., 4.875V)				
Fuel Pump Control Module - Driver Over-temperature 1	P064A	This DTC detects if an internal fuel pump driver overtemperature condition exists under normal operating conditions (Tier 1 supplier Continental responsibility)	Module Range of Operation	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.)	Ignition OR HS Comm OR Fuel Pump Control AND Ignition Run / Crank	Run or Crank Enabled Enabled 9V<voltage<32V	3 failures out of 15 samples 1 sample/12.5 ms	DTC Type B 2 trips
			AND Fuel pump driver Temp	> 190C	KeFRPD_b_FPOverTempDiag	TRUE		

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.)	Ignition OR HS Comm OR Fuel Pump Control AND Ignition Run / Crank	Run or Crank Enabled Enabled 9V<voltage<32V	3 failures out of 15 samples 1 sample/12.5 ms	DTC Type B 2 trips
			AND Fuel pump driver Temp	> 190C	KeFRPD_b_FPOverTempDiag	TRUE		
Ignition 1 Switch Circuit Low Voltage	P2534	This DTC detects if the Ignition1 Switch circuit is shorted to low or open	Ignition 1 voltage	<= 6 V	Engine	Running	180 failures out of 200 samples 1 sample/25.0 ms	DTC Type A 1 trip
Fuel Pump Flow Performance (rationality)	P2635	This DTC detects degradation in the performance of the SIDI electronic return-less fuel system	Filtered fuel rail pressure error	<= Low Threshold (function of desired fuel rail pressure and fuel flow rate. 15% of resultant Target Pressure) OR >= High Threshold (function of desired fuel rail pressure and fuel flow rate. 15% of resultant Target Pressure) **(See Supporting Tables tab)**	1. FRP Circuit Low DTC (P018C)	not active	Filtered fuel rail pressure error Time Constant = 12.5 seconds Frequency: Continuous 12.5 ms loop	DTC Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					2. FRP Circuit High DTC (P018D)	not active		
					3. Fuel Pressure Sensor Performance DTC (P018B)	not active		
					4. FuelPump Circuit Low DTC (P0231)	not active		
					5. FuelPump Circuit High DTC (P0232)	not active		
					6. FuelPump Circuit Open DTC (P023F)	not active		
					7. Reference Voltage DTC (P0641)	not active		
					8. Fuel Pump Control Module Driver Over-temperature DTC's (P064A, P1255)	not active		
					9. Control Module Internal Performance DTC (P0606)	not active		
					10. An ECM fuel control system failure (PPEI $1ED)	has not occurred		
					11. The Barometric pressure (PPEI $4C1) signal	valid (for absolute fuel pressure sensor)		
					12. Engine run time	>= 30 seconds		
					13. Emissions fuel level (PPEI $3FB) AND Engine Run Time	not low > 30 sec		
					14. Fuel pump control	enabled		
					15. Fuel pump control state	normal		
					16. Battery Voltage	11V<=voltage=<32V		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					17. Fuel flow rate **(See Supporting Tables tab)**	> 0.047 g/s **AND** <= Max allowed fuel flow rate as a function of desired rail pressure & Vbatt (Typical values in the range of 11 to 50 g/s)		
					18. Fuel Pressure Control System	Is not responding to an over-pressurization due to pressure build during DFCO or a decreasing desired pressure command.		
Control Module Communication Bus “A” Off	U0073	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state	Bus Status	Off	Power mode	Run/Crank	5 failures out of 5 samples (5 seconds)	DTC Type B 2 trips
Lost Communication With ECM/PCM “A”	U0100	Detects that CAN serial data communication has been lost with the ECM	Message $0C9	Undetected	1. Power mode 2. Ignition Run/Crank Voltage 3. U0073	Run/Crank 11V<=voltage=<32V not active	12 failures out of 12 samples (12 seconds)	DTC Type B 2 trips

FSCM C202 Support Tables

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

X-axis= Desired Fuel Pressure (kiloPascals)

Y-axis= Battery voltage (volts)

	200	250	300	350	400	450	500	550	600
4.5	29.703	29.703	29.703	29.703	26.156	22.375	18.688	15.086	11.570
6	29.703	29.703	29.703	29.703	26.156	22.375	18.688	15.086	11.570
7.5	29.703	29.703	29.703	29.703	26.156	22.375	18.688	15.086	11.570
9	29.703	29.703	29.703	29.703	26.156	22.375	18.688	15.086	11.570
10.5	29.703	29.703	29.703	29.703	26.156	22.375	18.688	15.086	11.570
12	29.703	29.703	29.703	29.703	29.703	29.703	28.203	24.484	20.859
13.5	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703
15	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703
16.5	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703
18	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703
19.5	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703
21	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703
22.5	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703
24	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703
25.5	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703
27	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703
28.5	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703	29.703

FSCM C202 Support Tables

P2635 Fuel Pump Performance Filtered Pressure Error Fault Threshold High map (kiloPascals)

X-axis= Target Fuel Pressure (kiloPascals)
Y-axis= Fuel Flow (grams / s)

	200	250	300	350	400	450	500	550	600
0	55.500	69.375	83.250	97.125	111.000	124.875	138.750	152.625	166.500
1.5	55.500	69.375	83.250	97.125	111.000	124.875	138.750	152.625	166.500
3	55.500	69.375	83.250	97.125	111.000	124.875	138.750	152.625	166.500
4.5	55.500	69.375	83.250	97.125	111.000	124.875	138.750	152.625	166.500
6	55.500	69.375	83.250	97.125	111.000	124.875	138.750	152.625	166.500
7.5	55.500	69.375	83.250	97.125	111.000	124.875	138.750	152.625	166.500
9	55.500	69.375	83.250	97.125	111.000	124.875	138.750	152.625	166.500
10.5	55.500	69.375	83.250	97.125	111.000	124.875	138.750	152.625	166.500
12	55.500	69.375	83.250	97.125	111.000	124.875	138.750	152.625	166.500
13.5	55.500	69.375	83.250	97.125	111.000	124.875	138.750	152.625	166.500
15	55.500	69.375	83.250	97.125	111.000	124.875	138.750	152.625	166.500
16.5	55.500	69.375	83.250	97.125	111.000	124.875	138.750	152.625	166.500
18	55.500	69.375	83.250	97.125	111.000	124.875	138.750	152.625	166.500
19.5	35.000	69.375	83.250	97.125	111.000	124.875	138.750	152.625	166.500
21	19.500	59.000	83.250	97.125	111.000	124.875	138.750	152.625	166.500
22.5	19.500	31.000	83.250	97.125	111.000	124.875	138.750	152.625	166.500
24	19.500	24.375	51.000	97.125	111.000	124.875	138.750	152.625	166.500
25.5	19.500	24.375	29.250	69.000	111.000	124.875	138.750	152.625	166.500
27	19.500	24.375	29.250	35.000	85.000	124.875	138.750	152.625	166.500
28.5	19.500	24.375	29.250	34.125	50.000	100.000	150.000	150.000	150.000
30	19.500	24.375	29.250	34.125	45.000	95.000	145.000	145.000	145.000
31.5	19.500	24.375	29.250	34.125	45.000	95.000	145.000	145.000	145.000
33	19.500	24.375	29.250	34.125	45.000	95.000	145.000	145.000	145.000
34.5	19.500	24.375	29.250	34.125	45.000	95.000	145.000	145.000	145.000
36	19.500	24.375	29.250	34.125	45.000	95.000	145.000	145.000	145.000

FSCM C202 Support Tables

P2635 Fuel Pump Performance Filtered Pressure Error Fault Threshold High map (kiloPascals) (Con't)

X-axis= Target Fuel Pressure (kiloPascals)
Y-axis= Fuel Flow (grams / s)

37.5	19.500	24.375	29.250	34.125	45.000	95.000	145.000	145.000	145.000
39	19.500	24.375	29.250	34.125	45.000	95.000	145.000	145.000	145.000
40.5	19.500	24.375	29.250	34.125	45.000	95.000	145.000	145.000	145.000
42	19.500	24.375	29.250	34.125	45.000	95.000	145.000	145.000	145.000
43.5	19.500	24.375	29.250	34.125	45.000	95.000	145.000	145.000	145.000
45	19.500	24.375	29.250	34.125	45.000	95.000	145.000	145.000	145.000
46.5	19.500	24.375	29.250	34.125	45.000	95.000	145.000	145.000	145.000
48	19.500	24.375	29.250	34.125	45.000	95.000	145.000	145.000	145.000

P2635 Fuel Pump Performance Filtered Pressure Error Fault RePass Threshold High map (kiloPascals)

X-axis= Target Fuel Pressure (kiloPascals)
Y-axis= Fuel Flow (grams / s)

	200	250	300	350	400	450	500	550	600
0	48.625	60.7813	72.9375	85.09375	97.25	109.4063	121.5625	133.7188	145.875
1.5	48.625	60.7813	72.9375	85.09375	97.25	109.4063	121.5625	133.7188	145.875
3	48.625	60.7813	72.9375	85.09375	97.25	109.4063	121.5625	133.7188	145.875
4.5	48.625	60.7813	72.9375	85.09375	97.25	109.4063	121.5625	133.7188	145.875
6	48.625	60.7813	72.9375	85.09375	97.25	109.4063	121.5625	133.7188	145.875
7.5	48.625	60.7813	72.9375	85.09375	97.25	109.4063	121.5625	133.7188	145.875
9	48.625	60.7813	72.9375	85.09375	97.25	109.4063	121.5625	133.7188	145.875
10.5	48.625	60.7813	72.9375	85.09375	97.25	109.4063	121.5625	133.7188	145.875
12	48.625	60.7813	72.9375	85.09375	97.25	109.4063	121.5625	133.7188	145.875
13.5	48.625	60.7813	72.9375	85.09375	97.25	109.4063	121.5625	133.7188	145.875
15	48.625	60.7813	72.9375	85.09375	97.25	109.4063	121.5625	133.7188	145.875

FSCM C202 Support Tables

P2635 Fuel Pump Performance Filtered Pressure Error Fault RePass Threshold High map (kiloPascals) (Con't)

X-axis= Target Fuel Pressure (kiloPascals)
Y-axis= Fuel Flow (grams / s)

16.5	48.625	60.7813	72.9375	85.09375	97.25	109.4063	121.5625	133.7188	145.875
18	48.625	60.7813	72.9375	85.09375	97.25	109.4063	121.5625	133.7188	145.875
19.5	30.6719	60.7813	72.9375	85.09375	97.25	109.4063	121.5625	133.7188	145.875
21	17.0781	51.6875	72.9375	85.09375	97.25	109.4063	121.5625	133.7188	145.875
22.5	17.0781	27.1563	72.9375	85.09375	97.25	109.4063	121.5625	133.7188	145.875
24	17.0781	21.3594	44.6875	85.09375	97.25	109.4063	121.5625	133.7188	145.875
25.5	17.0781	21.3594	25.625	60.45313	97.25	109.4063	121.5625	133.7188	145.875
27	17.0781	21.3594	25.625	30.67188	74.46875	109.4063	121.5625	133.7188	145.875
28.5	17.0781	21.3594	25.625	29.89063	43.8125	87.60938	131.4219	131.4219	131.4219
30	17.0781	21.3594	25.625	29.89063	39.42188	83.23438	127.0313	127.0313	127.0313
31.5	17.0781	21.3594	25.625	29.89063	39.42188	83.23438	127.0313	127.0313	127.0313
33	17.0781	21.3594	25.625	29.89063	39.42188	83.23438	127.0313	127.0313	127.0313
34.5	17.0781	21.3594	25.625	29.89063	39.42188	83.23438	127.0313	127.0313	127.0313
36	17.0781	21.3594	25.625	29.89063	39.42188	83.23438	127.0313	127.0313	127.0313
37.5	17.0781	21.3594	25.625	29.89063	39.42188	83.23438	127.0313	127.0313	127.0313
39	17.0781	21.3594	25.625	29.89063	39.42188	83.23438	127.0313	127.0313	127.0313
40.5	17.0781	21.3594	25.625	29.89063	39.42188	83.23438	127.0313	127.0313	127.0313
42	17.0781	21.3594	25.625	29.89063	39.42188	83.23438	127.0313	127.0313	127.0313
43.5	17.0781	21.3594	25.625	29.89063	39.42188	83.23438	127.0313	127.0313	127.0313
45	17.0781	21.3594	25.625	29.89063	39.42188	83.23438	127.0313	127.0313	127.0313
46.5	17.0781	21.3594	25.625	29.89063	39.42188	83.23438	127.0313	127.0313	127.0313
48	17.0781	21.3594	25.625	29.89063	39.42188	83.23438	127.0313	127.0313	127.0313

FSCM C202 Support Tables

P2635 Fuel Pump Performance Filtered Pressure Error Fault Threshold Low map (kiloPascals)

X-axis= Target Fuel Pressure (kiloPascals)
Y-axis= Fuel Flow (grams / s)

	200	250	300	350	400	450	500	550	600
0	-34.563	-34.563	-34.563	-31.469	-28.406	-28.406	-28.406	-28.406	-28.406
1.5	-63.000	-63.000	-63.000	-73.500	-84.000	-84.000	-84.000	-84.000	-84.000
3	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
4.5	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
6	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
7.5	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
9	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
10.5	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
12	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
13.5	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
15	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
16.5	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
18	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
19.5	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
21	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
22.5	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
24	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
25.5	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
27	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
28.5	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
30	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
31.5	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
33	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
34.5	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
36	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500

FSCM C202 Support Tables

P2635 Fuel Pump Performance Filtered Pressure Error Fault Threshold Low map (kiloPascals) (Con't)

X-axis= Target Fuel Pressure (kiloPascals)
Y-axis= Fuel Flow (grams / s)

37.5	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
39	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
40.5	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
42	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
43.5	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
45	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
46.5	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500
48	-64.500	-80.625	-96.750	-112.875	-129.000	-145.125	-161.250	-177.375	-193.500

P2635 Fuel Pump Performance Filtered Pressure Error Fault RePass Threshold Low map (kiloPascals)

X-axis= Target Fuel Pressure (kiloPascals)
Y-axis= Fuel Flow (grams / s)

	200	250	300	350	400	450	500	550	600
0	-16.875	-16.875	-16.875	-14.4375	-12	-12	-12	-12	-12
1.5	-49.906	-49.906	-49.906	-58.25	-66.5625	-66.5625	-66.5625	-66.5625	-66.5625
3	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
4.5	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
6	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
7.5	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
9	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
10.5	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
12	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125

FSCM C202 Support Tables

P2635 Fuel Pump Performance Filtered Pressure Error Fault RePass Threshold Low map (kiloPascals) (Con't)

X-axis= Target Fuel Pressure (kiloPascals)
Y-axis= Fuel Flow (grams / s)

13.5	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
15	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
16.5	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
18	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
19.5	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
21	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
22.5	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
24	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
25.5	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
27	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
28.5	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
30	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
31.5	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
33	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
34.5	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
36	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
37.5	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
39	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
40.5	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
42	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
43.5	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
45	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
46.5	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125
48	-55.375	-69.219	-83.063	-96.9063	-110.75	-124.594	-138.438	-152.281	-166.125

Gasoline COMPONENT/SYSTEM	List DTC of monitor that detects the following failure malfunction: MONITORING REQUIREMENTS
Catalyst	
Heated Catalyst	
Misfire	
Evaporative System	
Secondary Air	
Fuel System	(e)(6.2.2) Adaptive limits reached P0191 P2635
Upstream O2/Exhaust Gas Sensor Monitoring	
Downstream O2/Exhaust Gas Sensor Monitoring	
EGR	
Crankcase Ventilation	
Engine Cooling System	
Cold start strategy	
VVT system	
Direct Ozone Reduction (DOR) System	

FSCM C202 Gasoline Checklist

List DTC of monitor used that detects the following failure mode:

Monitor/System		OOR-low	Circuit low	OOR- high	Circuit high	Circuit open	Rationality- low	Rationality- high	Other Rationality	Functional #1	Functional #2	Other Functional
Fuel Pump Performance							P2635	P2635				
Fuel Pump Circuits		P0231	P0231	P0232	P0232	P023F						
Fuel Pressure Sensor Circuits		P018C	P018C	P018D	P018D	P018C	P018B	P018B				
Fuel Pressure Sensor 5V Reference Circuit		P0641	P0641	P0641	P0641							
Fuel Pump Control Module Enable Circuit									P025A			
Fuel Pump Control Module Driver Over-Temperature												P064A P1255
Ignition1 Switch Circuit		P2534	P2534									
CAN Bus A									U0073 U0100			U0073 U0100

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	0.20v	Sys Voltage	> 9.0	> 100ms	2 Trips Type B
					Sys Voltage	< 19.5		
			Pass Threshold: > 0.20v	Nominal range: (0.20v < WSS voltage range < 2.20v)	Processing_Enabled	True (Note 1)		
					No Active DTCs	C1207		
Right Front Wheel Speed Sensor Circuit Low	C1233	The right front wheel speed sensor is open.	WSS feedback voltage < Threshold	0.20v	Sys Voltage	> 9.0	> 100ms	2 Trips Type B
					Sys Voltage	< 19.5		
			Pass Threshold: > 0.20v	Nominal range: (0.20v < WSS voltage range < 2.20v)	Processing_Enabled	True (Note 1)		
					No Active DTCs	C1208		
Left Rear Wheel Speed Sensor Circuit Low	C1234	The left rear wheel speed sensor is open.	WSS feedback voltage < Threshold	0.20v	Sys Voltage	> 9.0	> 100ms	2 Trips Type B
					Sys Voltage	< 19.5		
			Pass Threshold: > 0.20v	Nominal range: (0.20v < WSS voltage range < 2.20v)	Processing_Enabled	True (Note 1)		
					No Active DTCs	C1209		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Right Rear Wheel Speed Sensor Circuit Low	C1235	The right rear wheel speed sensor is open.	WSS feedback voltage < Threshold	0.20v	Sys Voltage	> 9.0	> 100ms	2 Trips Type B
					Sys Voltage	< 19.5		
			Pass Threshold: > 0.20v	Nominal range: (0.20v < WSS voltage range < 2.20v)	Processing_Enabled	True (Note 1)		
					No Active DTCs	C1210		
Left Front Wheel Speed Sensor Circuit High	C1207	The left front wheel speed sensor is shorted.	WSS feedback voltage > Threshold1	Threshold1 = 2.20v	Sys Voltage	> 9.0	> 100ms	2 Trips Type B
					Sys Voltage	< 19.5		
			OR		Processing_Enabled	True (Note 1)		
			ORION ASIC detects current > Threshold2	Threshold2 = 35ma				
			Pass Threshold: < 2.2v	Nominal range: (0.20v < WSS voltage range < 2.20v)				
Right Front Wheel Speed Sensor Circuit High	C1208	The right front wheel speed sensor is shorted.	WSS feedback voltage > Threshold1	Threshold1 = 2.20v	Sys Voltage	> 9.0	> 100ms	2 Trips Type B
					Sys Voltage	< 19.5		
			OR		Processing_Enabled	True (Note 1)		
			ORION ASIC detects current > Threshold2	Threshold2 = 35ma				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Pass Threshold: < 2.2v	Nominal range: (0.20v < WSS voltage range < 2.20v)				
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	2 Trips Type B
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	2 Trips Type B

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	2 Trips Type B
		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	> 12.8kph < 19.5 True (Note 1)	70ms	2 Trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No Active DTCs	C1208		
		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	2 Trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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	2 Trips Type B
		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	See Malfunction Criteria	Accel (on all wheels) Veh Vel (largest from all 4 wheels)	< 17.16m/s/s > 12.8kph	Single: Time > 5s Single TC Active: Time > 60s	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Max is the maximum filtered velocity from the other 3 wheels Pass Threshold: WSS signal is detected	Nominal Range: (0.6kph < WSS vel range < 240kph)	Processing_Enabled No Active DTCs	True (Note 1) C1210	Multiple: Time > 2minutes / > 15 ms	
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	2 Trips Type B
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	2 Trips Type B
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	2 Trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Right Rear Wheel Speed Sensor Circuit 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	2 Trips Type B
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 C1207 C1208 C1209 C1210 < 3% (Note 10) Not Detected (Note 10) True (Note 2) True (Note 1) C1207 C1208 C1209 C1210	30ms	2 Trips Type B
Pedal Travel								
Brake Pedal Position Sensor Power Circuit Low	C120F	The supply to the pedal position sensor is shorted to ground.	Pedal supply voltage < Threshold Pass Threshold > 0.5v	0.5v	Processing_Enabled	True (Note 1)	30ms	2 Trips Type B

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake Pedal Position Sensor 3 Circuit Offset Error	C129C	The brake pedal position 3 input signal offset voltage is out of range	Brake Ped Pos 3 input offset > Threshold Pass Threshold Brake Ped Pos 3 input offset < Threshold	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	2 Trips Type B
		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 3 Plausibility	C12F8	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	FALSE TRUE > 4.75v < 5.25	30ms	2 Trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Brake Pedal Position Sensor 1 Input = Valid Brake Pedal Position Sensor 2 Input = Valid	TRUE TRUE		
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	2 Trips Type B
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	2 Trips Type B
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	5 mm (>1.07v typical)	Brake Pedal Apply Detected OR	True (Note 2)	15ms	2 Trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Pass Thresold Brake Ped Pos 4 input offset <Threshold	Nominal Range: 4.75v - 5.25v - Supply 4.5v - 0.5v - Sensor	Pressure Zeroing Enable AND Processing_Enabled No Active DTCs	True (Note 3) True (Note 1) C120F C127D C129D C129E C12E5 C120C		
		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 4 Plausibility	C120C	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	2 Trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	2 Trips Type B
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	150ms (condition 1) 100ms (condition 2)	2 Trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						C129E C129F C12E5 C12F8		
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	2 Trips Type B
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	2 Trips Type B
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	2 Trips Type B
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	False > 0.4m/s2 Not Active	20ms	2 Trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Brake Pedal Apply Detected	True (Note 2)		
					AND			
					Processing_Enabled	True (Note 1)		
					No active DTCs:	C12B2 C12B3 C128E		
		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	False (Note 6)	1s	2 Trips Type B
					Vehicle Acceleration	> -0.5m/s/s		
					Vehicle Velocity	> 2.0m/s		
					Accelerator Pedal Position	< 10%		
					Brake Switch	FALSE		
					Processing_Enabled	True (Note 1)		
					No active DTCs:	C12B2 C12B3 C128E		

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	Successive Loops	Processing_Enabled	True (Note 1)	100ms Pass = 150ms	2 Trips Type B
					No active DTCs:	C12BC C12BD		
			Pass Threshold: Transitions do not occur.	Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)				
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	False (Note 6)	1s	2 Trips Type B
					Vehicle Acceleration	> -0.5m/s/s		
					Vehicle Velocity	> 2.0m/s		
					Accelerator Pedal Position	< 10%		
					Brake Switch	False		
					Processing_Enabled	True (Note 1)		
					No active DTCs:	C12BC C12BD C12BE		

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	2 Trips Type B
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	2 Trips Type B
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	(Regen axle pressure – Boost pressure) > Threshold	500 kPa	All Wheel Speeds = 0	> 200msec	100 ms	2 Trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		difference to a trimmed threshold. The pressures are equalized by controlling the regen axle valves during the test.	Pass Threshold: < 500 kPa		Brake Pedal Apply Detected	True (Note 2)		
					Boost Pressure	> 150 kPa		
					Regen Valves Active	FALSE		
					Processing_Enabled	True (Note 1)		
					System Mode	!= Diagnostic Mode		
					Skid Impending	== False		
					No active DTCs:	C127D C128A C128C C128D C128F C12B9 C12BA C12BB C12BC C12BD C12BE C12E4 C12F7		

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	2 Trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		This diagnostic is set when the boost loss condition described in the "Boost Loss Fault" is a result of certain situations such as the Engine Run Active being low. This diagnostic is used to effect the proper system reaction without indicating a hardware fault.	Boost Press < Threshold1 AND MCP Greater Than Boost Press Time >= Time1 AND Accum Pres Filtered > Threshold2 OR Boost Loss First Apply Time > Time2	Threshold1 = 7000 kPa Time1 = 250msec Threshold2 = 16000 kPa Time2 = 250msec	Boost Pressure Valid Boost Loss Condition Boost Loss Condition Fault	True True FALSE	250 ms	
ESC Solenoids								
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	2 Trips Type B
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	2 Trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	30% battery	Power Switch Slip Control Enabled	True (Note 7)	30ms	2 Trips Type B
			Pass Threshold: > 30%	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	Off		
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	30% battery	Power Switch Slip Control Enabled	True (Note 7)	30ms	2 Trips Type B
			Pass Threshold: > 30%	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	Off		
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	150% of requested current	Power Switch Slip Control Enabled	True (Note 7)	15ms	2 Trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Pass Threshold: < 150% of requested current	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	Off		
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	25% of Commanded Current	Power Switch Slip Control Enabled	True (Note 7)	100ms	2 Trips Type B
			Pass Threshold: < 25% of commanded current	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Commanded Current	> 0.0a		
					Commanded Current	< 2.5a		
		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	0.10amp	Power Switch Base Brake Enabled	True (Note 8)	30ms	
			Pass Threshold < 0.10amp	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	Off		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ABS Right Rear **Isolation** Solenoid Circuit **Shorted**	C12F5	This failsafe performs the shorted coil detection for HW CLC coils	Current Feedback > Threshold	150% of requested current	Power Switch Slip Control Enabled	True (Note 7)	15ms	2 Trips Type B
			Pass Threshold: < 150% of requested current	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Commanded Current	> 0.25a		
					Commanded Current	< 0.35a		
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	25% of Commanded Current	Power Switch Slip Control Enabled	True (Note 7)	100ms	2 Trips Type B
			Pass Threshold: <25% of Commanded Current	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Commanded Current	> 0.0a		
					Commanded Current	< 2.5a		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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	0.10amp	Power Switch Base Brake Enabled	True (Note 8)	30ms	
			Pass Threshold < 0.10amp	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	Off		
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	30% battery	Power Switch Slip Control Enabled	True (Note 7)	30ms (Solenoid in ON/OFF Mode)	2 Trips Type B
			Pass Threshold: > 30%	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	Off		
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	30% battery	Power Switch Slip Control Enabled	True (Note 7)	30ms (Solenoid in ON/OFF Mode)	2 Trips Type B
			Pass Threshold: > 30%	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Solenoid Power Supply	< 16v		
					Coil Command	Off		
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	80% battery	Power Switch Slip Control Enabled	True (Note 7)	30ms (Solenoid in ON/OFF Mode)	2 Trips Type B
			Solenoid feedback voltage > Threshold	30% battery	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
			Pass Threshold: > 80%	Nominal Range: (8v > 16v)				
					Coil Command	Off		
			Pass Threshold: < 30%					
		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	65.23% battery	Power Switch Base Brake Enabled	True (Note 8)	21ms (Solenoid in PWM Mode)	
			Solenoid feedback voltage > Threshold	43.49% battery	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
			Pass Threshold >65.23%	Nominal Range: (8v > 16v)				
					Coil Command	Off		

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 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	30% of battey (Solenoid in ON/OFF Mode)	Power Switch Slip Control Enabled	True (Note 7)	15ms (Solenoid in ON/OFF Mode)	2 Trips Type B
			Pass Threshold: < Threshold		Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	On		
		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	85% battery	Power Switch Base Brake Enabled	True (Note 8)	21ms (Solenoid in PWM Mode)	
			Pass Threshold < 85%	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	On		
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	30% battery	Power Switch Slip Control Enabled	True (Note 7)	30ms (Solenoid in ON/OFF Mode)	2 Trips Type B
			Pass Threshold: > 30%	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	Off		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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)	2 Trips Type B
		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	True (Note 8) > 8v < 16v	21ms (Solenoid in PWM Mode)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Coil Command	Off		
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	30% of battey (Solenoid in ON/OFF Mode)	Power Switch Slip Control Enabled	True (Note 7)	15ms (Solenoid in ON/OFF Mode)	2 Trips Type B
			Pass Threshold: < Threshold		Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	On		
		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	85% battery	Power Switch Base Brake Enabled	True (Note 8)	21ms (Solenoid in PWM Mode)	
			Pass Threshold < 85%	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	Off		
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	30% battery	Power Switch Slip Control Enabled	True (Note 7)	30ms	2 Trips Type B
			Pass Threshold >30%	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Coil Command	Off		
		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	43.49% battery	Power Switch Base Brake Enabled	True (Note 8)	21ms (Solenoid in PWM Mode)	
			Pass Threshold > 43.49%	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	Off		
BB Solenoids								
ABS **Power Switch** Circuit Open	C12E6	When the power switch has been commanded on the voltage level is monitored for proper operation.	Voltage Level (switched battery) < Threshold	80% bat voltage	Power Switch Base Brake Enabled	True (Note 8)	50ms	2 Trips Type B
			Pass Threshold > 80% bat volt	Nominal Range: (N/A)	Power Switch Command	On		
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	Threshold1 = 80% bat volt	Power Switch Command	Off	50ms	2 Trips Type B
					Motor	!= Running		
			Power Switch Short FSM Capacitor Fault: Power switch feedback < Threshold2	Threshold2 = 50% bat volt				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Pass Threshold 80% < fdbk <50%	Nominal Range: (N/A)				
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	2 Trips Type B
		Whenever the Power Switch **Base Brake** is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high.**	Solenoid feedback voltage < Threshold Pass Threshold >65.23%	65.23% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	21ms (Solenoid in PWM Mode)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ABS **Base Brake 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	30% of battey (Solenoid in ON/OFF Mode)	Power Switch Slip Control Enabled	True (Note 7)	15ms (Solenoid in ON/OFF Mode)	2 Trips Type B
			Pass Threshold: < Threshold		Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	On		
		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	85% of batter (Solenoid in PWM Mode)	Power Switch Slip Control Enabled	True (Note 7)	21ms (Solenoid in PWM Mode)	
			Pass Threshold: < 85%	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	On		
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	30% battery	Power Switch Base Brake Enabled	True (Note 8)	30ms	2 Trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Pass Threshold >30%	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	Off		
		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	43.49% battery	Power Switch Base Brake Enabled	True (Note 8)	21ms (Solenoid in PWM Mode)	
			Pass Threshold > 43.49%	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	Off		
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	80% battery	Power Switch Base Brake Enabled	True (Note 8)	30ms	2 Trips Type B
			Solenoid feedback voltage > Threshold	30% battery	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
			Pass Threshold >80%	Nominal Range: (8v > 16v)				
					Coil Command	Off		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Pass Threshold <30%					
		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	65.23% battery	Power Switch Base Brake Enabled	True (Note 8)	21ms (Solenoid in PWM Mode)	
			Pass Threshold >65.23%	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	Off		
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	30% of battey (Solenoid in ON/OFF Mode)	Power Switch Slip Control Enabled	True (Note 7)	15ms (Solenoid in ON/OFF Mode)	2 Trips Type B
			Pass Threshold: < Threshold		Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	On		
		Whenever the Power Switch **Base Brake** is closed and the driver transistor is turned on (solenoid commanded	Solenoid feedback voltage > Threshold	85% of batter (Solenoid in PWM Mode)	Power Switch Slip Control Enabled	True (Note 7)	21ms (Solenoid in PWM Mode)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		on) the feedback voltage should be **low.**						
			Pass Threshold: < Threshold	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	On		
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	30% battery	Power Switch Base Brake Enabled	True (Note 8)	30ms	2 Trips Type B
			Pass Threshold >30%	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	Off		
		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	43.49% battery	Power Switch Base Brake Enabled	True (Note 8)	21ms (Solenoid in PWM Mode)	
			Pass Threshold > 43.49%	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Coil Command	Off		
ABS Boost Valve Solenoid Circuit **Shorted**	C12DD	This failsafe is for shorted coil detection for HW CLC coils	Current Feedback > Threshold	150% of requested current	Power Switch Base Brake Enabled	True (Note 8)	15ms	2 Trips Type B
			Pass Threshold: < 150% of requested current	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Commanded Current	> 0.25a		
					Commanded Current	< 0.35a		
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	25% of Commanded Current	Power Switch Base Brake Enabled	True (Note 8)	100ms	2 Trips Type B
			Pass Threshold: < 25% of commanded current	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Commanded Current	> 0.44a		
					Commanded Current	< 1.5a		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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	0.10amp	Power Switch Base Brake Enabled	True (Note 8)	30ms	
			Pass Threshold < 0.10amp	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	Off		
ABS Proportioning Valve Solenoid Circuit **Shorted**	C12DF	This failsafe is for shorted coil detection for HW CLC coils	Current Feedback > Threshold	150% of requested current	Power Switch Slip Control Enabled	True (Note 7)	15ms	2 Trips Type B
			Pass Threshold: < 150% of requested current	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Commanded Current	> 0.25a		
					Commanded Current	< 0.35a		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	25% of Commanded Current	Power Switch Slip Control Enabled	True (Note 7)	100ms	2 Trips Type B
			Pass Threshold <25% of Commanded Current	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Commanded Current	> 0.0a		
					Commanded Current	< 2.5a		
		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	0.10amp	Power Switch Slip Control Enabled	True (Note 7)	30ms	
			Pass Threshold <0.10amp	Nominal Range: (8v > 16v)	Solenoid Power Supply	> 8v		
					Solenoid Power Supply	< 16v		
					Coil Command	Off		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
FSM Pump Motor								
ABS Pump Motor Run On	C12E9	This fault occurs if the Motor is continuously on for greater than 60s for 5 consecutive run times during an ignition cycle.	FSM Run-On Fault counter > Threshold Pass Threshold < 5	5 Nominal Range: (10v > 16v)	Motor_Enabled Motor_ON	True (Note 9) > 60s	15 ms	2 Trips Type B
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	2 Trips Type B
		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	Motor start PWM cycles > Threshold (without a recognized turning point)	750 cycles	Motor_Enabled	True (Note 9)	4.75 s	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		spinning state).						
		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.	
ABS Pump Motor Performance	C12E0	This fault checks to see if a condition exists in which the accumulator is not charging	Accumulator Pressure < Threshold	11000 kPa	Brake Pedal Apply Detected	True (Note 2)	100ms	2 Trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Pass Threshold > 12000 kPa	Nominal Range: (10v > 16v)	Motor_Enabled	True (Note 9)		
					Boost_Pressure < Command + 150 kPa	True		
					No active DTCs:	C12B6 C12B7 C12B8 C127D C12E4		
Power Inputs								
EBCM Device Voltage Low	C12E1	System voltage is too low for certain operations.	System voltage < Threshold	9v	Ignition	!= Crank	20s	Special C
		If the vehicle is not moving or if the vehicle is in park and the park signal is valid, the fault maturation time will be 20 sec. Otherwise the fault maturation time will be 100msec.	Pass Threshold Volt >9.3v	Nominal Range: (N/A)	Vehicle Moving	!= TRUE	100ms	
					PRNDL	!= Park		
					OR			
					PRNDL_P Signal Valid	FALSE		
					Wheel Speeds Valid	FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EBCM Device Voltage High	C12E2	System voltage is too high for certain operations.	System voltage > Threshold Pass Threshold Volt <15.7v	16v Nominal Range: (N/A)	Ignition	!= Crank	100ms	2 Trips Type B
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	1 Trip, Type A
EBCM Processor Performance	C127B	**Normal Operation:** The micro sends a watchdog enable command(WEC) via the SPI to the Orion ASIC every schedule loop. If the ASIC does not receive this message, the external watchdog circuit inhibits the power switches. **Ignition Self-Test:** The external watchdog circuit is tested by not sending the WEC via the SPI to the ASIC so that the external watchdog is off and then commanding the power switch to on.	Power Switch Slip Control Voltage Feedback > Threshold Pass Threshold < 80% bat volt	80% bat volt Nominal Range: (N/A)		Run during Start-up	30ms	1 Trip, Type A

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EBCM Read Only Memory (ROM)	C1256	This check is called from the scheduler each loop. Each ROM section is check-summed by byte. Each byte will be added to the current checksum for a section. If the byte being checked is the last byte of a section, then the section is verified for a correct checksum.	ROM Section's Checksum != Threshold	0 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	Immediate	1 Trip, Type A
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	1 Trip, Type A

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	2 Trips, Type B
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	2 Trips Type B
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	2 Trips Type B
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	1 Trip, Type A

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) / 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	2 Trips Type B
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	1 Trip, Type A
EBCM High End Timer Program Overflow	C123B	If the HET program does not complete execution time within one HET loop time, the current HET program is aborted and the next program execution is started and a fault code is set.	HET Program Exectution Time > Threshold	HET Loop Time Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	1 Trip, Type A

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EBCM High End Timer (HET) RAM Fault (Note 11)	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	1 Trip, Type A

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	2 Trips, Type B
		The periodic Internal Processor Communication (IPC) packet transmission service checks for previous transmission request completion before the new request is made. If the previous transmission was not completed, then the IPC handler declares an IPC packe	Secondary micro-processor communication packet does not re-synchonize with expected start-up sequence and with in set time.	Time Nominal Range: (N/A)	100msec	Upon Starting Scheduler in the Application	15 ms	

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication Bus B Off	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 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.	CAN Hardware Transmit Error Counter > Threshold	256 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15 ms	2 Trips, Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EBCM Communication Bus "B" RAM Error (Note 11)	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	2 Trips, Type B
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	2 Trips, Type B
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	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	2 Trips, Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			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.					
		PRIV_EST_REGEN_TORQ_ARC	Out of the 16 received frames, 4 ARC values do not match the calculated values.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	
		PRIV_EST_REGEN_TORQ_PROT	Out of the 16 received frames, 4 protection values do not match the calculated values.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	
Antilock Brake System Control Module Lost Communication With Engine Control Module on Bus 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.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	2 Trips, Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		MISSING_ETEI_AXLE_TORQ_CMD_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	
		ETEI_AXLE_TORQUE_CMD_ARC_FAULT	Out of the 16 received frames, 4 ARC values do not match the calculated values.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	
		ETEI_AXLE_TORQUE_CMD_PROT_ERR	Out of the 16 received frames, 4 protection values do not match the calculated values.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	
Antilock Brake System Control Module Lost Communication With Engine Control Module	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	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	140msec	2 Trips, Type B

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

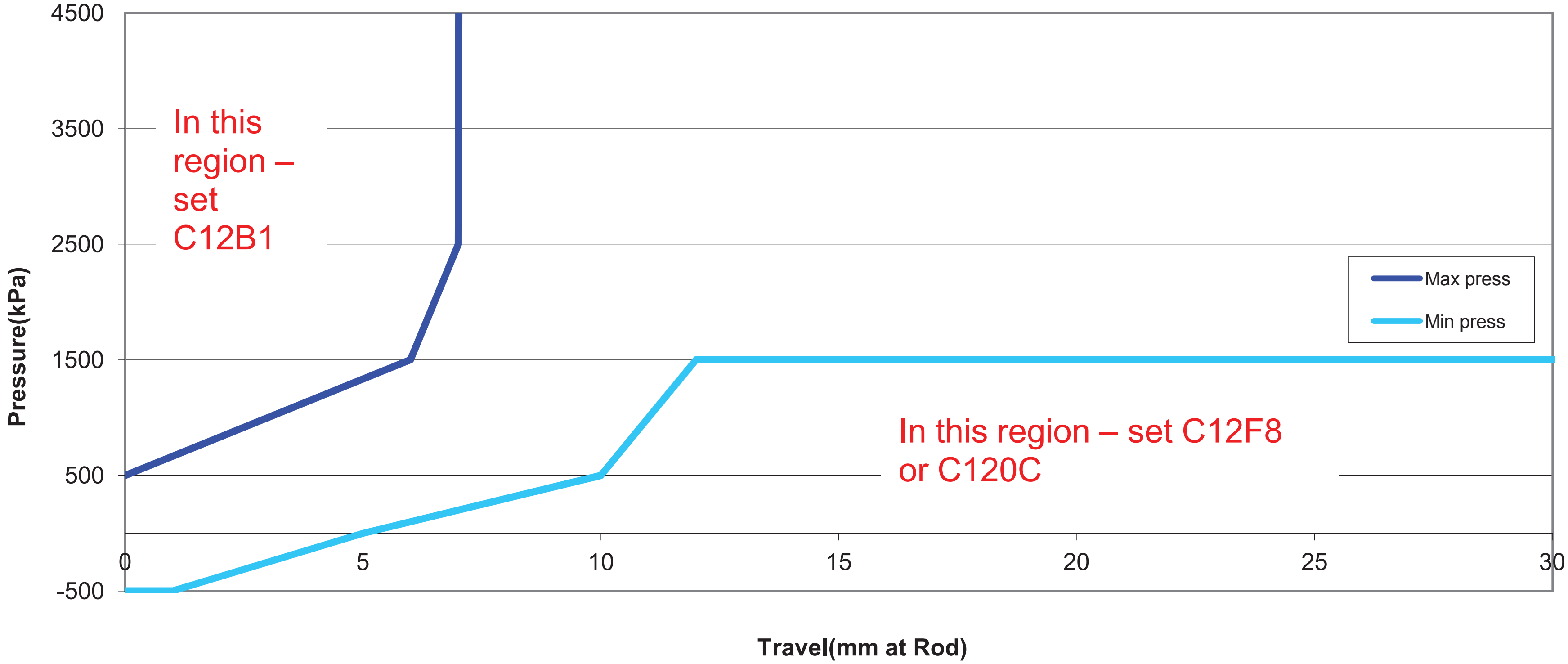
Note #1 - Processing_Enable is set to FALSE when the following DTCs are set to 'Fault': C1255, C1256, C126E, C123C, C127C

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

Note #3 - Pressure Zeroing Enable. When the vehicle is in a known state that the driver brake pedal should be released, the Pressure Zeroing Enable is set. Typical vehicle conditions are:
1) There is no vehicle brake control active
2) Vehicle acceleration > $-0.5m/s^2$ (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 comparision of the raw M/C pressure reading against 2 filtered versions of the reading (0.5 Hz and 5 Hz.) If all 3 values are within a small tolerance (7 kpa) then the driver's input is considered stable.
Note #6 - Brake Control is considered 'False' when there is no activity being performed by the hydaulic modulator - no wheel control valves are being commanded and the motor is not being commanded.
Note #7 - Power Switch Slip Control Enable is used to open the power control FET in the electronics as a safety mechanism for the brake controller. It is set to FALSE when the following DTCs are set to 'Fault': C12C2, C12C5, C12D2, C12D5, C12CC, C12CF, C12C6, C12C8, C12DE, C12D8, C12D2, C1256, C1255, C126E, C123C, C127C, C121E, C121F, C120D, C127B
Note #8 - Power Switch Base Brake Control Enable is used to open the Base Brake power control FET in the electronics as a safety mechanism for the brake controller. It is set to FALSE when the following DTCs are set to 'Fault': C12DB, C12DC, C12D8, C12D3, C1256, C1255, C126E, C123C, C127C, C121E, C121F, C12E6, C127B
Note #9 - Motor_Enable is used to indicate when the motor is allowed to be commanded on. Motor_Enable is set to FALSE when the following DTCs are set to 'Fault': C12B7, C12B6, C12B8, C12D8, C12DB, C12DC, C12E9, C12E8, C1256, C1255, C126E, C123C, C123E, C123A, C127A, C123B, C127C, C121E, C121F, C123D, C126F, C121C, C120C, C12E6, C12E7, C127B
Note #10 - Cornering determination is a comparison of the 4 wheel speeds to estimate the percentage of road wheel angle of the drive wheels relative to their full amount of articulation. Wheel slip is the calculated ratio of individual wheel velocities to the calculated average vehicle velocity. Vehicle velocity is calculated from the 4 wheel speed sensors.
Note #11 – The first 2000 vehicles built in Model Year 2011 will have the failure criteria noted for DTC C126D combined with DTC C123C (DTC C126D will not be enabled, DTC C123C will set for either failure). The remaining vehicles will have both C126D and C123C enabled as noted.

Note 4:
Correlation Table



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

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B51 P0B52 P0ABC P0ABD P0ABB =RUN > 200ms	160 Failures out of 170 Samples Frequency: 100ms	Two Trips Type B
Block 6 Voltage Sensor Circuit:								
Block 6 Voltage measurement - Out of Range - Low	P0B56	Out of range low	Block 6 AND Block 7	< 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 6 Voltage measurement - Out of Range - High	P0B57	Out of range high	Block 6	> 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 6 Voltage measurement - Rationality	P0B55	Rationality compares block voltage sensor to pack voltage sensor	| Block 6 * 20 - Battery Pack Voltage| AND | Block 7 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 6 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B56 P0B57 P0ABC P0ABD P0ABB =RUN > 200ms	160 Failures out of 170 Samples Frequency: 100ms	Two Trips Type B
Block 7 Voltage Sensor Circuit:								
Block 7 Voltage measurement - Out of Range - Low	P0B5B	Out of range low	Block 7 AND Block 8	< 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 7 Voltage measurement - Out of Range - High	P0B5C	Out of range high	Block 7	> 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 7 Voltage measurement - Rationality	P0B5A	Rationality compares block voltage sensor to pack voltage sensor	| Block 7 * 20 - Battery Pack Voltage| AND | Block 8 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 7 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B5B P0B5C P0ABC P0ABD P0ABB =RUN > 200ms	160 Failures out of 170 Samples Frequency: 100ms	Two Trips Type B
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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Block 9 Voltage measurement - Out of Range - High	P0B66	Out of range high	Block 9	> 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 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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B74 P0B75 P0ABC P0ABD P0ABB =RUN > 200ms	160 Failures out of 170 Samples Frequency: 100ms	Two Trips Type B
Block 13 Voltage Sensor Circuit:								
Block 13 Voltage measurement - Out of Range - Low	P0B79	Out of range low	Block 13 AND Block 14	< 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 13 Voltage measurement - Out of Range - High	P0B7A	Out of range high	Block 13	> 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 13 Voltage measurement - Rationality	P0B78	Rationality compares block voltage sensor to pack voltage sensor	| Block 13 * 20 - Battery Pack Voltage| AND | Block 14 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 13 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B79 P0B7A P0ABC P0ABD P0ABB =RUN > 200ms	160 Failures out of 170 Samples Frequency: 100ms	Two Trips Type B
Block 14 Voltage Sensor Circuit:								
Block 14 Voltage measurement - Out of Range - Low	P0B7E	Out of range low	Block 14 AND Block 15	< 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 14 Voltage measurement - Out of Range - High	P0B7F	Out of range high	Block 14	> 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 14 Voltage measurement - Rationality	P0B7D	Rationality compares block voltage sensor to pack voltage sensor	| Block 14 * 20 - Battery Pack Voltage| AND | Block 15 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 14 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B7E P0B7F P0ABC P0ABD P0ABB =RUN > 200ms	160 Failures out of 170 Samples Frequency: 100ms	Two Trips Type B
Block 15 Voltage Sensor Circuit:								
Block 15 Voltage measurement - Out of Range - Low	P0B83	Out of range low	Block 15 AND Block 16	< 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 15 Voltage measurement - Out of Range - High	P0B84	Out of range high	Block 15	> 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 15 Voltage measurement - Rationality	P0B82	Rationality compares block voltage sensor to pack voltage sensor	| Block 15 * 20 - Battery Pack Voltage| AND | Block 16 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 15 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B83 P0B84 P0ABC P0ABD P0ABB =RUN > 200ms	160 Failures out of 170 Samples Frequency: 100ms	Two Trips Type B
Block 16 Voltage Sensor Circuit:								
Block 16 Voltage measurement - Out of Range - Low	P0B88	Out of range low	Block 16 AND Block 17	< 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 16 Voltage measurement - Out of Range - High	P0B89	Out of range high	Block 16	> 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 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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B97 P0B98 P0ABC P0ABD P0ABB =RUN > 200ms	160 Failures out of 170 Samples Frequency: 100ms	Two Trips Type B
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 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 20 Voltage measurement - Out of Range - High	P0B9D	Out of range high	Block 20	> 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 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 Block 20 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B9C P0B9D P0ABC P0ABD P0ABB =RUN > 200ms	160 Failures out of 170 Samples Frequency: 100ms	Two Trips Type B
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 BPCM Power Mode Time since contactors closed	>= 9.0V <= 18.0V =RUN > 200ms	300 Failures out of 400 Samples Frequency: 10ms	One Trip Type A

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No active DTCs:	P0A1F		
Hybrid Battery Pack Voltage Sense Circuit High	P0ABD	Out of range high	Battery Pack Voltage	> 430 V	12V System Voltage BPCM Power Mode Time since contactors closed No active DTCs:	>= 9.0V <= 18.0V =RUN > 200ms P0A1F	300 Failures out of 400 Samples Frequency: 10ms	One Trip Type A
Hybrid Battery Pack Voltage Sense Circuit Rationality	P0ABB	Rationality compares pack voltage sensor to sum of the block voltages	|Sum of battery block voltages - Battery Pack voltage| AND BPCM High Voltage Battery Pack Voltage Validity	> 50 V = VALID	12V System Voltage Pack Voltage sensor input BPCM Power Mode Time since contactors closed No active DTCs:	>= 9.0V <= 18.0V = VALID =RUN > 200ms P0A1F P0ABC P0ABD	70 Failures out of 80 Samples Frequency: 100ms	One Trip Type A
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)	> 200 A > 52 A	12V System Voltage BPCM Power Mode	>= 9.0V <= 18.0V =RUN	30 Failures out of 40 Samples Frequency: 100ms	One Trip Type A

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AND Current Sensed (Low range)	 > 22 A	No active DTCs:	P1A07 P0A1F		
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 (|Current sensor Input (Hi range)| AND	> 5 A > 5 A > 5 A <= 20A	12V System Voltage (See Note) Contactor Status No active DTCs: Note: BPCM is checking System Voltage every 10ms	>= 9.0V <= 18.0V =OPEN P1A07 P0A1F P0AC1 P0AC2	10 counts Frequency: 500ms	One Trip Type A

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			| Current sensor Input (Hi range) - Current sensor Input (Me range) | AND | Current sensor Input (Hi range) - Current sensor Input (Lo range) |)	>= 4A >= 4A	during current offset processing			
			OR					
			(|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 P0AC2	100 counts Frequency: 10ms	
			OR					
			(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	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.
						P0AC1 P0AC2		
Temperature sensor1 Circuit:								
Temperature Sensor 1 Circuit Low	P0A9D	Out of range low	Temperature Input1 AND (Temperatue 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	> 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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			|Temperature Input1 - Temperature Input4|	> 15 ºC				
Temperature sensor2 Circuit:								
Temperature Sensor 2 Circuit Low	P0AC7	Out of range low	Temperature Input2 AND (Temperatue Input1 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 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	> 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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			| Temperature Input2 - Temperature Input4 |	> 15 ºC				
Temperature sensor3 Circuit:								
Temperature Sensor 3 Circuit Low	P0ACC	Out of range low	Temperature Input3 AND (Temperatue 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	> 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 Input3 - Temperature Input4|	> 15 ºC				
Temperature sensor4 Circuit:								
Temperature Sensor 4 Circuit Low	P0AEA	Out of range low	Temperature Input4 AND (Temperatue 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	> 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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			| Temperature Input4 - Temperature Input3 |	> 15 ºC				
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 Temperature Input| 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 Engine Off Time Mask Powerup Outlet Air Temperature Input	>= 9.0V <= 18.0V =RUN > 8 hours = Valid = True ≥ -7°C	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.
					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	> 95 ºC	12V System Voltage	>= 9.0V <= 18.0V	30 Failures out of 40 Samples	Two Trips Type B
					BPCM Power Mode	=RUN		
			AND				Frequency: 100ms	
			(Temperatue Input1	< 70 ºC	No active DTCs:	P0A1F		
			OR					
			Temperature Input2	< 70 ºC				
			OR					
			Temperature Input3	< 70 ºC				
			OR					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Input4)	< 70 ºC				
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 Pack Max Module Temperature	> 10 ºC	12V System Voltage Fan Command BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V = ON =RUN P0A1F P0A9C P0A9D P0A9E P0AB3 P0AB4 P0AC6 P0AC7 P0AC8 P0ACB P0ACC P0ACD P0AE9 P0AEA P0AEB P0A81	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.
Battery Cooling Fan:								
Fan Relay Welded	P0BC1		Fan control signal monitor voltage	>= 0.9 V	12V System voltage BPCM Power Mode Fan command No active DTCs:	>= 9.0 V <= 18.0 V =RUN = OFF P0A1F P0A81	10 Failures out of 20 Samples Frequency: 100ms	Two Trips Type B
Fan Unit Failure	P0A81		Fan control signal monitor voltage	>= 2.3 V OR <= 0.5 V	12V System voltage BPCM Power Mode Fan command Fan speed No active DTCs:	>= 9.0 V <= 18.0 V =RUN =ON >= 35 % P0A1F	50 Failures out of 50 Samples Frequency: 100ms	Two Trips Type B
			Fan control signal monitor voltage	>= 7.0 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	
			Fan control signal monitor voltage	> 4.0 V AND < 7.0 V	12V System voltage BPCM Power Mode	>= 9.0 V <= 18.0 V =RUN	90 Failures out of 100 Samples Frequency: 100ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Fan command No active DTCs:	=OFF P0A1F		
			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	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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: Fan command	>= 9.0 V <= 18.0 V =VALID (less than 3 Module Temperature Sensors have associated circuit faults active) P0AAD P0AAE P0AAF P0A1F = ON	1200 Failures out of 1200 Samples Frequency: 100ms	Two Trips Type B
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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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]	< 60V, =0ms	12V System Voltage BPCM Power Mode	=> 9.0 V =< 18.0 V = RUN	1 time (5ms)	Special Type "C"

<table>
<tr><th>Component/ System</th><th>Fault Code</th><th>Monitor Strategy Description</th><th>Malfunction Criteria</th><th>Threshold Value</th><th>Secondary Parameters</th><th>Enable Conditions</th><th>Time Required</th><th>MIL Illum.</th></tr>
<tr><td></td><td></td><td></td><td>AND

[| BPCM High Voltage pack Voltage - Sum of battery block voltages |

AND Precharge Time])</td><td>=< 23V

=<20ms</td><td>No active DTCs:</td><td>P0A1F
P0AC0
P0AC1
P0AC2
P0ABC
P0ABD
P0ABB</td><td></td><td></td></tr>
<tr><td></td><td></td><td colspan="3">OR</td><td></td><td></td><td>OR</td><td></td></tr>
<tr><td></td><td></td><td>HV bus = Short</td><td>(BPCM High Voltage Battery Pack Current

AND Precharge Time)</td><td>=> 25A

> 100ms</td><td></td><td></td><td>1 time (5ms)</td><td></td></tr>
<tr><td>High Voltage Battery:</td><td colspan="8"></td></tr>
<tr><td>Battery Module – Voltage deviation EOL</td><td>P0BBD</td><td>Voltage deviation is high</td><td>Maximum | Block Voltage(n) - Block Voltage (n+1) |</td><td>> 1.5 V</td><td>BPCM Power Mode

12V System Voltage

Battery current

Min. battery temp.

No active DTC's:</td><td>= RUN

>= 9.0V
<= 18.0V

>0.2A

>= -7ºC

P0B3D
P0B3E
P0B3C
P0B42
P0B43
P0B41
P0B47
P0B48
P0B46
P0B4C
P0B4D</td><td>3 Failures out of 3 Samples

Frequency: 1s</td><td>Two Trips Type B</td></tr>
</table>

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						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 P0B7A P0B78 P0B7E P0B7F P0B7D P0B83 P0B84 P0B82 P0B88 P0B89 P0B87 P0B8D P0B8E P0B8C P0B92 P0B93		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						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"
					12V System Voltage	>= 9.0V <= 18.0V	Frequency: 100ms	
					Block voltage rationality	= Pass (at least 1block)		
			OR		No active DTC's:	P0B3D	OR	
			Any Block Voltage N	> 20.4 V		P0B3E P0B3C P0B42 P0B43 P0B41 P0B47 P0B48 P0B46 P0B4C P0B4D P0B4B P0B51 P0B52 P0B50 P0B56 P0B57 P0B55 P0B5B P0B5C P0B5A P0B60 P0B61 P0B5F	20 Failures out of 20 Samples Frequency: 100ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P0B65 P0B66 P0B64 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 – Under Voltage	P1A1F	Voltage too low	High Voltage Battery Pack Voltage	< 168 V	BPCM Power Mode 12V System Voltage	= RUN >= 9.0V	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.
						<= 18.0V	Frequency: 100ms	
					Block voltage rationality	= Pass (at least 1block)		
			OR		No active DTC's:	P0B3D	OR	
			Any Block Voltage N	< 8.4 V		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 P0B6A P0B6B P0B69 P0B6F P0B70 P0B6E P0B74 P0B75 P0B73 P0B79	20 Failures out of 20 Samples Frequency: 100ms	

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	= 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.
					n = # of measurements in 60s X = measured current Battery temperature # of calculated block resistances 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	50 Failures out of 50 Samples Frequency: 100ms	Special Type "C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P0A9E P0A9C P0AC7 P0AC8 P0AC6 P0ACC P0ACD P0ACB P0AEA P0AEB P0AE9 P0A1F		
			OR					
			1 or more Battery Module Temperatures	> 70ºC				
Controller Faults (BPCM) :								
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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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	
		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
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	>110 A	Main Relay Wakeup Signal	Closed On	X: 160 cts Y: 190 cts R: 0.083 - 0.5 ms T: 13.28 - 80 ms	One Trip, Type A
Drive Motor "A" Phase U-V-W Current Sensor Overcurrent	P0C01	**Fail Case 1**: To detect fast, repeated 3 Phase over currents and to protect IGBT.	U, V, or W Phase current sensor	> 600 A	Wakeup Signal	On	X: 2 cts Y: 10 cts R: 2.08 ms T: 2.08 ms	One Trip, Type A
		Fail Case 2: To detect slow, intermittent 3 Phase over currents and to protect IGBT.					X: 5 cts Y: 50 cts R: 2.08 ms T: 8.32 ms	
Drive Motor "A" Phase U-V-W Circuit/Open	P0C05	Drive Motor "A" Missing Motor Current checks for minimum current in each phase when rotor position is near that peak's phase axis. Each phase is checked individually as rotor turns.	Two Non-Peak Phase Sensors are BOTH AND THEN Peak Phase Axis Current	> ABS (9 A) < ABS (9 A)	Inverter State Inverter Voltage Rotor Position Peak Phase Current	RUN > 35 V -30 deg < Phase Axis < +30 deg >= 23 A	2 Task1 Loops delay = 4.2 ms PLUS X: 201 cts Y: N/A R: 0.083 - 0.5 ms T: 16.7 - 101 ms = 20.8 - 104.7 ms TOTAL	One Trip, Type A
Drive Motor "A" Phase U Current Sensor Circuit Low	P0BE7	Circuit Low monitor to detect the failure of U-phase current sensor circuit below valid range	U Phase current sensor output at highside	< -700 A	Wakeup Signal PWMOutputEnable	On FALSE	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" 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 PWMOutputEnable	On FALSE	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips, Type B
Drive Motor "A" Phase U Current Sensor Offset Out-of Range	P0BE6	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	U Phase offset current output at highside	>30 A	Wakeup Signal Power Stage P0BE7/P0BE8	On OPEN NOT ACTIVE	X: 100 cts Y: N/A R: 2.08ms T: 208ms	Two Trips, Type B
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 PWMOutputEnable	On FALSE	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips, Type B
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 PWMOutputEnable	On FALSE	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips, Type B
Drive Motor "A" Phase V Current Sensor Offset Out-of Range	P0BEA	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	V Phase offset current output at highside	>30 A	Wakeup Signal Power Stage P0BEB/P0BEC	On OPEN NOT ACTIVE	X: 100 cts Y: N/A R: 2.08ms T: 208ms	Two Trips, Type B
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 PWMOutputEnable	On FALSE	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" 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 PWMOutputEnable	On FALSE	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips, Type B
Drive Motor "A" Phase W Current Sensor Offset Out-of Range	P0BEE	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	W Phase offset current output at highside	>30 A	Wakeup Signal Power Stage P0BEF/P0BF0	On OPEN NOT ACTIVE	X: 100 cts Y: N/A R: 2.08ms T: 208ms	Two Trips, Type B
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, Type A
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 Run/Crank Voltage OR Powertrain Relay Voltage	Initialization Complete > 9.5 Volts OR < 18 Volts	X: 1 ct Y: N/A R: 2.08ms T: 2.08ms	One Trip, Type A
MCP A High Voltage (HV) Diagnostics								
Drive Motor "A" Hybrid Battery System Voltage High	P1AEE	To detect over voltage and to protect TPIM Vdc Circuit	HV Sensor Voltage	> 450V	WakeUp Signal	On	X: 5 cts Y: N/A R: 0.083 - 0.5 ms T: 0.42 - 2.50 ms	One Trip, Type A
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, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" Control Module Hybrid Battery Voltage 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, Type B
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, Type A
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 HV CAN Msg Rx BPCM Sourcing MCP HVIL Status	On TRUE TRUE	250ms debounce time PLUS X: 10 cts Y: 14 cts R: 10.4ms T: 104ms= 354 ms total	Special Type C
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	HV Sensor Voltage No HV Clamp Fault or MidPack Sensor OOR Faults: P1AEE, P1AF4, and P1AF5	> 50V NOT ACTIVE	X: 450 cts Y: 500 cts R: 10.4ms T: 4689ms	Special Type C
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, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 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, Type B
Motor A Temperature Sensor Diagnostics								
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 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 =10.94 sec total	Two Trips, Type B
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 When malfunction present at start of trip: Cumulative Motor Warmup Time at or above Motor Warmup Torque Threshold	On >=1.5min >=ABS(20 Nm)	X: 900 cts Y:1800cts R: 10.4ms T: 9378ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" Control Module 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, Type B
Drive Motor "A" Over Temperature	P0A2F	To detect a sustained motor overtemperature condition	Motor Temperature exceeds inital fault threshold AND Does not decrease below reset threshold	> 200 deg C initial fault >135 deg C reset	Motor Temperature No Temp Performance Fault; P0A2B	IN RANGE NOT ACTIVE	X: 300 cts Y: 450 cts R: 10.4ms T: 3125ms	Two Trips, Type B
SPI / SCI Bus Timeout Diagnostics								
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/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, Type A
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, Type B
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 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, Type A

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, Type A
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, Type B
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, Type B
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 Fault Diagnostics								
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, Type A
Drive Motor "A" Control Module Random Access Memory (RAM)	P1A50	To detect an error in the MCPA 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, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" Control Module 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, Type A
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, Type A
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, Type A
MCPA Not Program'd Diagnostic								
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, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Motor A Inverter Temperature Sensor Diagnostics								
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, Type B
Drive Motor Inverter Temperature Sensor A Circuit High	P0AF0	To detect Inverter A Temperature 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 at or above Inverter Warmup Torque Threshold	ON >=1.5min >=ABS(20 Nm)	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips, Type B
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, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor Inverter Temperature Sensor C Circuit Range/Performance	P0BD2	Inverter A Temperature Sensor #2 In-Range Rationality Check	ABS(PIM Temp 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 X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms =10.9 sec total	Two Trips, Type B
Drive Motor Inverter Temperature Sensor C Circuit High	P0BD4	To detect Inverter A Temperature Sensor #2 Out of Range high (voltage)	PIM Temp 1 Temperature	< -40 deg C (near 5V)	Wakeup Signal When malfunction present at start of trip: Cumulative Inverter Warmup Time at or above Inverter Warmup Torque Threshold	ON >=1.5min >=ABS(20 Nm)	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips, Type B
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, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor Inverter Temperature Sensor E Circuit Range/Performance	P0BDC	Inverter A Temperature Sensor #3 In-Range Rationality Check	ABS(PIM Temp 2 - 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, Type B
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 When malfunction present at start of trip: Cumulative Inverter Warmup Time at or above Inverter Warmup Torque Threshold	ON >=1.5min >=ABS(20 Nm)	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips, Type B
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, Type B
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 No Perf Fault; P0AEE	IN RANGE NOT ACTIVE	X: 500 cts Y: 650 cts R: 10.4ms T: 5208ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" Inverter Phase V Over Temperature	P0C12	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp 2 Temperature exceeds initial fault threshold AND Does not decrease below reset threshold	> 88 deg C initial fault >85 deg C reset	PIM Temperature No Perf Fault; P0BDC	IN RANGE NOT ACTIVE	X: 500 cts Y: 650 cts R: 10.4ms T: 5208ms	One Trip, Type A
Drive Motor "A" Inverter Phase W Over Temperature	P0C13	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp 1 Temperature exceeds initial fault threshold AND Does not decrease below reset threshold	> 88 deg C initial fault >85 deg C reset	PIM Temperature No Perf Fault; P0BD2	IN RANGE NOT ACTIVE	X: 500 cts Y: 650 cts R: 10.4ms T: 5208ms	One Trip, Type A
Motor A Resolver Sensors - Discrete Diagnostics								
Drive Motor "A" Position Sensor Circuit	P0A3F	To detect Loss of Signal or converter error (line open, short) in the Motor Resolver circuit	Sin or Cos Signal	<2.3V	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, Type A
Drive Motor "A" Position Sensor Circuit Range/Performance	P0A40	To detect a Degradation of Signal fault in the angle data read by the Motor Resolver circuit.	Sin or Cos Signal	>4.0V	Resolver Initialization Delay	500ms	X: 140 cts Y: 165 cts R: 0.083 - 0.5 ms T: 11.62 - 70.0 ms	One Trip, Type A
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: 140 cts Y: 165 cts R: 0.083 - 0.5 ms T: 11.62 - 70.0 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" Position Sensor Circuit Overspeed	P1B0D	To detect when Motor A has exceeded operational maximum speed	ABS(Motor speed) initially AND then ABS(Motor Speed)	>11500 rpm >10000 rpm	Wakeup Signal	On	X: 30 cts Y: 37 cts R: 10.4ms T: 312ms	One Trip, Type A
Drive Motor "A" Position Sensor Not Learned	P0C17	To detect an unvalidated Resolver Offset Learn Value and No Stored Previously Valid Value	**Fail Case 1**: Offset Learn DIDN'T complete because: ABS(Motor Speed) OR Filtered DC Voltage OR ALL Phase Current Max-Min Delta For Time Period **OR** **Fail Case 2**: Offset Learn Completes AND ABS(Offset Correction Angle)	>50 rpm < 192 V <15 A > 20% of 0.3s learn time (>60ms) >30 deg	Key Off Wakeup Signal ABS(Motor Speed) followed by Start Delay Valid Stored Offset	TRUE ON < 20 rpm 400 Task 1 Counts (400 * 2.08 ms) =832 ms FALSE	832ms Start Delay PLUS 300 ms learn time = 1132 ms total	Two Trips, Type B
Motor A Resolver Sensors - Circuit Diagnostics								
Drive Motor "A" Position Sensor Circuit "A" Low	P0C52	To detect Resolver Circuit S1/3 Out of Range Low	Resolver S13 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms T: 521ms	One Trip, Type A
Drive Motor "A" Position Sensor Circuit "A" High	P0C53	To detect Resolver Circuit S1/3 Out of Range High	Resolver S13 Circuit Reference Voltage	> 3.0 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
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, Type A
Drive Motor "A" Position Sensor Circuit "B" High	P0C5D	To detect Resolver Circuit S2/4 Out of Range High	Resolver S24 Circuit Reference Voltage	> 3.0 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	One Trip, Type A
Motor A Crank Pulse Diagnostics								
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, Type B
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, Type B
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: 110 A Threshold time: 200ms	Ignition switch	in crank or run	86 fail counts out of 96 sample counts Executes in a 2.08ms loop Detects in 200ms	One Trip, Type A

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: 104ms	Ignition switch	in crank or run	45 fail counts out of 50 sample counts Detects in 104ms 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, Type A
		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	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		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	One Trip, Type A
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, Type A
		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 "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, Type A
Comm'n Diagnostics								
Lost Communication With DMCM_A_LostComm_BECM	U1875	Drive Motor A Control Module Lost Communication With Battery Energy Control Module	Missed BECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage HV_ManageVN_Actv PowerMode BusOffFaultActive NormalCommEnabled NormalMsgTransmission DiagSystemDsbl DiagEnblTmr	> 9.5 Volts =FALSE =RUN =FALSE =TRUE =TRUE =FALSE >=3 sec	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, Type B
Lost Communication With DMCM_A_LostComm_ECM	U1876	Drive Motor A Control Module Lost Communication With Engine Control Module (ECM)/Powertrain Control Module (PCM)	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	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, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HV_ManageVN_Actv	=FALSE		
					PowerMode	=RUN		
					BusOffFaultActive	=FALSE		
					NormalCommEnabled	=TRUE		
					NormalMsgTransmission	=TRUE		
					DiagSystemDsbl	=FALSE		
					DiagEnblTmr	>=3 sec		

APPENDIX

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

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	>110 A	Main Relay Wakeup Signal	Closed On	X: 160 cts Y: 190 cts R: 0.083 - 0.5 ms T: 13.28 - 80 ms	One Trip, Type A
Drive Motor "B" Phase U-V-W Current Sensor Overcurrent	P0C04	**Fail Case 1**: To detect fast, repeated 3 Phase over currents and to protect IGBT.	U, V, or W Phase current sensor	> 600 A	Wakeup Signal	On	X: 2 cts Y: 10 cts R: 2.08 ms T: 2.08 ms	One Trip, Type A
		Fail Case 2: To detect slow, intermittent 3 Phase over currents and to protect IGBT.					X: 5 cts Y: 50 cts R: 2.08 ms T: 8.32 ms	
Drive Motor "B" Phase U-V-W Circuit/Open	P0C08	Drive Motor "B" 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 AND THEN Peak Phase Axis Current	> ABS (9 A) < ABS (9 A)	Inverter State Inverter Voltage Rotor Position Peak Phase Current	RUN > 35 V -30 deg < Phase Axis < +30 deg >= 23 A	2 Task1 Loops delay = 4.2 ms PLUS X: 201 cts Y: N/A R: 0.083 - 0.5 ms T: 16.7 - 101 ms = 20.8 - 104.7 ms TOTAL	One Trip, Type A
Drive Motor "B" Phase U Current Sensor Circuit Low	P0BF3	Circuit Low monitor to detect the failure of U-phase current sensor circuit below valid range	U Phase current sensor output at highside	< -700 A	Wakeup Signal PWMOutputEnable	On FALSE	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "B" 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 PWMOutputEnable	On FALSE	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips, Type B
Drive Motor "B" Phase U Current Sensor Offset Out-of Range	P0BF2	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	U Phase offset current output at highside	>30 A	Wakeup Signal Power Stage P0BF3/P0BF4	On OPEN NOT ACTIVE	X: 100 cts Y: N/A R: 2.08ms T: 208ms	Two Trips, Type B
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 PWMOutputEnable	On FALSE	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips, Type B
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 PWMOutputEnable	On FALSE	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips, Type B
Drive Motor "B" Phase V Current Sensor Offset Out-of Range	P0BF6	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	V Phase offset current output at highside	>30 A	Wakeup Signal Power Stage P0BF7/P0BF8	On OPEN NOT ACTIVE	X: 100 cts Y: N/A R: 2.08ms T: 208ms	Two Trips, Type B
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 PWMOutputEnable	On FALSE	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "B" 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 PWMOutputEnable	On FALSE	X: 10 cts Y: 15 cts R: 2.08ms T: 20.8ms	Two Trips, Type B
Drive Motor "B" Phase W Current Sensor Offset Out-of Range	P0BFA	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	W Phase offset current output at highside	>30 A	Wakeup Signal Power Stage P0BFB/P0BFC	On OPEN NOT ACTIVE	X: 100 cts Y: N/A R: 2.08ms T: 208ms	Two Trips, Type B
MCP B 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, Type A
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 Run/Crank Voltage OR Powertrain Relay Voltage	Initialization Complete > 9.5 Volts OR < 18 Volts	X: 1 ct Y: N/A R: 2.08ms T: 2.08ms	One Trip, Type A
MCP B High Voltage (HV) Diagnostics								
Drive Motor "B" Hybrid Battery System Voltage High	P1AEF	To detect over voltage and to protect TPIM Vdc Circuit	HV Sensor Voltage	> 450V	WakeUp Signal	On	X: 5 cts Y: N/A R: 0.083 - 0.5 ms T: 0.42 - 2.50 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "B" 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, Type B
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, Type B
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, Type A
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 HV CAN Msg Rx BPCM Sourcing MCP HVIL Status	On TRUE TRUE	250ms debounce time PLUS X: 10 cts Y: 14 cts R: 10.4ms T: 104ms= 354 ms total	Special Type C
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	HV Sensor Voltage No HV Clamp Fault or MidPack Sensor OOR Faults: P1AEF, P1AF6, and P1AF7	> 50V NOT ACTIVE	X: 450 cts Y: 500 cts R: 10.4ms T: 4689ms	Special Type C

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensor 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, Type B
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, Type B
Motor B Temperature Sensor Diagnostics								
Drive Motor "B" Control Module Temperature Sensor Performance	P0A31	Motor B Temperature Sensor In-Range Rationality Check	ABS(Motor Temp - PIM Temp Avg)	> 28 deg C	Ignition Off Time PIM Temp Average Motor Temp No PIM or Motor Temp OOR Faults: P0AF4, P0AF5, P0BD8, P0BD9, P0BE2, P0BE3, P0A32 and P0A33	>=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 =10.94 sec total	Two Trips, Type B
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 When malfunction present at start of trip: Cumulative Motor Warmup Time	On >=1.5min	X: 900 cts Y:1800cts R: 10.4ms T: 9378ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					at or above Motor Warmup Torque Threshold	>=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, Type B
Drive Motor "B" Over Temperature	P0A35	To detect a sustained motor overtemperature condition	Motor Temperature exceeds inital fault threshold AND Does not decrease below reset threshold	> 200 deg C initial fault >135 deg C reset	Motor Temperature No Temp Performance Fault; P0A31	IN RANGE NOT ACTIVE	X: 300 cts Y: 450 cts R: 10.4ms T: 3125ms	Two Trips, Type B
SPI / SCI Bus Timeout Diagnostics								
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, Type A
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, Type A

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, Type A
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, Type B
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, Type B
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 Fault Diagnostics								
Drive Motor "B" Control Module Internal Performance	P0A1C	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, Type A
Drive Motor "A" Control Module Random Access Memory (RAM)	P1A53	To detect an error in the MCPA 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, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "B" Control Module 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, Type A
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, Type A
MCPB Not Program'd Diagnostic								
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, Type A
Motor B Inverter Temperature Sensor Diagnostics								
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 PIM Temp Average Motor Temp No PIM or Motor Temp OOR Faults; P0AF4, P0AF5, P0BD8, P0BD9, P0BE2, P0BE3, P0A32 and P0A33	>=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, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor Inverter Temperature Sensor B Circuit High	P0AF5	To detect Inverter B Temperature 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 at or above Inverter Warmup Torque Threshold	ON >=1.5min >=ABS(20 Nm)	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips, Type B
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, Type B
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 PIM Temp Average Motor Temp No PIM or Motor Temp OOR Faults; P0AF4, P0AF5, P0BD8, P0BD9, P0BE2, P0BE3, P0A32 and P0A33	>=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, Type B
Drive Motor Inverter Temperature Sensor D Circuit High	P0BD9	To detect Inverter B Temperature Sensor #2 Out of Range high (voltage)	PIM Temp 1 Temperature	< -40 deg C (near 5V)	Wakeup Signal When malfunction present at start of trip: Cumulative Inverter Warmup Time	ON >=1.5min	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					at or above Inverter Warmup Torque Threshold	>=ABS(20 Nm)		
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, Type B
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 PIM Temp Average Motor Temp No PIM or Motor Temp OOR Faults; P0AF4, P0AF5, P0BD8, P0BD9, P0BE2, P0BE3, P0A32 and P0A33	>=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, Type B
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 When malfunction present at start of trip: Cumulative Inverter Warmup Time at or above Inverter Warmup Torque Threshold	ON >=1.5min >=ABS(20 Nm)	X: 250 cts Y: 350 cts R: 10.4ms T: 2604ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor 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, Type B
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 No Perf Fault; P0BE1	IN RANGE NOT ACTIVE	X: 500 cts Y: 650 cts R: 10.4ms T: 5208ms	One Trip, Type A
Drive Motor "B" Inverter Phase V Over Temperature	P0C15	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp 0 Temperature exceeds initial fault threshold AND Does not decrease below reset threshold	> 88 deg C initial fault >85 deg C reset	PIM Temperature No Perf Fault; P0AF3	IN RANGE NOT ACTIVE	X: 500 cts Y: 650 cts R: 10.4ms T: 5208ms	One Trip, Type A
Drive Motor "B" Inverter Phase W Over Temperature	P0C16	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp 1 Temperature exceeds initial fault threshold AND Does not decrease below reset threshold	> 88 deg C initial fault >85 deg C reset	PIM Temperature No Perf Fault; P0BD7	IN RANGE NOT ACTIVE	X: 500 cts Y: 650 cts R: 10.4ms T: 5208ms	One Trip, Type A
Motor B Resolver Sensors - Discrete Diagnostics								
Drive Motor "B" Position Sensor Circuit	P0A45	To detect Loss of Signal or converter error (line open, short) in the Motor Resolver circuit	Sin or Cos Signal	<2.3V	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, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "B" Position Sensor Circuit Range/Performance	P0A46	To detect a Degradation of Signal fault in the angle data read by the Motor Resolver circuit.	Sin or Cos Signal	>4.0V	Resolver Initialization Delay	500ms	X: 140 cts Y: 165 cts R: 0.083 - 0.5 ms T: 11.62 - 70.0 ms	One Trip, Type A
Drive Motor "B" Position Sensor Circuit Loss of Tracking	P1B04	To detect a Loss of Tracking fault in the Motor Resolver circuit.	Internal Tracking Error	> 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, Type A
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)	>11500 rpm >10000 rpm	Wakeup Signal	On	X: 9 cts Y: 12 cts R: 10.4ms T: 93.6ms	One Trip, Type A
Drive Motor "B" Position Sensor Not Learned	P0C18	To detect an unvalidated Resolver Offset Learn Value and No Stored Previously Valid Value	**Fail Case 1**: Offset Learn DIDN'T complete because: ABS(Motor Speed) OR Filtered DC Voltage OR ALL Phase Current Max-Min Delta For Time Period **OR** **Fail Case 2**: Offset Learn Completes AND ABS(Offset Correction Angle)	>50 rpm < 192 V <15 A > 20% of 0.3s learn time (>60ms) >30 deg	Key Off Wakeup Signal ABS(Motor Speed) followed by Start Delay Valid Stored Offset	TRUE ON < 20 rpm 400 Task 1 Counts (400 * 2.08 ms) =832 ms FALSE	832ms Start Delay PLUS 300 ms learn time = 1132 ms total	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Motor B Resolver Sensors - Circuit Diagnostics								
Drive Motor "B" Position Sensor Circuit "A" Low	P0C57	To detect Resolver Circuit S1/3 Out of Range Low	Resolver S13 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms T: 521ms	One Trip, Type A
Drive Motor "B" Position Sensor Circuit "A" High	P0C58	To detect Resolver Circuit S1/3 Out of Range High	Resolver S13 Circuit Reference Voltage	> 3.0 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	One Trip, Type A
Drive Motor "B" Position Sensor Circuit "B" Low	P0C61	To detect Resolver Circuit S2/4 Out of Range Low	Resolver S24 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms T: 521ms	One Trip, Type A
Drive Motor "B" 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, Type A
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: 110 A Threshold time: 200ms	Ignition switch	in crank or run	86 fail counts out of 96 sample counts Executes in a 2.08ms loop Detects in 200ms	One Trip, Type A
		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	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Fail Case 3: Monitor torque command by checking the SPI communication status	SPI rolling count fails to update more than threshold time	Threshold time: 104msec	Ignition switch	in crank or run	45 fail counts out of 50 sample counts Detects in 104ms 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, Type A
		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	

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	86 fail counts out of 96 sample counts Detects in 200ms 2.08 ms loop	One Trip, Type A
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, Type A
		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 "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, Type A
Comm'n Diagnostics								
Lost Communication With DMCM_B_LostComm_BECM	U1878	Drive Motor B Control Module Lost Communication With Battery Energy Control Module	Missed BECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage HV_ManageVN_Actv	> 9.5 Volts =FALSE	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, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					PowerMode BusOffFaultActive NormalCommEnabled NormalMsgTransmission DiagSystemDsbl DiagEnblTmr	=RUN =FALSE =TRUE =TRUE =FALSE >=3 sec		
Lost Communication With DMCM_B_LostComm_ECM	U1879	Drive Motor B Control Module Lost Communication With Engine Control Module (ECM)/Powertrain Control Module (PCM)	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage HV_ManageVN_Actv PowerMode BusOffFaultActive NormalCommEnabled NormalMsgTransmission DiagSystemDsbl DiagEnblTmr	> 9.5 Volts =FALSE =RUN =FALSE =TRUE =TRUE =FALSE >=3 sec	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, Type B

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

Glossary of Key Terms

Term	Definition
PECM	Power Electronics Control Module
BPCM	Battery Pack Control Module (GM term for BECM)
EBCM	Eletrohydraulic Brake Control Module
FSCM	Fuel System Control Module
TCM	Transmission Control Module
HCP	Hybrid Control Processor
MCP	Motor Control Processor
TPIM	Traction Power Inverter Module
PECL	Power Electronics Coooling Loop