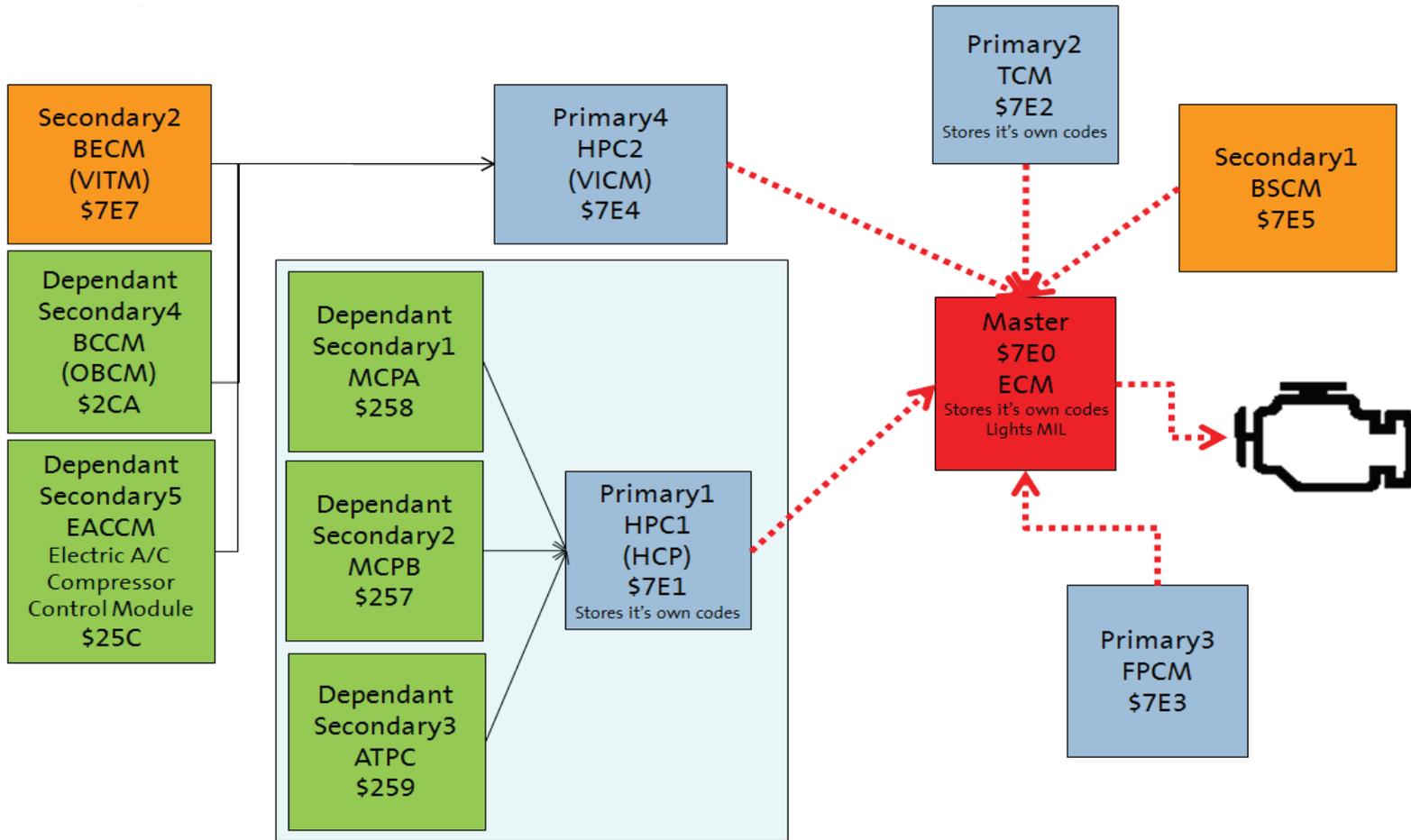


# 11 OBDG01 HYBRID Diagnostics



**Colors indicate the type of OBD controller.**

- Red = MASTER (ECM) - Stores Codes - Supports M01-0A - Controls MIL
- Blue = PRIMARY (HPC1, TCM, FPCM, HPC2) - Stores Codes - Supports Modes 01, 04, 09, 0A
- Orange = SECONDARY (BECM, BSCM) - Supports Modes 01, 04, 09, 0A
- Green = DEPENDANT SECONDARY (MCPA, MCPB, ATPC, BCCM, EACCM)

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Intake Camshaft Actuator Solenoid Circuit – Bank 1	P0010	Detects a VVT system error by monitoring the circuit for electrical integrity	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		System supply voltage is within limits Output driver is commanded on, Ignition switch is in crank or run position	> 11 Volts	20 failures out of 25 samples  250 ms /sample, continuous	Trips 2 B Type

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Intake Camshaft System Performance – Bank 1	P0011	Detects a VVT system error by comparing the desired and actual cam positions when VVT is activated	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive	(Intake cam Bank 1)Cam Position Error > KtPHSD_phi_CamPosErrorLimlc1 Deg (see Supporting Table)	DTC's are NOT active: P0010 IntkCMP B1 Circuit IntakeCamSensorTFTKO CrankSensorTFTKO CrankIntakeCamCorrelationFA	System Voltage > 11 Volts,  Both Desired & Measured cam positions cannot be < KtPHSD_phi_CamPosErrorLimlc1 or > than (29.0 - KtPHSD_phi_CamPosErrorLimlc1).  Desired cam position cannot vary more than 3.0 Cam Deg for at least KtPHSD_t_StablePositionTimeIc1 seconds (see Supporting Tables)	135 failures out of 150 samples	Trips 2 B Type

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Engine is running VVT is enabled Desired camshaft position > 0 Power Take Off (PTO) not active		100 ms /sample	
Exhaust Camshaft Actuator Solenoid Circuit – Bank 1	P0013	Detects a VVT system error by monitoring the circuit for electrical integrity	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		System supply voltage is within limits  Output driver is commanded on, Ignition switch is in crank or run position	> 11 Volts	20 failures out of 25 samples  250 ms /sample, continuous	Trips 2 B Type

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Exhaust Camshaft System Performance – Bank 1	P0014	Detects a VVT system error by comparing the desired and actual cam positions when VVT is activated	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive	(Exhaust cam Bank 1)Cam Position Error > KtPHSD_phi_CamPosErrorLimEc1 Deg (see Supporting Table)	DTC's are NOT active: P0013 IntkCMP B1 Circuit ExhaustCamSensorTFTKO CrankSensorTFTKO CrankExhaustCamCorrelationFA	System Voltage > 11 Volts,  Both Desired & Measured cam positions cannot be < KtPHSD_phi_CamPosErrorLimEc1 or > than (Exh23.5 - KtPHSD_phi_CamPosErrorLimEc1).  Desired cam position cannot vary more than 3.0 Cam Deg for at least KtPHSD_t_StablePositionTimeEc1 seconds (see Supporting Tables)	135 failures out of 150 samples	Trips 2 B Type

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Engine is running VVT is enabled Desired camshaft position > 0 Power Take Off (PTO) not active		100 ms /sample	
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 1 Sensor A	P0016	Detects cam to crank misalignment by monitoring if cam sensor pulse for bank 1 sensor A occurs during the incorrect crank position	4 cam sensor pulses more than - 10 crank degrees before or 10 crank degrees after nominal position in one cam revolution.		Crankshaft and camshaft position signals are synchronized  Engine is Spinning  Cam phaser is in "parked" position  No Active DTCs:	P0335, P0336 P0340, P0341 5VoltReferenceA_F A 5VoltReferenceB_F A	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. There is a delay after the first failed test to allow the camshaft position to return to the park position. This time is defined by the table "Cam Correlation Oil Temperature Threshold".	Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Time since last execution of diagnostic	< 1.0 seconds	One sample per cam rotation	
Crankshaft Position (CKP)-Camshaft Position (CMP) Correlation Bank 1 Sensor B	P0017	Detects cam to crank misalignment by monitoring if cam sensor pulse for bank 1 sensor B occurs during the incorrect crank position	4 cam sensor pulses more than - 10 crank degrees before or 10 crank degrees after nominal position in one cam revolution.		Crankshaft and camshaft position signals are synchronized  Engine is Spinning  Cam phaser is in "parked" position  No Active DTCs:	P0335, P0336	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	Type B 2 trips



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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Ignition Voltage Engine Run time	< 32.0 volts < 0.275 seconds		
Radiator Coolant Temp Sensor Circuit Low Voltage	P00B3	This DTC detects a short to ground in the RCT signal circuit or the RCT sensor.	RCT Resistance (@ 150°C)	< 34 Ohms	Engine run time Or IAT min	> 10.0 seconds ≤ 70.3 °C	5 failures out of 10 samples	2 trips Type B
							1 sec/ sample  Continuous	
Radiator Coolant Temp Sensor Circuit High Voltage	P00B4	Circuit Continuity This DTC detects a short to high or open in the RCT signal circuit or the RCT sensor.	RCT Resistance (@ -60°C)	> 260000 Ohms	Engine run time Or IAT min	> 60.0 seconds ≥ -7.0 °C	5 failures out of 10 samples	2 trips Type B
							1 sec/ sample  Continuous	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Radiator Coolant Temp - Engine Coolant Temp (ECT) Correlation	P00B6	This DTC detects a difference between ECT and RCT after a soak condition.	<p>A failure will be reported if any of the following occur:</p> <p>1) Absolute difference between ECT at power up &amp; RCT at power up is <math>\geq</math> an IAT based threshold table lookup value(fast fail).</p> <p>2) Absolute difference between ECT at power up &amp; RCT at power up is <math>&gt;</math> by 20.0 C and a block heater has not</p>	See "P00B6: Fail if power up ECT exceeds RCT by these values" in the Supporting tables section	<p>No Active DTC's</p> <p>Engine Off Soak Time</p> <p>Non-volatile memory initialization</p> <p>Test complete this trip</p> <p>Test aborted this trip</p> <p>IAT</p> <p>LowFuel Condition Diag</p>	<p>VehicleSpeedSensor_FA</p> <p>IAT_SensorCircuitFA</p> <p>THMR_RCT_Sensor_Ckt_FA</p> <p>THMR_ECT_Sensor_Ckt_FA</p> <p>IgnitionOffTimeValid</p> <p>TimeSinceEngineRunningValid</p> <p><math>&gt; 28800</math> seconds</p> <p>= Not occurred</p> <p>= False</p> <p>= False</p> <p><math>\geq -7</math> °C</p> <p>= False</p>	<p>1 failure</p> <p>500 msec/sample</p> <p>Once per valid cold start</p>	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<p>been detected.</p> <p>3) ECT at power up &gt; IAT at power up by 20.0 C and the time spent cranking the engine without starting is greater than 1.0 seconds with the LowFuelConditionDiag</p>	= False	<p><b>Block Heater detection is enabled when either of the following</b></p> <p>1) ECT at power up &gt; IAT at power up by &gt; 20.0 °C</p> <p>2) Cranking time &lt; 1.0 Seconds</p> <p><b>Block Heater is detected and diagnostic is aborted when 1) or 2) occurs. Diagnostic is aborted when 3) or 4) occurs:</b></p> <p>1a) Vehicle drive time &gt; 1 Seconds with</p> <p>1b) Vehicle speed &gt; 158.4 MPH and</p> <p>1c) Additional Vehicle drive time is provided to 1a when Vehicle speed is below 1b as follows: 0.50 times the seconds with vehicle speed below 1b</p> <p>1d) IAT drops from power up IAT ≥ 255.0 °C</p>			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					2a) ECT drops from power up ECT > 255 °C Within 2b) Engine run time > 255 Seconds			
					3) Engine run time with vehicle speed below 1b > 1800 Seconds 4) Minimum IAT during test ≤ -7.0 °C			
Engine Coolant Flow Insufficient	P00B7	This DTC detects a Insufficient Flow Condition (i.e.. Stuck Closed Thermostat)	Engine Coolant Temp (ECT) is greater than 117 Deg C and Difference between ECT and RCT is greater than 45 Deg C. When above is present for more than 5 seconds, fail counts start.		No Active DTC's  Engine run time OR Engine Coolant Temp	THMR_RCT_Senso r_Ckt_FA THMR_ECT_Senso r_Ckt_FA  > 45 seconds > 70.0 Deg C	30 failures out of 200 samples  1 sec/ 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
					No Active DTCs:	Residual Weight Factor based on  See table "IFRD Residual Weighting MAP_SensorCircuit FA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuit FA CrankSensor_FA ECT_Sensor_FA ECT_Sensor_Ckt_FP IAT_SensorFA IAT_SensorCircuitFP		
Mass Air Flow Sensor Circuit Low Frequency	P0102	Detects a continuous short to low or a open in either the signal circuit or the MAF sensor	MAF Output	<= 1800 Hertz  (0 gm/sec)	Engine Run Time  Engine Speed Ignition Voltage Above criteria present for a period of time	> 1.0 seconds  >= 300 RPM >= 10.0 Volts  >= 1.0 seconds	200 failures out of 250 samples  1 sample every cylinder firing event	Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Mass Air Flow Sensor Circuit High Frequency	P0103	Detects a high frequency output from the MAF sensor	MAF Output	>= 14500 Hertz  (108 gm/sec)	Engine Run Time  Engine Speed Ignition Voltage Above criteria present for a period of time	> 1.0 seconds  >= 300 RPM >= 10.0 Volts  >= 1.0 seconds	200 failures out of 250 samples  1 sample every cylinder firing event	Type B 2 trips
Manifold Absolute Pressure Sensor Performance	P0106	Determines if the MAP sensor is stuck within the normal operating range	Filtered Throttle Model Error AND ABS(Measured MAP – MAP Model 1) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	<= 125 kPa*(g/s)  > 20.0 kPa  > 20.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 500 RPM <= 8000 RPM >= -7 Deg C <= 125 Deg C >= -20 Deg C <= 125 Deg C  >= 0.25  Filtered Throttle Model Error multiplied by TPS Residual Weight  MAP Model 1 Error multiplied by MAP1	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
			Engine Not Rotating		No Active DTCs:	Residual Weight Factor based on  MAP Model 2 Error multiplied by MAP2 Residual Weight Factor based on  See table "IFRD Residual Weighting  MAP_SensorCircuit FA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuit FA CrankSensor_FA ECT_Sensor_FA ECT_Sensor_Ckt_FP IAT_SensorFA IAT_SensorCircuitFP		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<u>Case:</u> Manifold Pressure OR Manifold Pressure	< 50.0 kPa > 115.0 kPa	Time between current ignition cycle and the last time the engine was running  Engine is not rotating  No Active DTCs:  No Pending DTCs:	> 8.0 seconds  EngModeNotRunTmErr MAP_SensorFA AAP_SnsrFA MAP_SensorCircuitFP AAP_SnsrCktFP	4 failures out of 5 samples  1 sample every 12.5 msec	
Manifold Absolute Pressure Sensor Circuit Low	P0107	Detects a continuous short to low or open in either the signal circuit or the MAP sensor.	MAP Voltage	< 3.0 % of 5 Volt Range (0.2 Volts = 3.5 kPa)	Continuous		320 failures out of 400 samples  1 sample every 12.5 msec	Type B 2 trips
Manifold Absolute	P0108	Detects an open sensor ground or	MAP Voltage	> 90.0 % of 5 Volt Range (4.5	Continuous		320 failures out of 400 samples	Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Sensor Circuit High		continuous short to high in either the signal circuit or the MAP sensor.		Volts = 115.0 kPa)			1 sample every 12.5 msec	
Intake Air Temperature Sensor Circuit Performance	P0111	Detects an IAT sensor that has stuck in range by comparing to engine coolant temperature at startup	ABS(Power Up IAT - Power Up ECT)	> 40 deg C	Time between current ignition cycle and the last time the engine was running  Power Up ECT  No Active DTCs:	> 28800 seconds < 60 deg C  ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSensorCk	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B 2 trips
Intake Air Temperature Sensor Circuit Low (High Temperature)	P0112	Detects a continuous short to ground in the IAT signal circuit or the IAT sensor	Raw IAT Input	< 62 Ohms (~150 deg C)	Engine Run Time	> 0.0 seconds	40 failures out of 50 samples  1 sample every 100 msec	Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Intake Air Temperature Sensor Circuit High (Low Temperature)	P0113	Detects a continuous open circuit in the IAT signal circuit or the IAT sensor	Raw IAT Input	> 126840 Ohms (~-60 deg C)	Engine Run Time	> 0.0 seconds	40 failures out of 50 samples  1 sample every 100 msec	Type B 2 trips
Intake Air Temperature Sensor Intermittent In-Range	P0114	Detects a noisy or erratic IAT signal circuit or IAT sensor	String Length  Where: "String Length" = sum of "Diff" calculated over  And where:  "Diff" = ABS(current IAT reading - IAT reading from 100 milliseconds previous)	> 125 DegC  10 consecutive IAT samples	Continuous		4 failures out of 5 samples	Type B 2 trips
Engine Coolant Temperature (ECT) Sensor Performance	P0116	This DTC detects ECT temp sensor stuck in mid range.	A failure will be reported if any of the following occur:  1) ECT at power up > IAT at power up	See "P0116: Fail if power up	No Active DTC's	VehicleSpeedSensor IAT_SensorFA ECT_Sensor_Ckt_F IgnitionOffTimeValid TimeSinceEngineRunningValid	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
			by an IAT based table lookup value after a minimum 28800 second soak (fast fail).  2) ECT at power up > IAT at power up by 20.0 C after a minimum 28800 second soak and a block heater has not been detected.  3) ECT at power up > IAT at power up by 20.0 C after a minimum 28800 seconds soak and the time spent cranking the engine without starting is greater than 0.0 seconds with the LowFuelConditionDi	ECT exceeds IAT by these values" in the Supporting tables section	Non-volatile memory Test complete this trip = Not occurred Test aborted this trip = False IAT ≥ -7 °C LowFuelCondition = False	= Not occurred = False = False ≥ -7 °C = False	Once per valid cold start	
					<b>Block Heater detection is enabled when either of the following</b>			
					1) ECT at power up > IAT at power up by	> 20.0 °C		
					2) Cranking time	< 0.0 Seconds		
					<b>Block Heater is detected and diagnostic is aborted when 1) or 2) occurs. Diagnostic is aborted when or 4) occurs:</b>			
					1a) Vehicle drive time	> 400 Seconds with		
					1b) Vehicle speed	> 158.4 MPH		
					1c) Additional			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Vehicle drive time is provided to 1a when Vehicle speed is below 1b as follows:  1d) IAT drops from power up IAT $\geq 255.0$ °C	0.50 times the seconds with vehicle speed below 1b		
					2a) ECT drops from power up ECT $\geq 255$ °C Within 2b) Engine run time $\leq 65535$ Seconds			
					3) Engine run time with vehicle speed below 1b $> 1800$ Seconds 4) Minimum IAT during test $\leq -7$ °C			
Engine Coolant Temp Sensor Circuit Low	P0117	Circuit Continuity This DTC detects a short to ground in the ECT signal	ECT Resistance (@ 150°C)	< 34 Ohms			5 failures out of 6 samples  1 sec/ sample	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		circuit or the ECT sensor.					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 (@ -60°C)	> 260000 Ohms	Engine run time	> 10.0 seconds	5 failures out of 6 samples	2 trips Type B
					Or IAT min	≥ 0.0 °C		
							Continuous	
Engine Coolant Temperature (ECT) Sensor Circuit Intermittent	P0119	Circuit Continuity This DTC detects large step changes in the ECT signal circuit or the ECT sensor. Allowable high and low limits are calculated for the next sample	ECT temperature step change: 1) positive step change is greater than high limit OR 2) negative step change is lower than low limit.		No Active DTC's	P0117 P0118	3 failures out of 4 samples  1 sec/ sample	2 trips Type B
							Continuous	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		based on the previous sample and the time constant of the						
Throttle Position Sensor Performance	P0121	Determines if the Throttle Position Sensor input is stuck within the normal operating range	Filtered Throttle Model Error AND ABS(Measured Flow – Modeled Air Flow) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	> 125 kPa*(g/s)  > 10 grams/sec  <= 20.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 500 RPM <= 8000 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C  >= 0.25  Filtered Throttle Model Error multiplied by TPS Residual Weight  Modeled Air Flow Error multiplied by MAF Residual Weight Factor based on RPM and MAF Residual	Continuous  Calculation are performed every 12.5 msec	Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTCs:	See table "IFRD Residual Weighting MAP_SensorCircuit FA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuit FA CrankSensor_FA ECT_Sensor_FA ECT_Sensor_Ckt_FP IAT_SensorFA IAT_SensorCircuitFP		
TPS1 Circuit Low	P0122	Detects a continuous or intermittent short or open in TPS1 circuit	TPS1 Voltage <	0.325		Run/Crank voltage > 6.41  No 5V reference error or fault for # 4	639/1279 counts; 153 counts continuous; 3.125 ms /count in the ECM 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
						5V reference circuit		
TPS1 Circuit High	P0123	Detects a continuous or intermittent short or open in TPS1 circuit	TPS1 Voltage >	4.75		Run/Crank voltage > 6.41  No 5V reference error or fault for # 4 5V reference circuit	639/1279 counts; 153 counts continuous; 3.125 ms /count in the ECM main processor	Trips: 1 Type: A MIL: YES
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	Engine run time is accumulated when airflow is $\geq 1$ grams per sec during Range #1 or #2:  <u>Range #1 (Primary)</u> ECT reaches Commanded temperature minus 11.0 °C when IAT min is < 60.0°C and $\geq -7.0^\circ\text{C}$ .	See "P0128: Maximum Accumulated Time for IAT and Start-up ECT conditions" in the Supporting	No Active DTC's  Engine not run time $\geq 1800$ seconds Engine run time $1 \leq \text{Eng Run Tme} \leq 1800$ seconds Fuel Condition Ethanol $\leq 86\%$	MAF_SensorFA IAT_SensorFA THMR_RCT_Sensor_Ckt_FA THMR_ECT_Sensor_Ckt_FA	1 failure to set DTC  1 sec/ sample  Once per ignition key cycle	2 trips Type B
					<u>Range #1 (Primary) Test</u>			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<p>Range #2 (Alternate)</p> <p>ECT reaches Commanded temperature minus 11.0 °C when IAT min is &lt; -50.0°C and ≥ -50.0°C.</p>		<p>ECT at start run</p> <p>Average Airflow</p> <p>T-Stat Heater duty commanded</p>	<p>-40.0 ≤ ECT ≤ 59.0 °C</p> <p>≥ 1.0 gps</p> <p>≤ 10 %</p>		
					<p><b>Range #2 (Alternate) Test</b></p> <p>ECT at start run</p> <p>Average Airflow</p> <p>T-Stat Heater duty commanded</p>	<p><b>Not used in this application</b></p> <p>-50.0 ≤ ECT ≤ -50.0 °C</p> <p>≥ 1.0 gps</p> <p>≤ 10 %</p>		
O2S Circuit Low Voltage Bank 1 Sensor 1	P0131	This DTC determines if the O2 sensor circuit is shorted to low.	Oxygen Sensor Signal	< 50 mVolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoid Circuit_FA EvapFlowDuringNo nPurge_FA	380 failures out of 475 samples  Frequency: Continuous in 100 milli - second loop	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnrCkt_FA FuelInjectorCircuit_FA AIR intrusive test = Not active Fuel intrusive test = Not active Idle intrusive test = Not active EGR intrusive test = Not active System Voltage 10.0 < Volts < 32.0 EGR Device Control = Not active Idle Device Control = Not active Fuel Device Control = Not active AIR Device Control = Not active Low Fuel Condition Diag = False		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Equivalence Ratio Air Per Cylinder 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	0.9912 < ratio < 1.0400 50 < mgram < 500		
					<b>All of the above met for</b>	> 5.0 seconds		
O2S Circuit High Voltage Bank 1 Sensor 1	P0132	This DTC determines if the O2 sensor circuit is shorted to high.	Oxygen Sensor Signal	> 1050 mvolts	<b>Open Test Criteria</b> No Active DTC's System Voltage AFM Status	TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolComposition Sensor_FA 10.0 < Volts < 32.0 = All Cylinders active	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
					Initial delay after Open Test > 45.0 seconds Criteria met (cold start condition) when engine soak time > 28800 seconds  Initial delay after Open Test > 45.0 seconds Criteria met (not cold start condition) when engine soak time ≤ 28800 seconds Equivalence Ratio $0.9912 \leq \text{ratio} \leq 1.0400$ Air Per Cylinder Fuel Control State $50.0 \leq \text{mgram} \leq 500.0$ not = Power Enrichment			
					<b>All of the above met for</b>	> 5.0 seconds		
O2S Slow Response Bank 1 Sensor 1	P0133	This DTC determines if the O2 sensor response time is degraded.	The average response time is calculated over the test time, and compared to the threshold. Refer to <b>"P0133 - O2S Slow</b>		No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA	Sample time is 60 seconds  Frequency: Once per trip	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<p><b>Response Bank 1 Sensor 1"</b> Pass/Fail Threshold table in the Supporting Tables tab.</p>		<p>EvapPurgeSolenoidCircuit_FA EvapFlowDuringNoPurge_FA EvapVentSolenoidCircuit_FA  EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSensorCkt_FA FuelInjectorCircuit_FA AIR System FA EthanolCompositionSensor_FA EngineMisfireDetected_FA P0131 P0132 P0134 System Voltage EGR Device Control Idle Device Control</p>	<p>10.0 &lt; Volts &lt; 32.0  = Not active  = Not active</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Fuel Device Control = Not active AIR Device Control = Not active Low Fuel Condition Diag = False = Not Valid, See definition of <b>Green Sensor Delay Criteria (B1S1)</b> in Supporting Tables tab. Green O2S Condition O2 Heater on for Learned Htr resistance ≥ 40 seconds = Valid Engine Coolant IAT > 50 °C > -40 °C Engine run Accum > 90 seconds Time since any AFM status change > 2.0 seconds Time since Purge On to Off 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 Off to On change Engine airflow Engine speed Fuel Baro Air Per Cylinder Low Fuel Condition Diag Fuel Control State Closed Loop Active LTM fuel cell Transient Fuel Mass Baro Fuel Control State Fuel State Commanded Proportional Gain	> 2.0 seconds 17 ≤ grams per second ≤ 40 1000 ≤ RPM ≤ 3500 < 87 % Ethanol > 70 kpa ≥ 150 mGrams = False = Closed Loop = TRUE = Enabled ≤ 100.0 mgrams = Not Defaulted not = Power Enrichment DFCO not active ≥ 0.0 %		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					<u>All of the above met for</u>	> 1.0 seconds		
O2S Circuit Insufficient Activity Bank 1 Sensor 1	P0134	This DTC determines if the O2 sensor circuit is open.	Oxygen Sensor Signal	> 1700 mvolts	No Active DTC's  System Voltage  AFM Status Heater Warm-up delay  Engine Run Time Engine Run Accum Fuel	TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolComposition Sensor_FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds  > 150 seconds ≤ 87 % Ethanol	200 failures out of 250 samples.  Frequency: Continuous  100msec loop	2 trips Type B
O2S Heater Performance Bank 1 Sensor 1	P0135	This DTC determines if the O2 sensor heater is functioning properly by monitoring the	Heater Current outside of the expected range of	0.3 < Amps < 2.5	No Active DTC's  System Voltage Heater Warm-up delay  O2S Heater device control	ECT_Sensor_FA 10.0 < Volts < 32.0 = Complete = Not active	8 failures out of 10 samples  Frequency: 2 tests 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
		current through the heater circuit.			B1S1 O2S Heater Duty Cycle	> zero	30 seconds delay between tests and 1 second execution rate	
					<u>All of the above met for</u>	> 120 seconds		
O2S Circuit Low Voltage Bank 1 Sensor 2	P0137	This DTC determines if the O2 sensor circuit is shorted to low.	Oxygen Sensor Signal	< 50 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoid Circuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA  EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSensorCkt_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 Fuel intrusive test Idle intrusive test EGR intrusive test System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Diag Equivalence Ratio Air Per Cylinder Fuel Control State Closed Loop Active	FuellInjectorCircuit_FA = Not active = Not active = Not active = Not active 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = Not active = False 0.9912 ≤ ratio ≤ 1.0400 50 ≤ mgrams ≤ 500 = Closed Loop = TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum	
					All Fuel Injectors for active Cylinders Fuel Condition Fuel State	Enabled (On) Ethanol <= 87% DFCO not active			
					<b>All of the above met for</b>	> 5.0 seconds			
O2S Circuit High Voltage Bank 1 Sensor 2	P0138	This DTC determines if the O2 sensor circuit is shorted to high.	Oxygen Sensor Signal	> 1050 mvolts	<b>Open Test Criteria</b> No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Fuel Condition No Active DTC's		TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolComposition Sensor_FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds ≤ 87 % Ethanol MAP_SensorFA EvapPurgeSolenoid Circuit_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
						EvapFlowDuringNo nPurge_FA EvapVentSolenoidC ircuit_FA  EvapSmallLeak_FA EvapEmissionSyste m_FA FuelTankPressureS nsrCkt_FA FuelInjectorCircuit_ FA AIR System FA  Low Fuel Condition Diag = False Fuel Condition ≤ 87 % Ethanol Initial delay after Open Test > 45.0 seconds Criteria met (cold when start condition) engine soak time > 28800 seconds Initial delay after Open Test > 45.0 seconds Criteria met (not when cold start engine soak time ≤ condition) 28800 seconds		



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				is 150 mvolts)	key cycle  System Voltage Learned heater resistance ICAT MAT Burnoff delay  Green O2S Condition Low Fuel Condition Diag Post fuel cell DTC's Passed  DTC's Passed	P013F, P2270 or P2271  10.0 < Volts < 32.0 = Valid = Not Valid = Not Valid, See definition of <b>Green Sensor Delay Criteria (B1S2)</b> in Supporting Tables tab. = False = enabled P2270 (and P2272 if applicable) P013E (and P014A if applicable)		
					After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).			



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					<p>Green O2S Condition Low Fuel Condition Diag Post fuel cell DTC's Passed</p>	<p>= Not Valid, See definition of <b>Green Sensor Delay Criteria (B1S2)</b> in Supporting Tables tab.</p> <p>= False</p> <p>= enabled</p> <p>P2270 (and P2272 if applicable)</p> <p>P013E (and P014A if applicable)</p> <p>P013A (and P013C if applicable)</p> <p>P2271 (and P2273 if applicable)</p> <p>P013F (and P014B if applicable)</p>		
<p>After above conditions are met: Fuel Enrich mode continued.</p>								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
O2 Sensor Delayed Response Rich to Lean Bank 1 Sensor 2	P013E	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.	<p>Post O2 sensor voltage</p> <p>AND</p> <p>The Accumulated mass air flow monitored during the Delayed Response Test under DFCO</p> <p>DFCO begins after:</p> <p>1) Catalyst has been rich for a minimum of</p> <p>AND</p> <p>2) Catalyst Rich Accumulation Air Flow is greater or equal to</p>	<p>&gt; 450 mvolts</p> <p>&gt; 33 grams</p> <p>&gt; 2 secs</p> <p>&gt; 2 grams</p>	<p>No Active DTC's</p> <p>B1S2 Failed this key cycle</p> <p>System Voltage Learned heater resistance = Valid</p> <p>ICAT MAT Burnoff delay = Not Valid</p>	<p>TPS_ThrottleAuthorityDefaulted</p> <p>ECT_Sensor_FA</p> <p>IAT_SensorFA</p> <p>MAF_SensorFA</p> <p>MAP_SensorFA</p> <p>AIR System FA</p> <p>FuelInjectorCircuit_FA</p> <p>FuelTrimSystemB1_FA</p> <p>FuelTrimSystemB2_FA</p> <p>EngineMisfireDetected_FA</p> <p>EthanolCompositionSensor_FA</p> <p>P013A, P013B, P013F, P2270 or P2271</p> <p>10.0 &lt; Volts &lt; 32.0</p> <p>= Valid</p> <p>= Not Valid</p>	<p>Frequency: Once per trip</p> <p>Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.</p>	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Green O2S Condition Low Fuel Condition Diag Post fuel cell DTC's Passed	= Not Valid, See definition of <b>Green Sensor Delay Criteria (B1S2)</b> in Supporting Tables tab. = False = enabled P2270 (and P2272 if applicable)		
					After above conditions are met: DFCO mode entered (wo driver)			
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	Post O2 sensor voltage AND The Accumulated mass air flow monitored during the Delayed Response Test	< 350 mvolts > 120 grams	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR_System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE,	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		the delivered A/F ratio to achieve the required rich threshold.			B1S2 Failed this key cycle  System Voltage Learned heater resistance ICAT MAT Burnoff delay  Green O2S Condition Low Fuel Condition Diag Post fuel cell DTC's Passed	FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013A, P013B, P013E, P2270 or P2271  10.0 < Volts < 32.0  = Valid = Not Valid = Not Valid, See definition of <b>Green Sensor Delay Criteria (B1S2)</b> in Supporting Tables tab.  = False = enabled P2270 (and P2272 if applicable)	multiple tests per trip are allowed	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						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.	Oxygen Sensor Signal	> 1700 mvolts	No Active DTC's  System Voltage  AFM Status Heater Warm-up delay  Engine Run Time Engine Run Accum Fuel	TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolComposition Sensor_FA 10.0 <Volts < 32.0 = All Cylinders active  = Complete  > 5 seconds  > 150 seconds ≤ 87 % Ethanol	200 failures out of 250 samples.  Frequency: Continuous  100msec loop	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
O2S Heater Performance Bank 1 Sensor 2	P0141	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Heater Current outside of the expected range of	0.3 > amps > 2.5	No Active DTC's System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty <u>All of the above met for</u> Time	ECT_Sensor_FA 10.0 < Volts < 32.0 = Complete = Not active > zero > 120 seconds	8 failures out of 10 samples Frequency: 2 tests per trip  30 seconds delay between tests and 1 second execution rate.	2 trips Type B
Fuel System Too Lean Bank 1	P0171	Determines if the fuel control system is in a lean condition, based on the filtered long-term fuel trim.	The filtered long-term fuel trim metric	>= 1.250	Engine speed BARO Coolant Temp MAP Inlet Air Temp MAF Fuel Level  Long Term Fuel Trim data accumulation:	400 <rpm< 6100 > 70 kPa -38 <°C< 130 15 <kPa< 255 -20 <°C< 150 1.0 <g/s< 512.0 > 10 % or if fuel sender is faulty  > 20.0 seconds of data must accumulate on each trip, with at least	Frequency: 100 ms Continuous Loop	2 Trip(s) Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						15.0 seconds of data in the current fuel trim cell before fuel trim diagnosed during decels? No <b>Long-Term Fuel Trim Cell Usage</b> Sometimes, certain Long-Term Fuel Cells are not utilized for control or diagnosis. <b>Please see "Supporting Tables" Tab for a list of cells for diagnosis.</b>		
						<b>Fuel Control Status</b> Closed Loop Enabled Long Term FT Enabled <b>Please see "Closed Loop Enable Criteria" and "Long Term FT Enable Criteria" in Supporting Tables.</b>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Fuel Consumed	> 65535.0 liters of fuel consumed after a fuel fill event ("Virtual Flex Fuel Sensor applications only)		
					EGR Flow Diag. Intrusive Test Not Catalyst Monitor Intrusive Test Not Post O2 Diag. Intrusive Test Not Device Control Not Active EVAP Diag. "tank pull down" Not Active			
					<p align="center"><b>No active DTCs:</b></p> IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapExcessPurgePsbl_FA Ethanol Composition Sensor FA FuelInjectorCircuit_FA EngineMisfireDetected_FA EGRValvePerformance_FA EGRValveCircuit_FA MAP_EngineVacuumStatus AmbPresDfltdStatus			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					TC_BoostPresSnrFA 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:	<b>Passive Test:</b>			Secondary Parameters and Enable Conditions are identical to those for P0171, with the exception	Frequency: 100 ms Continuous Loop	2 Trip(s) Type B
			The filtered Non-Purge Long Term Fuel Trim metric	<= 0.795 (a Passive Test decision cannot be made when Purge is enabled)				
			<b>Intrusive Test:</b>					
			The filtered Purge Long Term Fuel Trim metric	<= 0.800				
			AND					
			The filtered Non-Purge Long Term Fuel Trim metric	<= 0.795 for  2 out of 3 intrusive				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				segments				
		<p>Intrusive Test: When the filtered Purge Long Term Fuel Trim metric is <math>\leq 0.800</math>, purge is ramped off to determine if excess purge vapor is the cause of the rich condition. If the filtered Purge Long Term Fuel Trim metric <math>&gt; 0.800</math>, the test passes without checking the filtered Non-Purge Long Term Fuel Trim metric.</p>	<p>Segment Def'n: Segments can last up to 35 seconds and are separated by the lesser of 30 seconds of purge-on time or enough time to purge 5 grams of vapor.</p> <p>A maximum of 3 completed segments or 25 attempts are allowed for each intrusive test.</p> <p>After an intrusive test report is completed, another intrusive test cannot occur for 299 seconds to allow</p>					

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.	sufficient time to purge excess vapors from the canister. During this period, fuel trim will pass if the filtered Purge-on Long Term fuel trim > Purge Rich Limit Table for at least 150 seconds, indicating that the canister has been purged.					
Injector 1	P0201	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions  Engine Running	11 volts ≤ Voltage for greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Injector 2	P0202	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions  Engine Running	11 volts ≤ Voltage for greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
Injector 3	P0203	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions  Engine Running	11 volts ≤ Voltage for greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
Injector 4	P0204	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions  Engine Running	11 volts ≤ Voltage for greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
TPS2 Circuit Low	P0222	Detects a continuous or intermittent short	TPS2 Voltage <	0.25		Run/Crank voltage > 6.41	639/1279 counts; 153 counts	Trips: 1 Type:

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		or open in TPS2 circuit				No 5V reference error or fault for # 4 5V reference circuit	continuous; 3.125 ms /count in the ECM main processor	A MIL: YES
TPS2 Circuit High	P0223	Detects a continuous or intermittent short or open in TPS2 circuit	TPS2 Voltage >	4.59		Run/Crank voltage > 6.41  No 5V reference error or fault for # 4 5V reference circuit	639/1279 counts; 153 counts continuous; 3.125 ms /count in the ECM main processor	Trips: 1 Type: A MIL: YES
Random Misfire Detected	P0300 P0301	These DTC's will determine if a random or a cylinder specific	Deceleration index vs. Engine Speed Vs Engine load	(>Idle SCD AND > Idle SCD ddt Tables)	Engine Run Time ECT	> 2 crankshaft revolutions -7°C < ECT < 125°C	Emission Exceedence = any (5) failed 200 rev blocks	2 Trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Cylinder 1 Misfire Detected	P0302	misfire is occurring by monitoring crankshaft velocity	Deceleration index calculation is tailored to specific veh. Tables used are 1st tables encountered that are not max of range. Undetectable region at a given speed/load point is where all tables are max of range point. see Algorithm Description	<b>OR</b> (>SCD Delta AND > SCD Delta ddt Tables) <b>OR</b> (>Idle Cyl Mode AND > Idle Cyl Mode ddt Tables) <b>OR</b> (>Cyl Mode AND > Cyl Mode ddt Tables) <b>OR</b>	If ECT at startup  then ECT  System Voltage  + Throttle delta  - Throttle delta	< -7°C  21°C < ECT < 125°C 9.00 < volts < 32.00  < 100.00% per 25 ms < 100.00% per 25 ms	out of (16) 200 rev block tests  Failure reported for (1) Exceedence in 1st (16) 200 rev block tests, or (4) Exceedences thereafter.	(Mil Flashes with Catalyst Damaging Misfire)
Cylinder 2 Misfire Detected	P0303							
Cylinder 3 Misfire Detected	P0304							
Cylinder 4 Misfire Detected	P0305							
	P0306							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Cylinder 5 Misfire Detected	P0307		Document for additional details.	(>Rev Mode Table) <b>OR</b> (> AFM Table in Cyl Deact mode)	Early Termination option	NotEnabled	<b>OR</b> <b>when Early Termination Reporting = Enabled and engine rev &gt; 1000 and &lt; 3200 at end of trip</b> <b>Initial Emission Exceedence = fails when MF% &gt; Emission Failure Threshold</b>	
Cylinder 6 Misfire Detected	P0308							
Cylinder 7 Misfire Detected								
Cylinder 8 Misfire Detected								
			Misfire Percent Emission Failure Threshold	≥ 0.63% P0300 ≥ 0.63% emission				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<p>Misfire Percent Catalyst Damage</p> <p>When engine speed and load are less than the FTP calcs (3) catalyst damage exceedences are allowed.</p>	<p>&gt; "Catalyst Damaging Misfire Percentage" Table whenever secondary conditions are met.</p> <p>≤ 0 FTP rpm AND ≤ 0 FTP % load</p>	<p>Engine Speed Engine Load Misfire counts</p> <p>(at low speed/loads, one cylinder may not cause cat damage)</p>	<p>&gt; 6500 rpm AND &gt; 40 % load AND &lt; 180 counts on one cylinder</p>	<p>any Catalyst Exceedence = (1) 200 rev block as data supports for catalyst damage.</p> <p>Failure reported with (1 or 3) Exceedences in FTP, or (1) Exceedence outside FTP.</p> <p>Continuous</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Engine Speed	1250 < rpm < (4900) - 50  Engine speed limit is a function of inputs like Gear and temperature  Engine Speed Limit = 4900 rpm (Rev, Gears 1-6) Engine Speed Limit = 2000 rpm (P,N)	4 cycle delay	
				disable conditions:	No active DTCs:	TPS_FA EnginePowerLimited MAF_SensorTFTKO MAP_SensorTFTKO  IAT_SensorTFTKO ECT_Sensor_Ckt_TFTKO	4 cycle delay	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						5VoltReferenceB_FA CrankSensorTestFailedTKO CrankSensorFaultActive CrankIntakeCamCorrelationFA CrankExhaustCamCorrelationFA CrankCamCorrelationTFTKO  AnyCamPhaser_FA AnyCamPhaser_TFTKO  If Monitor Rough Road=1 and RoughRoadSource="TOSS"  Transmission Output Shaft Angular Velocity Validity (Auto Trans only)		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						Clutch Sensor FA (Manual Trans only)  TransEngagedState_FA (Auto Trans only)  > 1000 rpm		
					P0315 & engine speed Fuel Level Low Cam and Crank Sensors Misfire requests TCC unlock	LowFuelConditionDia in sync with each other Not honored because Transmission in hot mode or POPD intrusive diagnostic running	500 cycle delay 4 cycle delay 4 cycle delay	
					Fuel System Status Active Fuel Management Undetectable engine speed and engine load region	≠ Fuel Cut Transition in progress invalid speed load range in <b>decel index</b> tables	4 cycle delay 0 cycle delay 4 cycle delay	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Driveline Ring Filter active After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early.  Filter Driveline ring:  Stop filter early:	> "Ring Filter" in Supporting Tables tab engine cycles after misfire  > "Number of Normals" in Supporting Tables tab engine cycles after misfire		



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Misfire Pattern Recognition Enabled: Validates misfire vs. false detection  Engine Speed  Veh Speed  Final fail conditions within:  Monitor Rough Road  Rough Road	0 (1 = Enabled)  Between > 700 RPM and < 3000 RPM > 0.62 mph  > "min multiplier" or < "max multiplier" in Supporting Tables tab of misfire threshold for a given engine speed and load  0 (1=Yes)  TOSS		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Source			
Crankshaft Position System Variation Not Learned	P0315	Monitor for valid crankshaft error compensation factors	Sum of Compensation factors	≥ 2.0400 OR ≤ 1.9960	OBD Manufacturer Enable Counter	= 0	0.50 seconds  Frequency Continuous 100 msec	1 Trips Type A
Knock Sensor (KS) Performance Per Cylinder	P0324	This diagnostic checks for knock sensor performance out of the normal expected range due to: 1) Excessive knock <b>and</b> 2) Abnormal engine noise on a per cylinder basis	Common Enable Criteria		Diagnostic Enabled	TRUE	First Order Lag Filter with Weight Coefficient	Type: B MIL: YES Trips: 2
					Engine Speed	≤ 8500 RPM		
					Engine Air Flow	≥ 40 mg/cylinder and		
					ECT	≥ -40 deg's C		
					IAT	≥ -40 deg's C		
		Specific Enable Criteria and Thresholds						
		1. Filtered Knock Intensity (for Excessive Knock)		> 4.0000	Engine Speed Engine running	≥ 600 RPM ≥ 1.3 seconds	Weight Coefficient = 0.0400  Updated each engine event	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			2. Filtered FFT Intensity: (for Abnormal Noise)	< Abnormal Noise Threshold (see supporting tables)	Engine Speed Engine running	≥ 8000 RPM ≥ 0.4 seconds	Weight Coefficient = 0.0100  Updated each engine event	
Knock Sensor (KS) Circuit Bank 1	P0325	This diagnostic checks for an open in the knock sensor circuit	Filtered FFT Output	> OpenCktThrsh Min <b>and</b> < OpenCktThrsh Max  See Supporting Tables for OpenCktThrsh Min & Max	Diagnostic Enabled	TRUE	First Order Lag Filter with Weight Coefficient	Type: B MIL: YES Trips: 2
					Engine Speed	≥ 600 RPM and ≤ 8500 RPM		
					Engine Air Flow	≥ 40 mg/cylinder and ≤ 2000 mg/cylinder		
					ECT	≥ -40 deg's C	Weight Coefficient = 0.0100	
					IAT	≥ -40 deg's C		
					Engine running	≥ 5.0 seconds	Updated each engine event	
Knock Sensor	P0326	This diagnostic	Common Enable		Diagnostic	TRUE	First Order Lag	Type: B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
(KS) Performance Bank 1		checks for knock sensor performance out of the normal expected range due to 1. Excessive knock or 2. Abnormal engine noise on a per bank/sensor basis	Criteria		Enabled		Filter with Weight Coefficient	MIL: YES Trips: 2
					Engine Speed	≤ 8500 RPM		
					Engine Air Flow	≥ 40 mg/cylinder and		
					ECT	≥ -40 deg's C		
			1. Filtered Knock Intensity (for Excessive Knock)	> 2.4140	Engine Speed Engine running	≥ 600 RPM ≥ 5.0 seconds	Weight Coefficient = 0.0100  Updated each engine event	
			2. Filtered FFT Intensity: (for Abnormal Noise)	< Abnormal Noise Threshold (see supporting tables)	Engine Speed Engine running	≥ 2000 RPM ≥ 1.5 seconds	Weight Coefficient = 0.0100  Updated each	
Knock Sensor (KS) Circuit Low Bank 1	P0327	This diagnostic checks for an out of range low knock sensor signal	Sensor Input Signal Line	< 0.57 Volts	Diagnostic Enabled	TRUE	50 Failures out of 63 Samples	Type: B MIL: YES Trips: 2
			or		Engine Speed	> 0 RPM and < 8500 RPM	100 msec rate	
			Sensor Return	< 0.40 Volts				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Signal Line					
Knock Sensor (KS) Circuit High Bank 1	P0328	This diagnostic checks for an out of range high knock sensor signal	Sensor Input Signal Line	> 2.76 Volts	Diagnostic Enabled?	Enabled	50 Failures out of 63 Samples  100 msec rate	Type: B MIL: YES Trips: 2
					Engine Speed			
			or					
			Sensor Return Signal Line	> 1.95 Volts				
Crankshaft Position (CKP) Sensor A Circuit	P0335	Determines if a fault exists with the crank position sensor signal	<u>Engine-Cranking Crankshaft Test:</u>  Time since last crankshaft position sensor pulse received	>= 4.0 seconds	<u>Engine-Cranking Crankshaft Test:</u>  Starter engaged  AND (cam pulses being received OR ( DTC P0101 AND DTC P0102 AND DTC P0103	= FALSE = FALSE = FALSE	<u>Engine-Cranking Crankshaft Test:</u>  Continuous every 100 msec	Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<u>Time-Based Crankshaft Test:</u> No crankshaft pulses received  <u>Event-Based Crankshaft Test:</u> No crankshaft pulses received	>= 0.7 seconds	AND Engine Air Flow  <u>Time-Based Crankshaft Test:</u> Engine is Running Starter is not engaged No DTC Active:  <u>Event-Based Crankshaft Test:</u> Engine is Running OR Starter is engaged No DTC Active:	> 3.0 grams/second  5VoltReferenceB_F A  5VoltReferenceA_F A 5VoltReferenceB_F A P0365	<u>Time-Based Crankshaft Test:</u> Continuous every 12.5 msec  <u>Event-Based Crankshaft Test:</u> 2 failures out of 10 samples  One sample per engine revolution	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						P0366		
Crankshaft Position (CKP) Sensor A Performance	P0336	Determines if a performance fault exists with the crank position sensor signal	<u>Crank Re-synchronization Test:</u> Time in which 10 or more crank re-synchronizations occur  <u>Time-Based Crankshaft Test:</u>  No crankshaft synchronization gap found  <u>Engine Start Test during Crank:</u>  Time since starter engaged without	< 10.0 seconds          >= 0.4 seconds	<u>Crank Re-synchronization Test:</u> Engine Air Flow  Cam-based engine speed No DTC Active:  <u>Time-Based Crankshaft Test:</u>  Engine is Running Starter is not engaged No DTC Active:  <u>Engine Start Test during Crank:</u>  Starter engaged	>= 3.0 grams/second  > 450 RPM 5VoltReferenceB_F A P0335       5VoltReferenceB_F A	<u>Crank Re-synchronization Test:</u> Continuous every 250 msec       Continuous every 12.5 msec       <u>Engine Start Test during Crank:</u> Continuous every 100 msec	Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			detecting crankshaft synchronization gap	>= 1.5 seconds	AND (cam pulses being received OR ( DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow	= FALSE = FALSE = FALSE > 3.0 grams/second		
			<u>Event-Based Crankshaft Test:</u>  Crank Pulses received in one engine revolution OR Crank Pulses received in one engine revolution	< 51  > 65	<u>Event-Based Crankshaft Test:</u>  Engine is Running OR Starter is engaged No DTC Active:	5VoltReferenceA_F A 5VoltReferenceB_F A P0365 P0366	<u>Event-Based Crankshaft Test:</u>  8 failures out of 10 samples  One sample per engine	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							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	<u>Engine Cranking Camshaft Test:</u>  Time since last camshaft position sensor pulse received OR Time that starter has been engaged without a camshaft sensor pulse   <u>Time-Based Camshaft Test:</u>  Fewer than 4 camshaft pulses received in a time	>= 5.5 seconds   >= 4.0 seconds   > 3.0 seconds	<u>Engine Cranking Camshaft Test:</u>  Starter engaged  AND (cam pulses being received OR ( DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow	= FALSE = FALSE = FALSE > 3.0 grams/second	<u>Engine Cranking Camshaft Test:</u>  Continuous every 100 msec       <u>Time-Based Camshaft Test:</u>  Continuous every 100 msec	Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<p><u>Fast Event-Based Camshaft Test:</u></p> <p>No camshaft pulses received during first 12 MEDRES events</p> <p>(There are 12 MEDRES events per engine cycle)</p> <p><u>Slow Event-Based Camshaft Test:</u></p>		<p>No DTC Active:</p> <p><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</p> <p>No DTC Active:</p> <p><u>Slow Event-Based Camshaft Test:</u></p>	<p>5VoltReferenceA_FA</p> <p>5VoltReferenceA_FA</p> <p>5VoltReferenceB_FA</p> <p>CrankSensor_FA</p>	<p><u>Fast Event-Based Camshaft Test:</u> Continuous every MEDRES event</p> <p><u>Slow Event-Based Camshaft Test:</u></p>	

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_F A 5VoltReferenceB_F A 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	<u>Fast Event-Based Camshaft Test:</u>  The number of camshaft pulses received during first 12 MEDRES events is less than 4 or greater than 6  (There are 12 MEDRES events per engine cycle)		<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_F A 5VoltReferenceB_F A	<u>Fast Event-Based Camshaft Test:</u>  Continuous every MEDRES event	Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<u>Slow Event-Based Camshaft Test:</u>  The number of camshaft pulses received during 100 engine cycles  OR	< 398 > 402	<u>Slow Event-Based Camshaft Test:</u>  Crankshaft is synchronized No DTC Active:	CrankSensor_FA  5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	<u>Slow Event-Based Camshaft Test:</u>  8 failures out of 10 samples  Continuous every engine cycle	
IGNITION CONTROL #1 CIRCUIT	P0351	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 1	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	> 5.00 Volts	50 Failures out of 63 Samples  100 msec rate	Type: B MIL: YES Trips: 2
IGNITION	P0352	This diagnostic	The ECM detects		Engine running		50 Failures out	Type: B

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Monitors EST for Cylinder 4	control circuit do not match.					
Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor B	P0365	Determines if a fault exists with the cam position bank 1 sensor B signal	<u>Engine Cranking Camshaft Test:</u>  Time since last camshaft position sensor pulse received OR Time that starter has been engaged without a camshaft sensor pulse   <u>Time-Based Camshaft Test:</u>  Fewer than 4	>= 5.5 seconds   >= 4.0 seconds	<u>Engine Cranking Camshaft Test:</u>  Starter engaged  AND (cam pulses being received OR ( DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow	= FALSE = FALSE = FALSE > 3.0 grams/second	<u>Engine Cranking Camshaft Test:</u>  Continuous every 100 msec          <u>Time-Based Camshaft Test:</u>  Continuous	Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<p>camshaft pulses received in a time</p> <p><u>Fast Event-Based Camshaft Test:</u></p> <p>No camshaft pulses received during first 12 MEDRES events</p> <p>(There are 12 MEDRES events per engine cycle)</p> <p><u>Slow Event-Based</u></p>	> 3.0 seconds	<p>Running Starter is not engaged</p> <p>No DTC Active:</p> <p><u>Fast Event-Based Camshaft Test:</u></p> <p>Crankshaft is synchronized</p> <p>Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged</p> <p>No DTC Active:</p> <p><u>Slow Event-</u></p>	<p>5VoltReferenceA_FA</p> <p>5VoltReferenceA_FA</p> <p>5VoltReferenceB_FA</p> <p>CrankSensor_FA</p>	<p>every 100 msec</p> <p><u>Fast Event-Based Camshaft Test:</u></p> <p>Continuous every MEDRES event</p> <p><u>Slow Event-</u></p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<u>Camshaft Test:</u>  The number of camshaft pulses received during 100 engine cycles	= 0	<u>Based Camshaft Test:</u>  Crankshaft is synchronized No DTC Active:	5VoltReferenceA_F A 5VoltReferenceB_F A CrankSensor_FA	<u>Based Camshaft Test:</u>  8 failures out of 10 samples  Continuous every engine cycle	
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor B	P0366	Determines if a performance fault exists with the cam position bank 1 sensor B signal	<u>Fast Event-Based Camshaft Test:</u>  The number of camshaft pulses received during first 12 MEDRES events is less than 4 or greater than 6  (There are 12 MEDRES events per engine cycle)		<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		<u>Fast Event-Based Camshaft Test:</u>  Continuous every MEDRES event	Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<p><u>Slow Event-Based Camshaft Test:</u></p> <p>The number of camshaft pulses received during 100 engine cycles</p> <p>OR</p>	<p>&lt; 398</p> <p>&gt; 402</p>	<p>No DTC Active:</p> <p><u>Slow Event-Based Camshaft Test:</u></p> <p>Crankshaft is synchronized</p> <p>No DTC Active:</p>	<p>5VoltReferenceA_F A 5VoltReferenceB_F A CrankSensor_FA</p> <p>5VoltReferenceA_F A 5VoltReferenceB_F A CrankSensor_FA</p>	<p><u>Slow Event-Based Camshaft Test:</u></p> <p>8 failures out of 10 samples</p> <p>Continuous every engine cycle</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Catalyst System Low Efficiency Bank 1	P0420	Oxygen Storage	Normalized Ratio OSC Value (EWMA filtered)	< 0.400			1 test attempted per valid decel period  Minimum of 1 test per trip  Maximum of 3 tests per trip  All enable criteria associated with P0420 can be found under P2270 - (O2 Sensor Signal Stuck Lean Bank 1 Sensor 2)  Frequency: Fueling Related : 12.5 ms  OSC Measurements: 100 ms  Temp Prediction: 1000ms	Type A 1 Trip(s)
		The catalyst washcoat contains Cerium Oxide. Cerium Oxide reacts with NO and O2 during lean A/F excursions to store the excess oxygen				<b>Rapid Step Response (RSR) feature will initiate multiple tests:</b>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p>(I.e. Cerium Oxidation). During rich A/F excursions, Cerium Oxide reacts with CO and H<sub>2</sub> to release this stored oxygen (I.e. Cerium Reduction). This is referred to as the Oxygen Storage Capacity, or OSC. CatMon's strategy is to "measure" the OSC of the catalyst through forced Rich (intrusive rich) and Lean (decel fuel cutoff) A/F excursions</p> <p>Normalized Ratio OSC Value Calculation Information and Definitions =</p> <ol style="list-style-type: none"> <li>1. Raw OSC Calculation = (post cat O<sub>2</sub> Resp time - pre cat O<sub>2</sub> Resp time)</li> <li>2. BestFailing OSC value from a calibration table (based on temp and exhaust gas flow)</li> <li>3. WorstPassing OSC value (based on temp and exhaust gas flow)</li> </ol> <p>Normalized Ratio Calculation = (1-2) / (3-2)</p> <p>A Normalized Ratio of 1 essentially represents a good part and a ratio of 0</p>			<p>If the difference between current EWMA value and the current OSC Normalized Ratio value is &gt; 0.470 and the current OSC Normalized Ratio value is &lt; 0.340</p> <p>Maximum of 18 RSR tests to detect failure when RSR is enabled.</p> <p><b>General Enable Criteria</b></p> <p>In addition to the p-codes listed under P2270, the following DTC's shall also not be set:</p> <p>O2S_Bank_1_Sensor_1_FA</p> <p>O2S_Bank_1_Sensor_2_FA</p> <p>O2S_Bank_2_Sensor_1_FA</p> <p>O2S_Bank_2_Sensor_2_FA</p>			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p>essentially represents a very bad part.</p> <p>The Catalyst Monitoring Test is completed during a decel fuel cutoff event. This fuel cutoff event occurs following a rich intrusive fueling event initiated by the O2 Sensor Signal Stuck Lean Bank 1 Sensor 2 test (P2270). Several conditions must be met in order to execute this test.</p> <p><b>These conditions and their related values are listed in the "Secondary Parameters" and "Enable Conditions" section of this document for P2270 (O2 Sensor Signal Stuck Lean Bank 1 Sensor 2)</b></p>						
Evaporative Emission System Leak Detection	P043E	A plugged ELCP reference orifice is detected.	While performing 1st 0.020" reference orifice vacuum		Propulsion system not active time	4.3 ≤ time ≤ 5.8 hours or	Up to twice per trip, for each required wake-up event	2 trip Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Reference Orifice Low Flow  (Sealed Fuel System)			measurement for or 2nd 0.020" reference orifice vacuum measurement for  If the difference between the ELCP pressure sensor (absolute) reading taken before the end of the reference measurement and the final ELCP pressure sensor (absolute) reading is then a stabilized 0.020" reference orifice vacuum measurement could not be obtained and the DTC fails.	360 seconds  30 seconds.  10 seconds  > 220 Pa	Odometer Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455  Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion	6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 1.0 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C  ≥ 17 hours  ≥ 10 hours  ≥ 10 volts ≤ 1 MPH  0	100 msec loop	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<p>If 1st 0.020” reference orifice vacuum measurement is &gt; 4000 Pa after 360 seconds then a plugged ELCP reference orifice is detected and the DTC fails.</p> <p>If 2nd 0.020” reference orifice vacuum measurement is &gt; 4510 Pa after 30 seconds then a plugged ELCP reference orifice is detected and the DTC fails.</p>	<p>&gt; 4000 Pa 360 seconds</p> <p>&gt; 4510 Pa 30 seconds</p>	<p>system not active time Previous propulsion system active time</p> <p><b>Abort Conditions:</b> Min fuel level slosh Max fuel level slosh Key up during test Refueling request button pressed</p> <p>Service bay test active Device control exceeds</p> <p><b>No Active DTC's</b></p>	<p>≥ 0 seconds</p> <p>≥ 0 seconds</p> <p>≥ 190 %</p> <p>≤ 200 %</p> <p>0.5 seconds</p> <p>FuelLevelDataFault</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCP_Circuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA  LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTC's TFTKO	ModuleOffTime_FA  P0451 P1458 P145C P145D P145E P2421 P2422 P2450		
Evaporative Emission System Leak Detection Reference Orifice High Flow  (Sealed Fuel System)	P043F	A missing ELCP reference orifice is detected.	If 1st 0.020" reference orifice vacuum measurement is after then a missing ELCP reference orifice is detected and the DTC fails.	< 1180 Pa  360 seconds	Propulsion system not active time  Odometer Drive distance Min baro Max baro Min fuel level	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 1.0 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 %	Up to twice per trip, for each required wake-up event  100 msec loop	2 trip Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<p>If 2nd 0.020" reference orifice vacuum measurement is after then a missing ELCP reference orifice is detected and the DTC fails.</p>	<p>&lt; 1180 Pa 30 seconds</p>	<p>Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455  Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time  <b>Abort Conditions:</b></p>	<p>≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C  ≥ 17 hours ≥ 10 hours  ≥ 10 volts ≤ 1 MPH 0  ≥ 0 seconds  ≥ 0 seconds</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Min fuel level slosh Max fuel level slosh Key up during test Refueling request button pressed  Service bay test active Device control exceeds  <b>No Active DTC's</b>	$\geq 190 \%$ $\leq 200 \%$  0.5 seconds  FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCP_Circuit_FA FTP_SensorCircuit_FA		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA  LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA  ModuleOffTime_FA  No Active DTC's TFTKO P0451 P1458 P145C P145D P145E		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						P2421 P2422 P2450		
EVAP System Small Leak Detected  (Sealed Fuel System)	P0442	A small leak ( $\geq 0.020''$ ) is detected in the EVAP system between the fuel cap, purge solenoid, and diurnal control valve (DCV).  The ELCP vacuum pump creates a vacuum across a $0.020''$ reference orifice. This reference vacuum is then compared to the vacuum level	If the ELCP pressure sensor (gauge) vacuum reading is less than the $0.020''$ reference orifice vacuum measurement times a plus a offset for then the fuel tank system has a small leak and the DTC fails.	1.00 multiplier 200 Pa 400 seconds	Propulsion system not active time  Odometer Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455	$4.3 \leq \text{time} \leq 5.8$ hours or $6.0 \leq \text{time} \leq 8.1$ hours or $8.2 \leq \text{time} \leq 11.0$ hours  $\geq 9.9$ miles $\geq 1.0$ miles $\geq 70$ kPa $\leq 110$ kPa $\geq 10\%$ $\leq 90\%$ $\leq 40^\circ\text{C}$ $\geq 4^\circ\text{C}$ $\leq 45^\circ\text{C}$  $\geq 17$ hours  $\geq 10$ hours	Once per trip, for each required wake-up event  100 msec loop	2 trip Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p>created in the fuel tank to determine if a leak exists.</p> <p>The diagnostic has fast pass capability. If the Fuel Tank Pressure (FTP) sensor measures a fuel tank system pressure greater than 1009 Pa or a fuel tank system vacuum greater than -1011 Pa then both the small leak and large leak diagnostics pass</p>			<p>Voltage</p> <p>Vehicle speed</p> <p>Vehicle not in assembly plant (value must = 0)</p> <p>Propulsion system not active time</p> <p>Previous propulsion system active time</p> <p><b>Abort Conditions:</b></p> <p>Min fuel level slosh</p> <p>Max fuel level slosh</p> <p>Key up during test</p> <p>Refueling request button pressed</p> <p>Service bay test active</p>	<p>≥ 10 volts</p> <p>≤ 1 MPH</p> <p>0</p> <p>≥ 0 seconds</p> <p>≥ 0 seconds</p> <p>≥ 190 %</p> <p>≤ 200 %</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p>without using the ELCP vacuum pump.</p> <p>The Fast Pass Full Test Sequence is conducted on the 5th consecutive fast pass. All other times, the Fast Pass Reduced Test Sequence is conducted to conserve battery state of charge. The Fast Pass Reduced Test Sequence includes the following diagnostics: ELCP Pump Stuck On</p>			<p>Device control exceeds</p> <p><b>No Active DTC's</b></p>	<p>0.5 seconds</p> <p>FuelLevelDataFault</p> <p>IAT_SensorFA</p> <p>ECT_Sensor_FA</p> <p>VehicleSpeedSensor_FA</p> <p>AmbientAirDefault</p> <p>VentCircuit_FA</p> <p>ELCPCircuit_FA</p> <p>FTP_SensorCircuit_FA</p> <p>ELCP_PumpCircuit_FA</p> <p>ELCP_SwitchCircuit_FA</p> <p>VICM_WakeupDiag_FA</p> <p>VICM_WakeupDiag_TFTKO</p> <p>LostCommBCM_FA</p> <p>LostCommBusB_VICM_FA</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		(P145D), ELCP Sensor Performance (P1458), FTP Sensor Performance (P0451), DCV Stuck Closed (P2422), DCV Stuck Open (P2421), Small Leak (P0442) and Large Leak (P0455) diagnostics.			No Active DTC's TFTKO	CommBusAOff_VIC M_FA CommBusBOff_VIC M_FA AccCktLo_FA  ModuleOffTime_FA  P043E P043F P0451 P1458 P145C P145D P145E P145F P2421 P2422 P2450		
Evaporative Emission System Purge Control Valve	P0443	This DTC checks for open circuit failures during operation.	The ECM detects that the commanded state of the driver and the		PT Relay Voltage	Voltage ≥ 11 volts	20 failures out of 25 samples	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Open Circuit  (Sealed Fuel System)			actual state of the control circuit do not match.				250 ms / sample	
Evaporative Emission (EVAP) Vent System Performance Diagnostic  (Sealed Fuel System)	P0446	EVAP Vent System Restriction is detected	After an initial time delay of if the Fuel Tank Pressure (FTP) sensor indicates a vacuum level for then a vent restriction has been detected and the DTC fails.	10 seconds,  < -3238 Pa 5 seconds	Min baro Max baro Min OAT Max OAT Vehicle not in assembly plant (value must = 0)  Engine Running Run/Crank Voltage Purge is enabled  <b>Abort Conditions:</b> Refueling request button pressed  Device control exceeds Purge Low Flow	≥ 70 kPa ≤ 110 kPa ≥ 4 °C ≤ 35 °C  0 Voltage ≥ 11 volts  0.5 seconds	When Propulsion System Active and Engine On  100 msec loop	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					diagnostic (P0497) is running  <b>No Active DTC's</b>	MAP_SensorFA EnginePowerLimited AmbientAirDefault OAT_EstAmbTemp_FA P0443 P0449 P0451 P0452 P0453 P0458 P0459 P0498 P0499 P1459 P145A P145D P2400 P2401 P2402		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						P2418 P2419 P2420 P2422 P2450		
Evaporative Emission System Vent Solenoid Control Open Circuit  (Sealed Fuel System)	P0449	This DTC checks for open circuit failures during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.				20 failures out of 25 samples  250 ms / sample	2 trips Type B
Fuel Tank Pressure (FTP) Sensor Circuit Performance Diagnostic  (Sealed Fuel	P0451	Fuel Tank Pressure (FTP) Sensor Correlation Diagnostic.	After a delay time of and a stabilization time of  <u>This section of the diagnostic can both</u>	2 seconds  3 seconds	<u>Propulsion System Not Active</u>  Propulsion system not active time	  4.3 ≤ time ≤ 5.8 hours or	Once per trip with Propulsion System Not Active, for each required wake-up event  Once per trip	2 trip Type B



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<p>pressure sensor (gauge) reading is after then a FTP sensor correlation failure has been detected and the DTC fails.</p> <p><u>This section of the diagnostic can only pass</u></p> <p>IF 1) the FTP sensor reading is and the FTP sensor is outside its readable range.</p>	<p>&gt; 3000 Pa 5 seconds</p> <p>&lt; -3811 Pa &gt; 3388 Pa,</p>	<p>system not active time Previous propulsion system active time</p> <p><b>Abort Conditions:</b> Min fuel level slosh Max fuel level slosh Key up during test Refueling request button pressed</p> <p>Service bay test active Device control exceeds</p> <p><b>No Active DTC's</b></p>	<p>≥ 0 seconds</p> <p>≥ 0 seconds</p> <p>≥ 190 %</p> <p>≤ 200 %</p> <p>0.5 seconds</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			AND 2) the ELCP pressure sensor (gauge) reading is and the ELCP pressure sensor indicates that the FTP sensor is outside its readable range. THEN after the correlation is confirmed and the DTC passes.	< -3736 Pa  > 3313 Pa,  5 seconds		FuelLevelDataFault  IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCP_Circuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA  LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VIC		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					<p>No Active DTC's TFTKO</p> <p><u>Propulsion System Active and Engine On</u></p> <p>Min baro Max baro Min OAT Max OAT Vehicle not in assembly plant (value must = 0) Engine Running Run/Crank Voltage Purge is not enabled</p>	<p>M_FA AccCktLo_FA ModuleOffTime_FA</p> <p>P1458 P145D</p> <p>≥ 70 kPa ≤ 110 kPa ≥ 4 °C ≤ 35 °C</p> <p>0</p> <p>Voltage ≥ 11 volts</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					<p><b>Abort Conditions:</b> Refueling request button pressed</p> <p>Device control exceeds</p> <p><b>No Active DTC's</b></p>	<p>0.5 seconds</p> <p>MAP_SensorFA EnginePowerLimited AmbientAirDefault OAT_EstAmbTemp_FA P0442 P0443 P0449 P0452 P0453 P0455 P0458 P0459 P0498 P0499 P1458</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						P1459 P145A P145D P145E P2400 P2401 P2402 P2418 P2419 P2420 P2422 P2450		
Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage  (Sealed Fuel System)	P0452	This DTC will detect a Fuel Tank Pressure (FTP) sensor signal that is too low out of range.	FTP sensor signal  The normal operating range of the FTP sensor is 0.5 volts (~ -3757 Pa) to 4.5 volts (~ 3329 Pa).	< 0.15 volts (3 % of Vref or ~ -4377 Pa)			640 failures out of 800 samples  12.5 ms / sample	2 trips Type B
Fuel Tank Pressure (FTP) Sensor	P0453	This DTC will detect a Fuel Tank Pressure	FTP sensor signal	> 4.85 volts (97% of Vref or ~ 3950 Pa)			640 failures out of 800 samples	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Circuit High Voltage  (Sealed Fuel System)		(FTP) sensor signal that is too high out of range.	The normal operating range of the FTP sensor is 0.5 volts (~ -3757 Pa) to 4.5 volts (~ 3329 Pa).				12.5 ms / sample	
EVAP System Large Leak Detected  (Sealed Fuel System)	P0455	A large leak (>> 0.020") is detected in the EVAP system between the fuel cap, purge solenoid, and diurnal control valve (DCV) after a refueling event has been detected.  The ELCP vacuum pump	After a refueling event has been detected and the small/large leak diagnostics have not passed.  If the ELCP pressure sensor (gauge) vacuum reading is less than the 0.020" reference orifice vacuum measurement times a		Propulsion system not active time  Odometer Drive distance Min baro Max baro Min fuel level Max fuel level Fuel level increase for ECT Min IAT	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 1.0 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≥ 10 % ≥ 5 seconds ≤ 40 °C ≥ 4 °C	Once per trip after a refueling event has been detected, for each required wake-up event  100 msec loop	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p>creates a vacuum across a 0.020" reference orifice. This reference vacuum is then compared to the vacuum level created in the fuel tank to determine if a leak exists.</p> <p>The diagnostic has fast pass capability. If the Fuel Tank Pressure (FTP) sensor measures a fuel tank system pressure greater than</p>	<p>plus a offset times a for then the fuel tank system has a large leak and the DTC fails.</p>	<p>1.00 multiplier 200 Pa 0.20 multiplier 400 seconds</p>	<p>Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455  Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Refueling request active true  <b>Abort Conditions:</b></p>	<p>≤ 45 °C  ≥ 17 hours ≥ 10 hours  ≥ 10 volts ≤ 1 MPH  0  ≥ 0 seconds  ≥ 0 seconds</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p>1009 Pa or a fuel tank system vacuum greater than -1011 Pa then both the small leak and large leak diagnostics pass without using the ELCP vacuum pump.</p> <p>The Fast Pass Full Test Sequence is conducted on the 5th consecutive fast pass. All other times, the Fast Pass Reduced Test Sequence is conducted to conserve battery state of charge.</p>			<p>Min fuel level slosh Max fuel level slosh Key up during test Refueling request button pressed</p> <p>Service bay test active Device control exceeds</p> <p><b>No Active DTC's</b></p>	<p>≥ 190 % ≤ 200 %</p> <p>0.5 seconds</p> <p>FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		The Fast Pass Reduced Test Sequence includes the following diagnostics: ELCP Pump Stuck On (P145D), ELCP Sensor Performance (P1458), FTP Sensor Performance (P0451), DCV Stuck Closed (P2422), DCV Stuck Open (P2421), Small Leak (P0442) and Large Leak (P0455) diagnostics.			No Active DTC's TFTKO	ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P043E P043F P0451 P1458 P145C		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						P145D P145E P145F P2421 P2422 P2450		
Evaporative Emission System Purge Control Valve Circuit Low  (Sealed Fuel System)	P0458	This DTC checks for short to low voltage circuit failures during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		PT Relay Voltage	Voltage $\geq$ 11 volts	20 failures out of 25 samples  250 ms / sample	2 trips Type B
Evaporative Emission System Purge Control Valve Circuit High  (Sealed Fuel System)	P0459	This DTC checks for short to high voltage circuit failures during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		PT Relay Voltage	Voltage $\geq$ 11 volts	20 failures out of 25 samples  250 ms / sample	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel Level Sensor 1 Performance	P0461	This DTC will detect a fuel sender stuck in range in the primary fuel tank.	Delta Fuel Volume change over an accumulated 149 miles.	< 3 liters	Engine Running  No active DTCs:	VehicleSpeedSensor_FA	250 ms / sample	2 trips Type B
Fuel Level Sensor 1 Circuit Low Voltage	P0462	This DTC will detect a fuel sender stuck out of range low in the primary fuel tank.	Fuel level Sender % of 5V range	< 10 %			100 failures out of 125 samples  100 ms / sample	2 trips Type B
Fuel Level Sensor 1 Circuit High Voltage	P0463	This DTC will detect a fuel sender stuck out of range high in the primary fuel tank.	Fuel level Sender % of 5V range	> 60 %			100 failures out of 125 samples  100 ms / sample	2 trips Type B
Evaporative Emission	P0497	Low purge flow is detected	After an initial time delay of	3 seconds	Min baro Max baro	≥ 70 kPa ≤ 110 kPa	Once per trip with Propulsion	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
System Low Purge Flow Diagnostic  (Sealed Fuel System)			when the Fuel Tank Pressure (FTP) sensor reading is or after an initial time delay of when the FTP sensor reading is plus an ELCP switching valve delay time of if the ELCP pressure sensor (gauge) indicates a vacuum change for then a low purge flow failure has been detected and the DTC fails.	<p>≥ 996 Pa</p> <p>3 seconds</p> <p>&lt; 996 Pa</p> <p>0.2 seconds,</p> <p>&lt; 2000 Pa</p> <p>20 seconds</p>	<p>Min OAT ≥ 4 °C</p> <p>Max OAT ≤ 35 °C</p> <p>Engine Vacuum &gt; 5 kPa</p> <p>Purge flow to enable ≥ 1 % requested</p> <p>Purge flow to disable &lt; 1 % requested</p> <p>Vehicle not in assembly plant (value must = 0) 0</p> <p>Engine Running</p> <p>Run/Crank Voltage ≥ 11 volts</p> <p>Purge is enabled</p> <p><b>Abort Conditions:</b> Refueling request button pressed</p> <p>Device control exceeds 0.5 seconds</p> <p>Fuel tank protection active</p>	<p>System Active and Engine On</p> <p>100 msec loop</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					when FTP sensor for <b>No Active DTC's</b>	< -3238 Pa for 5.0 seconds  MAP_SensorFA EnginePowerLimited AmbientAirDefault OAT_EstAmbTemp_FA P0442 P0443 P0449 P0451 P0452 P0453 P0455 P0458 P0459 P0498 P0499 P1458 P1459 P145A P145D		

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
(Sealed Fuel System)		active, an intrusive test is performed with the vent solenoid commanded closed for 15 seconds.						
Air Conditioning High Side Pressure Sensor (HSPS) Sensor Performance	P0531	Determines if the Air Conditioning High Side Pressure Sensor circuit voltage is stuck or biased in range	<b>Engage Test:</b>  <b>To fail a currently passing test:</b>		Compressor Type = Electric Driven Diagnostic enabled/ disabled  Enable with Key Off	Enabled  Enabled  Enabled		2 trip(s)  Type B
			The filtered, weighted difference between measured Delta and predicted delta (a function of ambient temp, coolant temp, and fan speed.):	Filtered Weighted residual < = 0.75	Filtered AC HSPS test weighting factors (function of ambient temp, engine coolant temperature, and fan speed).	Weighting Factor > 1.0 and Coolant Factor > -0.0 AND < 16.0 and # of Test Samples > 200	Performed every 100 msec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Details on Supporting	Compressor Speed > 500 RPM		
			<p><b>To pass a currently failing test:</b></p> <p>The filtered, weighted difference between measured Delta and predicted delta (a function of ambient temp, coolant temp, and fan speed.):</p>	Engaged Test: Filtered Weighted residual > 0.75	<p>Filtered AC HSPS test weighting factors (function of ambient temp, engine coolant temperature, and fan speed). Details on Supporting Tables Tab (P0531 Section)</p>	<p>Weighting Factor &gt; 1.0 and Coolant Factor &gt; -0.0 AND &lt; 16.0 and # of Test Samples &gt; 200</p> <p>Compressor Speed &gt; 500 RPM</p>	Performed every 100 msec	
			<p><b>On Test:</b></p> <p>The pressure sensor has to be less than athreshold value when engaged (a function</p>	On Test: Pressure < Threshold	<p>Diagnostic enabled/ disabled</p> <p>Fault Threshold (function of ambient temperature). Details on</p>	<p>Enabled</p> <p>Delay Time &gt; 20</p>	80 failures out of 100 samples	
							Performed	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			engaged (a function of ambient temp)		Supporting Tables Tab (P0531 Section)		every 100 msec	
						Fault bundles: ACHighSidePressSnsrCktFA ACFailedOnSD ACThrmlRefrigSpdVld ACCMLostComm		
Air Conditioning High Side Pressure Sensor (HSPS) Circuit Low Voltage	P0532	Determines if the Air Conditioning High Side Pressure Sensor circuit voltage is too low	(AC High Side Pressure Sensor Circuit Voltage) / 5 Volts	< 3 percent	Sensor Present Diagnostic enabled/ disabled	Enabled Enabled	80 failures out of 100 samples  Performed every 25 msec	2 trip(s)  Type B
Air Conditioning High Side Pressure Sensor (HSPS) Circuit High	P0533	Determines if the Air Conditioning High Side Pressure Sensor circuit voltage is too high	(AC High Side Pressure Sensor Circuit Voltage) / 5 Volts	> 85 percent	Sensor Present Diagnostic enabled/ disabled	Enabled Enabled	80 failures out of 100 samples  Performed every 25 msec	2 trip(s)  Type B



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
								MIL:
								NO Trips: 1
Cruise Control Set Circuit	P0568	Detects a failure of the cruise set switch in a continuously applied state	Cruise Control Set switch remains applied for greater than a calibratable period of time for architecture where cruise switch states are received over serial data		CAN cruise switch diagnostic enable in ECM	TRUE	fail continuously for greater than 90.000 seconds	Type:
								C MIL: NO
							fail continuously for greater than 90.000 seconds	Trips:  1

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Cruise Control Input Circuit	P0575	Detects rolling count or protection value errors in Cruise Control Switch Status serial data signal	If x of y rolling count / protection value faults occur, disable cruise for duration of fault		Cruise Control Switch Serial Data Error Diagnostic Enable	TRUE	10/16 counts	Type:
								C
								MIL: NO
							Trips: 1	
Thermostat Heater Control Open Circuit	P0597	This DTC checks the T-stat Heater Driver Output circuit for electrical integrity.	Voltage low during driver open state (indicates short-to-ground or open circuit). Fault present state for Open circuit is determined from output driver status byte.		Run Crank Ignition in Range = True		15 failures out of 30 samples	2 trips Type B
					Engine not cranking = True			
					Run Crank active = True			
					Above is true and			
						1 sec/ sample		
					Last Open Circuit Test = not Indeterminate		Continuous	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Thermostat Heater Control Circuit Low	P0598	This DTC checks the T-stat Heater Driver Output circuit for electrical integrity.	Voltage low during driver open state (indicates short-to-ground or open circuit). Fault present state for Ground Short circuit is determined from output driver status byte.		Run Crank Ignition in Range = True Engine not cranking = True Run Crank active = True		15 failures out of 30 samples  1 sec/ sample	2 trips Type B
					Above is true and			
					Last Ground Short Circuit Test	= not Indeterminate	Continuous	
Thermostat Heater Control Circuit High	P0599	This DTC checks the T-stat Heater Driver Output circuit for electrical integrity.	Voltage high during driver closed state (indicates short-to-power). Fault present state for Power Short circuit is determined from output driver status byte.		Run Crank Ignition in Range = True Engine not cranking = True Run Crank active = True		15 failures out of 30 samples  1 sec/ sample	2 trips Type B
					Above is true and			
					Last Power Short Circuit Test		Continuous	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			a selected subset of the calibrations.					
			The Secondary Processor's calculated checksum does not match the stored checksum value. Covers all software and calibrations.	1 failure if the fault is detected during the first pass. 5 failures if the fault occurs after the first pass is complete.			Diagnostic runs continuously in the background	
				In all cases, the failure count is cleared when controller shuts down				
Control Module Not Programmed	P0602	This DTC will be stored if the PCM is a service PCM that has not been programmed.	Output state invalid		PCM State = crank or run	Diagnostic runs at powerup and once per second continuously after that		Type A 1 trips
					PCM is identified through calibration as a Service PCM			
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	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ECM RAM Failure	P0604	Indicates that the ECM has detected a RAM fault:						Trips: 1
		Primary Processor System RAM Fault	Indicates that the primary processor is unable to correctly read data from or write data to system RAM. Detects data read does not match data written	>= 254 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background	Type: A
		Primary Processor Cache RAM Fault	Indicates that the primary processor is unable to correctly read data from or write data to cached RAM. Detects data read does not match data written	>= 254 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	MIL: YES
		Primary Processor TPU					Will finish first memory scan	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		RAM Fault	Indicates that the primary processor is unable to correctly read data from or write data to TPU RAM. Detects data read does not match data written	>= 5 counts			within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	
		Primary Processor Update Dual Store RAM Fault	Indicates that the primary processor detects a mismatch between the data and dual data is found during RAM updates. Detects a mismatch in data and dual data updates >	0.47856 seconds			When dual store updates occur.	
		Primary Processor Write Protected RAM Fault	Indicates that the primary processor detects an illegal write attempt to protected RAM. Number of illegal writes are >	0 counts			Diagnostic runs continuously (background loop)	
		Secondary					Will finish first	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Processor RAM Fault	Indicates that the secondary processor is unable to correctly read data from or write data to system RAM. Detects data read does not match data written	>= 5 counts			memory scan within 30 seconds at all engine conditions, diagnostic runs continuously (background loop)	
Internal ECM Processor Integrity Fault	P0606	Indicates that the ECM has detected an internal processor integrity fault:						Trips: 1 Type: A MIL: YES
		Primary Processor SPI Fault Detected	Loss or invalid message of SPI communication from the Secondary Processor at initialization detected by the Primary Processor or loss or invalid message of SPI communication	Loss or invalid message at initialization detected or loss or invalid message after a valid message was recieved	Run/Crank Voltage OR Run/Crank Voltage Else	>= 6.41V  >= 11.00  The failure will be reported for all conditions	In the primary processor, 159/399counts intermittent or 39 counts continuous; 39 counts continuous @ initialization. 12.5 ms /count in the ECM	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			from the Secondary Processor after a valid message was recieved by the Primary Processor				main processor	
		Secondary Processor SPI Fault Detected	Loss or invalid message of SPI communication from the Primary Processor at initialization detected by the Secondary Processor or loss or invalid message of SPI communication from the Primary Processor after a valid message was recieved by the Secondary Processor	Loss or invalid message at initialization detected or loss or invalid message after a valid message was recieved			In the secondary processor, 20/200 counts intermittent or 0 counts continuous; 0 counts continuous @ initialization. 12.5 ms /count in the ECM main processor	
		Secondary Processor Stack Fault	Checks for stack over or underflow in secondary processor by looking		Stack Limit Test Enabled	TRUE	variable, depends on length of time to corrupt stack	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			for corruption of known pattern at stack boundaries. Checks number of stack over/under flow since last powerup reset	$\geq 5$				
		Secondary processor received incorrect Keys	MAIN processor is verified by responding to a seed sent from the secondary with a key response to secondary. Checks number of incorrect keys received > or Secondary processor has not received a new within time limit	2 incorrect seeds within 8 messages, 0.200 seconds	Ignition State	Run OR Crank	150 ms for one seed continually failing	
		MAIN processor did not receive seed within time limit	Time new seed not received exceeded			always running	0.450 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		MAIN processor test for seeds to arrive in a known sequence	MAIN processor receives seed in wrong order			always running	3 / 17 counts intermittent. 50 ms/count in the ECM main	
		Secondary processor ALU check	2 fails in a row in the Secondary processor's ALU check		ALU Test Enabled	TRUE	25 ms	
		Secondary processor register configuration check	2 fails in a row in the Secondary processor's configuration register masks versus known good data		Configuration Register Test Enabled	TRUE	12.5 to 25 ms	
		MAIN processor discrete fault:	Secondary processor detects an error in the toggling of a hardware discrete line controlled by the MAIN processor: number of discrete changes	7	Main CPU State Of Health Fault Enabled  Time from Initialization	TRUE  >= 0.488 seconds	50 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				>= 17				
		MAIN detected corruption in throttle or pedal critical RAM data	memory and complement memory do not agree				409.59 seconds	
		MAIN Processor Performance Check	Software background task first pass time to complete exceeds		Run/Crank voltage	> 6.41 V	360.000 seconds	
		MAIN processor ALU check	2 fails in a row in the MAIN processor's ALU check		ALU Test Enabled	TRUE	25 ms	
		MAIN processor configuration register check	2 fails in a row in the MAIN processor's configuration		Configuration Register Test Enabled	TRUE	12.5 to 25 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			register masks versus known good data					
		MAIN Stack Fault	Checks number of stack over/under flow since last powerup reset >= 5		Stack Limit Test Enabled	TRUE	variable, depends on length of time to corrupt stack	
		MAIN processor ADC test	Voltage deviation >	0.495	A2D Converter Test Enabled	TRUE	5 / 10 counts or 0.150 seconds continuous; 50 ms/count in main processor	
		Flash ECC Fault	Checks for ECC (error correcting code) circuit test errors reported by the hardware for flash memory. Increments counter during controller initialization if ECC error occurred since	3 (results in MIL),	Flash ECC Circuit Test Enabled	TRUE	variable, depends on length of time to access flash with corrupted memory	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			last controller initialization. Counter >=	5(results in MIL and remedial action)				
		RAM ECC Fault	Checks for ECC (error correcting code) circuit test errors reported by the hardware for RAM memory circuit. Increments counter during controller initialization if ECC error occurred since last controller initialization. Counter >=	3 (results in MIL), 5 (results in MIL and remedial action)	RAM ECC Circuit Test Enable	TRUE	variable, depends on length of time to access flash with corrupted memory	
		MAIN DMA transfer check	MAIN processor DMA transfer from Flask to RAM has 1 failure		DMA Transfer Check Enabled	TRUE	variable, depends on length of time to write flash to RAM	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel Pump Relay Control Circuit Low Voltage	P0628	This DTC checks for a shorted low circuit while the device is commanded on.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage  Engine Speed	Voltage ≥ 11 volts  ≥ 0 RPM	8 failures out of 10 samples  250 ms / sample	2 trips Type B
Fuel Pump Relay Control Circuit High Voltage	P0629	This DTC checks for an open and shorted high circuit while the device is commanded off.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage  Engine Speed	Voltage ≥ 11 volts  ≥ 0 RPM	8 failures out of 10 samples  250 ms / sample	2 trips Type B
Control Module EEPROM Error	P062F	Indicates that the NVM Error flag has not been cleared	The next write to NVM will not succeed or the assembly calibration integrity		Ignition State	= accessory, run, or crank	1 test failure Diagnostic runs once at powerup	Type A 1 trips
VIN Not Programmed or	P0630	This DTC checks VIN is correctly written	At least one of programmed VIN's digit	= 00 or FF	OBD Manufacturer Enable Counter	= 0	250 ms / test Continuous	Type A 1 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Mismatched - Engine Control Module					Enable Counter			
5 Volt Reference #1 Circuit	P0641	Detects a continuous or intermittent short on the 5 volt reference circuit #1	ECM Vref1 < 4.875 or ECM Vref1 > 5.125 or the difference between ECM filtered Vref1 and Vref1 > 0.05	4.875 5.125 0.05	Run/Crank Voltage	> 6.41	19/39counts or 0.1875 sec continuous; 12.5 ms/count in main processor	Trips: 1 Type: A MIL: YES
Malfunction Indicator Lamp (MIL) Control Circuit (ODM)	P0650	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage  Remote Vehicle Start is not active	Voltage ≥ 11 volts	20 failures out of 25 samples  250 ms / sample	2 trip Type B  NO MIL
5 Volt Reference #2 Circuit	P0651	Detects a continuous or intermittent short on the 5 volt reference circuit	ECM Vref2 < 4.875 or ECM Vref2 > 5.125 or the difference between ECM	4.875 5.125	Run/Crank Voltage	> 6.41	19/39 counts or 0.1875 sec continuous; 12.5 ms/count in main processor	Trips: 1 Type: A

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Vref3 >					YES
Fuel Pump Control Module (FPCM) Requested MIL Illumination	P069E	Monitors the FPCM MIL request line to determine when the FPCM has detected a MIL illuminating fault.	Fuel Pump Control Module Emissions-Related DTC set		Time since power-up	> 3 seconds	Continuous	Type A 1 trips  MIL: NO
5 Volt Reference #4 Circuit	P06A3	Detects a continuous or intermittent short on the 5 volt reference circuit #4	ECM Vref4 < or ECM Vref4 > or the difference between ECM filtered Vref4 and Vref4 >	4.875 5.125 0.05	Run/Crank Voltage	> 6.41	19/39counts or 0.1875 sec continuous; 12.5 ms/count in main processor	Trips: 1 Type: A MIL: YES
Internal Control Module Knock Sensor Processor 1 Performance	P06B6	This diagnostic checks for a fault with the internal test circuit used only for the '20 kHz' method of the Open Circuit	Gated FFT Diagnostic Output (VaKNKD_k_OpenTestCktIntFilter[0])	> OpenTestThreshLo <b>and</b> < OpenTestThreshHi	Diagnostic Enabled?  Engine Speed Engine Air Flow	Enabled  > 600 RPM and < 5000 RPM ≥ 40 mg/cylinder	First Order Lag Filter with Weight Coefficient  Weight	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
		Diagnostic		See Supporting Tables		and ≤ 2000 mg/cylinder	Coefficient = 0.0100	
					Engine running	≥ 5.0 seconds	Updated each engine event	
Control Module Wake-up Circuit Performance Diagnostic  (Sealed Fuel System)	P06E4	VICM Wake-up events were not received	Whenever the propulsion system goes active, the diagnostic reads its internal timer and evaluates the results from the wake-up events that could have occurred. For each wake-up event the status can be: <u>Pass</u> – the wake-up event occurred within a window <u>Indeterminate</u> – the ECM was already awake at the time		Odometer Drive distance Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455  <b>No Active DTC's</b>	≥ 9.9 miles ≥ 1.0 miles  ≥ 17 hours ≥ 10 hours	Once per each wake-up event when Propulsion System is not active  Final decision is made when Propulsion System is Active  100 msec loop	2 trips Type B
					VehicleSpeedSensor_FA ModuleOffTime_FA LostCommBus_VI			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<p>the wake-up event could have occurred Fail – the wake-up event occurred outside a window or did not occur at all</p> <p>If the 5.0 hour wake-up event did not occur from 4.3 hours to 5.8 hours then a failure has occurred.</p> <p>If the 7.0 hour wake-up event did not occur from 6.0 hours</p>			<p>CM_FA CommBusAOff_VIC M_FA CommBusBOff_VIC M_FA AccCktLo_FA</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<p>to 8.1 hours then a failure has occurred.</p> <p>If the 9.5 hour wake-up event did not occur from 8.2 hours to 11.0 hours then a failure has occurred.</p> <p>At Propulsion System Active, if any of the wake-up events indicate a failure then the DTC fails.</p>					
Transmission Control Module (TCM) Requested	P0700	Monitors the TCM MIL request line to determine when the TCM	Transmission Emissions-Related DTC set			Time since power-up > 3 seconds	Continuous	Type A 1 trips  MIL:



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<p style="text-align: center;"><b>OR</b></p> <p>Too many minimum limit torque request transitions occur from TRUE to FALSE to TRUE within a time period</p> <p>Torque request greater than torque request diagnostic maximum threshold</p>	<p>Requested torque intervention type toggles from not increasing request to increasing request</p> <p>&gt; 250 Nm for engine based traction torque system, &gt; 2588 Nm for axle based traction torque system</p>			<p>&gt;= 3 multi-transitions out of 5 samples. Performed every 200 ms</p> <p>&gt;= 4 out of 10 samples Performed every 12.5 msec</p>	<p>1 trip(s)</p> <p>Special Type C</p>
Hybrid Powertrain Control	P0AC4	Monitors the HPC MIL request line to determine	HPC Emissions-Related DTC set			Time since power-up > 3 seconds	Continuous	Type A 1 trips



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTCs:	MAP Model 1 Error multiplied by MAP1 Residual Weight Factor based on  MAP Model 2 Error multiplied by MAP2 Residual Weight Factor based on  See table "IFRD Residual Weighting MAP_SensorCircuit FA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuit FA CrankSensor_FA ECT_Sensor_FA ECT_Sensor_Ckt_FP IAT_SensorFA IAT_SensorCircuitFP		



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Slope Time R/L Switches	< 3	DTC's not active System Voltage 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 <b>Green Sensor Delay Criteria (B1S1)</b> in Supporting Tables tab. O2 Heater on for Learned Htr resistance ≥ 40 seconds = Valid Engine Coolant IAT > 50 °C IAT > -40 °C Engine run Accum > 90 seconds Time since any AFM status > 2.0 seconds	P0134 10.0 < Volts < 32.0		

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 Time since Purge Off to On change Engine airflow  Engine speed Fuel Baro Air Per Cylinder Low Fuel Condition Diag Fuel Control State Closed Loop Active LTM fuel cell Transient Fuel Mass Baro Fuel Control State Fuel State Commanded Proportional Gain	> 2.0 seconds > 2.0 seconds 17 ≤ gps ≤ 40  1000 ≤ RPM ≤ 3500 < 87 % Ethanol > 70 kpa ≥ 150 mgrams = False = Closed Loop = TRUE = Enabled ≤ 100.0 mgrams = Not Defaulted not = Power Enrichment DFCO not active ≥ 0.0 %		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					<u>All of the above met for</u> Time > 1.0 seconds			
Mass Air Flow A Supply Voltage Control Circuit Low	P121B	Electrical Integrity of the Mass Air Flow Power Supply Circuit - Shorted to Ground	ECM detects that commanded and actual states of output driver do not match because the output is shorted to ground		Mass Air Flow Power is commanded on		40 failures out of 50 samples  1 sample every 100 msec	Type B 2 trips
Mass Air Flow A Supply Voltage Control Circuit High	P121C	Electrical Integrity of the Mass Air Flow Power Supply Circuit - Shorted to Power	ECM detects that commanded and actual states of output driver do not match because the output is shorted to power		Mass Air Flow Power is commanded off		40 failures out of 50 samples  1 sample every 100 msec	Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Cold Start Emissions Reduction System Fault	P1400	Model based test computes power from exhaust flow and thermal energy resulting from elevated idle speed and retarded spark advance. Detects if the cold start emission reduction system has failed resulting in the delivered power being out of range.	Average desired accumulated exhaust power - Average actual accumulated exhaust power (too much energy delivered to catalyst)  OR Average desired accumulated exhaust power - Average actual accumulated exhaust power (too little energy delivered to catalyst)  (EWMA filtered)	< -32.00 KJ/s (high RPM failure mode)  > 4.15 KJ/s (low RPM failure mode)	<b>To enable the diagnostic, the Cold Start Emission Reduction Strategy must be Active per the following:</b>		Runs once per trip when the cold start emission reduction strategy is active  Frequency: 100ms Loop  Test completes after 15 seconds of accumulated qualified data.	Type A 1 Trip(s)
					Catalyst Temperature	< 350.00 degC		
					<b>AND</b>			
					Engine Coolant	> -10.00 degC		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					<b>AND</b>			
					Engine Coolant	<= 180.00 degC		
					<b>The Cold Start Emission Reduction strategy must not be exiting. The strategy will exit per the following:</b>			
					Catalyst Temperature	>= 550.00 degC		
					<b>AND</b>			
					Engine Run Time	>= 30.00 seconds		
					<b>OR</b>			
					Engine Run Time	> "Extended Engine Exit Time" This Extended Engine Exit time is a function of percent ethanol. <b>Refer to "Supporting Tables" for details.</b>		
					<b>Other Enable Criteria</b>			
					OBD Manufacturer Enable Counter	0		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Vehicle Speed	< 621.37 MPH		
					Allow diagnostic to calculate residual in an off-idle state	1 (A value of 1 allows diagnostic to run and calculate the residual while off idle. A value of 0 requires calculation of the residual at idle)		
					If the value above is equal to a value of 1 then this "DriverOffAccelPedal" will not be checked. However, if the above value is equal to a value of 0 then driver must be off the accel pedal. This checks that the final accel pedal position (comprehending deadband and hysteresis) is essentially zero.			
					A change in throttle position (tip-in/tip-out) will initiate a delay in the calculation of the average qualified residual value. When the			
					Pedal Close Delay Timer	> 0.00 seconds		
					the diagnostic will continue the calculation.			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum		
					<p>Clutch Pedal Top of Travel Achieved and Clutch Pedal Bottom of Travel Achieved. <b>Refer to the "Clutch Pedal Top of Travel Achieved criteria" and "Clutch Pedal Bottom of Travel Achieved criteria"</b> section of the "Supporting Tables" tab criteria</p> <p>The diagnostic will delay calculation of the residual value and potentially weight the residual calculation differently based on engine run time. This is to ensure the diagnostic is operating in idle speed control as well as during the peak catalyst light off period. <b>Refer below.</b></p> <table border="1"> <tr> <td>Time Weighting Factor</td> <td>                     &gt; 0                      These are scalar values that are a function of engine run time. <b>Refer to "Supporting Tables" for details.</b> </td> </tr> </table> <p style="text-align: center;"><b>General Enable</b> <b>DTC's Not Set</b></p>		Time Weighting Factor	> 0 These are scalar values that are a function of engine run time. <b>Refer to "Supporting Tables" for details.</b>		
Time Weighting Factor	> 0 These are scalar values that are a function of engine run time. <b>Refer to "Supporting Tables" for details.</b>									

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum	
					AcceleratorPedalFailure ECT_Sensor_FA IAT_SensorCircuitFA ManTempSensorCircuitFA CrankSensorFaultActive FuelInjectorCircuit_FA MAF_SensorFA MAP_SensorFA EngineMisfireDetected_FA Clutch Sensor FA IAC_SystemRPM_FA IgnitionOutputDriver_FA P050A (ColdStrt_IAC_SysPerf) P050B (ColdStrtIgnTmngPerf) TPS_FA VehicleSpeedSensor_FA 5VoltReferenceMAP_OOR_Flt TransmissionEngagedState_FA EngineTorqueInaccurate				
Evaporative Emission System Leak Detection Pump Pressure Sensor Circuit Performance	P1458	ELCP Pressure Sensor Correlation Diagnostic	<u>Propulsion System Not Active</u>  If the difference between the ELCP pressure sensor (absolute) reading and the barometric		<u>Propulsion System Not Active</u>  Propulsion system not active time		4.3 ≤ time ≤ 5.8 hours or	Once or twice per trip with Propulsion System Not Active, for each required wake-up event	2 trip Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Diagnostic (Sealed Fuel System)			pressure value from the MAP sensor is then increment the fail counter. This diagnostic runs for	> 3000 Pa	Odometer Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing	6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 1.0 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C	First time diagnostic runs, 50 failures out of 63 samples  Second time diagnostic runs, 50 failures out of 63 samples  100 msec loop	
			<u>Propulsion System Active</u>					
			After a stabilization time of	10 seconds.	P0442/P0455 Time since last test when failing P0442/P0455	≥ 17 hours ≥ 10 hours		
			When a recent barometric pressure update has occurred within the last	0.1 miles,	Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion	≥ 10 volts ≤ 1 MPH 0		
			if the difference					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<p>between the ELCP pressure sensor (absolute) reading and the barometric pressure value from the MAP sensor is then increment the fail counter.</p> <p>When a recent barometric pressure update has not occurred within the last 0.1 miles, if the difference between the ELCP pressure sensor (absolute) reading and the barometric pressure value from the MAP sensor is then increment the fail counter.</p>	<p>&gt; 15000 Pa</p> <p>&gt; 20000 Pa</p>	<p>system not active time</p> <p>Previous propulsion system active time</p> <p><b>Abort Conditions:</b></p> <p>Min fuel level slosh</p> <p>Max fuel level slosh</p> <p>Key up during test</p> <p>Refueling request button pressed</p> <p>Service bay test active</p> <p>Device control exceeds</p> <p><b>No Active DTC's</b></p>	<p>≥ 0 seconds</p> <p>≥ 0 seconds</p> <p>≥ 190 %</p> <p>≤ 200 %</p> <p>0.5 seconds</p> <p>FuelLevelDataFault</p>	<p>When Propulsion System Active</p> <p>50 failures out of 63 samples</p> <p>100 msec loop</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCP_Circuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTC's TFTKO	ModuleOffTime_FA  P043E P043F P0451 P145C P145D P145E P145F P2421 P2422 P2450		
					<u>Propulsion System Active</u>	Min baro ≥ 70 kPa Max baro ≤ 110 kPa Min OAT ≥ 4 °C Max OAT ≤ 35 °C		
					Vehicle not in assembly plant (value must = 0)	0		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Run/Crank Voltage Voltage Purge is not enabled  <b>Abort Conditions:</b> Refueling request button pressed  Device control exceeds FTP correlation diagnostic (P0451) is running Purge Low Flow diagnostic (P0497) is running  <b>No Active DTC's</b>	Voltage ≥ 11 volts          0.5 seconds          MAP_SensorFA EnginePowerLimited AmbientAirDefault		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						OAT_EstAmbTemp _FA P0443 P0458 P0459 P1459 P145A P145D P2400 P2401 P2402 P2418 P2419 P2420 P2450		
Evaporative Emission System Leak Detection Pump Pressure Sensor Circuit Low Voltage	P1459	This DTC will detect an ELCP pressure sensor signal that is too low out of range.	ELCP pressure sensor signal	< 0.70 volts (14 % of Vref or ~ 47 kPa)			640 failures out of 800 samples  12.5 ms / sample	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
(Sealed Fuel System)								
Evaporative Emission System Leak Detection Pump Pressure Sensor Circuit High Voltage  (Sealed Fuel System)	P145A	This DTC will detect an ELCP pressure sensor signal that is too high out of range.	ELCP pressure sensor signal	> 4.85 volts (97% of Vref or ~ 123 kPa)			640 failures out of 800 samples  12.5 ms / sample	2 trips Type B
Evaporative Emission System Leak Detection Pump Performance/ Stuck Off  (Sealed Fuel System)	P145C	This DTC will detects an ELCP vacuum pump that is stuck off.	When the ELCP vacuum pump is commanded on during the 1st 0.020" reference orifice vacuum measurement, if the stabilized ELCP pressure sensor (gauge) vacuum		Propulsion system not active time  Odometer Drive distance	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 1.0 miles	Up to twice per trip, for each required wake-up event  100 msec loop	2 trip Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<p>reading is after then the ELCP vacuum pump is stuck off and the DTC fails.</p> <p>When the ELCP vacuum pump is commanded on during the 2nd 0.020" reference orifice vacuum measurement, if the stabilized ELCP pressure sensor (gauge) vacuum reading is after then the ELCP</p>	<p>&lt; 100 Pa 360 seconds</p> <p>&lt; 100 Pa 30 seconds</p>	<p>Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time</p>	<p>≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C  ≥ 17 hours ≥ 10 hours ≥ 10 volts ≤ 1 MPH 0 ≥ 0 seconds ≥ 0 seconds</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			vacuum pump is stuck off and the DTC fails.		<p><b>Abort Conditions:</b>                      Min fuel level slosh                      Max fuel level slosh                      Key up during test                      Refueling request button pressed                      Service bay test active                      Device control exceeds</p> <p><b>No Active DTC's</b></p>	<p>≥ 190 %                      ≤ 200 %                      0.5 seconds</p> <p>FuelLevelDataFault                      IAT_SensorFA                      ECT_Sensor_FA                      VehicleSpeedSensor_FA                      AmbientAirDefault                      VentCircuit_FA                      ELCPcircuit_FA</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA  LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA  ModuleOffTime_FA  No Active DTC's TFTKO P043E P043F P0451		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						P1458 P145D P145E P2421 P2422 P2450		
Evaporative Emission System Leak Detection Pump Stuck On  (Sealed Fuel System)	P145D	This DTC detects an ELCP vacuum pump that is stuck on.	The 1st time in the test sequence when the ELCP vacuum pump is commanded off, after the ELCP switching valve transitions from vent to pump position, if the difference between an initial ELCP pressure sensor (absolute) reading and a second ELCP pressure sensor (absolute) reading is after		Propulsion system not active time  Odometer Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 1.0 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C	Once or twice per trip, for each required wake-up event  100 msec loop	2 trip Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<p>then the ELCP vacuum pump is stuck on and the DTC fails.</p> <p>The 2nd time in the test sequence when the ELCP vacuum pump is commanded off, if the ELCP pressure sensor (gauge) vacuum reading is after then the ELCP vacuum pump is stuck on and the DTC fails.</p>	<p>&gt; 1000 Pa 8 seconds</p> <p>&gt; 1180 Pa 14 seconds</p>	<p>passing P0442/P0455 Time since last test when failing P0442/P0455</p> <p>Voltage Vehicle speed Vehicle not in assembly plant (value must = 0)</p> <p>Propulsion system not active time Previous propulsion system active time</p> <p><b>Abort Conditions:</b> Min fuel level slosh Max fuel level slosh Key up during</p>	<p>≥ 17 hours</p> <p>≥ 10 hours</p> <p>≥ 10 volts ≤ 1 MPH</p> <p>0</p> <p>≥ 0 seconds</p> <p>≥ 0 seconds</p> <p>≥ 190 %</p> <p>≤ 200 %</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					test Refueling request button pressed  Service bay test active Device control exceeds  <b>No Active DTC's</b>	0.5 seconds  FuelLevelDataFault  IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCP_Circuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					<p>No Active DTC's TFTKO</p>	<p>VICM_WakeupDiag_TFTKO LostCommBCM_FA  LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA  ModuleOffTime_FA</p> <p>P043E P043F P0451 P1458 P145C P145E P2421 P2422 P2450</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EVAP System Leak Between Vent Control Valve and Leak Detection Pump  (Sealed Fuel System)	P145E	A small leak ( $\geq 0.020$ " ) is detected in the EVAP system between the Diurnal Control Valve (DCV) and the ELCP vacuum pump. This includes a leak through the DCV.  The ELCP vacuum pump creates a vacuum across a 0.020" reference orifice. This reference vacuum is then compared to the vacuum level	If the ELCP pressure sensor (gauge) vacuum reading is less than the 0.020" reference orifice vacuum measurement times a plus a offset for then a small leak is detected between the DCV and ELCP vacuum pump and the DTC fails.	1.00 multiplier 200 Pa 30 seconds	Propulsion system not active time  Odometer Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455  Voltage Vehicle speed	$4.3 \leq \text{time} \leq 5.8$ hours or $6.0 \leq \text{time} \leq 8.1$ hours or $8.2 \leq \text{time} \leq 11.0$ hours $\geq 9.9$ miles $\geq 1.0$ miles $\geq 70$ kPa $\leq 110$ kPa $\geq 10$ % $\leq 90$ % $\leq 40$ °C $\geq 4$ °C $\leq 45$ °C  $\geq 17$ hours  $\geq 10$ hours  $\geq 10$ volts $\leq 1$ MPH	Up to once per trip, for each required wake-up event  100 msec loop	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		created between the Diurnal Control Valve (DCV) and the ELCP leak detection pump to determine if a leak exists.			Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time  <b>Abort Conditions:</b> Min fuel level slosh Max fuel level slosh Key up during test Refueling request button pressed  Service bay test active Device control exceeds	0  ≥ 0 seconds  ≥ 0 seconds  ≥ 190 % ≤ 200 %  0.5 seconds		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTC's	FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCP_Circuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTC's TFTKO	AccCktLo_FA  ModuleOffTime_FA  P043E P043F P0451 P1458 P145C P145D P2450		
Evaporative Emission System Leak Detection Reference Orifice Performance (Sealed Fuel System)	P145F	1st and 2nd 0.020" reference orifice vacuum measurements do not correlate.	If the difference between the 1st 0.020" reference orifice vacuum measurement and the 2nd 0.020" reference orifice vacuum measurement is after then the 1st and 2nd reference	> 510 Pa	Propulsion system not active time  Odometer Drive distance Min baro Max baro	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 1.0 miles ≥ 70 kPa ≤ 110 kPa	Up to once per trip, for each required wake-up event  100 msec loop	2 trip Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			orifice vacuum measurements do not correlate and the DTC fails.	30 seconds	Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455  Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time  <b>Abort</b>	$\geq 10 \%$ $\leq 90 \%$ $\leq 40 \text{ }^\circ\text{C}$ $\geq 4 \text{ }^\circ\text{C}$ $\leq 45 \text{ }^\circ\text{C}$  $\geq 17 \text{ hours}$ $\geq 10 \text{ hours}$  $\geq 10 \text{ volts}$ $\leq 1 \text{ MPH}$  0 $\geq 0 \text{ seconds}$  $\geq 0 \text{ seconds}$		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					<p><b>Conditions:</b>                      Min fuel level slosh                      Max fuel level slosh                      Key up during test                      Refueling request button pressed                      Service bay test active                      Device control exceeds</p> <p><b>No Active DTC's</b></p>	<p>≥ 190 %                      ≤ 200 %                      0.5 seconds</p> <p>FuelLevelDataFault                      IAT_SensorFA                      ECT_Sensor_FA                      VehicleSpeedSensor_FA                      AmbientAirDefault                      VentCircuit_FA                      ELCPcircuit_FA</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA  LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA  ModuleOffTime_FA  No Active DTC's TFTKO P043E P043F P0451		

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			match.		Accessory line is high for  <b>No Active DTC's</b>	> 5 seconds  P2537		
Cooling Fan 1 Output Circuit High Voltage (ODM)	P1487	This DTC checks for short to high voltage circuit failures during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Battery voltage to enable Battery voltage to remain enabled  Accessory line is high for  <b>No Active DTC's</b>	≥ 11 volts  ≥ 10 volts  > 5 seconds  P2537	50 failures out of 63 samples  100 ms / sample	2 trips Type B
Steady State Actuation Fault	P1516	Detect an inability to maintain a steady state throttle position	Throttle is considered to be steady state when: Change in throttle position over 12.5 msec is <	0.25 percent  4.00 seconds	Run/Crank Voltage	> 6.41	0.49 ms	Trips:
								1
								Type: A
								MIL: YES

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Cruise Control Switch State Undertermined	P155A	Detects when cruise switch state cannot be determined, such as low voltage conditions	cruise switch state remains undetermined for greater than a calibratable time				fail continuously for greater than 0.5 seconds	Type:
								C
								MIL: NO
								Trips: 1
Hybrid Control Torque Request Circuit	P15F2	Determines if torque request from the HCP is valid	1. Serial Communication 2's complement not equal for message \$181	Message <> 2's complement of message	Secondary High Speed Bus is Present  No Serial communication loss to HCP (U1817)		>= 10 Password Protect errors out of 16 samples	1 trip(s)  Type A
			<b>OR</b>				<b>OR</b>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			2. Serial Communication rolling count value shall be + 1 from previous \$181 message	Message rolling count value <> previous message rolling count value plus one	Run Crank Active	>= 0.20 Sec	>= 10 Rolling count errors out of 16 samples Pass diagnostic if samples >=16 Performed every 12.5 msec	
Hybrid Control Speed Request Circuit	P15F9	Determines if torque request from the HCP is valid	1. Serial Communication 2's complement not equal for message \$281  OR 2. Serial Communication rolling count value	Message <> 2's complement of message  Message rolling count value <> previous	No Serial communication loss to HCP (U1817)  Run Crank Active	>= 0.50 Sec	>= 10 Password Protect errors out of 16 samples  OR >= 10 Rolling count errors out of 16 samples	2 trip(s)  Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			shall be + 1 from previous \$281 message	message rolling count value plus one			Pass diagnostic if samples >=16  Performed every 12.5 msec	
Brake Pedal Position Sensor Signal Message Counter Incorrect	P15FB	Detects rolling count or protection value errors in Chassis Brake Pedal Position Emissions Related serial data signal	If x of y rolling count / protection value faults occur, default brake pedal position to zero for duration of fault		Chassis Brake Pedal Position Emissions Related Serial Data Error Diagnostic Enable	TRUE	10/16 counts	Type:  B MIL: YES Trips: 2
EVAP System Alarm Clock Signal Not Received	P162D	ECM could not set VICM Alarm Clock	Whenever the propulsion system goes active, the diagnostic reads its internal timer and		Odometer Drive distance Time since last test when passing	≥ 9.9 miles ≥ 1.0 miles	Once per each wake-up event when Propulsion System is not active	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
(Sealed Fuel System)			<p>evaluates the results from the wake-up events that could have occurred.</p> <p>If the ECM did not receive feedback from the VICM that the alarm clock was set, the 5.0 hour wake-up event did not occur, and the ECM did not wake up for any reason from to then a failure has occurred.</p>	<p>4.3 hours 5.8 hours</p>	<p>P0442/P0455 Time since last test when failing P0442/P0455</p> <p><b>No Active DTC's</b></p> <p><b>Abort Conditions:</b> Service bay test active</p>	<p>≥ 17 hours</p> <p>≥ 10 hours</p> <p>VehicleSpeedSensor_FA</p> <p>ModuleOffTime_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA</p>	<p>Final decision is made when Propulsion System is Active</p> <p>100 msec loop</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<p>If the ECM did not receive feedback from the VICM that the alarm clock was set, the 7.0 hour wake-up event did not occur, and the ECM did not wake up for any reason from</p> <p>to</p> <p>then a failure has occurred.</p>	<p>6.0 hours</p> <p>8.1 hours</p>				
			<p>If the ECM did not receive feedback from the VICM that the alarm clock was set, the 9.5 hour wake-up event did not occur, and the ECM did not wake up for any reason from</p> <p>to</p>	<p>8.2 hours</p>				

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Internal Control Module Redundant Memory Performance	P16F3	Detect Processor Calculation faults due to RAM corruptions, ALU failures and ROM failures						Trips: 1
							Type: A	
							MIL: YES	
			Difference between Cruise Axle Torque Arbitrated Request and Cruise Axle Torque Request exceeds threshold	143.88 Nm	Cruise Engaged for	> 4.00 seconds	Up/down timer 175 ms continuous, 0.5 down time multiplier	
		Difference of base friction torque and its redundant calculation is out of bounds given by threshold range	High Threshold 164.43Nm Low Threshold -164.43Nm	Ignition State	Accessory / Run / Crank	Up/down timer 475 ms continuous, 0.5 down time multiplier		
		Accessory drive friction torque is out of bounds given by threshold range	High Threshold 164.43 Nm Low Threshold 0.00 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 475 ms continuous, 0.5 down time multiplier		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			AC friction torque is greater than commanded by AC control software or less than threshold limit	High Threshold 0.00 Nm Low Threshold 0.00 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Generator friction torque is out of bounds given by threshold range	High Threshold 164.43 Nm Low Threshold 0.00 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Min. Axle Torque Capacity is greater than threshold	-2520.00 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Commanded Predicted Axle Torque and its dual store do not match	1 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Rate limited cruise axle torque request and its dual store do	143.88 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 163 ms continuous, 0.5	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			and its dual store do not match				continuous, 0.5 down time multiplier	
			1) Absolute difference of Calculated accelerator pedal position compensated for carpet learn and error conditions and its redundant calculation is out of	1) 5.00 %	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Commanded axle torque is greater than its redundant calculation by threshold	1151.00 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Commanded axle torque is less than its redundant calculation by threshold	-863.25 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Redundant Commanded Axle Torque	< -863.25		
			Rate limited vehicle speed and its dual store do not equal	NA	Time since first CAN message with vehicle speed	>= 0.500sec	5/8counts; 25.0msec/count	
			transfer case neutral request from four wheel drive logic does not match with	NA	Ignition State  Transfer Case Range	Accessory / Run / Crank  Valid and Not Over-Ridden	14/16 counts; 25.0msec/count	
			transfer case neutral and its dual store do not equal	NA	Ignition State	Accessory / Run / Crank	5/15 counts; 25.0msec/count	
			Throttle progression mode and its dual store do not equal	NA	Ignition State	Accessory / Run / Crank	Up/down timer 175ms continuous, 0.5	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							down time multiplier	
			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	Ignition State	Accessory / Run / Crank	5/15 counts; 25.0msec/count	
			TOS to wheel speed conversion factor and its dual store do not equal	NA	Ignition State	Accessory / Run / Crank	10/16 counts; 25.0msec/count	
			Commanded Predicted Engine Torque and its dual store do not match	N/A	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Zero pedal axle torque is out of bounds given by threshold range	High Threshold 1151.00 Nm Low Threshold -1726.50 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Creep Coast Axle	High Threshold	Ignition State	Accessory / Run /	Up/down timer	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Torque is out of bounds given by threshold range	1151.00 Nm Low Threshold -1726.50 Nm		Crank	175 ms continuous, 0.5 down time multiplier	
			Difference between Driver Requested Immediate Torque primary path and its secondary exceeds threshold	1151.00 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			1. Driver Predicted Request is greater than its redundant calculation plus threshold 2. Driver Predicted Request is less than its redundant calculation minus threshold	1151.00 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Driver Immediate Request is less than its redundant calculation minus threshold	1151.00 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			1. Commanded Immediate Request is greater than its redundant calculation plus threshold 2. Commanded Immediate Request is less than its redundant	1151.00 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Commanded Immediate Response Type is set to Inactive	N/A	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Commanded Immediate Engine Request is greater than its redundant calculation plus threshold	164.43 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Commanded Predicted Engine Request is greater than its redundant calculation plus threshold	164.43 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Regeneration Brake Assist is not within a specified range	Brake Regen Assist < 0 Nm or Brake Regen Assist > 1000.00 Nm	Ignition State	Accessory / Run / Crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
Driver Intended Brake Torque Fault	P1B12	Detect a rolling count or protection value error in Driver Intended Brake Torque serial data	X of Y failure criteria have been met for rolling count or protection errors for Driver Intended Brake Torque.		Propulsion System Diagnostic Enabled Manufacturer Enable Counter	Active  TRUE  0	10/16 counts or 0.488 seconds continuous; 25 ms/count in main processor	Trips: 1 Type: C

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
								MIL: NO
Hybrid Powertrain Control Module 2 Requested MIL Illumination	P1E00	Monitors the Hybrid Powertrain Control Module 2 MIL request line to determine when the Hybrid Powertrain Control Module 2 has detected a MIL illuminating fault.	Hybrid Powertrain Control Module 2-Related DTC set		Time since power-up	> 3 seconds	Continuous	Type A 1 trips  MIL: NO
Control Module Throttle Actuator Position Performance	P2101	1) Detect a throttle positioning error	Difference between measured throttle position and modeled throttle position >  Difference between modeled throttle	10.00 percent	TPS minimum learn is not active and Throttle is being Controlled and (Engine Running or Ignition Voltage or Ignition Voltage )	Run/Crank voltage > 6.41  > 11	1. 39counts; 12.5 ms/count in the primary processor	Trips: 1 Type: A MIL: YES

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			position and measured throttle position >	10.00 percent	Ignition voltage failure is false (P1682)	> 5.5		
		2) Throttle control is driving the throttle in the incorrect direction	Throttle Position >	37.60 percent	TPS minimum learn is active		2. 11 counts; 12.5 ms/count in the primary processor	
		3) Throttle control exceeds the reduced power limit	Throttle Position >	36.60 percent	Reduced Power is True		3. 11 counts; 12.5 ms/count in the primary processor	
					Powertrain relay voltage	> 6.41 Volts		
					Powertrain relay voltage	> 6.41 Volts		
Throttle return to default	P2119	Throttle unable to return to default throttle position after de-	TPS1 Voltage > AND TPS2 Voltage >	1.617  1.727	Throttle de-energized	No 5V reference error or fault for # 4 5V reference circuit (P06A3)	0.4969 sec	Trips: 1 Type:

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		energizing ETC motor.	On the main processor		No TPS circuit faults  PT Relay Voltage > 5.500			C MIL: NO
Accelerator Pedal Position (APP) Sensor 1 Lo	P2122	Detect a continuous or intermittent short or open in the APP sensor #1 on Main processor	APP1 Voltage <	0.463	Run/Crank Voltage	> 6.41  No 5V reference error or fault for # 4 5V reference circuit (P06A3)	19/39 counts or 14 counts continuous; 12.5 ms/count in the main processor	Trips: 1 Type: A MIL: YES
Accelerator Pedal Position (APP) Sensor 1 Hi	P2123	Detect a continuous or intermittent short or open in the APP sensor #1 on Main	APP1 Voltage >	4.75	Run/Crank Voltage	> 6.41	19/39 counts or 14 counts continuous; 12.5 ms/count in the main 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
		processor				No 5V reference error or fault for # 4 5V reference circuit (P06A3)		YES
Accelerator Pedal Position (APP) Sensor 2 Lo	P2127	Detect a continuous or intermittent short or open in the APP sensor #2 on Main processor	APP2 Voltage <	0.325	Run/Crank	> 6.41  No 5V reference error or fault for # 4 5V reference circuit (P0697)	19/39counts or 14 counts continuous; 12.5 ms/count in the main processor	Trips: 1 Type: A MIL: YES
Accelerator Pedal Position (APP) Sensor 2 Hi	P2128	Detect a continuous or intermittent short or open in the APP sensor #2 on Main processor	APP2 Voltage >	2.6	Run/Crank	> 6.41	19/39 counts or 14 counts continuous; 12.5 ms/count in the main processor	Trips: 1 Type: A MIL: YES

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						No 5V reference error or fault for # 4 5V reference circuit (P0697)		
Throttle Position (TP) Sensor 1-2 Correlation	P2135	1. Detects a continuous or intermittent correlation fault between TPS sensors #1 and #2 on Main processor	1. Difference between TPS1 displaced and TPS2 displaced >	1. 7.022% offset at min. throttle position with a linear threshold to 9.622% at max. throttle position	Run/Crank	> 6.41	1 & 2: 639/1279 counts or 154 counts continuous; 3.125 ms/count in the main processor	Trips: 1
								Type: A
								MIL: YES
			2. Difference between (normalized min TPS1 ) and (normalized min TPS2) >	2. 5.000 % Vref		No TPS sensor faults (P0122, P0123, P0222, No 5V reference error or fault for # 4 5V reference circuit (P06A3)		
Accelerator Pedal Position (APP) Sensor 1-2 Correlation	P2138	Detects a continuous or intermittent correlation fault between APP	1. Difference between APP1 displaced and APP2 displaced >	1. 10.001% offset at min. pedal position with a linear threshold to	Run/Crank	> 6.41	1 & 2: 19/39 counts intermittent or 15 counts continuous, 12.5	Trips: 1
								Type: A
								MIL:

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		sensors #1 and #2 on Main processor	2. Difference between (normalized min APP1 ) and (normalized min APP2) >	10.001% at max. pedal position  2. 5.000% Vref		No APP sensor faults (P2122, P2123,P2127,  No 5V reference errors or faultst for # 3 & # 4 5V reference circuits	ms/count in the main processor	YES
Vehicle Speed – Output Shaft Speed Correlation	P215B	Detect invalid vehicle speed source.	The absolute difference between wheel speed vehicle speed and TOS vehicle speed greater than >  Secure vehicle speed source is unavailable	6.21 mph	CAN timer >	0.5000 sec  Secure vehicle speed source is TOS vehicle speed or wheel speed  Trans engaged state is not equal to not engaged.	400/800 counts for wheel speed correlation or 400/800 counts for TOS correlation; 25ms/count	Trips: 1
								Type: A
								MIL: YES

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Minimum Throttle Position Not Learned	P2176	TP sensors were not in the minimum learn window after multiple attempts to learn the minimum.	During TPS min learn on the Main processor, TPS Voltage >  Number of learn attempts >	0.955	Run/Crank Voltage	> 6.41	2.0 secs	Trips:
				10 counts				1
								Type: A
								MIL: YES
Cooling System Performance	P2181	This DTC detects thermostat malfunction (i.e. stuck open)	Engine Coolant Temp (ECT) is ≤ commanded temperature minus 11 Deg C and normalized ratio is ≤ than 4. When above is present for more than 5 seconds, fail counts start.		No Active DTC's	MAF_SensorFA IAT_SensorFA THMR_RCT_Sensor_Ckt_FA THMR_ECT_Sensor_Ckt_FA	20 failures out of 150 samples	2 trips Type B
			Engine total airgrams is accumulated when 1 ≤ AirFlow ≤ 100 grams per second.		Engine not run time ≥ 1800 seconds Engine run time 50 ≤ Time ≤ 1370 seconds Fuel Condition Ethanol ≤ 86% ECT at Power Up -40.0 ≤ ECT ≤ 59.0 °C IAT min -7°C ≤ IAT ≤ 60°C. T-Stat Heater	1 sec/ sample  Once per ignition key cycle		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					duty cycle commanded Airflow	$\leq 10\%$ $1.0 \leq \text{Airflow} \leq 100.0 \text{ GPS}$		
			<b>Ratio Definition:</b>					
			Current temp difference between ECT and RCT minus PwrUp difference divided by total airgrams. Note: Minimum total airgrams is 100.0 grams.					
Air Fuel Imbalance Bank 1	P219A	Determines if a cylinder-to-cylinder air-fuel imbalance is present by monitoring the pre and post catalyst O2 sensor voltage characteristics. The pre voltage	<b>The following criteria apply to:</b>	<b>Bank 1</b>	System Voltage is NOT < for >=	10.9 Volts 0.2 seconds	Minimum of 1 test per trip	1 Trip(s) Type A
			Filtered Ratio	> 0.50	Fuel Level	> 10.0 percent AND no fuel level sensor	Maximum of 10 tests per trip	
			Exclude AFM (DoD) Ratio data from Ratio value	YES	ECT	> -20 degrees C	The front O2 sensor voltage is sampled once per cylinder event.	
			AFM (DoD)		Cumulative engine run time	> 40.0 seconds		
					Engine speed always	< 10000.0 rpm		
					Diagnostic runs			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum	
		is used to generate a ratio metric. A normal system will generally result in a negative ratio while a failing system will generally result in a positive ratio. The post voltage is used to generate an X out of Y metric, where Y represents the number of samples and X represents the number of those samples that failed.  Monitor Strategy Notes: The AFIM Filtered	operation required in order to report: <b>AND</b> AFM (DoD) Filtered Ratio	NO  > 0.50	at Idle regardless of speed, load, air flow, spark advance, and phaser angle:	NO	Therefore, the time required to complete a single test (when all enable conditions are met) decreases as engine speed increases. For example, 9.0 seconds of data is required at 1000 rpm while double this time is required at 500 rpm and half this time is required at 2000 rpm.		
<b>AND</b>					<b>Engine speed during:</b>				
			Post O2 Feature Enabled: <b>AND</b> Filtered Post catalyst O2 voltage is NOT between  for more than out of  during non-AFM	NO  600 and 800 mV 50.0 62.5 seconds	Normal operation	1350 <= rpm <= 4800			
					Intrusive cam	0 <= rpm <= 0			
					AFM (DoD)	0 <= rpm <= 4800			
					AFM (DoD) and intrusive cam	0 <= rpm <= 0			
					Post O2 testing	0 <= rpm <= 10000			
					Engine speed range is less than: during a short term sample	100 rpm			
<b>OR</b>					<b>Mass Airflow During:</b>				
			for more than out of  during AFM	50.0 62.5 seconds	Normal operation	0 <= g/s <= 10000			
				Intrusive cam	0 <= g/s <= 0				
				AFM (DoD)	0 <= g/s <= 10000				
				AFM (DoD) and intrusive cam	0 <= g/s <= 0				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Ratio is derived from the pre-O2 sensor voltage metric known as Variance. Variance is the statistical variation of the O2 sensor voltage over one engine cycle. The reason we use Variance is because it comprehends O2 signal deviation from nominal on a cylinder firing event basis. This metric is representative of the air/fuel imbalance.	only when operating in an enabled Post O2 Cell. The following Post O2 Cells are enabled:	Idle: NO	Post O2 testing	0 <= g/s <= 10000		
	Cruise: NO			Cumulative delta mass air flow does not exceed: during a short term sample	5 g/s			
	Light Accel: NO							
	Heavy Accel: NO							
			<b>NOTE:</b> The "filtered Post catalyst O2 voltage" referred to above is the result of applying a first order lag filter to the Post O2 voltage used by the closed loop fuel control system. The filter coefficient is:	0.001	Filtered Mass Airflow does not change by more than: every 12.5 ms Note: first order lag filter coefficient applied to MAF:	0.20 g/s	The post catalyst O2 sensor voltage is sampled every 12.5 ms. The cumulative time required for the post O2 portion of the diagnostic to report is 62.5 seconds.	
	<b>Air Per Cylinder During:</b>							
	Normal operation				0 <= mg/cylinder <= 10000			
	Intrusive cam				0 <= mg/cylinder <= 0			
	AFM (DoD)				0 <= mg/cylinder <= 10000			
	AFM (DoD) and intrusive cam				0 <= mg/cylinder <= 0			
		Note: Instusive phaser control is active, allowing a specified phaser angle during certain operating		Post O2 testing	0 <= mg/cylinder <= 10000	Note: If the post O2 feature is		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			conditions: The AFIM Filtered Ratio metric is the difference between the current, measured Variance metric and a 17x17 table lookup value (the threshold), divided by a second 17 x 17 table lookup value (the normalizer), and finally multiplied by a Quality Factor, also a 17 x 17 table lookup value (the latter ranges between 0 and 1, based on robustness to false diagnosis in the current operating region). The reason we use a ratio of the Variance is so that we can normalize	NO 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	Filtered APC shall not change by more than: between 12.5 ms samples. Note: first order lag filter coefficient applied to APC:  APC range during short term sample shall not exceed:  <b>Spark Advance During:</b> Normal operation Intrusive cam AFM (DoD) AFM (DoD) and intrusive cam <b>Throttle Area (percent of max)</b> Normal operation	5.00 percent  1.000  75 mg/cylinder  5 <= degrees <= 55 0 <= degrees <= 0 5 <= degrees <= 55 0 <= degrees <= 0 0 <= percent <= 200	enabled, both the front and post portions of the diagnostic must complete before reporting. If the post O2 feature is not enabled, only the front portion must complete before reporting.	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			the failure metric over various engine speed and load regions since engine speed and load directly impact the magnitude of the Variance metric.	data is determined via statistical analysis of Variance data. QF values less than 0.75 identify regions where diagnosis is not possible.	Intrusive cam	0 <= percent <= 0		
					AFM (DoD)	0 <= percent <= 200		
					AFM (DoD) and intrusive cam	0 <= percent <= 0		
					<b>Intake Cam Phaser Angle During:</b>			
					Normal operation	0 <= degrees <= 25		
					Intrusive cam	0 <= degrees <= 0		
					AFM (DoD)	0 <= degrees <= 100		
					AFM (DoD) and intrusive cam	0 <= degrees <= 0		
					<b>Exhaust Cam Phaser Angle During:</b>			
					Normal operation	0 <= degrees <= 25		
					Intrusive cam	0 <= degrees <= 0		
					AFM (DoD)	0 <= degrees <= 100		
					AFM (DoD) and intrusive cam	0 <= degrees <= 0		
					Average O2 voltage change	< 2 millivolts		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					since last sample			
					An AFM (DoD) state change will cause the current sample to be discarded:	NO		
					Quality Factor	>= 0.75 in the current operating		
					AIR pump not on			
					CASE learn not active			
					EGR - no device control, no intrusive diagnostics			
					EVAP - no device control, no intrusive diagnostics			
					Engine OverSpeed Protection Not Active			
					Idle speed control normal			
					No EngineMisfireDetected_FA			
					No MAP_SensorFA			
					No MAF_SensorFA			
					No ECT_Sensor_FA			
					No TPS_ThrottleAuthorityDefaulted			
					No FuelInjectorCircuit_FA			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No AIR System FA			
					No EvapExcessPurgePsbl_FA			
					PTO Not Active			
					Injector base pulse width above min lim			
					<b>Fuel Control Status</b>			
					Closed Loop Long Term FT Enabled	for >= 1.2 seconds  <b>Please see "Closed Loop Enable Criteria" and "Long Term FT Enable Criteria" in</b>		
					<b>Rapid Step Response (RSR):</b>			
					RSR will trigger if the ratio result from the last test is is or for AFM (DoD) is <b>AND</b> it exceeds the last filtered ratio by at least: or for AFM (DoD) by at least: Once triggered,	>= 0.50  >= 0.50  1.00  1.00	For RSR or FIR, 10 tests must complete before the diagnostic can report.	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					the filtered ratio is reset to: or for AFM (DoD) is reset to:	0.00  0.00		
					<b>Fast Initial Response (FIR):</b>			
					FIR will trigger when an NVM reset or code clear occurs. Once triggered, the non-AFM filtered ratio is reset to: and the AFM filtered ratio is reset to:	-0.50  -0.50		
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	Post O2 sensor signal  AND  The Accumulated	< 850 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA	Frequency: Once per trip Note: if Reset Fast Response Function = FALSE for the	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		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.	mass air flow monitored during the Stuck Lean Voltage Test	> 120 grams	B1S2 Failed this key cycle  System Voltage ICAT MAT Burnoff delay  Green O2S Condition Low Fuel Condition Diag Pedal position	AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013A, P013B, P013E, P013F, P2270 or P2271  10.0 < Volts < 32.0  = Not Valid = Not Valid, See definition of <b>Green Sensor Delay Criteria (B1S2)</b> in Supporting Tables tab.  = False ≤ 100.0 %	given Fuel Bank OR Rapid Response Active = TRUE, multiple tests per trip are allowed.	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Engine Speed to initially enable Engine Speed range to keep test enabled (after initially Engine Airflow Vehicle Speed to initially enable Vehicle Speed range to keep test enabled (after initially Closed loop integral Closed Loop Active = TRUE Evap Ethanol Post fuel cell EGR Intrusive diagnostic All post sensor heater delays O2S Heater on	$1800 \leq \text{RPM} \leq 3500$ $1700 \leq \text{RPM} \leq 3650$ $18 \leq \text{gps} \leq 28$ $24.9 \leq \text{MPH} \leq 90.1$ $21.7 \leq \text{MPH} \leq 93.2$ mph $0.84 \leq \text{C/L Int} \leq 1.07$ not in control of purge not in estimate mode = enabled = not active = not active		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Time Predicted Catalyst temp Fuel State	$\geq 60.0 \text{ sec}$ $0 \leq \text{°C} \leq 1000$ = DFCO possible		
					All of the above met for at least 3.0 seconds, and then the Force Cat Rich intrusive stage is requested.			
O2 Sensor Signal Stuck Rich Bank 1 Sensor 2	P2271	This DTC determines if the post catalyst O2 sensor is stuck in a normal rich voltage range and thereby can no longer be used for post oxygen sensor fuel control or for catalyst monitoring. The diagnostic is an intrusive test which requests the DFCO mode	Post O2 sensor signal  AND  The Accumulated mass air flow monitored during the Stuck Rich Voltage Test	$> 100 \text{ mvolts}$   $> 36 \text{ grams}$	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA	Frequency: Once per trip Note: if Reset Fast Response Function = FALSE for the given Fuel Bank OR Rapid Response Active = TRUE, multiple tests per trip are allowed.	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		to achieve the required lean threshold.			B1S2 Failed this key cycle  System Voltage ICAT MAT Burnoff delay  Green O2S Condition Low Fuel Condition Diag  Engine Speed  Engine Airflow  Vehicle Speed Closed loop integral Closed Loop Active Evap	P013A, P013B, P013E, P013F or P2270  10.0 < Volts < 32.0 = Not Valid = Not Valid, See definition of <b>Green Sensor Delay Criteria (B1S2)</b> in Supporting Tables tab. = False  1800 ≤ RPM ≤ 3500  18 ≤ gps ≤ 28  24.9 ≤ MPH ≤ 90.1 0.84 ≤ C/L Int ≤ 1.07 = TRUE not in control of purge		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Ethanol Post fuel cell Power Take Off EGR Intrusive diagnostic All post sensor heater delays O2S Heater on Time Predicted Catalyst temp Fuel State DTC's Passed DTC's Passed DTC's Passed	not in estimate mode = enabled = not active = not active = not active ≥ 60.0 sec 0 ≤ °C ≤ 1000 = DFCO possible = P2270 (and P2272 if applicable) = P013E (and P014A if applicable) = P013A (and P013C if applicable)		
					After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Evaporative Emission System Leak Detection Pump Control Open Circuit  (Sealed Fuel System)	P2400	This DTC checks for open circuit failures during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.				20 failures out of 25 samples  250 ms / sample	2 trips Type B
Evaporative Emission System Leak Detection Pump Control Circuit Low  (Sealed Fuel System)	P2401	This DTC checks for short to low voltage circuit failures during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.				20 failures out of 25 samples  250 ms / sample	2 trips Type B
Evaporative Emission	P2402	This DTC checks for short to high	The ECM detects that the				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
System Leak Detection Pump Control Circuit High  (Sealed Fuel System)		voltage circuit failures during operation.  If the P2402 is active, an intrusive test is performed with the pump commanded on for 15 seconds.	commanded state of the driver and the actual state of the control circuit do not match.				250 ms / sample	
Evaporative Emission System Switching Valve Control Open Circuit  (Sealed Fuel System)	P2418	This DTC checks for open circuit failures during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.				20 failures out of 25 samples  250 ms / sample	2 trips Type B
Evaporative Emission System	P2419	This DTC checks for short to low voltage circuit	The ECM detects that the commanded state				20 failures out of 25 samples	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Switching Valve Control Circuit Low  (Sealed Fuel System)		failures during operation.	of the driver and the actual state of the control circuit do not match.				250 ms / sample	
Evaporative Emission System Switching Valve Control Circuit High  (Sealed Fuel System)	P2420	This DTC checks for short to high voltage circuit failures during operation.  If the P2420 is active, an intrusive test is performed with the switching valve commanded on for 15 seconds.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.				20 failures out of 25 samples  250 ms / sample	2 trips Type B
EVAP System Vent Valve Stuck Closed	P2422	This DTC detects a Diurnal Control Valve (DCV) that is	<u>When sufficient pressure or vacuum exists in the fuel tank system</u>		Propulsion system not active time	4.3 ≤ time ≤ 5.8 hours or	Up to once per trip, for each required wake-up event	2 trip Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
(Sealed Fuel System)		stuck closed.  There are two ways to run this diagnostic depending on the amount of pressure or vacuum in the fuel tank system.	When the Fuel Tank Pressure (FTP) sensor indicates a pressure or a vacuum  With the DCV commanded opened, if the change in the FTP sensor reading is after then the DCV is stuck closed and the DTC fails.  <u>When no pressure or vacuum exists in</u>	> 697 Pa < -697 Pa.  < 1000 Pa 10 seconds	Odometer Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455  Voltage Vehicle speed  Vehicle not in assembly plant	6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 1.0 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C  ≥ 17 hours ≥ 10 hours  ≥ 10 volts ≤ 1 MPH	100 msec loop	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			<p>the fuel tank system</p> <p>When the FTP sensor indicates a pressure or a vacuum</p> <p>With the DCV commanded opened and the ELCP vacuum pump commanded on, if the 0.020" reference orifice vacuum measurement minus the ELCP pressure sensor (gauge) vacuum reading is after then the DCV is stuck closed and the DTC fails.</p>	<p>&lt; 697 Pa &gt; -697 Pa.</p> <p>&lt; 300 Pa 5 seconds</p>	<p>(value must = 0) Propulsion system not active time Previous propulsion system active time</p> <p><b>Abort Conditions:</b> Min fuel level slosh Max fuel level slosh Key up during test Refueling request button pressed</p> <p>Service bay test active Device control exceeds</p> <p><b>No Active DTC's</b></p>	<p>0</p> <p>≥ 0 seconds</p> <p>≥ 0 seconds</p> <p>≥ 190 %</p> <p>≤ 200 %</p> <p>0.5 seconds</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						FuelLevelDataFault  IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCP_Circuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA  LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTC's TFTKO	AccCktLo_FA  ModuleOffTime_FA  P043E P043F P0451 P1458 P145C P145D P145F P2422 P2450		
ELCP Switching Valve Control Performance  (Sealed Fuel System)	P2450	This DTC detects a ELCP switching valve that is stuck.	When the ELCP vacuum pump is commanded on and the ELCP switching valve transitions from vent to pump position, if the difference between the 1st 0.020" orifice reference		Propulsion system not active time      Odometer Drive distance	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 1.0 miles	Up to once per trip, for each required wake-up event  100 msec loop	2 trip Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			vacuum measurement and the ELCP pressure sensor (gauge) vacuum reading is after then the ELCP switching value is stuck and the DTC fails.	< 400 Pa 5 seconds	Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455  Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time	≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C  ≥ 17 hours ≥ 10 hours  ≥ 10 volts ≤ 1 MPH 0 ≥ 0 seconds ≥ 0 seconds		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					<b>Abort Conditions:</b> Min fuel level slosh Max fuel level slosh Key up during test Refueling request button pressed Service bay test active Device control exceeds	≥ 190 % ≤ 200 % 0.5 seconds		
					<b>No Active DTC's</b> FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPcircuit_FA			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA  LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA  ModuleOffTime_FA  No Active DTC's TFTKO P043E P043F P0451		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						P1458 P145C P145D P2422		
Ignition Switch Accessory Position Circuit Low  (EREV/PHEV only)	P2537	This DTC checks for short to low voltage circuit failures during operation.	The ECM detects that the state of the accessory line is low when it should be high.  The diagnostic is evaluated when Propulsion System Active time is > 0.5 seconds.  Diagnostic fails when pass counts are	< 8 counts.			12.5 ms / sample  Once per trip	2 trips Type B
ECM/PCM Internal Engine Off Timer Performance	P2610	This DTC determines if the hardware timer does not initialize or count	<b>Count Up Test:</b>  Time difference between the current read and the				<b>Count Up Test:</b>  4 failures out of 20 samples	2 trips Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p>properly. There are two tests to ensure proper functioning of the timer: Count Up Test (CUT) and Range Test (RaTe).</p> <p>Count Up Test (CUT): Verifies that the HWIO timer is counting up with the proper increment.</p> <p>Range Test (RaTe): When the run/crank is not active both</p>	<p>previous read of the timer</p> <p><b>Range Test:</b></p> <p>The variation of the HWIO timer and mirror timer is</p>	<p>&gt; 1.50 seconds</p> <p>&gt; 25 %.</p>			<p>1 sec / sample</p> <p>Continuous while run/crank is not active and until controller shutdown is initiated.</p> <p><b>Range Test:</b></p> <p>Once per trip when controller shutdown is initiated or run/crank becomes active.</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		the hardware and mirror timers are started. The timers are compared when ECM shutdown is initiated or run/crank becomes active.						
Crankshaft Position Signal Output Circuit Low	P2618	Electrical Integrity of the Crankshaft Position Singal Output Circuit - Shorted to Ground	ECM detects that commanded and actual states of output driver do not match because the output is shorted to ground		Powertrain Relay Voltage  Engine is not cranking  Crankshaft Position Output is commanded high	>= 11.00 Volts	40 failures out of 50 samples  1 sample every 100 msec	Type B 2 trips
Crankshaft Position Signal Output Circuit High	P2619	Electrical Integrity of the Crankshaft Position Singal	ECM detects that commanded and actual states of output driver do not		Powertrain Relay Voltage  Engine is not	>= 11.00 Volts	40 failures out of 50 samples  1 sample every	Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Output Circuit - Shorted to Power	match because the output is shorted to power		cranking  Crankshaft Position Output is commanded low		100 msec	
O2Sensor Circuit Range/ Performance Bank 1 Sensor 1	P2A00	This DTC determines if the O2 sensor voltage is not meeting the voltage criteria to enable closed loop fueling.	Closed Loop O2S ready flag	= False	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA  ECT_Sensor_FA FuelInjectorCircuit_FA P0131, P0151 P0132, P0152	200 failures out of 250 samples.	2 trips Type B
			A) O2S signal must be	< 1100 mvolts				
			To set Closed Loop ready flag	= True				
			Closed Loop O2S ready flag	= True				
B) Once set to ready O2S cannot for	> 1100 mvolts > 5.0 seconds	System Voltage  Engine Speed Engine Airflow Engine Coolant Engine Metal Overtemp Active Converter Overtemp Active Fuel State AFM Status	10.0 < Volts < 32.0 1000 ≤ RPM ≤ 3400  4.0 ≤ gps ≤ 30.0 ≥ 70.0 °C  = False = False DFCO not active = All Cylinders active	Frequency: Continuous 100msec loop				
Then set Closed Loop ready flag	= False							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Predicted Exhaust Temp (B1S1) $\geq 0.0$ °C Engine run time > 100 seconds Fuel Enrichment = Not Active  <u>All of the above met for</u> > 5 seconds			
Control Module Communication Bus A Off	U0073	This DTC monitors for a BUS A off condition	Bus off failures	$\geq 10$ counts	<b>General Enable Criteria:</b>		Diagnostic runs in 12.5 ms loop	2 Trip(s)
			out of these samples	$\geq 10$ counts	U0073	Not Active on Current Key Cycle		Type B
					Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management  <b>Ignition Voltage Criteria:</b> Ignition voltage $\geq 11.00$ or $\geq 6.41$ Power Mode = run	Enabled Not Active Not Active		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					<b>Off Cycle Enable Criteria:</b>			
					Diagnostic Enable	1		
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000			
					CAN hardware is bus OFF for	> 0.1125 seconds		
Control Module Communication Bus B Off	U0074	This DTC monitors for a BUS B off condition	Bus off failures	≥ 10 counts	<b>General Enable Criteria:</b>		Diagnostic runs in 12.5 ms loop	2 Trip(s)
			out of these samples	≥ 10 counts	U0074	Not Active on Current Key Cycle		Type B
					Normal CAN transmission on Bus B	Enabled		
					Device Control	Not Active		
				High Voltage Virtual Network Management	Not Active			
					<b>Ignition Voltage Criteria:</b>			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Ignition voltage or Power Mode	>= 11.00 or >= 6.41 = run		
					<b>Off Cycle Enable Criteria:</b>			
					Diagnostic Enable	1		
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000			
					CAN hardware is bus OFF for	> 0.1125 seconds		
Lost Communication With TCM	U0101	This DTC monitors for a loss of communication with the transmission control module	Message is not received from controller for Message \$0C7 Message \$0F9 Message \$1F5	≥ 10.0 seconds ≥ 0.5 seconds ≥ 0.5 seconds	<b>General Enable Criteria:</b>		Diagnostic runs in 12.5 ms loop	2 Trip(s)
					U0073	Not Active on Current Key Cycle		Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Normal CAN transmission on Bus A	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					<b>Ignition Voltage Criteria:</b>			
					Ignition voltage	>= 11.00 or >= 6.41		
					Power Mode	= run		
					<b>Off Cycle Enable Criteria:</b>			
					Diagnostic Enable		1	
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	> 0.4000 seconds		
					U0101	Not Active on Current Key Cycle		
					TCM	is present on the bus		
Lost Communication With Fuel Pump Control Module	U0109	This DTC monitors for a loss of communication with the fuel pump control module	Message is not received from controller for	≥ 10.0seconds	<b>General Enable Criteria:</b>		Diagnostic runs in 12.5 ms loop	2 Trip(s)
					U0073	Not Active on Current Key Cycle		Type B
					Normal CAN transmission on Bus A	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					<b>Ignition Voltage Criteria:</b>			
					Ignition voltage	>= 11.00 or >= 6.41		
					Power Mode	= run		
					<b>Off Cycle Enable Criteria:</b>			
					Diagnostic Enable		1	
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000			
					Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	> 0.4000 seconds		
					U0109	Not Active on Current Key Cycle		
					Fuel Pump Control Module	is present on the bus		

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000			
					Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	> 0.4000 seconds		
					U0129	Not Active on Current Key Cycle		
					Brake System Control Module	is present on the bus		
Lost Communication With Body Control Module	U0140	This DTC monitors for a loss of communication with the Body Control Module.	Message is not received from controller for	≥ 10.0seconds	<b>General Enable Criteria:</b>		Diagnostic runs in 12.5 ms loop	1 Trip(s)
					U0073	Not Active on Current Key Cycle		Type C

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Normal CAN transmission on Bus A	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					<b>Ignition Voltage Criteria:</b>			
					Ignition voltage	>= 11.00 or >= 6.41		
					Power Mode	= run		
					<b>Off Cycle Enable Criteria:</b>			
					Diagnostic Enable		1	
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	> 0.4000 seconds		
					U0140	Not Active on Current Key Cycle		
					Body Control Module	is present on the bus		
Lost Communication with Electric A/C Compressor Control Module	U016B	This DTC monitors for a loss of communication with the Electric A/C Compressor Control Module.	Message is not received from controller for	≥ 10.0seconds	<b>General Enable Criteria:</b>		Diagnostic runs in 12.5 ms loop	2 Trip(s)
					U0073	Not Active on Current Key Cycle		Type B
					Normal CAN transmission on Bus A	Enabled		
					Device Control	Not Active		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					High Voltage Virtual Network Management	Not Active		
					<b>Ignition Voltage Criteria:</b>			
					Ignition voltage	>= 11.00 or >= 6.41		
					Power Mode	= run		
					<b>Off Cycle Enable Criteria:</b>			
					Diagnostic Enable	1		
					Ignition Accessory Line or Battery Voltage	= Active  > 11.00		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000			
					Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	> 0.4000 seconds		
					U016B	Not Active on Current Key Cycle		

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000			
					Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	> 0.4000 seconds		
					U0293	Not Active on Current Key Cycle		
					Hybrid Powertrain Control Module	is present on the bus		
Lost Communication with Hybrid Powertrain Control Module B	U179A	This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module B	Message is not received from controller for	≥ 10.0 seconds	<b>General Enable Criteria:</b>		Diagnostic runs in 12.5 ms loop	2 Trip(s)

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					U0073	Not Active on Current Key Cycle		Type B
					Normal CAN transmission on Bus A	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					<b>Ignition Voltage Criteria:</b>			
					Ignition voltage	>= 11.00 or >= 6.41		
					Power Mode	= run		
					<b>Off Cycle Enable Criteria:</b>			
					Diagnostic Enable		1	
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for U179A	> 0.4000 seconds Not Active on Current Key Cycle		
					Hybrid Powertrain Control Module B	is present on the bus		
Lost Communication with Hybrid Powertrain Control Module on Bus B	U1817	This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module on Bus B	Message is not received from controller for	≥ 0.5seconds	<b>General Enable Criteria:</b>		Diagnostic runs in 12.5 ms loop	1 Trip(s)
					U0074	Not Active on Current Key Cycle		Type A
					Normal CAN transmission on Bus B	Enabled		
					Device Control	Not Active		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					High Voltage Virtual Network Management	Not Active		
					<b>Ignition Voltage Criteria:</b>			
					Ignition voltage	>= 11.00 or >= 6.41		
					Power Mode	= run		
					<b>Off Cycle Enable Criteria:</b>			
					Diagnostic Enable	1		
					Ignition Accessory Line or Battery Voltage	= Active > 11.00		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000			
					Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	> 0.4000 seconds		
					U1817	Not Active on Current Key Cycle		

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
<b>Power Moding Diagnostics</b>								
System Voltage Low	P0562	Sets when the low voltage system voltage is below a threshold	Ignition Voltage	Ignition Voltage <= 10 Volts	RunCrankActive	= 1	5 seconds in a 6 second window	Special Type C
		DTC Pass		Ignition Voltage > 10 Volts	Engine Speed	>= 0 RPM		
System Voltage Hi	P0563	Sets when the low voltage system voltage is above a threshold	Ignition Voltage	Ignition Voltage >= 18 Volts	RunCrankActive	= 1	5 seconds in a 6 second window	Special Type C
		DTC Pass		Ignition Voltage < 18 Volts				
<b>Shift Solenoid Hydraulic Diagnostics</b>								



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	<p>This DTC will indicate when Shift Solenoid Valve A (X Valve) is stuck in the hydraulically low position</p> <p>This detection only occurs during an X valve transition</p>	<p>X valve is determined to be in a hydraulically Low state when it has been commanded hydraulically High.</p>	<p>X Commanded Hi for &gt; XvalveTurnOnTime + 1 seconds</p> <p>Where XValveTurnOnTime:</p> <table border="1"> <tr> <td>Trans Fluid Temp</td> <td>Time</td> </tr> <tr> <td>-40</td> <td>0.50</td> </tr> <tr> <td>-30</td> <td>0.35</td> </tr> <tr> <td>-20</td> <td>0.250</td> </tr> <tr> <td>-10</td> <td>0.09</td> </tr> <tr> <td>20</td> <td>0.05</td> </tr> <tr> <td>140</td> <td>0.02</td> </tr> </table>	Trans Fluid Temp	Time	-40	0.50	-30	0.35	-20	0.250	-10	0.09	20	0.05	140	0.02	X Command X Position	1 0	Fail Conditions met for 3 seconds	One Trip, Type A
					Trans Fluid Temp	Time																
-40	0.50																					
-30	0.35																					
-20	0.250																					
-10	0.09																					
20	0.05																					
140	0.02																					
DTC Pass	X valve completes Low to High transition without failure	X Command X Position	1 1	1 loop execution at 0.0125 seconds																		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum												
Shift Solenoid Valve A Stuck On	P0752	<p>This DTC will indicate when Shift Solenoid Valve A (X Valve) is stuck in the hydraulically hi position</p> <p>This DTC is linked to both a steady state and transitional test.</p>	X valve is determined to be in a hydraulically high state when it has been commanded to a low state.	<p><b>Transition Case:</b> X commanded Low for &gt; (XvalveTurnOffTm + 1) seconds</p> <p>Where XValveTurnOffT ime:</p> <p>Trans Fluid Temp Time</p> <table border="1"> <tr><td>-40</td><td>4</td></tr> <tr><td>-30</td><td>2.25</td></tr> <tr><td>-20</td><td>1.4</td></tr> <tr><td>-10</td><td>.5</td></tr> <tr><td>20</td><td>0.265</td></tr> <tr><td>140</td><td>0.0325</td></tr> </table>	-40	4	-30	2.25	-20	1.4	-10	.5	20	0.265	140	0.0325	X Command X Position	0 1	Fail Conditions met for 3 seconds	One Trip, Type A
		-40	4																	
-30	2.25																			
-20	1.4																			
-10	.5																			
20	0.265																			
140	0.0325																			
DTC Pass ( <b>Transitional Pass</b> )	X valve completes High to Low transition without failure		X Command X position PCS2 and PCS4 Monitors	0 0 No Fault Pending	5 seconds															

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				<b>Steady State Case:</b> Simultaneous failures occur on both PCS2 and PCS4 monitors	XY state	EVT Lo OR EVT Hi	Fail Conditions met for 2 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					PCS2 and PCS4 faults	Occur Simultaneously - within (VlvXStckHiSteadyStWindow + 0.1 ) seconds  Where VlvXStckHiSteadyStWindow:  Trans Fluid Temp Time -50 0.50 -32 0.50 -24 0.50 -5 0.50 4 0.50 40 0.50		
		DTC Pass (Steady State Pass)	X valve completes High to Low transition without failure		X Command X position PCS2 and PCS4 Monitors	0 0 No Fault Pending	5 seconds	

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	<p>This DTC will indicate when Shift Solenoid Valve B (Y Valve) is stuck in the hydraulically low position</p> <p>This detection only occurs during an Y valve transition</p>	<p>The Y valve is determined to be in a hydraulically Low state when it has been commanded hydraulically High.</p>	<p>Y Commanded Hi for &gt; (Yvalve_TurnOnTm + 1 seconds</p> <p>Where Yvalve_TurnOnTm:</p> <table border="1"> <tr> <td>Trans Fluid Temp</td> <td>Time</td> </tr> <tr> <td>-40</td> <td>15</td> </tr> <tr> <td>-30</td> <td>10</td> </tr> <tr> <td>-20</td> <td>5</td> </tr> <tr> <td>-10</td> <td>0.30</td> </tr> <tr> <td>20</td> <td>0.15</td> </tr> <tr> <td>140</td> <td>0.05</td> </tr> </table>	Trans Fluid Temp	Time	-40	15	-30	10	-20	5	-10	0.30	20	0.15	140	0.05	Y Command Y Position	1 0	Fail Conditions met for 4.5 seconds	One Trip, Type A
		Trans Fluid Temp	Time																			
-40	15																					
-30	10																					
-20	5																					
-10	0.30																					
20	0.15																					
140	0.05																					
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																	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum														
Shift Solenoid Valve B Stuck On	P0757	<p>This DTC will indicate when Shift Solenoid Valve B (Y Valve) is stuck in the hydraulically hi position</p> <p>This detection only occurs during an Y valve transition</p>	<p>The Y valve is determined to be in a hydraulically Hi state when it has been commanded hydraulically Lo</p>	<p>Y Commanded Lo for &gt; (Yvalve_TurnOffTm + 1) seconds</p> <p>Where Yvalve_TurnOffTm:</p> <table border="1"> <tr> <td>Trans Fluid Temp</td> <td>Time</td> </tr> <tr> <td>-40</td> <td>4</td> </tr> <tr> <td>-30</td> <td>2.7</td> </tr> <tr> <td>-20</td> <td>1.4</td> </tr> <tr> <td>-10</td> <td>.7</td> </tr> <tr> <td>20</td> <td>.2</td> </tr> <tr> <td>140</td> <td>.05</td> </tr> </table>	Trans Fluid Temp	Time	-40	4	-30	2.7	-20	1.4	-10	.7	20	.2	140	.05	Y Command Y Position	0 1	Fail Conditions met for 4.5 seconds	One Trip, Type A
		Trans Fluid Temp	Time																			
-40	4																					
-30	2.7																					
-20	1.4																					
-10	.7																					
20	.2																					
140	.05																					
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																	
<b>Pressure Control Solenoid Hydraulic Diagnostics</b>																						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control Solenoid hydraulic diagnostics P0776, P0777, P0796, P0797 P2714, P2715, share these common secondary parameter enable conditions	***				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 LinePressure Estimate	No fault pending  > 325 kpa AND >=325 kpa FOR > 1 seconds		
					Propulsion System Active	=1		

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 Off	P0776	This DTC will determine if Pressure Control Solenoid 2 (B) is stuck in the hydraulically low position. This DTC has two fail cases.	The pressure switch associated with pressure control solenoid B (PCS2) is indicating that the PCS is regulating exhaust when the PCS has been commanded full feed.	<b>Fail Case 1:</b> 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)	

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	<b>Fail Case 2:</b> Fail case 1 criteria met for at least 0.5 seconds (40 * 0.0125), more than 10 times in a given key cycle	Same as <b>Fail Case 1.</b>		N/A	
Pressure Control (PC) Solenoid B Stuck ON	P0777	This DTC will determine if Pressure Control Solenoid 2 (B) is stuck in the hydraulically hi position. This DTC has two fail cases.	The pressure switch associated with pressure control solenoid B (PCS2) is indicating that the PCS is in the full feed position when the PCS has been commanded regulating exhaust.	<b>Fail Case 1:</b> PCS2PS (PSw3) indicates hi hydraulic pressure	PCS commanded pressure  *** Common Hydraulic Enables	<= 5 kpa for >= (FFDelay + 0.1) seconds  Where FFDelay:  Temp Time -50 4.50 -30 1.40 -18 0.80 -4 0.30 13 0.19 40 0.08	Failure exists for 30 seconds (2400 * 0.0125)	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		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	<b>Fail Case 2:</b> Fail case 1 criteria met for at least 0.5 seconds (40 * 0.0125), more than 10 times in a given key cycle	Same as <b>Fail Case 1.</b>		N/A	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control (PC) Solenoid C Stuck Off	P0796	This DTC will determine if Pressure Control Solenoid 3 (C) is stuck in the hydraulically low position. This DTC has two fail cases.	The pressure switch associated with pressure control solenoid C (PCS3) is indicating that the PCS is regulating exhaust when the PCS has been commanded full feed.	<b>Fail Case 1:</b> PCS3PS (PSw1) indicates low hydraulic pressure	PCS commanded pressure  *** Common Hydraulic Enables	>= 1800 kpa for >= (PSReDelay + 0.1) seconds  Where PSReDelay:  Temp Time -50 4.50 -30 1.80 -24 1.2 -17 0.80 4 0.20 40 0.1	Failure exists for 30 seconds (2400 * 0.0125)	Two Trips, Type B
		DTC Pass	Pass when PCS3PS and PCS3Cmnd are in agreement (Full Feed)	PCS3PS (PSw1) indicates hi hydraulic pressure			1.25 seconds ((2500 - 2400) * 0.0125)	

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	<b>Fail Case 2:</b> Fail case 1 criteria met for at least 1.875 seconds ( 150 * 0.0125), more than 10 times in a given key cycle	Same as <b>Fail Case 1.</b>		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.	<b>Fail Case 1:</b> PCS3PS (PSw1) indicates hi hydraulic pressure	PCS commanded pressure  *** Common Hydraulic Enables	<=5 kpa for >= (FFDelay + 0.1) seconds  Where FFDelay:  Trans Fluid Temp Time -50 4.50 -30 1.40 -18 0.80 -4 0.30 13 0.19 40 0.08	Failure exists for 30 seconds (2400 * 0.0125)	One Trip, Type A

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

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	<b>Fail Case 2:</b> Fail case 1 criteria met for at least 0.5 seconds (40 * 0.0125), more than 10 times in a given key cycle	Same as <b>Fail Case 1.</b>		N/A	
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.	<b>Fail Case 1:</b> 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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		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	<b>Fail Case 2:</b> 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 <b>Fail Case 1.</b>		N/A	
<b>Clutch Slip Diagnostics</b>								

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					C1 Fill detected	=1  Predicted Mtr A spd  Predicted Mtr B spd	Instantly if  >6300  <b>OR</b> >9500	
		DTC Pass	Clutch 1 Slip Speed	C1 Slip < 50 RPM	C1 Pressure Command  C1 Torq Estimate C1 Fill detected	> = 1800 kpa  > = 20 Nm  = 1	0.125 seconds (10 * 0.0125)	
Clutch 2 Slip	P079B	This DTC sets when excessive slip is observed on C2 while commanded on	C2 Slip Speed	C2 Slip > 200 RPM	C2 Pressure Command  C2 Torq Estimate C2 Fill detected	> = 1800 kpa  > = 200 Nm  = 1	63 seconds (3 retries * 1s failtime * 30 seconds between attempts)  <b>OR</b> Instantly if	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						Predicted Mtr A spd  Predicted Mtr B spd	>6300  <b>OR</b> >9500	
		DTC Pass	C2 Slip Speed	C2 Slip < 50 RPM	C2 Pressure Command  C2 Torq Estimate C2 Fill detected	> = 1800 kpa  > = 20 Nm  =1	0.125 seconds (10 * 0.0125)	
Clutch 3 Slip	P079C	This DTC sets when excessive slip is observed on C3 while C3 has been commanded on	C3 Slip Speed	C3 Slip > 300 RPM	C3 Pressure Command  C3 Torq Estimate C3 Fill detected	> = 1800 kpa  > = 200 Nm  = 1  Predicted Mtr A spd	63 seconds (3 retries * 1s failtime * 30 seconds between attempts <b>OR</b> Instantly if >6300 <b>OR</b>	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						Predicted Mtr B spd	>9500	
		DTC Pass	C3 Slip Speed	C3 Slip < 50 RPM	C3 Pressure Command  C3 Torq Estimate C3 Fill detected	> = 1800 kpa  > = 20 Nm = 1	0.125 seconds (10 * 0.0125)	
<b>Pressure Control Solenoid Electrical Diagnostics</b>								
All Pressure Control Solenoid electrical diagnostics P0961, P0962, P0963, P0965, P0966, P0967, P0969, P0970, P0971, P2719,	***				Ignition voltage  Engine Speed  Vehicle Speed  PropSysActive	> = 11 Volts && <= 16 Volts  >= 0 RPM && <= 7500 RPM for >= 5 seconds  <= 200 mph for >= 5 seconds =1		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
P2720, P2721, P2728, P2729, P2730, P0973, P0974, P0976, P0977 share these common secondary parameter enable conditions								
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 circuitry detects out of range error is present	DTC P0961	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
					*** Common Electrical Enables			
		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	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	*** Common Electrical Enables		0.1 seconds ((40 - 32) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control (PC) Solenoid A Control Circuit High Voltage	P0963	This DTC sets when PCS1 has been detected to be shorted to power or open circuited.	PCS1 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P0963  *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
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
		DTC Pass		HWIO circuitry detects an out of range error is not present			1 second ((400 - 320) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control (PC) Solenoid B Control Circuit Low Voltage	P0966	This DTC sets when the PCS2 control circuit has been detected to be shorted to ground	PCS2 electrical status	HWIO circuitry detects an electrical low pressure error is present.	DTC P0966  *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control (PC) Solenoid B Control Circuit High Voltage	P0967	This DTC sets when PCS2 has been detected to be shorted to power or open circuited.	PCS2 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P0967  *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
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
		DTC Pass		HWIO circuitry detects an out of range error is not present			1 second ((400 - 320) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control (PC) Solenoid C Control Circuit Low Voltage	P0970	This DTC sets when the PCS3 control circuit has been detected to be shorted to ground	PCS3 electrical status	HWIO circuitry detects an electrical low pressure error is present.	DTC P0966  *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control (PC) Solenoid C Control Circuit High Voltage	P0971	This DTC sets when PCS3 has been detected to be shorted to power or open circuited.	PCS3 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P0967  *** Common Electrical Enables	Not failed this key on	Failure detected for 0.2 seconds (16 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
				HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 16) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control (PC) Solenoid D System Performance	P2719	This DTC sets when an invalid voltage in PCS4 control circuit has been detected	PCS4 electrical status	HWIO circuitry detects out of range error is present.	DTC P2719  *** Common Electrical Enables	Not failed this key on	Failure detected for 4 seconds (320 * 0.0125) out of a 5 second (400 * 0.0125) window	Two Trips, Type B
		DTC Pass		HWIO circuitry detects an out of range error is not present			1 second ((400 - 320) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control (PC) Solenoid D Control Circuit Low Voltage	P2720	This DTC sets when the PCS4 control circuit has been detected to be open circuit or shorted to power	PCS4 electrical status	HWIO circuitry detects an electrical low pressure error is present.	DTC P2720  *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control (PC) Solenoid D Control Circuit High Voltage	P2721	This DTC sets when PCS4 has been detected to be shorted to ground	PCS4 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P2721  *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
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
		DTC Pass		HWIO circuitry detects an out of range error is not present			1 second ((400 - 320) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control (PC) Solenoid E Control Circuit Low Voltage	P2729	This DTC sets when the PCS5 control circuit has been detected to be open circuit or shorted to power	PCS5 electrical status	HWIO circuitry detects an electrical low pressure error is present.	DTC P2720  *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control (PC) Solenoid E Control Circuit High Voltage	P2730	This DTC sets when PCS5 has been detected to be shorted to ground	PCS5 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P2721  *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Shift Solenoid A Control Circuit Low	P0973	This DTC detects a short to power or open circuit in the X valve control circuit.	X Valve Electrical Status	HWIO circuitry detects an open circuit or short to power error is present.	DTC P0973	Not failed this key on	Failure detected for 0.4 seconds (32*0.0125) out of a 0.5 second (40*0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an open circuit or short to power error is not present.	*** Common Electrical Enables		0.1 seconds ((20 - 16) * 0.025)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Shift Solenoid A Control Circuit High	P0974	This DTC detects a short to ground in the X valve control circuit.	X Valve Electrical Status	HWIO circuitry detects short to ground error is present.	DTC P0974  *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32*0.0125) out of a 0.5 second (40*0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects short to ground error is not present.			0.1 seconds ((20 - 16) * 0.025)	
Shift Solenoid B Control Circuit Low	P0976	This DTC detects a short to power or open circuit in the Y valve control circuit.	Y Valve Electrical Status	HWIO circuitry detects an electrical low pressure error is present.	DTC P0976	Not failed this key on	Failure detected for 0.4 seconds (32*0.0125) out of a 0.5 second (40*0.0125) window	One Trip, Type A

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.	*** Common Electrical Enables		0.1 seconds ((20 - 16) * 0.025)	
Shift Solenoid B Control Circuit High	P0977	This DTC detects a short to ground in the Y valve control circuit.  DTC Pass	Y Valve Electrical Status	HWIO circuitry detects an electrical hi pressure error is present.  HWIO circuitry detects short to ground error is not present.	DTC P0977  *** 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 ((20 - 16) * 0.025)	One Trip, Type A
<b>Power Moding Diagnostics</b>								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Ignition Switch Run/Start Position Circuit Low	P2534	Detects a run crank relay open circuit	Runk Crank Line voltage	Ignition Run Crank line voltage $\leq$ 2 Volts	CAN Communication	enabled	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	ECM run crank active data	available and active	5 seconds (200 * 0.025)	
Ignition Switch Run/Start Position Circuit High	P2535	Detects a run crank relay short to power	Runk Crank Line voltage	Ignition Run Crank line voltage $>$ 5 V	CAN Communication	enabled	12 seconds (480 * 0.025) in a 15 second window (600 * 0.025)	One Trip, Type A
		DTC Pass	Run Crank Line Voltage	Ignition Run Crank line voltage $<$ 2V	ECM run crank active data	available and false	3 seconds (120 * 0.025)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Ignition Switch Accessory Position Circuit Low	P2537	Detects an accessory position circuit open	Accessory On	FALSE	P2537	Not Test Failed This Key On and Not Test Passed This Key On	0.2 seconds (8 * 0.025)	One Trip, Type A
					Propulsion System	Active		
					Propulsion System Active Time	> 0.5 seconds		
		DTC Pass	Accessory On	TRUE			0.2 seconds (8 * 0.025)	
<b>TCM Substrate Temp Sensor</b>								
Transmission Control Module (TCM) Internal Temperature Too High	P0634	The DTC detects the electronic circuitry is at high operating temperature.	Transmission Substrate Temperature  OR Ignition Voltage AND Substrate Temperature	$\geq 142 \text{ }^\circ\text{C}$  $\geq 18 \text{ V}$ $\geq 50 \text{ }^\circ\text{C}$	Transmission Substrate Temperature	$-50 \text{ }^\circ\text{C} \leq$ Transmission Substrate Temperature $\leq 146 \text{ }^\circ\text{C}$ for 0.25 seconds	$\geq 5$ seconds  $\geq 2$ seconds  <b>Pass Conditions</b>	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 Substrate Temp ≤ 142 °C and Ignition Voltage is ≤ 18 V for 10 seconds <b>OR</b> 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)	> Highest of transmission temperature sensors Temp    Delta -40.1    256 -40       50 -20       30 0         30	IF vehicle speed is < 5 mph and accelerator position is > 20% for more than 7 seconds, then diagnostic is disabled.		> 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
				30 30 60 30 100 30 149.0 30 149.1 256	Once above conditions are removed > 20 seconds, diagnostic is re-enabled			
			AND					
			Delta between TCM substrate temperature sensor and TCM powerup temperature sensor	> Highest of transmission temperature sensors Temp Delta -40.1 256 -40 15 -20 15 0 15 30 15 60 15 100 15 149.0 15 149.1 256	Transmission state  Engine Torque Inaccurate  Accelerator Position Sensor Failure  P0721, P0722, P0723, P215C, P0658, P0668, P0669, P0712, P0713, P06AD, P06AE	NOT in park/neutral  Must be FALSE  Must be FALSE  NOT Fault Active OR Failed This Key On		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
					Vehicle Speed	≤ 124 MPH for 5 seconds		
		<b>DTC Pass</b>	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	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds	≥ 60 seconds	Two Trips, Type B
					Vehicle Speed	≤ 124 MPH for 5 seconds	<b>Pass Conditions</b> Transm'n Substrate Temp ≥ -55	



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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				-20 15 0 15 30 15 60 15 100 15 149.0 15 149.1 256	Accelerator Position Sensor Failure  P0721, P0722, P0723, P215C, P0658, P0668, P0669, P0712, P0713, P06AD, P06AE  Engine Speed  Vehicle Speed	Must be FALSE  NOT Fault Active OR Failed This Key On  0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds  ≤ 124 MPH for 5 seconds		
		<b>DTC Pass</b>	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
							seconds	
Transmission Control Module (TCM) Powerup Temperature Sensor Circuit High (Failed at a high temperature - circuit open or short to power).	P06AE	The DTC detects TCM powerup sensor open or short to power error.	TCM Power Up Temperature Sensor	≥ 164 °C	Engine Speed  Vehicle Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds  ≤ 124 MPH for 5 seconds	≥ 60 seconds       <b>Pass Conditions</b> Transm'n Substrate Temp ≤ 150 °C for 4 seconds	Two Trips, Type B
<b>Transmission Fluid Temp Sensor</b>								
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          30 0            30	IF vehicle speed is < 5 mph and accelerator position is > 20% for more than 7 seconds, then diagnostic is disabled.		> 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
				30 30 60 30 100 30 149.0 30 149.1 256	Once conditions are 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 30 0 30 30 30 60 30 100 30 149.0 30 149.1 256	Transmission state  Engine Torque Inaccurate  Accelerator Position Sensor Failure	NOT in park/neutral  Must be FALSE  Must be FALSE		
					P0721, P0722, P0723, P215C, P0658, P0668, P0669, P0712, P0713, P06AD, P06AE	NOT Fault Active OR Failed This Key On		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Engine Speed  Vehicle Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds  ≤ 124 MPH for 5 seconds		
		<b>DTC Pass</b>	Transm'n substrate temp delta between powerup temp sensor AND fluid temp sensor	< value in fail criteria table			> 70 sec (700 counts at 100ms)	
Transmission Fluid Temperature Sensor Circuit Low (Failed at a low temperature - circuit short to ground).	P0712	The DTC detects transmission fluid sensor short to ground error.	Transmission Sump Temperature Sensor	≤ -60 °C	P0721, P0722, P0723, P077B, P215C  Engine Speed  Vehicle Speed	NOT Fault Active OR Failed This Key On  0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds  ≤ 124 MPH for 5 seconds	≥ 60 seconds	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Estimated Motor Power Loss	Estimated Motor Power Loss $\geq 0.4$ kW for 200 seconds cumulative.	<p><b>Pass Conditions</b> Transm'n Sump Temp <math>\geq -50</math> °C for 4 seconds</p>	
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	$\geq 160$ °C	<p>P0721, P0722, P0723, P077B, P215C</p> <p>Engine Speed</p> <p>Vehicle Speed</p>	<p>NOT Fault Active OR Failed This Key On</p> <p><math>0 \leq</math> Engine Speed <math>\leq 7500</math> RPM for 5 seconds</p> <p><math>\leq 124</math> MPH for 5 seconds</p>	<p><math>\geq 60</math> seconds</p> <p><b>Pass Conditions</b></p>	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 Substrate Temp ≤ 149 °C for 4 seconds	
<b>Transmission Output Speed Sensor</b>								
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)  <b>Pass Conditions</b> TOS Direction Raw = Forward or Reverse for 3.125 seconds (125 counts at 25ms)	One Trip, Type A
Output Speed Sensor Circuit	P077B	The DTC detects if the	Transmission Output Speed	≠ Motor Direction	CAN Communication	FALSE	0.35 seconds (14	One Trip,



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Speed (OSS) - Wheel Speed Correlation		Correlates the Transmission Output Speed with the ABS Wheel Speed and Motor Speed to Detect any Failures in the Transmission Output Speed Sensor.	Transmission Output Speed and the Calculated Average of Output Speed from the Motors and Wheel Speed Sensors		Speed Calculated from Wheel Speeds AND Output Speed Calculated from Motor Speeds  Output Speed Calculated from Motor Speeds AND Output Speed Calculated from Wheel Speeds Difference  OBD Wheel Speed Sensors  Driven Wheel Estimated Vehicle Speed Fault  Propulsion	≤ 40 RPM    TRUE  FALSE  TRUE	counts at 25ms)          <b>Pass Conditions</b> Difference between Transm'n Output Speed and the Calculated Average of Output Speed from the Motors and Wheel	Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					System Active  Hybrid Motor Speed based Estimated Output Speed is Valid	Calculated based on M1 or M2 Speed Equation	Speed Sensors ≤ 125 RPM for 0.5 seconds (20 counts at 25ms)	
<b>Transmission Internal Mode Switch</b>								
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  PRNDL P Circuit Sensed	PARK  Has Not Been Observed Low	P1824  Transmission Direction State Fault Active  Ignition Voltage	NOT Fault Active OR Failed This Key On  FALSE  11V < IGN < 32V	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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Trans Direction State	DRIVE	P182C	NOT Fault Active OR Failed This Key On	<b>Pass Conditions</b> PRNDL B Circuit Has Been Observed Low for 1.5875 seconds	
					PRNDL State	PARK		
					PRNDL B Circuit Sensed	Has Been Observed High for 1 Second		
					Trans Direction State Fault Active	FALSE		
					Ignition Voltage	11V < IGN < 32		
					Run/Crank Active	TRUE		

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Vehicle Speed  P182E  Ignition Voltage  Run/Crank Active  Vehicle Speed  Engine Speed	$\leq 124$ MPH for 5 seconds  NOT Fault Active OR Failed This Key On  $11V < IGN < 31.99$  TRUE  $< 124$ mph for 5 sec  $0 \leq$ Engine Speed $\leq 7500$ RPM for 5 seconds	<b>Pass Conditions</b> PRNDL State is NOT Illegal for 5 seconds	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					TOS Sensor	Not Fault Active		
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  PRNDL A Circuit Sensed	PARK  Has Not Been Observed Low	P1838  Trans Direction State Fault Active  Ignition Voltage  Run/Crank Active	NOT Fault Active OR Failed This Key On  FALSE  11V < IGN < 31.99  TRUE	2.5 seconds + 1 count at 6.25ms  <b>Pass Conditions</b> PRNDL A Circuit Has Been Observed Low for 1.5875 seconds	Two Trips, Type B
Internal Mode Switch C Circuit Low Voltage	P1839	The DTC monitors if the IMS C Circuit is shorted to a Low Voltage	Transmission Direction State	PARK	P1839	NOT Fault Active OR Failed This Key On	2.5 seconds + 1 count at 6.25ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			PRNDL C Circuit Sensed	PRNDL C Circuit Has Not Been Observed High	Trans Direction State Fault Active  Ignition Voltage  Run/Crank Active	FALSE  11V < IGN < 31.99  TRUE	<b>Pass Conditions</b> PRNDL C Circuit Has Been Observed Low for 1.5875 seconds	
<b>Controller Diagnostics</b>								
Control Module Read	P0601	<i>This Diagnostic tests the checksum on ROM (flash) memory</i>						One Trip,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Only Memory (ROM)		<p><b>DTC Fail case 1:</b> This DTC will be stored if any check sum in the <b>boot</b> is incorrect</p>	<p>Calculated Checksum does not match stored checksum</p>		Ignition Status	= Run or Crank	<p>1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5 failures</p> <p>Frequency: Runs continuously in the background</p>	Type A
<p><b>DTC Fail case 2:</b> This DTC will be stored if any check sum in the <b>calibration</b> is incorrect</p>								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<b>DTC Fail case 3:</b> This DTC will be stored if any check sum in the <b>software</b> is incorrect						
		<b>DTC Pass:</b>		ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false				
Control Module Not Programmed	P0602	<i>This Diagnostic tests for whether a controller has been programmed</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> 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	
		<b>DTC Pass:</b>		Enable cal = false				
Control Module Long	P0603	<i>This Diagnostic tests for BINVDM errors</i>						One Trip,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Term Memory Reset		<b>DTC Fail case 1:</b> Non-volatile memory ( <b>Static</b> ) 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	Type A
		<b>DTC Fail case 2:</b> Non-volatile memory ( <b>Preserved</b> ) checksum error at controller power-up						
		<b>DTC Fail case 3:</b> Non-volatile memory ( <b>ShutdownFinished</b> ) checksum error at controller power-up						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<b>DTC Pass:</b>		No ROM memory faults				
Control Module Random Access Memory (RAM) Failure	P0604	<i>This Diagnostic tests the checksum on RAM memory</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> Indicates that HCP is unable to correctly write and read data to and from RAM	Data read does not match data written		Ignition Status	Run or Crank	Should finish within 30 seconds at all operating conditions	
Bosch T43 TEHCM Security-Output Disable/IPT Test	P0606	<i>This Diagnostic tests that the HWIO executes the IPT (Inhibit Path Test) exactly once at every ignition on to test the ability of the external monitoring module (CG122) to shutoff high-side drivers to the transmission hydraulics and reset the main processor.</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> 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
		<b>DTC Fail case 2:</b> 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	
		<b>DTC Fail case 3:</b> Abort IPT, because HSD may be short-circuited to ground or to battery voltage	Actuator supply is out of voltage threshold range during more than 40 msec.  AND	- WD error counter: >=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
			WD error counter is equal or higher than threshold. AND Output stage is interlocked AND Actuator supply is lower than 90% of Batt. Voltage.					
		<b>DTC Fail case 4:</b> 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	
		<b>DTC Fail case 5:</b> WD error counter does not reach its desired level (sdi_Ufet = 4)	WD error count is equal or higher than threshold	- WD error count: 4	IPT test started	end of Initialization	3.125ms loop	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<b>DTC Fail case 8:</b> 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	
		<b>DTC Fail case 9:</b> HSD cannot be switched off at WD error counter >= 5	Actuator supply voltage is out of range or WD error count is lower than threshold during more than 40 msec.  AND Output stage is interlocked AND	- actuator supply voltage: < 1.5 volts or > 5.5 volts  -WD error counter:<5	IPT test started	end of Initialization	3.125ms loop	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Actuator supply voltage is equal or higher than 90% of the Batt. Voltage.					
		<b>DTC Fail case 10:</b> DReset line = high level, HSD cannot be switched off (fgtr_DReset = False)	Actuator supply voltage is out of threshold range during more than 40 msec.  AND WD error count is equal or higher than threshold AND Output stage is not interlocked	- actuator supply voltage: < 1.5 volts or > 5.5 volts  -WD error counter:<5	IPT test started	end of Initialization	3.125ms loop	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum	
		<b>DTC Fail case 11:</b> Run time of IPT function too long	IPT execution time is equal or greater than time threshold.	- time threshold : 300ms	IPT test started	end of Initialization	3.125ms loop		
Internal Control Module A/D Processing Performance	P060B	<i>HWIO executes the A/D converter test. This test checks the Vref voltage at 3 levels.</i>							One Trip, Type A
		<b>DTC Fail case 1:</b> AtoD converter test result is failed	0 x Vref is higher than voltage threshold	> approx. 0.01467 Volts	Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	6.25ms		
		<b>DTC Fail case 2:</b> 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		
		<b>DTC Fail case 3:</b> 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		
<b>Torque Security</b>									
Control Module Long	P062F	<i>This Diagnostic tests for unuseable BINVDM (flash) memory only</i>							One Trip,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Term Memory Performance		<b>DTC Fail case 1:</b> Indicates that the NVM Error flag <b>HWIO Bat Dynamic Write will not succeed</b> set	Last EEPROM write did not complete		Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up	Type A
		<b>DTC Fail case 2:</b> Indicates that the NVM Error flag <b>HWIO Bat Static Write will not succeed</b> set						
		<b>DTC Pass:</b>		Dynamic or static Batwrite will not succeed = fail				
Internal Control	P16F3	<i>Detect the dual store memory fault by comparing the primary value and the dual store value of the individual variables</i>						One Trip,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Module Redundant Memory Performance		<b>DTC Fail case 1:</b> Detect the dual store memory fault by comparing the primary $V_e$ signals and the $W_e$ redundant signals	The primary value and the dual store value are not equal			Runs continuously	Signal Dependenda ntX fail counts out of Y sample counts Executes in a Xms loop  Detects in 200ms	Type A
Clutch pressure combination / valve commands do not fit to allowed range state	P16F7	<i>Detects controller faults such that solenoid commands doesn't match with it's expected associated Range State value.</i>						One Trip, Type A
		<b>DTC Fail case 1:</b>	Control State Request for Clutch 1 is NOT Active AND X Valve Command is 0 AND Y Valve Command is 0 AND	Clutch 1 Pressure > 153kpa time threshold: 200msec	Ignition switch	in crank or run	Executes in a 12.5ms loop	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Clutch 1 Pressure Command has been corrupted to higher than threshold					
		<b>DTC Fail case 2:</b>	Control State Request for Clutch 2 is NOT Active AND X Valve Command is 0 AND Y Valve Command is 1 AND Clutch 2 Pressure Command has been corrupted to higher than threshold	Clutch 2 Pressure > 178kpa time threshold: 200msec				
		<b>DTC Fail case 3:</b>	Control State Request for Clutch 1 is NOT Active AND	Clutch 1 Pressure > 153kpa time threshold: 200msec				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			X Valve Command is 1 AND Y Valve Command is 0 AND Clutch 1 Pressure Command has been corrupted to higher than threshold					
		<b>DTC Fail case 4:</b>	Control State Request for Clutch 2 is NOT Active AND X Valve Command is 1 AND Y Valve Command is 0 AND	Clutch 2 Pressure > 178kpa time threshold: 200msec				

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum	
			Clutch 3 Pressure Command has been corrupted to higher than threshold						
Alive Rolling Count / Protection Value fault	P179B	<i>This Diagnostic checks for corruption in signals sent over CAN for the Hybrid Range State</i>						14 fail counts out of 16 sample counts  Executes in a 12.5ms loop Detects in 200ms	One Trip, Type A
		<b>DTC Fail case 1:</b> 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			
		<b>DTC Pass:</b>		No errors in 1000ms					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
<b>Communication Diagnostics</b>								
Control Module Comm'n Bus A Off	U0073	<i>This diagnostic indicates a bus off condition on HSGMLAN (Bus A)</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.	CAN device driver	= bus-off state.	Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	4 fail counts out of 5 samples counts  Executes in a 12.5ms loop  Detects in 450 ms	
					Power Mode	=RUN		
					Bus Off Fault Active	=FALSE		

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission Diagnostic System Disable	=TRUE =FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Brake	U0129	<i>This diagnostic indicates a lost communication between the TCM and the BSCM on Bus A</i>						Two Trips,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
System Control Module		<b>DTC Fail case 1:</b> Detects that CAN serial data communication has been lost with the EBCM on Bus A	Missed EBCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage  Power Mode  Bus Off Fault Active  Normal Communication Enabled  Normal Message Transmission Diagnostic System Disable	> 9.5 Volts    =RUN/ACC  =FALSE  =TRUE  =TRUE  =FALSE	Executes in a 6.25ms loop       Detects in 500 ms	Type B

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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
<b>Crank Pulse Diagnostics</b>								
Crankshaft Position (CKP) Sensor A Circuit	P0335	Detects Lack of Response from 58X Crank Sensor	Crank Sync State (Lores Crank Compared to Hires Crank)	No Activity	HWIO based crank decode status	NOT DisableCrank	1500ms  <b>Pass Conditions:</b> Crank Sync State ≠ No Activity	Two Trips, Type B
Crankshaft Position (CKP) Sensor A Performance	P0336	Detects Invalid 58X Crank Sensor Signal	Crank Sync State (Lores Crank Compared to Hires Crank)	Verify Sync	HWIO based crank decode status	NOT DisableCrank	400ms  OR 10 crank re-sync events in a 10 second window	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							<b>Pass Criteria:</b> Crank Status = CrankInSync for 10 seconds	
<b>Idle Speed Diagnostics</b>								
Idle Diagnostics P0506, P0507 have the following common enable criteria	***				No Active DTCs:  No Active DTCs:  No Active DTCs:  Accelerator pedal position Accel Pedal position Engine State	Motor A speed faults: P0A3F, P1B03, P0A40, P0C52, P0C53, P0C5C, P0C5D  Motor B speed faults: P0A45, P1B04, P0A46, P0C57, P0C58, P0C61, P0C62  Vehicle Speed/TOS sensor faults: P0722, P077B, P215C  Not Defaulted  <= 1 %  Running (not		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Vehicle speed Commanded RPM Delta IdleConditons present	starting or stopping states) ≤ 0.6 mph < 50 RPM  for ≥ 5 seconds		
Idle Air Control (IAC) System - RPM Too Low	P0506	This DTC sets when the idle speed is lower than the targeted idle speed	Idle speed	Filtered input speed error (desired - actual) is greater than fail threshold 75 RPM. Filter coefficient for engine speed = 0.002	** Common Enables		1 loop execution at 100 ms rate	Two Trips, Type B
		DTC Pass	Idle speed		** Common Enables		Pass condition met for 15 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC RePass after failure	Idle Speed	Filtered input speed error (desired - actual), is less than fail threshold 50. Filter coefficient for engine speed = 0.002	No Active DTCs:  ** Common Enables	P0507	Pass condition met for 15 seconds	
Idle Air Control (IAC) System - RPM Too High	P0507	This DTC sets when the idle speed is higher than the targeted idle speed	Idle speed	Filtered input speed error (desired - actual) is less than fail threshold -150 RPM. Filter coefficient for engine speed = 0.002	** Common Enables		1 loop execution at 100 ms rate	Two Trips, Type B
		DTC Pass	Idle speed		** Common Enables		Pass condition met for 15 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC RePass after failure	Idle Speed	Filtered input speed error (desired - actual), is greater than fail threshold -140. Filter coefficient for engine speed = 0.00375	No Active DTCs:  ** Common Enables	P0506	Pass condition met for 15 seconds	
<b>Power Moding Diagnostics</b>								
System Voltage Low	P0562	Sets when the low voltage system voltage is below a threshold	Ignition Voltage	<= 10 Volts	Ignition Key Status	RUN/CRANK	5 seconds in a 6 second window	Special Type C
		DTC Pass		> 10 Volts	Engine Speed	>= 0 RPM	1 second	
System Voltage Hi	P0563	Sets when the low voltage system voltage is above a threshold	Ignition Voltage	>= 18 Volts	Ignition Key Status	RUN/CRANK	5 seconds in a 6 second window	Special Type C

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass		Ignition Voltage < 18 Volts			1 second	
Ignition Switch Run/Start Position Circuit Low	P2534	Detects a run crank relay open circuit	Runk Crank Line voltage	<= 2 Volts	CAN Communication  ECM run crank active data	enabled  available and active	60 seconds (2400 * 0.025) in a 65 second window (2600 * 0.025)	One Trip, Type A
		DTC Pass	Run Crank Line Voltage	> 5 Volts			5 seconds (200 * 0.025)	
Ignition Switch Run/Start Position Circuit High	P2535	Detects a run crank relay short to power	Runk Crank Line voltage	> 5 V	CAN Communication  ECM run crank active data	enabled  available and false	12 seconds (480 * 0.025) in a 15 second window (600 * 0.025)	One Trip, Type A
		DTC Pass	Run Crank Line Voltage	< 2V			3 seconds (120 * 0.025)	
Ignition Switch Accessory Position Circuit Low	P2537	Detects an accessory position circuit open	Accessory	FALSE	P2537	Not Test Failed This Key On and Not Test Passed This Key On	0.2 seconds (8 * 0.025)	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Propulsion System Propulsion System Active Time	Active  > 0.5 seconds		
		DTC Pass	Accessory	TRUE			0.2 seconds (8 * 0.025)	
<b>Stuck Clutch Diagnostics</b>								
Transmission Friction Element A Stuck On	P07A3	Detects an applied or welded clutch (C1)	Clutch slip observed	=0	C1 clutch state	=offgoing	.9s * 3 fail attempts + 2 *10 second wait between attempts	One Trip, Type A
						Clutch slip		
		DTC Pass	C1 Slip observed	=1	C1 Slip Speed	> 30 RPM		
Transmission Friction Element B Stuck On	P07A5	Detects an applied or welded offgoing clutch (C2)	Clutch slip observed	=0	C1 clutch state	=offgoing	.9s	One Trip, Type A
						Clutch slip		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Detects an applied or welded clutch (C2)	Clutch slip ref	>360 rpm				
		DTC Pass	Clutch slip actual	<100 rpm				
			C2 Slip observed	=1	C1 Slip Speed	> 30 RPM	.3 s (12*.025s)	
			Clutch slip reference	>360 rpm				
			Clutch slip actual	>200 rpm				
Transmission Friction Element C Stuck On	P07A7	Detects an applied or welded clutch (C2)	Clutch slip ref	>360 rpm			20.6s = (.2s * 3 fail attempts + 2 *10 second wait between attempts)	One Trip, Type A
		DTC Pass	Clutch slip actual	<100 rpm				
			Clutch slip reference	>360 rpm			.3 s (12*.025s)	
			Clutch slip actual	>200 rpm				
<b>Transm'n Auxiliary Oil Pump Diagnostics</b>								

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	Difference between desired and actual aux pump speed	>650 rpm for >.25s	Aux Pump Speed Command	>= 600 RPM FOR 1 second	Fail Condition met for 3 seconds (120 * 0.025) in a 1.25 second (150 * 0.025) window	One Trip, Type A
		DTC Pass	Aux pump speed	Aux pump speed - Commanded Aux pump Speed  <= 650 RPM	RunCrankActive	= 1 for > 0.2 s	Pass met for 0.5 seconds ((165-160) * 0.025)	
<b>Transm'n Output Speed Sensor</b>								
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	Transmission Output Speed Direction Raw	≠ Motor Direction	Transmission Output Speed  Hybrid Motor Speed based Estimated Output Speed is Valid	Not FAULT ACTIVE  Calculated based on M1 or M2 Speed Equation	0.325 seconds (13 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
		Motor Speed Sign			Transmission Output Speed and Motor Output Speed Difference	≤ 50 RPM	<b>Pass Conditions</b> Opposite of FAIL for 5 seconds (200 counts at 25ms)	
					Motor Estimated Transmission Output Speed	≥ 50 RPM		
Vehicle Speed Output Shaft Speed Correlation	P215B	The DTC Monitors if the Difference between the Transmission Output Speed and Output Speed Calculated from the Wheel Speed Sensors	Transmission Output Speed and Output Speed Calculated from the Wheel Speed Sensors Difference	6.2 mph	Number of Secured Vehicle Speed Sources	2	10 seconds (400 counts at 25ms)	Two Trips, Type B
					Secured Vehicle Speed Use Transmission Output Speed	TRUE	<b>Pass Conditions</b> Opposite of Fail for 20 seconds (800 counts at 25ms)	
					Secured Vehicle Speed Use Wheel Speed	TRUE		
<b>Internal Mode Switch 2</b>								

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

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

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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							<b>Pass Conditions</b> Opposite of Fail for 3.125 seconds (125 counts at 25ms)	
Internal Mode Switch 1-2 Correlation	P183F	The DTC Monitors if the IMS Direction and Range Correlation is Invalid	Converted Directional IMS	Correlation Fault Neutral (With No IMS Faults the Direction IMS and Range IMS Indicate Different Detent Postions)	**Common Enable Criteria		1.25 seconds (50 counts at 25ms)  <b>Pass Conditions</b> Opposite of Fail for 1.7 seconds (68 counts at 25ms)	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Internal Mode Switch 2 S Circuit Low Voltage	P184A	The DTC Monitors if the IMS S Circuit is Shorted to a Low Voltage	Converted Directional IMS  AND Directional IMS S Circuit	Transitional 9  Has Not Been Observed High	**Common Enable Criteria		2.7 seconds (108 counts at 25ms)  <b>Pass Conditions</b> IMS S Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 S Circuit High Voltage	P184B	The DTC Monitors if the IMS S Circuit is Shorted to a High Voltage	Converted Directional IMS  AND Directional IMS S Circuit	Transitional 26 AND DRIVE  Has Not Been Observed Low	**Common Enable Criteria		2.7 seconds (108 counts at 25ms)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			AND Directional IMS R1	R1 Has Been Observed Low			<b>Pass Conditions</b> IMS S Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	
<b>Battery Pack Diagnostics</b>								
Hybrid Battery System Discharge Time Too Long	P0C76	High voltage bus discharge time too long	High Voltage Inverter Rationalized Voltage	> 200V after 3.5 seconds	Vehicle Power Mode	= RUN	2 Failures out of 2 Samples  Frequency: Runs Once per Key-Cycle	Special Type C
Discharge Switch Circuit Open	P1A56	High voltage bus discharge circuit failed	High voltage bus voltage delta after commanded discharge circuit event	< 15V after 100ms	Vehicle Power Mode	= RUN	1 Failure	Special Type C

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Discharge circuit status	Unavailable	10 counts			10 discharge unavailable events Frequency: Runs once per key-cycle Pass:  High voltage bus delta > 15V after 100ms of a commanded discharge event	
Hybrid Battery Contactor Status Circuit Low	P1E08	The DTC monitors the redundant contactor status signal	Redundant contactor status signal PWM	< 10%	Vehicle Power Mode	~= OFF	4s out of a 5s window	Two Trips, Type B
Hybrid Battery Contactor Status Circuit High	P1E09	The DTC monitors the redundant contactor status signal	Redundant contactor status signal PWM	> 90%	Vehicle Power Mode	~= OFF	4s out of a 5s window	Two Trips, Type B
<b>Autostart Diagnostics</b>								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid System Performance	P0AB9	This diagnostic indicates an autostart or autostop attempt failed.	Engine state	not running	Clutch 3 slip state	Not fault pending or fault active	15s	One Trip, Type A
<b>Controller Diagnostics</b>								
Control Module Read Only Memory (ROM)	P0601	<i>This Diagnostic tests the checksum on ROM (flash) memory</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> This DTC will be stored if any check sum in the <b>boot</b> 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	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 2:</b> This DTC will be stored if any check sum in the <b>calibration</b> is incorrect</p> <p><b>DTC Fail case 3:</b> This DTC will be stored if any check sum in the <b>software</b> is incorrect</p> <p><b>DTC Pass:</b></p>						
				ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false				
Control Module	P0602	<i>This Diagnostic tests for whether a controller has been programmed</i>						One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Module Not Programmed		<b>DTC Fail case 1:</b> 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	Trip, Type A
		<b>DTC Pass:</b>		Enable cal = false				
Control Module Long Term Memory Reset	P0603	<i>This Diagnostic tests for BINVDM errors</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> Non-volatile memory ( <b>Static</b> ) checksum error at controller power-up			Ignition Status	= Run or Crank	1 failure  Frequency: Once at powerup	
		<b>DTC Fail case 2:</b> Non-volatile memory ( <b>Preserved</b> ) checksum error at controller power-up	Checksum at power-up					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 3:</b> Non-volatile memory (<b>BINVDM</b>) checksum error at controller power-up</p> <p><b>DTC Fail case 4:</b> Non-volatile memory (<b>ShutdownFinished</b>) checksum error at controller power-up</p> <p><b>DTC Pass:</b></p>	does not match checksum at power-down					
Control Module	P0604	<i>This Diagnostic tests that the RAM is functioning correctly</i>						One Trip.

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum	
Random Access Memory (RAM) Failure		<b>DTC Fail case 1:</b> The primary Ye variable does not match the redundant Ya variable <b>Dual Store RAM</b>	Ye variable	≠ Ya Variable	Ignition Status	= Run or Crank	Runs real time	Type A	
		<b>DTC Fail case 2:</b> Indicates that HCP is unable to correctly write to <b>Write Protect RAM</b>	Memory location is locked	Function is trying to write to that location					1 failure Frequency: Once at powerup
		<b>DTC Fail case 3:</b> During a running reset the RAM fault is still present during Init <b>Main SOH RAM</b>	RAM fault	= true @ init					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 4:</b> Indicates that HCP is unable to correctly write and read data to and from <b>System RAM</b></p>	<p>HWIO detects Fault</p>	<p>= true</p>				
		<p><b>DTC Fail case 5:</b> Indicates that HCP is unable to correctly write and read data to and from <b>Cache RAM</b></p>	<p>HWIO detects Fault</p>	<p>= true</p>				
		<p><b>DTC Fail case 6:</b> Indicates that HCP is unable to correctly write and read data to and from <b>eTPU RAM</b></p>	<p>HWIO detects Fault</p>	<p>= true</p>				

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 2:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_2ndNotRunningSeedKeyTst</p>	Key Value	= Calibration Value	SRAR shutdowns  SPI Fault  RunCrank Active  Ram or ROM fault  12V battery  Seed received in wrong order fault  Vehicle Speed  Seed/Key Timeout  Powermode	= False  =False  = False  = false  >11V  = false  <= 0 MPH  = False  = off for less than 5 seconds	Detects in 150ms	

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 5:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main DtctdSdKeyTime out</p>	seed does not update	within Calibration threshold	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	Detects in 1 sec	
		<p><b>DTC Fail case 6:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main DtctdSdRxWrongOrdr</p>	Seed sequence	≠ expected order	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	12 fail counts out of 16 sample counts  Executes in a 12.5ms loop  Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 7:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main SequenceFlt</p>	<p>Seed timeout</p> <p>PSW Fault</p>	<p>&gt; 200 ms</p> <p>= True</p>	<p>1. Seed Update Key StoreFault Enable OR</p> <p>2. Program Sequence Watch Enable</p>	<p>1. = True</p> <p>2. = True</p>	<p>3 fail counts out of 4 sample counts</p> <p>Executes in a 50ms loop</p> <p>Detects in 200ms</p>	
		<p><b>DTC Fail case 8:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main ALU_Flt</p>	<p>HWIO detects Fault</p>	<p>=2 (ina row)</p>	<p>1. ALU Test Enabled</p> <p>2. Diagnostic system status</p> <p>3. Code clear active</p> <p>4. PMDI Low voltage clear diag enable conditons met</p>	<p>1. = TRUE</p> <p>2. = Enabled</p> <p>3. &gt;= 0.15s</p> <p>4. = True</p>	<p>runs continuously in 12.5ms loop</p> <p>Detects in 12.5ms</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 9:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main CfgRegFlt</p>	HWIO detects Fault	=2 (in arow)	<p>1. Diagnostic Test Enabled</p> <p>2. Diagnostic system status</p> <p>3. Code clear active</p> <p>4. PMDI Low voltage clear diag enable conditons met</p>	<p>1. = TRUE</p> <p>2. = Enabled</p> <p>3. &gt;= 0.15s</p> <p>4. = True</p>	<p>runs continuously in 12.5ms loop</p> <p>Detects in 12.5ms</p>	
		<p><b>DTC Fail case 10:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main StackFlt</p>	HWIO detects Fault	= 5 (Since Powerup)	<p>Diagnostic Test Enabled</p> <p>Diagnostic System Enables</p>	<p>= True</p> <p>=True</p>	<p>Runs Continuously in 100ms loop</p> <p>Detects in 500ms</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 11:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main ADC_Flt</p>	Continuous Fault	> 200ms	<p>1. A2D Converter Test Enabled</p> <p>2. PT Relay Voltage</p> <p>3. Run Crank Voltage</p>	<p>1. = TRUE</p> <p>2. &gt; -1</p> <p>3. &gt; 7</p>	<p>5 fail counts out of 8 sample counts</p> <p>Executes in a 50ms loop</p> <p>Detects in 200ms</p>	
		<p><b>DTC Fail case 12:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Run CrankCorrFlt</p>	Run Crank on Secondary Processor	≠ Run Crank Active	<p>1. Run Crank Discrete Diagnostic Enable</p> <p>2. SPI Faults</p>	<p>1. = True</p> <p>2. = False</p>	<p>5 fail counts out of 8 sample counts</p> <p>Executes in a 25ms loop</p> <p>Detects in 200ms</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 13:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Flash ECC_CktTest</p>	HWIO detects Fault	= 3 /10 5/10	<p>1. Flash ECC Circuit Test Enable</p> <p>2. Power-Up Reset</p>	<p>1. = True</p> <p>2. = True</p>	<p>3 fail counts out of 10 sample counts (turns on MIL)</p> <p>5 fail counts out of 10 sample counts (shutdown vehicle)</p> <p>Executes once at every power up reset</p>	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Internal Control Module Torque Performance	P061A	<i>This Diagnostic tests if the regen is reported accurately to the brake control module</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> The Estimated output torque Commanded exceeds the upper Regen torque limit	The Estimated output torque Commanded	>The drivers output torque Request + .2g (534Nm)	Regenerative Braking Torque	> 0 Nm	14 fail counts out of 16 sample counts  Executes in a 12.5ms loop  Detects in 200ms	
		<b>DTC Pass:</b>		The Estimated output torque Commanded <= The drivers output torque Request + .2g (534Nm)				
Internal Control Module	P061B	<i>This Diagnostic tests if the hybrid torque command can create an unintended acceleration/decelerration or wrong direction hazzard</i>						One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Module Torque Calculation Performance		<b>DTC Fail case 1:</b> The Estimated output torque Commanded exceeds the upper torque limit  To Max Fault	The Estimated output torque Commanded	> Maximum of either the drivers output torque request or zero plus .2g (534Nm)		Runs continuously when a torque source is present	14 fail counts out of 16 sample counts  Executes in a 12.5ms loop  Detects in 200ms	Type A
		<b>DTC Fail case 2:</b> The Estimated output torque Commanded exceeds the lower torque limit  To Min Fault		< Minimum of either the drivers output torque request or zero minus .2g (534Nm)				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 3:</b> Transmission output torque rationality check violated  To Req Rat Fault</p>	<p>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.</p>	<p>1Nm</p>				
		<p><b>DTC Fail case 4:</b> Brake torque request rationality check violated  To Req Rat Fault</p>	<p>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.</p>					



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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum	
		<p><b>DTC Fail case 8:</b> The Traction Motor torque command exceeds the motor torque capacity</p> <p>Tm Cmd Fault</p>	The Traction Motor torque command	>Maximum motor torque capacity plus .2g (534Nm) or less than the minimum torque capacity minus .2g (534Nm)					
Control Module Long Term Memory Performance	P062F	<i>This Diagnostic tests for unuseable BINVDM (flash) memory only</i>							One Trip, Type A
		<p><b>DTC Fail case 1:</b> Indicates that the NVM Error flag <b>HWIO Bat Write will not succeed</b> set</p>	Last EEPROM write		Ignition State	= accesory, run, or crank	1 failure Frequency: Once at power-up		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<b>DTC Fail case 2:</b> Indicates that the NVM Error flag <b>HWIO Assembly Cal set</b>	did not complete					
		<b>DTC Pass:</b>		NV writewillnotsucceed = fail Assemblycalfail = false				
Torque Management System – Forced Engine Shutdown	P06AF	<i>This Diagnostic checks that the ECM is still functioning correctly</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> The main processor monitor ring compares the ECM 2nd pattern (nibble pattern) to known good pattern to determine ECM state of health.	The nibble pattern is incorrect	The pattern does not match (F, 5, B, D, A, 6, 3, 0)	Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	8 fail counts out of 12 sample counts  Executes in a 12.5 ms Loop  Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum	
		<b>DTC Pass:</b>		2nd RX pattern smpl > Smpl Limit Nibble pattern completed					
<b>Supply Voltage Circuit Diagnostics</b>									
Supply Voltage Circuit 2 Low Voltage	P150D								Special Type C
		<b>DTC Fail case 1:</b> Supply Voltage Circuit 2 Low Voltage	Ignition Voltage	< 8V	Enable Cals  Diag System Disable	= true  = false	20 Fail count out of 25 sample counts  Executes in a 100ms loop  Detects in 2.5s		
		<b>DTC Pass:</b>		No failure in 2.5s					
Supply Voltage	P150E								Special Type C

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			The primary signal value does not equal the protection value	Primary Value ≠ Protection Value				
Alive Rolling Count / Protection Value fault for the commanded predicted axle torque	P15F1	<i>This Diagnostic checks for corruption in signals sent over CAN for the commanded predicted axle torque</i>						One Trip, Type A
		<p><b>DTC Fail case 1:</b> Detect the ARC (Alive Rolling Count) or Protection Value fault by checking the ARC and Protection Value of the commanded predicted axle torque</p> <p>OR</p> <p>The primary signal value does not equal the protection value</p>	<p>The current alive rolling count value does not equal the previous alive rolling count value incremented by 1</p> <p>OR</p> <p>The primary signal value does not equal the protection value</p>	<p>Current ARC ≠ Previous ARC +1</p> <p>Primary Value ≠ Protection Value</p>	<p>Ignition Key Status</p>	<p>Run/Crank for &gt; 0.5 seconds</p>	<p>14 fail counts out of 16 sample counts</p> <p>Executes in a 12.5 ms Loop</p> <p>Detects in 200ms</p>	
Alive Rolling Count /	P1B15	<i>This Diagnostic checks for corruption in signals sent over CAN for the Regenerative Braking Axle Torque</i>						One Trip,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Protection Value fault for the Regenerative Braking Axle Torque		<b>DTC Fail case 1:</b> Detect the ARC (Alive Rolling Count) Protection Value fault by checking the ARC and Protection Value of the Regenerative Braking Axle Torque	The current alive rolling count value does not equal the previous alive rolling count value incremented by 1  OR The primary signal value does not equal the protection value	Current ARC $\neq$ Previous ARC +1  Primary Value $\neq$ Protection Value	Ignition Key Status	Run/Crank for > 0.5 seconds	21 fail counts out of 32 sample counts  Executes in a 6.25 ms Loop  Detects in 200ms	Type A
Internal Control Module Transmission	P16F2	<i>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.</i>						One Trip, Type A

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 3:</b> No direction match with one IMS failure</p>	<p>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.</p>					
		<p><b>DTC Fail case 4:</b> Multiple transmission directions with one IMS failure</p>	<p>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).</p>					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<b>DTC Fail case 5:</b> 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.					
Internal Control Module Redundant Memory Performance	P16F3	<i>Detect the dual store memory fault by comparing the primary value and the dual store value of the individual variables</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> Detect the dual store memory fault by comparing the primary Ve signals and the We redundant signals	The primary value and the dual store value are not equal			Runs continuously	Signal DependendantX fail counts out of Y sample counts Executes in a Xms loop  <b>All Detected in 200ms</b>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum	
		<p><b>DTC Fail case 2:</b> Detect the dual store memory fault by comparing the primary Ye signals and the Ya redundant signals</p>				<p>Fail Timer incremented</p> <p>Runs continuously</p>	<p>&gt; 175ms</p> <p>Detects in 200ms</p>		
		<p><b>DTC Pass:</b></p>		No errors in 1000ms					
Internal Control Module Transmission Range Control Performance	P16F4	<p><i>Detect transmission range errors by comparing the Direction IMS switches with the Range IMS information from the TCM.</i></p>							One Trip, Type A
		<p><b>DTC Fail case 1:</b> Positive transmission ranges that do not match</p>	<p>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.</p>		<p>Run/Crank Voltage OR Powertrain Relay Voltage</p>	> 9.5 Volts	<p>5 fail counts out of 8 sample counts</p> <p>Executes in a 25ms loop</p> <p>Detects in 200ms</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 2:</b> Error corrected Direction IMS does not match</p>	<p>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.</p>					
		<p><b>DTC Fail case 3:</b> Range IMS is between valid transmission positions and Direction IMS is error corrected</p>	<p>The Range IMS indicates a transitional PRNDL position and the Direction IMS has an error corrected transmission position.</p>					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 4:</b> Range IMS is invalid and Direction IMS is error corrected</p>	<p>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.</p>					
		<p><b>DTC Fail case 5:</b> Range IMS is between valid transmission positions and Direction IMS is invalid</p>	<p>The Range IMS indicates a transitional PRNDL position and the Direction IMS is invalid due to a fault or a problem with the HCP</p>					
		<p><b>DTC Fail case 6:</b> Range IMS and Direction IMS are both invalid</p>	<p>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</p>					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Internal Control Module Commanded Range State	P16F6	<i>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</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> 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	
		<b>DTC Fail case 2:</b> Invalid Transmission Range State Group	The current Transmission Range State Group being used by the system is an invalid value.					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<b>DTC Fail case 3:</b> 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.					
		<b>DTC Fail case 4:</b> Range Equation mismatches current Transmission Range State	The Range Equation can not be rationalized against the current Transmission Range State.					
		<b>DTC Fail case 5:</b> Torque Determination State mismatches current Transmission Range State	The Torque Determination State can not be rationalized against the current Transmission Range State.					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<b>DTC Fail case 6:</b> Input Torque Optimization State mismatches current Transmission Range State	The Input Torque Optimization State can not be rationalized against the current Transmission Range State					
<b>Redundant Speed Sensor Circuit Diagnostics</b>								
Control Module Redundant Drive Motor A Speed Sensing Circuit	P1E4A	<i>This Diagnostic rationalizes the HCP calculated MTR A speed against MCP A calculated MTR A speed</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> The difference between Mtr A calculated speed and HCP calculated MTR A speed exceeds a threshold	The difference between Mtr A calculated speed and HCP calculated MTR A speed	> 400	Enable Cal  Run/Crank Voltage OR Run/Crank Voltage Secured	= true   = true	21 fail counts out of 32 sample counts  Executes in a 6.25ms loop  Detects in 200ms	
Control Module	P1E4B	<i>This Diagnostic rationalizes the HCP calculated MTR B speed against MCP B calculated MTR B speed</i>						One Trip.

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Control Module	U0074	<i>This diagnostic indicates a bus off condition on the PTE (Bus B)</i>						One Trip,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Comm'n Bus B Off		<b>DTC Fail case 1:</b> Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.	CAN device driver	= bus-off state.	Run/Crank Voltage OR Powertrain Relay Voltage  Power Mode  Bus Off Fault Active  Normal Communication Enabled  Normal Message Transmission	> 9.5 Volts    =RUN  =FALSE  =TRUE  =TRUE	4 fail counts out of 5 samples counts  Executes in a 12.5ms loop  Detects in 450 ms	Type A

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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Brake System Control Module	U0129	<i>This diagnostic indicates a lost communication between the HCP and the BSCM on Bus A</i>						Two Trips, Type B
		<b>DTC Fail case 1:</b> 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	Executes in a 6.25ms loop  Detects in 500 ms	
					Power Mode	=RUN/ACC		
					Bus Off Fault Active	=FALSE		

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

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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
With BSCM on Bus E		<b>DTC Fail case 1:</b> Detects that CAN serial data communication has been lost with the BSCM	Missed BSCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage  Power Mode  Bus Off Fault Active  Normal Communication Enabled  Normal Message Transmission  Diagnostic System Disable  Diagnostic Enable Timer	> 9.5 Volts   =RUN/ACC  =FALSE  =TRUE  =TRUE  =FALSE  >=3 sec	Executes in a 6.25ms loop          Detects in 500 ms	Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
<b>Contactor Diagnostics</b>								
Sensor Reference Voltage A Circuit/Open	P0641	Sets when the Main HVIL Ouput Circuit is Open	HWIO signal from VICM indicates 5V Ref output circuit is open	SRC A/D greater than 4.90V.	12V Battery Voltage	> 10V	4 failures out of 6 samples 12.5 ms /sample	One Trip, Type A
		DTC Pass					75 ms	
Sensor Reference Voltage A Circuit Low	P0642	Sets when the Main HVIL Ouput Circuit is Shorted Low	HWIO signal from VICM indicates 5V Ref output circuit is shorted low	Source A/D < 2.63V. RTN A/D < 1.08V.	12V Battery Voltage	> 10V	4 failures out of 6 samples 12.5 ms /sample	One Trip, Type A
		DTC Pass					75 ms	
Sensor Reference Voltage A Circuit High	P0643	Sets when the Main HVIL Ouput Circuit is Shorted High	HWIO signal from VICM indicates 5V Ref output circuit is shorted high		12V Battery Voltage	> 10V	4 failures out of 6 samples 12.5 ms /sample	One Trip, Type A
		DTC Pass					75 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Sensor Reference Voltage B Circuit/Open	P0651	Sets when the Charging HVIL Ouput Circuit is Open	HWIO signal from VICM indicates 5V Ref output circuit is open		12V Battery Voltage	> 10V	4 failures out of 6 samples 12.5 ms /sample	One Trip, Type A
		DTC Pass					75 ms	
Sensor Reference Voltage B Circuit Low	P0652	Sets when the Charging HVIL Ouput Circuit is Shorted Low	HWIO signal from VICM indicates 5V Ref output circuit is shorted low		12V Battery Voltage	> 10V	4 failures out of 6 samples 12.5 ms /sample	One Trip, Type A
		DTC Pass					75 ms	
Sensor Reference Voltage B Circuit High	P0653	Sets when the Charging HVIL Ouput Circuit is Shorted High	HWIO signal from VICM indicates 5V Ref output circuit is shorted high		12V Battery Voltage	> 10V	4 failures out of 6 samples 12.5 ms /sample	One Trip, Type A
		DTC Pass					75 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
High Voltage System Interlock Circuit Low	P0A0C	DTC monitors the sensed voltage when the commanded voltage is high to determine if the circuit is faulty	HVIL Sensed % of Reference Voltage	< 10%	HVIL Source Status	Sourced (5V)	2 failures out of 2 samples 12.5 ms /sample	One Trip, Type A
		DTC Pass					25 ms	
High Voltage System Interlock Circuit High	P0A0D	DTC monitors the sensed voltage when the commanded voltage is high and low to determine if the circuit is faulty	HVIL Sensed % of Reference Voltage	> 20%	HVIL Source Status	Unsourced (0V)	5 failures out of 6 samples 12.5 ms /sample	One Trip, Type A
			OR					
			HVIL Sensed % of Reference Voltage	> 90%	HVIL Source Status	Sourced (5V)	4 failures out of 6 samples 12.5 ms /sample	
		DTC Pass					75 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Positive Contactor Circuit Stuck Closed	P0AA1	This DTC detects when the Positive Contactor is Stuck Closed by comparing the the Bus Voltage to the Battery Voltage.	Bus Voltage / Battery Voltage	> 80%	Bus Voltage Sensor  Battery Voltage Sensor Negative Contactor  Bus Voltage / Battery Voltage	Not Failed	3 failures out of 4 samples 12.5 ms /sample Executed Once Per Precharge Event	One Trip, Type A
		Not Failed  Closed  < 15 % before Negative Contactor Closed				50 ms		
		DTC Pass						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage System Isolation Fault	P0AA6	This DTC will determine if the measured resistance between the high voltage bus and chassis ground is too low which indicates that the internals of the battery are no longer adequately isolated from chassis ground	Case 1 Active Isolation Resistance	< 325 KOhm	P0AA6	DTC Not Active	Fail if last resistance measurement is below threshold AND any (5) measurements out of last (10) measurements are below resistance threshold. No more than one resistance measurement is taken per HPC2 Wakeup Cycle.	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			OR Case 2 Active Isolation Resistance	< 400 KOhm	Positive Contactor Negative Contactor  P0AA6  Positive Contactor Negative Contactor	Open for 10 Seconds Open for 10 Seconds  DTC Active  Open for 10 Seconds Open for 10 Seconds		
		DTC Pass						Pass if any single resistance measureme nt exceeds resistance threshold

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Positive Contactor Control Circuit	P0AD9	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Short to Ground Fault	Open Load detected while OFF and output voltage > 2V. Short to VBATT detected while OFF and output volage is > (VPWR -1.2V)	12V Battery Voltage	> 10V	40 failures out of 50 samples 12.5 ms /sample Continuous	One Trip, Type A
		DTC Pass					625 ms	
Hybrid Battery Negative Contactor Control Circuit	P0ADD	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Short to Ground Fault	Open Load detected while OFF and output voltage > 2V. Short to VBATT detected while OFF and output volage is > (VPWR -1.2V)	12V Battery Voltage	> 10V	40 failures out of 50 samples 12.5 ms /sample Continuous	Two Trips, Type B
		DTC Pass					625 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Precharge Contactor Circuit Stuck Closed	P0AE2	This DTC detects when the Precharge FET is Stuck Closed by comparing the the Bus Voltage to the Battery Voltage.	Bus Voltage / Battery Voltage	> 80%	P0AA1	Passed	4 failures out of 4 samples 12.5 ms /sample Executed Once Per Precharge Event	One Trip, Type A
					Bus Voltage Sensor Battery Voltage Sensor Negative Contactor Multipurpose Contactor	Not Failed Not Failed Closed Closed		
		DTC Pass					50 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Precharge Contactor Control Circuit	P0AE4	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Open Ckt Fault and the Short to Ground Fault	Short to VBATT detected while OFF and output volage is > (VPWR -1.2V)	12V Battery Voltage	> 10V	40 failures out of 50 samples 12.5 ms /sample Continuous	One Trip, Type A
		DTC Pass					625 ms	
Hybrid Battery System Precharge Time Too Short	P0C77	This DTC sets if Bus Voltage gets too high too fast during contactor precharge.	Bus Voltage / Battery Voltage	> 95% in less than 50 ms from the start of precharge	Battery Current Sensor  Bus Voltage  Bus Voltage Sensor	Not Failed  < 40 Volts before the start of precharge  Not Failed	50 ms Executed Once Per Precharge Event	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Lost Communication with Battery Energy Control Module (U0111)	Active		
		DTC Pass					50 ms	
Hybrid Battery System Precharge Time Too Long	P0C78	This DTC sets if either the Bus Voltage does not get high enough in 700 ms or battery current remains too high for too long after the contactor status changes from open to precharge	Bus Voltage / Battery Voltage	has not reached 95% in less than 700 ms from the start of contactor precharge	Battery Voltage Sensor  Bus Voltage Sensor Lost Communication with Battery Energy Control Module (U0111)	Not Failed  Not Failed  Active	700 ms Executed Once Per Precharge Event	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			or Battery Current	> 12 A for longer than 37.5 ms while waiting for Bus Voltage to reach 95% of Battery Voltage	Battery Current Sensor  Lost Communication with Battery Energy Control Module (U0111)	Not Failed  Active	Executed Once Per Precharge Event	
		DTC Pass					700 ms or less	
Battery Charging System Positive Contactor Control Circuit	P0D0A	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Short to Ground Fault		12V Battery Voltage	> 10V	40 failures out of 50 samples 12.5 ms /sample Continuous	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					625 ms	
Battery Charging System Negative Contactor Control Circuit/Open	P0D11	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Short to Ground Fault	Open Load detected while OFF and output voltage > 2V. Short to VBATT detected while OFF and output volage is > (VPWR -1.2V)	12V Battery Voltage	> 10V	40 failures out of 50 samples 12.5 ms /sample Continuous	One Trip, Type A
		DTC Pass					625 ms	
Battery Charging System High Voltage Interlock Circuit Low	P0D17	DTC monitors the sensed voltage when the commanded voltage is high to determine if the circuit is faulty	Charging HVIL Sensed % of Reference Voltage	< 30%	Charging HVIL Source Status	Sourced (5V)	2 failures out of 2 samples 12.5 ms /sample	One Trip, Type A
		DTC Pass					25 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charging System High Voltage Interlock Circuit High	P0D18	DTC monitors the sensed voltage when the commanded voltage is high and low to determine if the circuit is faulty	Charging HVIL Sensed % of Reference Voltage	> 24%	Charging HVIL Source Status	Unsourced (0V)	5 failures out of 6 samples 12.5 ms /sample	One Trip, Type A
			OR					
			Charging HVIL Sensed % of Reference Voltage	> 44%	Charging HVIL Source Status	Sourced (5V)	4 failures out of 6 samples 12.5 ms /sample	
		DTC Pass					75 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Hybrid/EV System Discharge Time Too Long	P0D5E	This DTC stores the result of the OBCM test (refer to OBCM Parameter Page) or when a discharge cannot be confirmed will run an intrusive backup/safety test which checks to see if battery current is flowing through what could be a stuck closed multifunction contactor	Condition A OBCM Status for P0D5E	Fail or Pass reported from OBCM			Executed Once Per Charger Discharge Event	One Trip, Type A
			OR					
			Condition B					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Battery Current	> 2.5 amps (averaged from 6 to 10 sec after discharge while HFET is commanded on for 2 seconds)	OBCM Status for P0D5E  Battery Current Sensor	No Confirmed Pass or Fail from OBCM  Not Failed	Executed Once 10 seconds after Charger Discharge Event if Condition A is not met	
		DTC Pass					See OBCM Parm Page	
Hybrid/EV Battery Multifunction Contactor Control Circuit	P1EBC	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Short to Ground Fault	Open Load detected while OFF and output voltage > 2V. Short to VBATT detected while OFF and output volage is > (VPWR -1.2V)	12V Battery Voltage	> 10V	40 failures out of 50 samples 12.5 ms /sample Continuous	Two Trips, Type B
		DTC Pass					625 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charging System Contactor(s) Stuck Open	P1EBD	This DTC determines if the Charging Contactors are stuck open by commanding the heater on for 2 sec and observing the Charge Current during this time.	Charge Current	< 1 A	12V Battery Voltage	> 10V	190 failures out of 300 samples, 12.5 ms /sample  Runs once near the beginning of each Charge Cycle	One Trip, Type A
					Battery Current Sensor Charger Commanded Current Charger Current Sensor Charge Control Mode Charge System Mode	No Faults > 1 A No Faults Constant Current or Constant Voltage Not (Heat Only)		
		DTC Pass					3.75 sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Battery Multifunction Contactor Stuck Open	P1EBE	This DTC determines if the Multipurpose Contactor is Stuck Open by commanding the heater on for 2 sec and observing the accumulated battery current during the Accumulation Time	Accumulated Battery Current	> 100 A	12V Battery Voltage	> 10V	5 sec	One Trip, Type A
					Battery Current Sensor	No Faults	Runs once near the beginning of each Charge Cycle	
					Charger Current Sensor	No Faults		
					Charge Control Mode	Constant Current or Constant Voltage		
					Charge System Mode	Not (Heat Only)		
					Accumulation Time	= 4 sec		
		DTC Pass					5 sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Battery Multifunction Contactor Stuck Closed	P1EBF	Sets if Charger Voltage is Too High Too Soon After Positive Contactor Closure	Charger Voltage	Average Charger Voltage $\geq 133$ Volts	Positive Charge Contactor	Was open for more than 2 seconds but is closed now	300 ms / Runs once during charger precharge	Two Trips, Type B
		Sets if the Absolute Value of Battery Current is Too High During Heater Only Mode	Battery Current	Absolute Value (Battery Current) $> 1$ A	Charge System Mode	Heater Only Mode	160 failures out of 240 samples  12.5 ms / sample	
Hybrid/EV Battery System Contactor(s) Stuck Open	P1EC0	This DTC checks for stuck open contactors by comparing Bus Voltage to Battery Voltage after the contactors are closed	Bus Voltage / Battery Voltage	$< 80\%$	Bus Voltage Sensor	No Faults	39 failures out of 40 samples 12.5 ms /sample Continuous	One Trip, Type A
					Battery Voltage Sensor	No Faults		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Time since Main Contactors have closed	> 1 sec		
		DTC Pass					0.5 sec	
Hybrid Battery Pack Heater Transistor Stuck Off	P1EC4	This DTC determines if the Heater FET is Stuck Off by commanding it on for 2 sec and observing the accumulated difference between charger and battery current during the Accumulation Time	Accumulated (Charger Current - Battery Current)	< 200 A	12V Battery Voltage  Battery Current Sensor Charger Current Sensor Charge Control Mode	> 10V  No Faults  No Faults  Constant Current or Constant Voltage	4 sec  Runs once near the beginning of each Charge Cycle	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Charge System Mode Accumulation Time	Not (Heat Only) = 4 sec		
		DTC Pass					4 sec	
Hybrid Battery Pack Heater Transistor Stuck On	P1EC5	This DTC checks for a stuck on heater transistor by checking for too much Charger Current when the multipurpose contactor and the heater transistor are both commanded off in charger precharge mode.	Charger Current	> 0.4 A	12V Battery Voltage  Charger Positive Contactor	> 10V  Closed	4 failures out of 48 samples 12.5 ms /sample Once per Charge Cycle	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Charger Negative Contactor	Closed		
					Multipurpose Contactor	Open		
					Heater	< 5%		
					Commanded Duty Cycle			
					Charger Current Sensor	No Faults		
					Battery Current Sensor	No Faults		
					Charge Control Mode	Precharge		
		DTC Pass					600 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charging Voltage System Isolation Fault	P1F0E	This DTC will determine if the measured resistance between the high voltage charging bus and chassis ground is too low which indicates that the integrity of the charging bus and/or battery are no longer adequately isolated from chassis ground	Active Isolation Resistance	< 325 KOhm	P1F0E	DTC Not Active	Fail if last resistance measurement is below threshold AND any (5) measurements out of last (10) measurements are below resistance threshold. No more than one resistance measurement is taken per HPC2 Wakeup Cycle.	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			OR Active Isolation Resistance	< 400 KOhm	Charge Only Mode  P1F0E  Charge Only Mode	10 seconds  DTC Active  10 seconds		
		DTC Pass					Pass if any single resistance measurement exceeds resistance threshold	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
System Isolation / Impact Sensor Fault - Hybrid Battery System Contactors Open	P1F17	This DTC will latch when the HPC1 detects a "passive" isolation fault and due to a variety of additional failures it becomes necessary to latch the contactors open until the vehicle is repaired.	Condition 1  Hybrid Battery Voltage System Isolation Fault (P0AA6) in HPC1 Condition 2	Active	Rollover or Airbag or Inertial Sensors	Not working	25 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Hybrid Battery Voltage System Isolation Fault (P0AA6) in HPC1	Active	Lost Communication with Inflatable Restraint Sensing and Diagnostic Module on Bus F (U184E)	Active		
			Condition 3 Lost Comm with HPC1	Active	Lost Communication with Inflatable Restraint Sensing and Diagnostic Module on Bus F (U184E)	Active		
			Condition 4 Lost Comm with HPC1	Active	Rollover or Airbag or Inertial Sensors	Not working		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass					Once set, this DTC cannot pass. DTC passes when latch is not set.	
<b>Battery Pack Coolant Valve Diagnostics</b>								
Hybrid/EV Battery Pack Coolant Control Valve A Performance/ Stuck Off	P0CE0	This performance fault detects if the 4 port valve is not functioning as intended.			System Voltage	>9V	1280 fails / 1600 samples at 6.25ms in State B/C	Two Trips, Type B
					No active DTCs	P0CE2, P0CE3, P0CE6, P0CE7, P1CE7, P1CE8		
			State A: IF: Valve is driven outside of OR  IF valve does not reach the endstop	30% < Feedback Position < 70%  <=800ms		State A has not already run this key cycle.  Propulsion System Active = True	8 fails / 10 samples at 1s in State D	
		State B:						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Valve has not reached its commanded position	<=1.5s	State A is	not running (or has completed)		
			State C: Valve feedback position	>3%	State A is Valve has not moved for	not running (or has completed) >1.5s		
			State D: Valve feedback position signal is erratic and its noise level sum is	>12%	State A is Valve is not	not running (or has completed) moving		
Hybrid/EV Battery Pack Coolant Control Valve A Control Circuit Low	P0CE2	Valve Motor drive 1 has a short to low fault.	Valve Motor sense 1	LOW	System Voltage Valve	>9V must be moving in reverse direction	90 fails / 100 samples at 6.25ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Battery Pack Coolant Control Valve A Control Circuit High	P0CE3	Valve Motor drive 1 has a short to high fault.	Valve Motor sense 1	HIGH	System Voltage	>9V  Valve must be stopped or moving in forward direction	90 fails / 100 samples at 6.25ms	Two Trips, Type B
Hybrid/EV Battery Pack Coolant Control Valve Position Sensor Circuit Low	P0CE6	Valve Feedback signal has a out of range low circuit fault	Valve feedback voltage	< 5% of reference voltage	System Voltage	>9V	40 fails / 50 samples at 100ms	Two Trips, Type B
Hybrid/EV Battery Pack Coolant Control Valve Position Sensor Circuit High	P0CE7	Valve Feedback signal has a out of range high circuit fault	Valve feedback voltage	> 95% of reference voltage	System Voltage	>9V	40 fails / 50 samples at 100ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Battery Pack Coolant Control Valve B Control Circuit Low	P1EC7	Valve Motor drive 2 has a short to low fault.	Valve Motor sense 2	LOW	System Voltage	>9V  Valve must be moving in forward direction	90 fails / 100 samples at 6.25ms	Two Trips, Type B
Hybrid/EV Battery Pack Coolant Control Valve B Control Circuit High	P1EC8	Valve Motor drive 2 has a short to high fault.	Valve Motor sense 2	HIGH	System Voltage	>9V  Valve must be stopped or moving in reverse direction	90 fails / 100 samples at 6.25ms	Two Trips, Type B
<b>Battery Thermal Controls Diagnostics</b>								
Hybrid Battery Pack Coolant Temperature Sensor Circuit Range/Performance	P0C43	Coolant Temp. Sensor 1 is not reading a rational value.	IF RESS Thermal conditioning mode = Active Heat then IF: ABS (RESS Inlet Temperature - RESS Outlet Temperature) AND	>28C	System Voltage	>9V	80 fails / 100 samples at 100ms	Two Trips, Type B





Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			IF: ABS (RESS Inlet Temperature - Battery Cell Average Temperature Sensor)	>50C	No active DTCs:  Coolant Pump speed	P1F18, P0C44, P0C47, P0C45, P0C4A, P0CD7, P0CD8, U0111  >20%		
Hybrid/EV Battery Pack Coolant Temperature Sensor B Circuit Range/Performance	P0CD6	Coolant Temp. Sensor 2 is not reading a rational value.	IF: ABS (RESS Outlet Temperature - RESS Inlet Temperature) AND	>10C	System Voltage	>9V	80 fails / 100 samples at 100ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			IF: ABS (RESS Outlet Temperature - Battery Cell Average Temperature Sensor)	>10C	No active DTCs:  Coolant Pump speed OR Coolant Temp2 Soak Time	P1F18, P0C44, P0C47, P0C45, P0C4A, P0CD7, P0CD8, U0111  >20%  >21600s		
Hybrid Battery Pack Coolant Pump Control Circuit/Open	P0C47	Coolant Pump Control line has a circuit fault	Coolant Pump Control line is open, shorted to voltage or shorted to ground	Board Support Package returns coolant pump control line fault = True	System Voltage  Coolant Pump Enable	>9V  = High	40 fails / 50 samples at 100ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Pack Coolant Pump Control Performance	P0C4A	Coolant Pump is not performing as intended	IF: Coolant Pump is ON AND  IF: RESS Inlet Coolant Temperature Final - RESS Inlet Coolant Temperature Initial	>60s  <5C	System Voltage    No active DTCs:	>9V    P1EC6, P0C47, P1F18, P0C44, P0C45, U0111	1 fail / 1 samples at 250ms	Two Trips, Type B
Hybrid Battery Pack Coolant Pump Enable Circuit/Open	P1F18	Coolant Pump Enable has a circuit fault	Coolant Pump Enable line is open, shorted to voltage or shorted to ground		System Voltage	>9V	40 fails / 50 samples at 100ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Battery Pack Heater Transistor Control Circuit/Open	P1EC3	Heater Transistor Control Circuit has a circuit fault	Heater Transistor Control Circuit is open, shorted to voltage or shorted to ground		System Voltage	>9V	40 fails / 50 samples at 100ms	Two Trips, Type B
Hybrid Battery Pack Heater Performance	P1EC6	Battery Heater is not performing as intended	IF: Heater is ON AND IF: RESS Inlet Coolant Temperature Final - RESS Inlet Coolant Temperature Initial	>40s  <9C	System Voltage	>9V	1 fail / 1 samples at 250ms	Two Trips, Type B
<b>Outside Air Temperature Sensor Diagnostics</b>								
Ambient Air Temperature Sensor Range/Performance	P0071	Outside Air Temperature sensor is not performing as intended	CASE 1		CASE 1		80 fails / 100 samples at 100ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			IF ABS (Outside Air Temperature - High Side Refrigerant Pressure converted to Temperature)	> 30°C	Power mode	≠ Crank		
			AND ABS (Outside Air Temperature - Low Side Refrigerant Temperature)	> 50°C	No active DTCs:	P0531, P0532, P0533, P0536, P0537, P0538, P0072, P0073, P0606		
					Air Conditioning Compressor Running Flag OAT	>21600s > -10C		
			CASE 2		CASE 2			



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Power Electronic Coolant Pump On	<12s		
Ambient Air Temperature Sensor Circuit Low Input	P0072	Outside Air Temperature sensor has an out of range low circuit fault	Sensor voltage	< 2% (0.1V) of reference voltage	System Voltage	>9V	40 fails / 50 samples at 100ms	Two Trips, Type B
Ambient Air Temperature Sensor Circuit High Input	P0073	Outside Air Temperature sensor has an out of range high circuit fault	Sensor voltage	> 98% (4.9V) of reference voltage	System Voltage	>9V	40 fails / 50 samples at 100ms	Two Trips, Type B
<b>Cooling Fan Diagnostics</b>								
Cooling Fan 1 Control Circuit	P0480	Engine Cooling Fan has a circuit fault	Engine Cooling Fan line is open, shorted to voltage or shorted to ground		System Voltage	>9V	16 fails / 20 samples at 250ms	Two Trips, Type B
Cooling Fan Signal Circuit Performance	P148A	Engine Cooling fan signal is not performing as intended	IF ABS (Hardware I/O Radiator fan period from ECM - 7.8125)	> 0.15625	System Voltage	>9V  Power mode ≠ crank	32 fails / 40 samples at 250ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			OR ABS (Hardware I/O Radiator fan duty cycle from ECM - Engine Cooling Fan Speed from CAN bus)	> 30%	No active DTCs:  Propulsion system active  OR  (Propulsion system active AND Energy storage system thermal condition request AND Engine Cooling fan operation enable) AND  Engine Cooling fan On	P148B, P148C  = True    = False  = ActiveCool    = True    >10s		
Cooling Fan Signal Circuit Low	P148B	Engine Cooling fan signal has a out of range low circuit fault	HWIO duty cycle (from ECM)	> high-calibration threshold (97%)	System Voltage	>9V	16 fails / 20 samples at 250ms	Two Trips, Type B



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
APM Cooling Fan Control Circuit/Open	P1EA6	APM Fan Control line has a circuit fault	APM Fan Control line is open, shorted to voltage or shorted to ground		System Voltage  HWIO APM Fan Control Circuit Status APM Fan Enable	>9V  ≠ Indeterminate = High	16 fails / 20 samples at 250ms	Two Trips, Type B
APM Cooling Fan Enable Circuit	P1EA7	APM FAN Enable signal has a circuit fault	APM Fan Enable line is open, shorted to voltage or shorted to ground		System Voltage	>9V	16 fails / 20 samples at 250ms	Two Trips, Type B
Hybrid/EV Electronics Coolant Pump Control Circuit/Open	P0CE9	Coolant Pump Control line has a circuit fault	Coolant Pump Control line is open, shorted to voltage or shorted to ground		System Voltage  HWIO Pump Control Circuit Status Coolant Pump Enable	>9V  ≠ Indeterminate = High	16 fails / 20 samples at 250ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Electronics Coolant Pump Enable Circuit	P0CED	Coolant Pump Enable signal has a circuit fault	Coolant Pump Enable line is open, shorted to voltage or shorted to ground		System Voltage	>9V	16 fails / 20 samples at 250ms	Two Trips, Type B
					HWIO Pump Enable Circuit Status	≠ Indeterminate		
Hybrid/EV Electronics Coolant Temperature Sensor Circuit Low	P0CF0	Power Electronics Coolant Temp Sensor has a out of range low circuit fault	Sensor voltage	< 2% (0.1V) of reference voltage	System Voltage	>9V	16 fails / 20 samples at 250ms	Two Trips, Type B
Hybrid/EV Electronics Coolant Temperature Sensor Circuit High	P0CF1	Power Electronics Coolant Temp Sensor has a out of range high circuit fault	Sensor voltage	> 98% (4.9V) of reference voltage	System Voltage	>9V	16 fails / 20 samples at 250ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Electronics Coolant Temperature Sensor Circuit Range/Performance	P0CEF	Power Electronics Coolant Temp Sensor is not functioning as intended					32 fails / 40 samples at 250ms	Two Trips, Type B
			IF Power Inverter Module request pump on, Then ABS (Power Electronics Coolant temperature sensor - High Voltage Charger temperature), Else ABS (Power Electronics Coolant temperature sensor - High Voltage Charger temperature)	>38°C       >40°C	System Voltage >9V			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs:  Power Electronics Coolant pump speed AND Power Electronics Coolant pump enabled	P0CF1, P0CF0, P0CE9, P0CED, P1ED7, P1ED6, P1ED8,  >=30%          >60 s		
<b>Engine Coolant Bypass Valve Diagnostics</b>								
Engine Coolant Bypass Valve Control Circuit / Open	P2681	Valve Drive (control) Circuit has a circuit fault	Valve Deive Circuit is open, shorted to voltage or shorted to ground		System Voltage       HWIO Valve Drive Circuit Status	>9V       ≠ Indeterminate	40 fails / 50 samples at 100ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Engine Coolant Bypass Valve Range/Performance	P26A3	Valve is stuck or end position learn failed					1 fails / 1 samples at 100ms (15s)	Two Trips, Type B
			State A: Valve end position learn request	=FAIL	System Voltage >9V No active DTCs: P2681, P26A6, P26A7, P0119; P0118, P0117, P0116,  Engine Coolant Temperature >50C Propulsion system active = True			
			State B: Valve has not reached its commanded position	>15s	System Voltage >9V No active DTCs: P2681, P26A6, P26A7  Propulsion system active = True			
					Valve Position Link 62% +/-4%			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Valve Position ByPass	38% +/- 4%		
Engine Coolant Bypass Valve Position Sensor Circuit Low	P26A6	Valve Feedback signal has a out of range low circuit fault	Valve feedback voltage	< 5% (0.25V) of reference voltage	System Voltage	>9V	40 fails / 50 samples at 100ms	Two Trips, Type B
Engine Coolant Bypass Valve Position Sensor Circuit High	P26A7	Valve Feedback signal has a out of range high circuit fault	Valve feedback voltage	> 95% (4.25V) of reference voltage	System Voltage	>9V	40 fails / 50 samples at 100ms	Two Trips, Type B
Engine Coolant Bypass Valve Position Sensor Stop/Minimum Stop Performance	P26A9	This performance fault detects if the Engine Coolant ByPass valve is not functioning as intended.						
			State A:					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			IF Valve feedback voltage is OR  IF Valve feedback voltage is	5% (0.25V) < Feedback Voltage < 30% (1.5V)  70% (3.5V) < Feedback Voltage < 95% (4.75V)	System Voltage  No active DTCs:  Propulsion system active	>9V  P2681, P26A6, P26A7  = True	3 fails / 5 samples at 100ms	Two Trips, Type B
		State B: IF $\sum$ ABS(Valve Feedback n - Valve Feedback n-1) where n = 10	>6%		System Voltage  No active DTCs:  Propulsion system active	>9V  P2681, P26A6, P26A7  = True	8 fails / 10 samples at 100ms	
		State C: Valve feedback Drift	>3%		System Voltage  No active DTCs:	>9V  P2681, P26A6, P26A7	80 fails / 100 samples at 100ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Propulsion system active	= True		
<b>Air Conditioning Compressor and Rationality Diagnostics</b>								
A/C Evaporator Temperature Sensor Circuit Range/Performance	P0536	Low Side Refrigerant Temp Sensor is not functioning as intended			System Voltage	>9V	32 fails / 40 samples at 250ms	Two Trips, Type B
					No active DTCs: P0537;P0538 Power mode ≠ Crank No active DTCs: P0073; P0072; P0071  No active DTCs: P0119; P0118; P0117; P0116 Engine Coolant Temperature Status = Valid Engine Coolant Temp - Outside Air Temperature < 15C			
			CASE 1		CASE 1			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			ABS (Low Side Refrigerant Temperature - Low Side Refrg Pressure reading converted to temperature)	>20C	No active DTCs:  No active DTCs: Outside Air Temp raw reading  Compressor On	P0073; P0072; P0071  P2517; P2518 >= -10C  > 30s		
			CASE 2		CASE 2			
			IF ABS (Low Side Refrigerant Temperature - OAT Raw Temperature Value) AND	>10C	No active DTCs:	P0073; P0072; P0071		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			ABS (Low Side Refrigerant Temperature - High Side Refrigerant Pressure Sensor Data converted to temperature)	>10C	No active DTCs:  High Side Refrigerant Pressure Status OAT_Raw Sensor Data Compressor running flag No active DTCs:	P0533; P0532; P0531  = Valid -10C < OAT_raw < 55C >3600s P0606		
Air Conditioner (A/C) Refrigerant Charge Loss	P0534	Cooling performance not adequate/Low charge/Plugged refrigerant line.	CASE 1  IF Power mode THEN	=Run Mode	System Voltage	>9V		Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Pump Performance diagnostic THEN  Total Run Timer THEN  Coolant Pump Override Flag THEN Coolant Pump Duty Cycle AND RESS Thermal Valve Position THEN Secondary Run Timer THEN ABS (RESS Coolant Outlet Temperature Sensor - RESS Coolant Inlet Temperature Sensor)	=Complete  =300s  =TRUE  =35%  =100% Chill  =240s  <4C	No active DTCs:  No active DTCs:  No active DTCs:  Inlet Temperature sensor validity	P0CE0; P0CE2; P0CE3; P0CE6; P0CE7; P1CE7; P1CE8  P0c47; P0c4a; P1f18  P0c44, P0c45, P0c43  = Valid		



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					OAT Arb Status	= Valid or uninitialized		
					Compressor Off Time	>240s		
			CASE 3		CASE 3			
			IF Low Side Refrigerant Pressure based on OAT Arb AND Low Side Pressure Time	<100Kpa  >5s	System Voltage	>9V		
					No active DTCs:	P2517; P2518; P2516		
					No active DTCs:	P0073; P0072; P0071		
					OAT Arb Status	= Valid or uninitialized		
					Compressor running flag	= ON		
			CASE 4		CASE 4			
			IF High Side Refrigerant Pressure AND High Side Pressure Time	>3200Kpa  >5s	System Voltage	>9V		
					No active DTCs:	P0533; P0532; P0531		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HSRP Status = Valid  No active DTCs: P0606 No active DTCs: P0073; P0072; P0071  OAT Arb Status = Valid or uninitialized  Compressor Off Time >240s			
A/C Evaporator Temperature Sensor Circuit Low	P0537	Signal has a out of range low circuit fault	Sensor voltage	< 2% (0.1V) of reference voltage	System Voltage	>9V	40 fails / 50 samples at 100ms	Two Trips, Type B
A/C Evaporator Temperature Sensor Circuit High	P0538	Signal has a out of range high circuit fault	Sensor voltage	> 98% (4.9V) of reference voltage	System Voltage	>9V	40 fails / 50 samples at 100ms	Two Trips, Type B
A/C Compressor Motor Voltage Sensor Performance	P0D69	ACCM Motor Voltage Sensor is not performing as intended	ABS (Compressor Input Voltage - VITM Battery Cell Voltage)	>15V	System Voltage	>9V	35 fails / 40 samples at 250ms	Two Trips, Type B
					No active DTCs: P0D6A; P0D6B			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Compressor High Voltage Status  No active DTCs:  Battery Cell Voltage Status No active DTCs:  Power mode High Voltage Battery Contactor	= Valid  P0ABC, P0ABD, P0ABB, P0AF8, P1A07, (U1111 AND U185A)  = Valid P0AE4, P0AD9, P0AA1, P0ADD, P1EBC, P0AE2  ≠ Crank = Closed		
Electric A/C Compressor Control Module Internal Temperature Sensor Performance	P0D71	ACCM CPU Temp. Sensor is not performing as intended	IF ABS (Compressor CPU Temperature Sensor - Intake Air Temperature Sensor) AND	>6C	System Voltage	>9V	35 fails / 40 samples at 250ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			IF ABS (Compressor CPU Temperature Sensor - Compressor IGBT Sensor)	>6C	No active DTCs:  IGBT Status = Valid  No active DTCs: No active DTCs: OAT_Filtd Status = Valid or uninitialzed OAT_Filtd >-7C  No active DTCs: No active DTCs: ECT Status = Valid  No active DTCs: CPU Temp = Valid Status  Power mode ≠ Crank	P0D77; P0D78		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Engine Coolant Temp - Outside Air Temperature Filtered Compressor Off Time	< 15C  > 21600s		
Electric A/C Compressor Control Module Output Driver Temperature Sensor Performance	P0D76	ACCM IGBT Temp. Sensor is not performing as intended	IF ABS (Compressor IGBT Temperature Sensor - OAT_Raw Temperature Sensor) AND  IF ABS (Compressor CPU Temperature Sensor - Intake Air Temperature Sensor)	>11C  >7C	System Voltage  No active DTCs:  IGBT Status = Valid  No active DTCs: No active DTCs:	>9V  P0D77; P0D78  P0606 P0073; P0072; P0071	35 fails / 40 samples at 250ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					OAT_FiltD Status OAT_FiltD No active DTCs: OAT_Raw Status No active DTCs: No active DTCs: ECT Status Power mode Engine Coolant Temp - Outside Ambient Temperature Filtered Compressor Off Time	= Valid or uninitialized >-7C P0073; P0072; P0071 = Valid or uninitialized P0113, P0112, P0111, P0114 P0119; P0118; P0117; P0116 = Valid ≠ Crank < 15C   > 21600s		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
A/C Refrigerant Pressure Sensor B Circuit Range/Performance	P2516	Low Side Refrigerant Pressure Sensor is not functioning as intended			ALL CASES  System Voltage >9V No active DTCs: P2517; P2518 Power mode ≠ Crank No active DTCs: P0073; P0072; P0071 OAT Raw/Filtered Status = Valid  No active DTCs: P0119; P0118; P0117; P0116 ECT Status = Valid Outside Air Temp raw reading 0C < OAT_raw < 25C  Engine Coolant Temp - Outside Ambient Temperature Filtered < 15C		32 fails / 40 samples at 250ms	Two Trips, Type B
			CASE 1		CASE 1			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			ABS (Low Side Refrigerant Pressure - Low Side Refrg Temperature converted to pressure)	>400kpa	No active DTCs:  OAT_Raw Compressor On	P0537;P0538  >= -10C > 30s		
			CASE 2		CASE 2			
			ABS (Low Side Refrigerant Pressure - Low Side Refrg Temperature converted to pressure)	>200kpa	No active DTCs:  HSRP Status No active DTCs: No active DTCs: Compressor Off Time	P0533; P0532; P0531  = Valid P0537;P0538  P0606 0C < OAT_raw < raw reading 25C  > 3600s		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
A/C Refrigerant Pressure Sensor B Circuit Low Input	P2517	Signal has a out of range low circuit fault	Sensor voltage	< 2% (0.1V) of reference voltage	System Voltage	>9V	40 fails / 50 samples at 100ms	Two Trips, Type B
A/C Refrigerant Pressure Sensor B Circuit High Input	P2518	Signal has a out of range high circuit fault	Sensor voltage	> 98% (4.9V) of reference voltage	System Voltage	>9V	40 fails / 50 samples at 100ms	Two Trips, Type B
<b>High Voltage Battery Diagnostics</b>								
Voltage measurement – Rationality (For Cell N)	See 'Cell Rationality table on VICM Supporting Tables' (For Cell N)	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRatio nalityFA (see Fault Bundle Page)  Average Cell Voltage Movement	= FALSE  > 0.006V	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Pack Voltage Sense Circuit Rationality	P0ABB	Rationality compares pack voltage sensor to average cell voltage * 96	Average cell voltage * 96 - Battery Pack voltage	> 10 V	VICMVoltageFA (see Fault Bundle Page)	= FALSE	20 Failures out of 100 Samples	One Trip, Type A
					No active DTCs:	U0111 U185A	Frequency: 200ms	
Hybrid Battery Pack Voltage Sense Circuit Correlation	P0AF8	Correlation compares pack voltage sensor to either TPIM Bus Voltage or Charger Bus Voltage	Battery Pack voltage - TPIM Bus Voltage	> 12 V	Main Contactor Status	= Closed	400 Failures out of 1995 Samples	One Trip, Type A
					No active DTCs:	P0ABC P0ABD P1A07 P0ABB P1AEC P1AED P1E28 P1AE9	Frequency: 25ms	



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery System Voltage High	P0AFB	Voltage too high	High Voltage Battery Pack Voltage	> KtBSED_U_BO V_PackVoltThresh (V) (see VICM Supporting Tables)	No active DTCs:	P0ABC  P0ABD P1A07 P0AF8 P0ABB U0111 U185A	320 Failures out of 1595 Samples       Frequency: 25ms	One Trip, Type A
			OR			Any Cell Voltage	> KtBSED_U_BO V_CellVoltThresh (V) (see VICM Supporting Tables)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						U185A	Frequency: 25ms	
Battery Energy Control Module Hybrid/EV Battery Cell Overvoltage	P1EAB	Voltage too high	Cell Voltage	> 4.5 V	No active DTC's:	P1EAC  U185A	80 Failures out of 80 Samples  Frequency: 25ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Battery Cell Overvoltage Signal/Circuit Performance	P1EAC	Over voltage circuit 2nd protection - Fault Flag Test  - Test Active Stuck On  - Test Active Stuck Off	Circuit Key Off Test counts (Hardware line send 13 pulses from VTSMs and the VICM counts the rising and falling edges to determine the circuit key off test counts)	≠ 26	RUN/CRANK Transitions to	= OFF	1 Failures out of 1 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							Frequency: 25ms	
OR								
			Test active Bit	= 1	RUN/CRANK Transitions to	= OFF for > 320 samples	40 Failures out of 50 Samples  Frequency: 25ms	
OR								
			Test active Bit	= 0	RUN/CRANK Transitions to	= OFF for < 320 samples	1 Failures out of 1 Samples  Frequency: 25ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery System Voltage Low	P0AFA	Voltage too low	High Voltage Battery Pack Voltage	< KtBSED_U_BLF_PackVoltThresh (V) (see VICM Supporting Tables)	No active DTCs:	P0ABC P0ABD P1A07 P0AF8 P0ABB  U0111 U185A	320 Failures out of 1595 Samples  Frequency: 25ms	One Trip, Type A
			OR			Any Cell Voltage	< KtBSED_U_BLF_CellVoltThresh (V) (see VICM Supporting Tables)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						U0111 U185A	Frequency: 25ms	
Hybrid Battery Pack Voltage Variation	P0BBE	Cell Voltage deviation	Maximum Cell Voltage - Minimum Cell Voltage	> 0.3 V	CellVoltageRatio nalityFA  No active DTCs:	= FALSE  U0111 U185A	50 Failures out of 245 Samples  Frequency: 100ms	One Trip, Type A
Hybrid Battery Pack Current Sensor A/B Correlation	P0B13	Checks for deviation between Fine and Coarse current sensors	Fine Current - Coarse Current	> 10 A	Fine Current measured	Between -20A and 20A	400 Failures out of 1995 Samples  Frequency: 25ms	One Trip, Type A
					OR			
					Coarse Current measured No active DTCs:	Between -20A and 20A P0AC1 P0AC2 P1EBA  P1A07 P0B13 P0B10 P0B11		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						P1EBB U0111 U185A		
Temperature Sensor Circuit Rationality	See 'Temp Rationality table'	Rationality compares temperature with the other sensor values read	Temperature input Movement (while other sensors have moved)	< 1 °C (while others have moved at least 10 °C)	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples  Frequency: 100ms	Two Trips, Type B
Replace Hybrid Battery Pack	P0A80	High Pack Resistance	Pack Resistance	> KtBSED_R_SOH_ResistanceTresh (ohm) - see VICM Supporting Tables	Average Battery Temperature  Battery State Estimator  Battery State of Charge (SOC)	> -7 °C  = ACTIVE  > 20 %  < 90 %	4000 Failures out of 5000 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					TempRationalityF	= FALSE		
Hybrid Battery Pack Over temperature	P0A7E	Battery temp. too high	Battery Module Temperature	> 73.5 °C	TempRationalityF A (see fault bundle page)	= FALSE	50 Failures out of 60 Samples  Frequency: 100ms	One Trip, Type A
Control Module Calculated Hybrid Performance	P1E3D	Redundant Voltage monitor	Pack Voltage - Redundant Pack Voltage	> 1 V			50 Failures out of 60 Samples  Frequency: 100ms	One Trip, Type A
<b>Miscellaneous Diagnostics</b>								
Engine Hood Switch Performance	P257D	Rationality Check for the Vehicle Hood Switch	Hood Switch Position Sensor reading within an invalid range	Within the following ranges: 86.9% - 87.9% 63% - 64% 22.8% - 23.8%	Diagnostic Enabled  Propulsion System Active	=TRUE  =TRUE	6 failed samples within 8 samples  1 sample every 12.5ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Engine Hood Switch Circuit Low Voltage	P257E	Detects if the Vehicle Hood Switch is Shorted to Ground	Hood Switch Position Sensor reading below a threshold	<22.8%	Diagnostic Enabled  Propulsion System Active	=TRUE  =TRUE	6 failed samples within 8 samples  1 sample every 12.5ms	Two Trips, Type B
Engine Hood Switch Circuit High Voltage	P257F	Detects if the Vehicle Hood Switch is Shorted to Battery	Hood Switch Position Sensor reading above a threshold	>87.9%	Diagnostic Enabled  Propulsion System Active	=TRUE  =TRUE	6 failed samples within 8 samples  1 sample every 12.5ms	Two Trips, Type B

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Power Off Timer Performance	P262B	Detects a fault in the internal Control Module off-timer	The absolute value of the difference between the Control Module 'Off' Timer and Control Module 'On' Timer (both timers operating during Controller 'On') exceeds a threshold	Difference > 5.6%	Diagnostic Enabled  Controller 'On' Time RunCrank DTCs Not Active	=TRUE  > 60 seconds  =TRUE P0601, P0602, P0603, P062F, P0604 and P0606	Runs once per drive cycle (when Run/Crank transitions from TRUE to FALSE).	Two Trips, Type B
High Voltage Energy Management Communication Bus Enable Circuit	P1EB9	Detects a fault in the High Voltage Energy Management Communication (HVEM) Bus Enable Circuit	Case 1: Short to Ground		Diagnostic Enabled  HVEM Bus Enabled	=TRUE  =TRUE	480 failed samples within 560 samples  1 sample every 12.5ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Case 2: Short to Battery or open circuit		Diagnostic Enabled	=TRUE		
					HVEM Bus Enabled	=FALSE		
Control Module Wake-up Circuit Performance	P06E4	Detects a fault in the Control Module Output Wake-Up Circuit	Case 1: Short to Ground		Diagnostic Enabled	=TRUE	480 failed samples within 560 samples  1 sample every 12.5ms	One Trip, Type A
					Control Module Output Wake-Up Circuit Enabled	=TRUE		
			Case 2: Short to Battery or Open circuit		Diagnostic Enabled	=TRUE		
					Control Module Output Wake-Up Circuit Enabled	=FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Ignition Switch Run/Start Position Circuit Low	P2534	Detects if the Run/Crank input circuit is low	Short to Ground or Open condition	<2volts	Diagnostic Enabled  CAN Communication ECM Run/Crank Active Data	=TRUE  Enabled  Available and Active	10 failed samples within 20 samples  1 sample every 250ms	One Trip, Type A
Ignition Switch Run/Start Position Circuit High	P2535	Detects if the Run/Crank input circuit is high	Short to Battery	>5volts	Diagnostic Enabled  CAN Communication ECM Run/Crank Active Data	=TRUE  Enabled  Available and False	10 failed samples within 20 samples  1 sample every 250ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
System Voltage Low	P0562	Detects if Battery input voltage is below a threshold	Battery voltage is below a threshold	≤ 10volts		Continuous	1 failed sample for 500ms below Threshold value	Special Type C
Control Module Read Only Memory (Rom)	P0601	This DTC will be stored if any software or calibration checksum is incorrect	Calculated Checksum does not match stored checksum				Runs once per powerup	One Trip, Type A
		Flash ECC Circuit Test	Failed validation of test data written to ECC			Continuous	1s loop, 3 failures in powerup cycle	
Control Module Not Programmed	P0602	Indicates that the Control Module needs to be programmed	'No Start' Calibration is set to true which is only available on a new un-programmed Module			Continuous	1s loop, 1 failure	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Long Term Memory Reset	P0603	Non-volatile memory checksum error	Checksum at power-up does not match checksum at power-down			Runs at battery connect or after a controller reset	1 failure	One Trip, Type A
Control Module Random Access Memory (RAM) Failure	P0604	Control Module is unable to correctly write and read data to and from RAM	Data read does not match data written				Runs at controller shutdown	One Trip, Type A
		RAM ECC Circuit Test	Failed validation of test data written to ECC			Continuous	1s loop, 3 failures in powerup cycle	
Control Module Internal Performance	P0606	ALU and Register Test	Control Module fails to execute a diagnostic test algorithm			Continuous	1s loop, 3 failures in powerup cycle	One Trip, Type A
		Configuration Registers Test	Comparison of current configuration register settings with predefined values fails			Continuous	1s loop, 3 failures in powerup cycle	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		MMU Test	Test of memory management related instructions fails	Fails MMU instruction		Continuous	1s loop, 3 failures in powerup cycle	
		MMU Configuration Fault	Verifies MMU TLB's are properly configured for the application	TLB set incorrectly		Continuous	1s loop, 3 failures in powerup cycle	
		Stack Limits Test	Verifies stack usage does not exceed maximum stack size	Stack usage exceeds 100%		Continuous	1s loop, 3 failures in powerup cycle	
		Clock Status	Checks for loss of lock/clock, forces a reset if failed			Continuous	1s loop, 3 failures in powerup cycle	
		Auxiliary ALU Test	Auxiliary microprocessor fails to run a defined diagnostic algorithm			Continuous	100ms loop, 3 failures in powerup cycle	
		Auxiliary RAM Test	Auxiliary microprocessor fails a write/read data diagnostic RAM test			Continuous	1s loop, 3 failures in powerup cycle	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Auxiliary ROM Test	Auxiliary microprocessor ROM checksum error			Continuous	2.5s loop, 3 failures in powerup cycle	
		Auxiliary Register Configuration Test	Configuration register values do not match expected pre-configured values			Continuous	100ms loop, 3 failures in powerup cycle	
		Auxiliary Stack Test	Auxiliary microprocessor stack underflow or overflow			Continuous	100ms loop, 3 failures in powerup cycle	
		Seed and Key Test	Seed and key test failed - invalid order, timeout, incorrect seed, incorrect key			Continuous	100ms loop, 3 failures in powerup cycle	
		Main Detected Seed Incorrect Order	Seed and key test failed - main microprocessor received seed from the auxiliary microprocessor out of order			Continuous	100ms loop, 3 failures in powerup cycle	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Main Detected Unknown Seed	Seed and key test failed - main microprocessor received an unknown seed			Continuous	100ms loop, 3 failures in powerup cycle	
		Internal IO Diagnostic (BVREF)	5V reference voltages out of range	2% above or below		Continuous	1s loop, 3 failures in powerup cycle	
		Internal IO Diagnostic (IVPWR)	IVPWR voltage out of range	IVPWR less than 9V or greater than 18V		Continuous	1s loop, 3 failures in powerup cycle	
		Internal IO Diagnostic (IVBAT)	IVBAT voltage out of range	IVBAT less than 9V or greater than 18V		Continuous	1s loop, 3 failures in powerup cycle	
		Internal IO Diagnostic (Analog 25% reference line)	25% reference line out of range	Reference less than 22% or greater than 28%		Continuous	1s loop, 3 failures in powerup cycle	
		Internal IO Diagnostic (Analog 75% reference line)	75% reference line out of range	Reference less than 72% or greater than 78%		Continuous	1s loop, 3 failures in powerup cycle	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Control Module Wake-up Circuit Performance (Self Wakeup Fault)	Control module unable to do a Self Wakeup when there is a request to do so		Diagnostic Enabled	=TRUE	Runs once at powerup if a Self-Wakeup request was active last power down	
					Self-Wakeup Requested	=TRUE		
		SPI Fault Detection Test	SPI B, C, or D fault detected			Continuous	1s loop, 3 failures in powerup cycle	
		SPI B Fault Detection Test	Fault detected via echo test on SPI bus B			Continuous	1s loop, 3 failures in powerup cycle	
		SPI C Fault Detection Test	Fault detected via echo test on SPI bus C			Continuous	1s loop, 3 failures in powerup cycle	
		SPI D Fault Detection Test	Fault detected via echo test on SPI bus D			Continuous	1s loop, 3 failures in powerup cycle	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Long Term Memory Performance	P062F	Update BINVDM operation	Battery independent non-volatile status update failed				Runs at controller shutdown and after new data is written to EEPROM (which is checked every 255 seconds)	One Trip, Type A
<b>Communication Faults</b>								
Control Module Communication Bus A Off	U0073	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.			Controller On  Bus A Communication Enabled	=TRUE  > 2 seconds	5 failures out of 5 samples  1 s loop	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Communication Bus B Off	U0074	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.			Controller On  Bus B Communication Enabled	=TRUE  > 2 seconds	5 failures out of 5 samples  1 s loop	One Trip, Type A
Control Module Communication Bus H Off	U007A	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.			Controller On  Bus H Communication Enabled	=TRUE  > 2 seconds	5 failures out of 5 samples  1 s loop	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Lost Communication With ECM on Bus A	U0100	<p>Detects that CAN serial data communication has been lost with the ECM on Bus A</p>	<p>Messages have not been received from the ECM for a specified time</p>	<p>≥ 500ms</p>	<p>Controller On</p> <p>Bus A Communication Enabled Battery Voltage</p>	<p>=TRUE</p> <p>&gt; 2 seconds</p> <p>&gt;10 Volts</p>	<p>Runs in 10ms loop</p>	<p>Two Trips, Type B</p>
		<p>DTC Pass</p>					<p>10ms after receiving any message from the supervised source</p>	
Lost Communication with Transmission Control Module	U0101	<p>Detects that CAN serial data communication has been lost with the TCM on Bus A</p>	<p>Messages have not been received from the TCM for a specified time</p>	<p>≥ 500ms</p>	<p>Controller On</p> <p>Bus A Communication Enabled Battery Voltage</p>	<p>=TRUE</p> <p>&gt; 2 seconds</p> <p>&gt;10 Volts</p>	<p>Runs in 10ms loop</p>	<p>Two Trips, Type B</p>

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass					10ms after receiving any message from the supervised source	
Lost Communication with Battery Energy Control Module	U0111	<p>Detects that CAN serial data communication has been lost with the Battery Energy Control Module on Bus A</p>	<p>Messages have not been received from the BECM for a specified time</p>	<p>≥ 500ms</p>	<p>Controller On</p> <p>Bus A Communication Enabled Battery Voltage</p>	<p>=TRUE</p> <p>&gt; 2 seconds</p> <p>&gt;10 Volts</p>	<p>Runs in 10ms loop</p>	<p>Two Trips, Type B</p>
		DTC Pass					10ms after receiving any message from the supervised source	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Lost Communication with Brake System Control Module	U0129	Detects that CAN serial data communication has been lost with the Brake System Control Module on Bus A	Messages have not been received from the EBCM for a specified time	≥ 500ms	Controller On	=TRUE	Runs in 10ms loop	Two Trips, Type B
		DTC Pass			Bus A Communication Enabled Battery Voltage	> 2 seconds >10 Volts	10ms after receiving any message from the supervised source	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Lost Communication with Electric A/C Compressor Control Module	U016B	<p>Detects that CAN serial data communication has been lost with the Electric A/C Compressor Control Module on Bus A</p>	<p>Messages have not been received from the EACCM for a specified time</p>	<p>≥ 500ms</p>	<p>Controller On</p>	<p>=TRUE</p>	<p>Runs in 10ms loop</p>	<p>Two Trips, Type B</p>
		<p>DTC Pass</p>			<p>Bus A Communication Enabled Battery Voltage</p>	<p>&gt; 2 seconds &gt;10 Volts</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Lost Communication With Hybrid Powertrain Control Module	U0293	Detects that CAN serial data communication has been lost with the Hybrid Powertrain Control Module on Bus A	Messages have not been received from the HCP for a specified time	≥ 500ms	Controller On	=TRUE	Runs in 10ms loop	Two Trips, Type B
		DTC Pass			Bus A Communication Enabled Battery Voltage	> 2 seconds >10 Volts	10ms after receiving any message from the supervised source	
Lost Communication with Hybrid Powertrain Control Module on Bus B	U1817	Detects that CAN serial data communication has been lost with the Hybrid Powertrain Control Module on Bus B	Messages have not been received from the HCP for a specified time	≥ 500ms	Controller On	=TRUE	Runs in 10ms loop	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Bus B Communication Enabled Battery Voltage	> 2 seconds >10 Volts		
		DTC Pass					10ms after receiving any message from the supervised source	
Lost Communication With ECM on Bus B	U1818	Detects that CAN serial data communication has been lost with the ECM on Bus B	Messages have not been received from the ECM for a specified time	≥ 500ms	Controller On  Bus B Communication Enabled Battery Voltage	=TRUE  > 2 seconds >10 Volts	Runs in 10ms loop	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass					10ms after receiving any message from the supervised source	
Lost Communication with Battery Charger Control Module on Bus H	U1838	<p>Detects that CAN serial data communication has been lost with the Battery Charger Control Module on Bus H</p>	<p>Messages have not been received from the Battery Charger Module for a specified time</p>	<p>≥ 500ms</p>	<p>Controller On</p> <p>Bus H Communication Enabled</p> <p>Battery Voltage</p>	<p>=TRUE</p> <p>&gt; 2 seconds</p> <p>&gt;10 Volts</p>	<p>Runs in 10ms loop</p>	<p>One Trip, Type A</p>
		DTC Pass					10ms after receiving any message from the supervised source	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Lost Communication with Battery Energy Control Module on Bus H	U185A	<p>Detects that CAN serial data communication has been lost with the Battery Energy Control Module on Bus H</p>	<p>Messages have not been received from the Battery Energy Control Module for a specified time</p>	<p>≥ 500ms</p>	<p>Controller On</p>	<p>=TRUE</p>	<p>Runs in 10ms loop</p>	<p>One Trip, Type A</p>
		<p>DTC Pass</p>			<p>Bus H Communication Enabled Battery Voltage</p>	<p>&gt; 2 seconds &gt;10 Volts</p>	<p>10ms after receiving any message from the supervised source</p>	
<b>Fuel Door Diagnostics</b>								
Fuel Fill Door Switch Stuck Closed	P04B6	Fuel Door Position Rationality	<p>Fuel door opened</p>	<p>FALSE</p>	<p>Fuel Fill Door Switch Stuck Closed Diagnostic Enable Calibration</p>	<p>=TRUE</p>	<p>50ms</p>	<p>Two Trips, Type B</p>
			<p>AND refuel request</p>	<p>TRUE</p>				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			AND refuel detected	TRUE				
Fuel Fill Door Position Sensor/Switch Circuit	P04B8	Detects if sensor reading is invalid	Fuel Fill Door Position Sensor reading within an invalid range	65.9% < Reported Position <= 81.6%	Fuel Fill Door Position Sensor/Switch Circuit Diagnostic calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Position Sensor/Switch Circuit Low	P04B9	Detects if the Circuit is Shorted to Ground	Fuel Fill Door Position Sensor reading below a threshold	Reported Position < 22.9%	Fuel Fill Door Position Sensor/Switch Circuit Low Diagnostic Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Position Sensor/Switch Circuit High	P04BA	Detects if the Circuit is Shorted to Battery	Fuel Fill Door Position Sensor reading above a threshold	Reported Position > 94.5%	Fuel Fill Door Position Sensor/Switch Circuit High Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Lock Control Circuit/Open	P04BB	Detects a fault in the Fuel Fill Door Lock/Unlock Control Circuit	Hardware Reported Test Result for OPEN Circuit	Fault =TRUE	Fuel Fill Door Lock Control Circuit/Open Diagnostic Enable Calibration	=TRUE	4 out of 5 samples @ 50ms per sample	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			OR		The Hardware reported test result, for an open circuit or short to power condition	≠ INDETERMINANT		
			Hardware Reported Test Result for SHORT Circuit to Battery		The door lock driver circuit must be active to assert an Unlock or Lock state	=ASSERT UNLOCK		
						OR		
						=LOCK		
			Hardware Reported Test Result for SHORT Circuit to Ground	Fault =TRUE	Fuel Fill Door Lock Control Circuit/Open Diagnostic Enable Calibration	=TRUE	64 out of 80 samples @ 50ms per sample	
					The Hardware reported test result is for short circuit condition	≠ INDETERMINANT		
					The door lock driver circuit is NOT be active	=ASSERT NONE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel Fill Door Lock Control Range/Performance	P04BC	Performance for the Fuel Fill Door Lock Control	Fuel Door Does NOT transition Unlocked to Locked		Fuel Fill Door Lock Control Range/Performance Diagnostic Enable Calibration	=TRUE	300ms	Two Trips, Type B
					No active DTCs:	P04BB, P04BD, P04BE, P04BF, P04C1, P04C2, P04C3, P04C5, P04C6,		
					The Fuel Fill Door Lock is comanded to the Lock position	=ASSERTLOCK		
					The Fuel Fill Door is not already in the Lock postion	=TRUE		
Fuel Fill Door Unlock Control Range/Performance	P04C0	Performance for the Fuel Fill Door Unlock Control	Fuel Door Lock state does NOT transition from Locked to Unlock		Fuel Fill Door Unlock Control Range/Performance Diagnostic Enable Calibration	=TRUE	300ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs:	P04BB, P04BD, P04BE, P04BF, P04C1, P04C2, P04C3, P04C5, P04C6,		
					The Fuel Fill Door Lock is commanded to the unlock position	=ASSERTUNLOCK		
					The Fuel Fill Door is not already in the Unlock position	=TRUE		
Fuel Fill Door Lock Position Sensor/Switch Circuit	P04C3	Detects if the circuit resistance is incorrect	Switch sensor reading within invalid range	65.9%> Reported Positon <=81.6%	Fuel Fill Door Lock Position Sensor/Switch Circuit Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel Fill Door Lock Position Sensor/Switch Circuit Range/Performance	P04C4	Performance for the Fuel Fill Door Lock Position Sensor/Switch Circuit	The current Fuel Fill Door position is determined to be	NOT LOCKED	Fuel Fill Door Lock Position Sensor/Switch Circuit Diagnostic Enable Calibration	=TRUE	300ms	Two Trips, Type B
			AND the previous lock position is	LOCKED	No active DTCs:	P04BB, P04BD, P04BE, P04BF, P04C1, P04C2, P04C3, P04C5, P04C6,		
			AND the Fuel Fill Door lock has NOT been commanded to UNLOCK	≠ASSERT UNLOCK				
Fuel Fill Door Lock Position Sensor/Switch Circuit Low	P04C5	Detects if the circuit is shorted to ground	Switch sensor reading less than threshold	Reported Position<22.9%	Fuel Fill Door Lock Position Sensor/Switch Circuit Low Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel Fill Door Lock Position Sensor/Switch Circuit High	P04C6	Detects if the circuit is shorted to battery or open	Switch sensor reading greater than threshold	Reported Position > 94.5%	Fuel Fill Door Lock Position Sensor/Switch Circuit High Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Open Request Sensor/Switch Circuit	P04C8	Detects if the circuit resistance is incorrect	Switch sensor reading within invalid range	65.9% < Reported Position <= 81.6%	Fuel Fill Door Open Request Sensor/Switch Circuit Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Open Request Sensor/Switch Circuit Low	P04CA	Detects if the circuit is shorted to ground	Fuel Fill Door Lock Request Switch sensor reading less than threshold	Reported Position < 22.9%	Fuel Fill Door Open Request Sensor/Switch Circuit Low Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B

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Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel Fill Door Open Request Sensor/Switch Circuit High	P04CB	Detects if the Circuit is shorted to battery or open	Fuel Fill Door Request Switch sensor reading above threshold	Reported Position > 94.5%	Fuel Fill Door Open Request Sensor/Switch Circuit High Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Evaporative Emission (EVAP) System Pressure Incorrect During Fuel Fill Door Open Request	P1461	Detects incorrect EVAP System pressure during a Fuel Fill Door Open Request	The Fuel Tank Vapor Pressure does NOT fall within a pressure range	Fuel Tank Vapor Pressure >= .623 Kpa OR Fuel Tank Vapor Pressure < -.623 Kpa	Evaporative Emission (EVAP) System Pressure Incorrect During Fuel Fill Door Open Request Diagnostic Enable Calibration	=TRUE	30sec	One Trip, Type A
					A request to refuel the vehicle has been detected	=TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel Fill Door Switch Wake-up Circuit Performance	P169D	Detects a circuit fault in the Fuel Fill Door Switch Wake-Up Circuit	Refuel Request Wake-up circuit state not equal to Refuel request Switch Position State		Fuel Fill Door Switch Wake-up Circuit Performance Diagnostic Enable Calibration	=TRUE		Two Trips, Type B
					No Active DTCs for the Open Request Sensor/Switch Circuit	P04C8, P04CA, P04CB		
			Case 1: Fuel Fill Door Switch Wake-Up Circuit Active	=FALSE	Fuel Fill Door Open Switch Request	=TRUE	4 out of 5 samples @ 50ms per sample	
			Case 2: Fuel Fill Door Switch Wake-Up Circuit Active	=TRUE	Fuel Fill Door Open Switch Request	=FALSE	64 out of 80 samples @ 50ms per sample	
<b>Charge Port Door Diagnostics</b>								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Charge Port Door Open Request Switch Wake-Up Circuit	P0CC6	Detects a fault in the Charge Port Door open Request Wake-Up Circuit	Charge Door Open request Wake-up state not equal to Charge Door Open Request Switch State		Diagnostic Enable	=TRUE		Two Trips, Type B
					No active DTCs:	P0CC9, P0CCA, P0CC7		
			Case 1: Charge Door Open Request Wake-Up Circuit Active	=FALSE	Charge Door Open Request Switch Active	=TRUE	4 out of 5 samples @ 50ms per sample	
			Case 2: Charge Door Open Request Wake-Up Circuit Active	=TRUE	Charge Door Open Request Switch Active	=FALSE	64 out of 80 samples @ 50ms per sample	
Charge Port Door Open Request Switch Circuit	P0CC7	Detects if the circuit resistance is incorrect	Switch sensor reading within INVALID range	65.9% < Reported Position <= 81.6%	Charge Port Door Open Request Switch Circuit Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 50ms per sample	Two Trips, Type B

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Charge Port Door Position Sensor Circuit High	P0CCF	Detects if the circuit is shorted to battery	Position sensor reading greater than threshold	Reported Positon > 94.5%	Charge Port Door Position Sensor Circuit High Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 50ms per sample	Two Trips, Type B
Charge Port Door Unlock Control Circuit	P0CD1	Detects a circuit fault			Charge Port Door Unlock Control Circuit Diagnostic Enable Calibration	=TRUE		Two Trips, Type B
					The hardware reported circuit fault staus is	≠ INDETERMINANT		
			Case 1: Short to Ground	=TRUE	Charge Port Door Unlock Command	=TRUE	3 out of 4 samples @ 50ms per sample	
			Case 2: Short to Battery or Open	=TRUE	Charge Port Door Unlock Command	=FALSE	64 out of 80 samples @ 50ms per sample	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Control Pilot Diag Switch Charge Cord State No active DTCs:	On Not Connected P0CD1,P0CCF,P0CCE, P0CCC,P0CCA,P0CC9, P0CC7,P0CC6		
		DTC Pass					5 seconds	
Control Pilot Circuit Range/Performance	P0CF4	This diagnostic tests the integrity of the Charge Control Pilot. There are two tests to ensure proper functioning of the pilot.  Part A: Sets when Control Pilot Percent Voltage is above a Threshold OR Aux Micro Logic	% Control Pilot Signal   Aux Micro Logic State Main Micro Logic State	> 0.03   High  Low	Part A:  CPDIAG Switch State  No Active DTCs for Charge Port Door Position  System Voltage Charge Port Door  Charge Cord State	Not Asserted (see Definitions)  P0CCF,P0CCE, P0CCC  > 9 V Closed  Not Connected	30 failures out of 50 samples  100 ms rate	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		State is in HIGH state OR Main Micro Logic State is in LOW state Part B: Control Pilot Percent Voltage is above a High Threshold OR Control Pilot Percent Voltage is below a Low Threshold	% Control Pilot Signal % Control Pilot Signal Aux Micro Logic State Main Micro Logic State	> 0.46 < 0.30 Low High	Part B: CPDIAG Switch State Control Pilot Charging Switch State Charging Ventilation Switch State Charge Cord State System Voltage	Asserted Open Open Not Connected > 9 V		
		OR Aux Micro Logic State is in LOW state OR Main Micro Logic State is in HIGH state						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass					5 seconds	
Proximity Detection Circuit High	P0D59	Sets when Proximity Detection Circuit Voltage is above a threshold	Proximity Detection Circuit Voltage	> 4.8 V.	System Voltage [Charge Port Door No Active DTCs on Charge Port Door Position  OR Vehicle Speed Shift Lever Position No Faults on Vehicle Speed	> 9V Closed  P0CCF,P0CCE, P0CCC  > 12.4 mph  Not in Park	30 failures out of 50 samples  100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Proximity Detection Circuit Low	P0D58	Sets when Proximity Detection Circuit Voltage is below a threshold	Proximity Detection Circuit Voltage	< 4.2 V.	System Voltage	> 9V	30 failures out of 50 samples  100 ms rate	One Trip, Type A
		[Charge Port Door			Closed			
					No Active DTCs on Charge Port Door Position	P0CCF,P0CCE, P0CCC		
					OR			
					Vehicle Speed	> 12.4 mph		
					Shift Lever Position	Not in Park		
					No Faults on Vehicle Speed]			
		DTC Pass					5 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger System Precharge Time Too Long	P0D26	This diagnostic tests whether precharge has occurred in the appropriate amount of time in a characteristic way. The target voltage is battery pack voltage. A deviation or deadband around pack voltage is calculated in the form of a percentage deviation. To have a successful or passing precharge,	Not Passing (see pass criteria below)	>= 10 seconds	System Voltage AND Multi-Purpose Contactor OR Charger Contactor State  Precharge Too Long Time	> 9V  open  Precharge  < = 10 sec.	10 sec	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		the bus voltage must rise and be within the calculated deadband window for a continuous time of at least 0.25 seconds and before 10 seconds has elapsed since the beginning of precharge.						
		DTC Pass	abs(Charger Bus Voltage / Battery Pack Voltage - 1)x 100) AND Precharge Complete Window Time	< 5%  >= 0.25 seconds			0.25 sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Output Shorted	P0D23	Sets Charger Bus Current is above a threshold	Bus Current	> .35 A	System Voltage	> 9V	4 failures out of 5 samples  100 ms rate	One Trip, Type A
		Multi-Purpose Contactor			Open			
					Charger Contactor State	Precharge		
					No Active DTCs on HV output current sensor signal	P0D53, P0D54, P1EEB, P1EEC, P1ECE, P0D5C, P16C5, P1EFD, P1F16		
					No Active Cooling	(See Definitions tab)		
					No Active Heating			
		DTC Pass					0.5 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Input Current Too High	P0D2A	Sets when Charger AC Input Current is above a threshold  If AC Input Voltage $\geq 185$ V  If AC Input Voltage $< 185$ V	AC input current	$> 17$ A	No Active DTCs on AC Input Voltage	P0D3F, P0D40, P1EE7, P1EE8, P0D3E, P1ECE, P0D5C, P0D5B, P16C4, P1EFD	240 failures out of 300 samples  100 ms rate	One Trip, Type A
			AC input current	$> 13$ A	No Active DTCs on AC Input Current Signal	P0D3A, P0D3B, P1EE7, P1EE8, P1ECE, P0D5C, P0D5B, P16C4, P1EFD, P1F14		
			DTC Pass		Control Pilot Charging Switch State	Closed	5 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Output Current Performance	P0D22	This DTC sets when current control degrades to the point where actual current exceeds an acceptable deviation (threshold) from the target or desired current.	abs( Charger HV Output Current Deviation)	>=Table F(Desired Current)  See Supporting Tables	Charge Control Mode  Desired Current  Delay Time after start of constant current control	Constant Current  >0.5 A  10 sec	150 failures out of 300 samples  100 ms rate	One Trip, Type A
		DTC Pass				30 seconds		
Battery Charger Output Voltage Performance	P0D20	This DTC sets when the percent of voltage deviation while in constant voltage control mode is greater than a threshold.	Charger HV Output Voltage Percent Deviation	>= 15%	System Voltage  Charge Control Mode	> 9 V  Constant Voltage	30 failures out of 50 samples  100 ms rate	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass					5 seconds	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Charger HV Out Current	> 0.5 A		
					No Active DTCs on HV Output Current Sensor	P0D53, P0D54, P1EEB, P1EEC, P1ECE, P0D5C, P16C5, P1EFD, P1F16		
					Charger Contactor Control Status	Closed		
					System Voltage	> 9 V		
					No faults on HV Output Voltage Sensor	P0D4E, P0D4F, P1EEB, P1EEC, P1ECE, P0D5C		
					Charge System Mode	P16C5, P1EFD Heat Only Mode		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger AC Voltage Not Present	P1EE6	Sets when Charger AC input Voltage is below a threshold	Charger AC Input Voltage	<= 5 V	System Voltage  AC On Requested  No Active DTCs on AC Input Voltage Sensor  Control Pilot State	> 9 V  >= 4 Sec.  P0D3F, P0D40, P1EE7, P1EE8, P0D3E, P1ECE, P0D5C, P0D5B, P16C4, P1EFD  Connected Ready (In/Out)	8 failures out of 10 samples  100 ms rate	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Pilot Charging Switch Range/Performance	P0CF9	Sets when Control Pilot % voltage is below a threshold or if it is above a threshold	Control Pilot Normalized Voltage OR Control Pilot Normalized Voltage	> 28 %  < 14 %	System Voltage  Control Pilot Charging Switch State  CPDIAG Switch State  Charge Cord State  Control Pilot Circuit and Performance Diagnostics	> 9 V  Closed  Asserted  Not Connected  Completed this Key-Cycle	30 failures out of 50 samples  100 ms rate	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Pilot Charging Ventilation Switch Range/Performance	P0D01	Sets when Control Pilot % voltage is below a threshold or if it is above a threshold	Control Pilot Normalized Voltage OR Control Pilot Normalized Voltage	> 10 %  < 5 %	System Voltage  Charging Ventilation Switch State  CPDIAG Switch State  Charge Cord State  Control Pilot Circuit and Performance Diagnostics  Control Pilot Charging Switch Performance	> 9 V  Closed  Asserted  Not Connected  Completed this Key-Cycle  Completed this Key-Cycle	30 failures out of 50 samples  100 ms rate	One Trip, Type A
			Note: Control Pilot Normalized Voltage=Charging System Control Pilot Voltage / Battery Voltage					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel Rail Pressure (FRP) Sensor Performance (rationality)	P018B	This DTC detects a fuel pressure sensor response stuck within the normal operating range	Absolute value of fuel pressure change as sensed during intrusive test.	$\leq 30$ kPa	1. FRP Circuit Low DTC (P018C)	Not active	Frequency : Continuous; 12.5 ms loop. 60 seconds between intrusive tests that pass  Intrusive test requested if fuel system is clamped for $\geq 5$	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. FRP Circuit High DTC (P018D)	Not active	seconds or fuel pressure error variance <= typically (0.3 to 0.6) (calculated over a 2.5sec period); otherwise report pass	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					3. FuelPump Circuit Low DTC (P0231)  4. FuelPump Circuit High DTC (P0232)	Not active  Not active	Duration of intrusive test is fueling related (5 to 12 seconds).	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					7. Fuel Pump Control Module Driver Over-temperature DTC (P064A)	Not active		
					8. Control Module Internal Performance DTC (P0606)	Not active		
					9. Engine run time	>=5 seconds		
					10. Emissions fuel level (PPEI \$3FB)	Not low		
					11. Fuel pump control	Enabled		
					12. Fuel pump control state	Normal or FRP rationality control		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					13. Engine fuel flow 14. ECM fuel control system failure (PPEI \$1ED)	> 0.047 g/s  Not failed		
Fuel Rail Pressure (FRP) Sensor Circuit Low Voltage	P018C	This DTC detects if the fuel pressure sensor circuit is shorted low	FRP sensor voltage	< 0.14 V	Ignition	Run or Crank	72 failures out of 80 samples  1 sample/12.5 ms	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel Rail Pressure (FRP) Sensor Circuit High Voltage	P018D	This DTC detects if the fuel pressure sensor circuit is shorted high	FRP sensor voltage	> 4.86 V	Ignition	Run or Crank	72 failures out of 80 samples  1 sample/12.5 ms	DTC Type A 1 trip
Fuel Pump Control Circuit Low Voltage	P0231	This DTC detects if the fuel pump control circuit is shorted to low	Fuel Pump Current	> 14.48A	Ignition  OR HS Comm OR	Run or Crank  enabled	72 test failures in 80 test samples if Fuel Pump Current <100A  1 sample/12.5 ms	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Fuel Pump Control AND Ignition Run/Crank Voltage	enabled  9V < voltage < 32V		
Fuel Pump Control Circuit High Voltage	P0232	This DTC detects if the fuel pump control circuit is shorted to high	Voltage measured at fuel pump circuit	> 3.86 V	Commanded fuel pump output  Fuel pump control enable	0% duty cycle (off)  False	36 test failures in 40 test samples; 1 sample/12.5ms  Pass/Fail determination made only once per trip	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Time that above conditions are met	>=4.0 seconds		
Fuel Pump Control Circuit (Open)	P023F	This DTC detects if the fuel pump control circuit is open	Fuel Pump Current  AND Fuel Pump Duty Cycle	<=0.5A  >20%	Ignition  OR HS Comm  OR Fuel Pump Control AND Ignition Run/Crank Voltage	Run or Crank  enabled  enabled  9V < voltage < 32V	72 test failures in 80 test samples; 1 sample/12.5ms	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel System Control Module Enable Control Circuit	P025A	This DTC detects if there is a fault in the fuel pump control enable circuit	PPEI (PPEI 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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Read Only Memory (ROM)	P0601	This DTC will be stored if any software or calibration check sum is incorrect	Calculated Checksum (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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Random Access Memory (RAM)	P0604	Indicates that control module is unable to correctly write and read data to and from RAM	Data read	≠ Data written	Ignition  OR  HS Comm  OR  Fuel Pump Control	Run or Crank    enabled    enabled	1 failure if it occurs during the first RAM test of the ignition cycle, otherwise 5 failures    Frequency : Runs continuously in the background.	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
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 discriminates the source of the fault )	1. For all I/O configuration register faults:  •Register contents	Incorrect value.	Ignition          OR HS Comm OR Fuel Pump Control	Run or Crank          enabled       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			2. For Processor Clock Fault: •EE latch flag in EEPROM. OR	0x5A5A	1. For all I/O configuration register faults: •KeMEMD_b_ProcFltCfgRegEnbl	TRUE	Test 3 3 failures out of 15 samples	
3. External watchdog test			• RAM latch flag.	0x5A	2. For Processor Clock Fault: •KeMEMD_b_ProcFltCLKDiagEnbl	TRUE	1 sample/12.5 ms	
			3. For External Watchdog Fault: • Software control of fuel pump driver	Control Lost	3. For External Watchdog Fault: •KeFRPD_b_FPExtWDogDiagEnbl	TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					3. For External Watchdog Fault: •Control Module ROM(P0601)	not active		
					3. For External Watchdog Fault: •Control Module RAM(P0604)	not active		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Long Term Memory (EEPROM) Performance	P062F	Indicates that the NVM Error flag has not been cleared	Last EEPROM write	Did not complete	Ignition  OR HS Comm OR Fuel Pump Control	Run or Crank  enabled  enabled	1 test failure Once on controller power-up	DTC Type A 1 trip
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	$\geq 0.5V$  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	$\geq 5.5V$  active				
			OR Reference voltage AND Output	$\leq 4.5V$  active				
			OR Reference voltage	$> 102.5\%$ nominal (i.e., 5.125V) OR $< 97.5\%$ nominal (i.e., 4.875V)				

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 1	P064A	This DTC detects if an internal fuel pump driver overtemperature condition exists under normal operating conditions	Pump Driver Temp	> 150C	Ignition  OR HS Comm OR Fuel Pump Control KeFRPD_b_FP Ignition Run/Crank	Run or Crank  Enabled  Enabled TRUE 9V<voltage<32V	3 failures out of 15 samples  1 sample/12.5 ms	DTC Type B 2 trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Ignition 1 Switch Circuit Low Voltage	P2534	This DTC detects if the Ignition1 Switch circuit is shorted to low or open	Ignition 1 voltage	$\leq 6$ V	Engine	Running	180 failures out of 200 samples  1 sample/25.0 ms	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel Pump Flow Performance (rationality)	P2635	This DTC detects degradation in the performance of the SIDI electronic return-less fuel system	Filtered fuel rail pressure error	<= Low Threshold ( function of desired fuel rail pressure and fuel flow rate. 15% of resultant Target Pressure )  OR  >= High Threshold ( function of desired fuel rail pressure and fuel flow rate. 15% of resultant Target Pressure)	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 Rail Pressure Sensor Performance DTC (P018B)	Not active		
					4. FuelPump Circuit Low DTC (P0231)	Not active		
					5. FuelPump Circuit High DTC (P0232)	Not active		
					6. FuelPump Circuit Open DTC (P023F)	Not active		
					7. Reference Voltage DTC (P0641)	Not active		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					8. Fuel Pump Control Module Driver Over-temperature DTC's (P064A)	Not active		
					9. Control Module Internal Performance DTC (P0606)	Not active		
					10. An ECM fuel control system failure (PPEI \$1ED)	Not occurred		
					11. The Barometric pressure (PPEI \$4C1) signal	Valid (for absolute fuel pressure sensor)		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					12. Engine run time	>= 30 seconds		
					13. Emissions fuel level (PPEI \$3FB)	Not low		
					14. Fuel pump control	Enabled		
					15. Fuel pump control state	Normal		
					16. Battery Voltage	11V<=voltage=<32V		

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 <b>AND</b> <= 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.		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Communication Bus "A" Off	U0073	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state	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

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

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 High	C1207	The left front wheel speed sensor is shorted.	WSS feedback voltage > Threshold1 OR ORION ASIC detects current > Threshold2  Pass Threshold: < 2.2v	Threshold1 = 2.20v Threshold2 = 35ma Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled	> 9.0 < 19.5 True (Note 1)	> 100ms	two trips
Right Front Wheel Speed Sensor Circuit High	C1208	The right front wheel speed sensor is shorted.	WSS feedback voltage > Threshold1 OR ORION ASIC detects current > Threshold2  Pass Threshold: < 2.2v	Threshold1 = 2.20v Threshold2 = 35ma Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled	> 9.0 < 19.5 True (Note 1)	> 100ms	two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Left Rear Wheel Speed Sensor Circuit High	C1209	The left rear wheel speed sensor is shorted.	WSS feedback voltage > Threshold1 OR ORION ASIC detects current > Threshold2  Pass Threshold: < 2.2v	Threshold1 = 2.20v Threshold2 = 35ma Nominal Range: 0.20v < WSS voltage range < 2.20v	Sys Voltage Sys Voltage Processing_Enabled	> 9.0 < 19.5 True (Note 1)		two trips
Right Rear Wheel Speed Sensor Circuit High	C1210	The right rear wheel speed sensor is shorted.	WSS feedback voltage > Threshold1 OR ORION ASIC detects current > Threshold2  Pass Threshold: < 2.2v	Threshold1 = 2.20v Threshold2 = 35ma Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled	> 9.0 < 19.5 True (Note 1)	> 100ms	two trips
Left Front Wheel Speed Sensor Circuit	C1221	The left front WSS signal has dropped out. It has stopped producing edges.	Number of detected edges = 0	0 edges Nominal Range: (N/A)	Veh Vel System Voltage Processing_Enabled No Active DTCs	> 8 mph < 19.5 True (Note 1) C1207	70ms	two trips

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

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

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	> 8 mph < 19.5 True (Note 1) C1210	70ms	two trips

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Right Front Wheel Speed Sensor Circuit Range/Performance	C1226	Erratic signal. The right front WSS is exhibiting erratic behavior with a large acceleration.	WSS Accel > Threshold  Pass Threshold: < 491m/s/s	491m/s/s Nominal Range: (N/A)	Veh Vel Processing_Enabled No Active DTCs	> 8 mph True (Note 1) C1208	280ms Pass >30s	two trips
Left Rear Wheel Speed Sensor Circuit Range/Performance	C1227	Erratic signal. The left rear WSS is exhibiting erratic behavior with a large acceleration.	WSS Accel > Threshold  Pass Threshold: < 491m/s/s	491m/s/s Nominal Range: (N/A)	Veh Vel Processing_Enabled No Active DTCs	> 8 mph True (Note 1) C1209	280ms Pass >30s	two trips
Right Rear Wheel Speed Sensor Circuit Range/Performance	C1228	Erratic signal. The right rear WSS is exhibiting erratic behavior with a large acceleration.	WSS Accel > Threshold  Pass Threshold: < 491m/s/s	491m/s/s Nominal Range: (N/A)	Veh Vel Processing_Enabled No Active DTCs	> 8 mph True (Note 1) C1210	280ms Pass >30s	two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Tire Size Mismatch	C122E	This detects that there may be mismatched sized tires on the vehicle	$ WSS(\text{one wheel}) - WSS(\text{other 3})  / \text{Wheel Vel}(\text{other 3}) > \text{Threshold}$	20% Nominal Range: N/A	Vehicle Velocity Cornering Wheel Slip  Brake Pedal Apply Detected Processing_Enabled No Active DTCs	>4m/s < 3% (Note 10) Not Detected (Note 10) True (Note 2) True (Note 1) C1207 C1208 C1209 C1210	30ms	two trips
<b>Pedal Travel</b>								
Brake Pedal Position Sensor Power Circuit Low	C120F	The supply to the pedal position sensor is shorted to ground.	Pedal supply voltage < Threshold  Pass Threshold > 0.5v	0.5v	Processing_Enabled	True (Note 1)	30ms	Two trips

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	Two trips
Brake Pedal Position Sensor 3 Circuit Low	C129A	Brake pedal position 3 input signal voltage is low.	Brake Ped Pos 3 Voltage < Threshold  Pass Threshold > 5% of sensor supply voltage	5% of sensor supply voltage  Nominal Range: 4.75v - 5.25v - Supply	Sensor Supply Voltage Sensor Supply Voltage Processing_Enabled No Active DTCs	> 4.75v < 5.25 True (Note 1) C120F	75ms	two trips
Brake Pedal Position Sensor 3 Circuit High	C129B	Brake pedal position 3 input signal voltage is high.	Brake Ped Pos 3 Voltage > Threshold  Pass Threshold > 95% of sensor supply voltage	95% of sensor supply voltage  Nominal Range: 4.75v - 5.25v - Supply	Sensor Supply Voltage Sensor Supply Voltage Processing_Enabled No Active DTCs	> 4.75v < 5.25 True (Note 1) C120F	75ms	two trips

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		predefined threshold.			Enabled Sensor Supply Voltage Sensor Supply Voltage 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  Nominal Range: 4.75v - 5.25v - Supply	Sensor Supply Voltage Sensor Supply Voltage Processing_Enabled No Active DTCs	> 4.75v < 5.25 True (Note 1) C120F	75ms	two trips

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

**Pressure Sensors**

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS Sensor Reference Output Circuit	C12E4	Determines if the internal 5v voltage supply is out of range.	Internal supply voltage < Threshold Low  Internal supply voltage > Threshold High  Pass Threshold 4.75 < Volt <5.25	Low = 4.75v  High = 5.25v  Nominal Range: (N/A)	Processing_Enabled	True (Note 1)	30ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS Master Cylinder Pressure Sensor and Brake Pedal Position Sensor Correlation	C12B1	The Master Cylinder Pressure sensor reading does not correlate with the pedal travel sensor readings.	M/C pressure input outside correlation table with Brake Ped Pos x inputs  M/C Pressure has not changed by more than Threshold 1 while pedal travel inputs have changed more than Threshold 2	Outside acceptance table (Note 4)  Threshold 1 = 50.0 kPa Threshold 2 = 2.0 mm (rod)	Processing_Enabled System self test complete One brake apply M/C Pressure signal stable No Active DTCs	True (Note 1) True True (Note 5) C120C C120F C12B2 C12B3 C12B4 C128B C128E C127D C129A C129B C129C C129D C129E C129F C12E5 C12F8	150ms (condition 1)  100ms (condition 2)	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS Master Cylinder Pressure Sensor Circuit Open or Shorted Low	C12B2	Out of range Low The MCP sensor is either open or shorted to ground.	MCP Voltage < Threshold  Pass Threshold: > 5%	5% Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled	True (Note 1)	100ms	two trips
ABS Master Cylinder Pressure Sensor Circuit Shorted High	C12B3	The MCP sensor signal is shorted high.	MCP Voltage > Supply Threshold  Pass Threshold: < 95%	95% Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled	True (Note 1)	100ms	two trips
ABS Master Cylinder Pressure Sensor Performance	C12B4	An MCP erratic condition exist if the ohmic fault status has changed since the last time the ohmic check was performed.	Transitions from Valid to Open/Shorted State  Pass Threshold: Transitions do not occur.	Successive Loops Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled No active DTCs:	True (Note 1) C12B2 C12B3	100ms Pass =150ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS Master Cylinder Pressure Sensor Offset Error	C128B	The MCP sensor's input signal offset is out of range.	MCP Offset > Threshold	800 kPa (0.7v typically) Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	(Brake Switch Veh Accel Pump Motor) or Brake Pedal Apply Detected AND Processing_Enabled No active DTCs:	False > 0.4m/s <sup>2</sup> Not Active  True (Note 2)  True (Note 1) C12B2 C12B3 C128E	20ms	Two trips
		Emulator pressure offset is out of range.	Emulator Pressure Offset > Max Threshold	800 kPa	Emulator Pressure Detected	TRUE	7 ms	
ABS Master Cylinder Pressure Sensor Raw Offset Error	C128E	The MCP sensor's raw offset is out of range.	MCP Raw Offset > Threshold	5000 kPa (1.64v typical) Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Brake Control Vehicle Acceleration Vehicle Velocity Accelerator Pedal Position Brake Switch Processing_Enabled No active DTCs:	False (Note 6) > -0.5m/s/s > 2.0m/s < 10% False True (Note 1) C12B2 C12B3 C128E	1s	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS HPA Pressure Sensor Circuit Open or Shorted Low	C12B6	Out of range low. The HPA pressure sensor is either open or shorted to ground.	HPA Voltage < Threshold  Pass Threshold: > 5%	5% Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled	True (Note 1)	100ms	Two trips
ABS HPA Pressure Sensor Circuit Shorted High	C12B7	The HPA pressure sensor signal is shorted high.	HPA Voltage > Supply Threshold  Pass Threshold: < 95%	95% Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled	True (Note 1)	100ms	Two trips
ABS HPA Pressure Sensor Erratic	C12B8	An HPA pressure sensor erratic condition exist if the ohmic fault status has changed since the last time the ohmic check was performed	Transitions from Valid to Open/Shorted State  Pass Threshold: Transitions do not occur.	Successive Loops Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled No active DTCs:	True (Note 1) C12B6 C12B7	100ms Pass = 150ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS Boost Pressure Sensor Circuit Open or Shorted Low	C12BC	The boost pressure sensor is either open or shorted to ground.	Boost Voltage < Threshold  Pass Threshold: > 5%	5% Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled	True (Note 1)	100ms	Two trips
ABS Boost Pressure Sensor Circuit Shorted High	C12BD	The boost pressure sensor signal is shorted high.	Boost Voltage > Supply Threshold  Pass Threshold: < 95%	95% Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled	True (Note 1)	100ms	Two trips
ABS Boost Pressure Sensor Erratic	C12BE	A boost pressure sensor erratic condition exist if the ohmic fault status has changed since the last time the ohmic check was performed	Transitions from Valid to Open/Shorted State  Pass Threshold: Transitions do not occur.	Successive Loops Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled No active DTCs:	True (Note 1) C12BC C12BD	100ms Pass = 150ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS Boost Pressure Sensor Raw Offset Error	C128D	The boost pressure sensor's raw offset is out of range.	Boost Signal Raw Offset > Threshold	5000 kPa (1.64v typical) Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Brake Control Vehicle Acceleration Vehicle Velocity Accelerator Pedal Position Brake Switch Processing_Enabled No active DTCs:	False (Note 6) > -0.5m/s/s > 2.0m/s < 10% False True (Note 1) C12BC C12BD C12BE	1s	Two trips
ABS Boost Pressure Sensor Offset Error	C128A	The boost pressure sensor's input signal offset is out of range.	Boost Signal Offset > Threshold  Pass Threshold: < 800 kPa	800 kPa (0.7v typically) Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Brake Switch Vehicle Acceleration Pump Motor Processing_Enabled No active DTCs:	False > 0.4m/s <sup>2</sup> Not Active True (Note 1) C12BC C12BD C12BE	20ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS Boost Pressure Performance	C120A	Determines if the boost pressure being commanded is being achieved or not.	Boost Pres Diff(BPD) =  Boost Pres(filtered, zeroed) – test command   With VSC or TC or ABS active: BPD > Thrshld1  Without VSC and TC and ABS active: BPD > Thrshld2	Thrshld1 = 3000 kPa  Thrshld2 = 1500 kPa Nominal Range: (N/A)	Processing_Enabled  No active DTCs:	True (Note 1)  C12B6 C12B7 C12B8 C12BC C12BD C12BE C128A C128D C127D C12E4	500ms	two trips

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	Boost Press(slow filtered) < Threshold1 AND MC Press Greater Than Boost Press Time >= Time1 AND Accum Pres Filtered > Threshold2 OR Boost Loss First Apply Time > Time2	Threshold1 = 7000 kPa Time1 = 250msec Threshold2 = 16000 kPa Time2 = 250msec	Boost Pressure Valid Boost Loss Condition MC Press Greater Than Boost Press Time Incremented When: Boost Pressure Commanded > (Boost Press + 1500 kPa) AND MC Pressure > (Boost Press – 2 bar)  No active DTCs	True False C12BC C12BD C12BE C128A C128D C127D C12E4	250 ms	Two trips

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS Power Switch Circuit Shorted	C12E7	The Base Brake Power switch voltage decay is monitored after the power switch is turned off. Voltage too high indicates a shorted switch. Voltage too low indicates a missing filter capacitor.	Power Switch Short Fault: Power switch feedback > Threshold1  Power Switch Short FSM Capacitor Fault: Power switch feedback < Threshold2  Pass Threshold 80% < fdbk < 50%	Threshold1 = 80% bat volt  Threshold2 = 50% bat volt Nominal Range: (N/A)	Power Switch Command  Motor	Off  != Running	50ms	Two trips
ABS Base Brake Open Solenoid Circuit Open	C12D6	Whenever the Power Switch <b>Base Brake</b> is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be <b>high</b> .	Solenoid feedback voltage < Threshold Solenoid feedback voltage > Threshold  Pass Threshold >80% Pass Threshold <30%	80% battery 30% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	Two trips

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Whenever the Power Switch <b>Base Brake</b> is closed and the driver transistor is turned on (solenoid commanded on) the feedback voltage should be <b>low</b> .	Solenoid feedback voltage > Threshold  Pass Threshold: < 85%	85% of batter (Solenoid in PWM Mode)  Nominal Range: (8v > 16v)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v On	21ms (Solenoid in PWM Mode)	
ABS Base Brake Open Solenoid Driver Shorted	C12D8	Whenever the Power Switch <b>Base Brake</b> is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be <b>high</b> .	Solenoid feedback voltage < Threshold  Pass Threshold >30%	30% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	Two trips

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 voltage should be <b>high</b> .	Solenoid feedback voltage < Threshold Pass Pass Threshold > 43.49%	43.49% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	21ms (Solenoid in PWM Mode)	
ABS Base Brake Closed Solenoid Circuit Open	C12D9	Whenever the Power Switch Base Brake is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be <b>high</b> .	Solenoid feedback voltage < Threshold Solenoid feedback voltage > Threshold  Pass Threshold >80% Pass Threshold <30%	80% battery 30% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	Two trips

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 voltage should be <b>high</b> .	Solenoid feedback voltage < Threshold  Pass Threshold >65.23%	65.23% battery  Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	21ms (Solenoid in PWM Mode)	
ABS Base Brake Closed Solenoid Circuit Shorted	C12DA	Whenever the Power Switch <b>Base Brake</b> is closed and the driver transistor is turned on (solenoid commanded on) the feedback voltage should be <b>low</b> .	Solenoid feedback voltage > Threshold  Pass Threshold: < Threshold	30% of battery (Solenoid in ON/OFF Mode)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v On	15ms (Solenoid in ON/OFF Mode)	Two trips

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Whenever the Power Switch <b>Slip Control</b> is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be <b>high</b> .	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 Boost Valve Solenoid Circuit <b>Shorted</b>	C12DD	This failsafe is for shorted coil detection for HW CLC coils	Current Feedback > Threshold  Pass Threshold: < 150% of requested current	150% of requested current Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Commanded Current Commanded Current	True (Note 8) > 8v < 16v > 0.25a < 0.35a	15ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS Boost Valve Solenoid Circuit Performance	C12A7	The current from the closed loop current controlled valve coil is diagnosed by checking if the difference of the measured current feedback and the commanded current is within a tolerance range.	Coil Feedback Current > Threshold  Pass Threshold: < 25% of commanded current	25% of Commanded Current  Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Commanded Current Commanded Current	True (Note 8) > 8v < 16v > 0.44a < 1.5a	100ms	Two trips
		Whenever the Power Switch Base Brake is closed and the driver transistor is not turned on (solenoid commanded off) the feedback current should be 0 amps.	Current feedback > Threshold  Pass Threshold < 0.10amp	0.10amp Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
<b>FSM Pump Motor</b>								
ABS Pump Motor Run On	C12E9	This fault occurs if the Motor is continuously on for greater than 60s for 5 consecutive run times during an ignition cycle.	FSM Run-On Fault counter > Threshold  Pass Threshold < 5	5 Nominal Range: (10v > 16v)	Motor_Enabled Motor_ON	True (Note 9) > 60s	15 ms	Two trips
ABS Pump Motor Locked	C12E8	This fault is set when the motor control micro communicates to the system micro that the motor is unable or will not rotate.	FS_Motor_No_Edge_Counter < Threshold	50 Nominal Range: (10v > 16v)	Motor_Enabled	True (Note 9)	15 ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p>This fault is set when the motor control micro communicates to the system micro that the motor is unable or will not rotate.</p> <p>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</p> <p>The turning point fault is monitored during motor</p>	<p>Motor start PWM cycles &gt; Threshold (without a recognized turning point)</p>	<p>750 cycles</p>	<p>Motor_Enabled</p>	<p>True (Note 9)</p>	<p>4.75 s</p>	<p>Two trips</p>

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p>This fault is set when the motor control micro communicates to the system micro that the motor is unable or will not rotate.</p> <p>The interrupt order fault is set, if the calls of the requested interrupt-services are not in the correct order.</p> <p>The interrupt order fault is monitored during motor start and motor spinning state.</p>	<p>Requested "interrupt-services" order = Value</p>	<p>Value = Incorrect order</p>	<p>Motor_Enabled</p>	<p>True (Note 9)</p>	<p>Interrupt frequency is tied to motor speed, so it is speed dependent.</p>	<p>Two trips</p>

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS Pump Motor Performance	C12E0	This fault checks to see if a condition exists in which the accumulator is not charging	Accumulator Pressure < Threshold  Pass Threshold > 12000 kPa	11000 kPa Nominal Range: (10v > 16v)	Brake Pedal Apply Detected Motor_Enabled Boost_Pressure < Command + 150 kPa No active DTCs:	True (Note 2) True (Note 9) True  C12B6 C12B7 C12B8 C127D C12E4	100ms	Two trips

Power Inputs



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Ignition Circuit Low	C1240	Ignition voltage is too Low	Ignition Voltage < Threshold  Pass Threshold > 6v	6v	EngRunCrankTerminalStatus EngRunCrankTerminalStatusValid	!= False = True	5s	Two trips
Ignition Circuit High	C1241	Ignition voltage is too High	Ignition Voltage > Threshold  Pass Threshold < 6v	6v	EngRunCrankTerminalStatus EngRunCrankTerminalStatusValid	= False = True	5s	Two trips
ACC Wake Up Circuit Low	C1242	Wakeup voltage is too Low at startup	Vakeup voltage < Threshold  Pass Threshold > 6v	6v	Engine run flag active Diagnostic ran this ignition cycle Normal Communication Enabled	= True for 3s = False = True	5s	Two trips
<b>Controller</b>								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Self Test Failed	C127C	The Built In Self Test (BIST) is responsible for testing the internal functionality of the core within the main microprocessor	Fail Consecutive Times = Threshold	2 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Processor Performance	C127B	<p><b>Normal Operation:</b> 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.</p> <p><b>Ignition Self-Test:</b> The external watchdog circuit is tested by not sending the WEC via the SPI to the ASIC so that the external watchdog is off</p>	<p>Power Switch Slip Control Voltage Feedback &gt; Threshold</p> <p>Pass Threshold &lt; 80% bat volt</p>	80% bat volt Nominal Range: (N/A)		Run during Start-up	30ms	one trip

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Stack Overrun	C126E	To detect underflow and overflow of the system stacks, a word of RAM is reserved at the end of each of the system stacks. A word of RAM is also reserved at the upper-most address of the stack section. The contents of these reserved words will be monitored periodically to determine if they have been modified. To detect cases where the application could be pushing a value onto the	End of Stack != Threshold	Set value changed every software release Nominal Range: (N/A)		Upon Starting Scheduler in the Application	Immediate	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Processor Overrun	C121D	Processor did not perform a proper shutdown. NVRAM blocks written at shutdown do not match expected values upon startup. Processing interrupt occurred.	The contents of the two NVRAM blocks are compared upon start-up with expected values from shutdown process.	Blocks do not compare	Vehicle moving On Brake	True True Upon Starting Scheduler in the Application	15ms	two trips
EBCM Unimplemented Interrupt	C121E	This fault is set if an interrupt occurs that has no explicit interrupt handler defined.	Interrupt Set = Threshold	Not Defined Interrupt Handler Nominal Range: (N/A)		<b>Upon Starting Scheduler in the Application</b>	6 interrupts	Two trips
EBCM Unexpected Exception	C121F	This fault is set if an exception that is not supported in our system has been generated.	Exception Not Supported = Condition	N/A Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM A/D Conversion Timeout	C127D	If the Analog to digital converter does not complete its conversion in a set amount of time then this fault is set.	A/D Conversion Counter = Threshold	0 (Counts down from 100) Nominal Range: (N/A)		Upon Starting Scheduler in the Application	100 clock cycles	one trip
EBCM Non-Volatile Random Access Memory (NVRAM) / Non-volatile RAM	C12FF	Checksum Error Fault	NVRAM status bit sent out by core software reports a failed NVRAM	NVRAMDiagstat > 0 Fault Counts > 0 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	Two trips
EBCM Non-Volatile Random Access Memory (NVRAM) / Software Learn ID		Software ID held in NVRAM does not match ID hard coded in software	BB NVRAM SW BLOCK ID ~ = Software ID	SwVerIDStat > 0 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM High End Timer Performance	C127A	Execution of the High End Timer (HET) program is limited to the actual instructions of the HET program. Execution of default instructions indicates program execution error.	Default Instructions = Threshold	Executed Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip
EBCM High End Timer Program Overflow	C123B	If the HET program does not complete execution time within one HET loop time, the current HET program is aborted and the next program execution is started and a fault code is set.	HET Program Execution Time > Threshold	HET Loop Time Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip

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	C123C	The following tests are continuously ran: 1. Read/write of the micro's HET RAM registers. 2. Address check of the HET RAM address lines. 3. Verify that the HET RAM location used to store the persistent address line test address (offset) advances to the next address line address. 4. Perform data check on a HET RAM address that includes a	If any of the tests fail, the system is forced into a reset by writing an invalid watchdog key to the system registers. If the RAM failure is NOT detected by the bootloader static RAM check algorithm then a fault code is set and the exact type of RAM failure is written to NVRAM.	See Malfunction Criteria Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		dependency check against another HET RAM location that is address adjacent to the HET RAM location being tested. 5. Verify that the HET RAM location used to store the persistent data test address advances to the next test address. The following test is run at power up and reset 1. CAN device RAM check on the mailbox area.						

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	one trip
EBCM High End Timer Periodic Interrupt	C123E	This failsafe verifies that a solenoid feedback interrupt generates a high end timer(HET) interrupt every loop cycle.	Solenoid Feedback Interrupt from the HET = Threshold	Calculated based on Solenoid activity Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Solenoid Timeout	C123D	Each solenoid in the system should generate a HET interrupt. At the completion of the System Self-Test, the number of valid HET interrupts is expected to be equal to the number of solenoids in the system.	Number of Valid HET Interrupts != Number	12 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip
<b>CAN / Communications</b>								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Internal Communication Error	C121C	<p>The periodic Internal Processor Communication (IPC) packet transmission service checks for previous transmission request completion before the new request is made.</p> <p>If the previous transmission was not completed, then the IPC handler declares an IPC packe</p>	Slave micro has not sent a packet for 3.5 sec	Time Nominal Range: (N/A)	3.5 sec	Upon Starting Scheduler in the Application	15 ms	two trips

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

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	one trip

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p>The CAN peripheral monitors CAN bus activity and increments an error counter if the following errors are present:</p> <p>1) BIT ERROR: If the bit sent does not match what was expected to be sent, increment the counter.</p> <p>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</p>	<p>CAN Hardware Transmit Error Counter &gt; Threshold</p>	<p>256 Nominal Range: (N/A)</p>		<p>Upon Starting Scheduler in the Application</p>	<p>15 ms</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p>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.</p>	<p>CAN Frame acknowledgement not received</p>	<p>Not Received Nominal Range: (N/A)</p>		<p>Upon Starting Scheduler in the Application</p>	<p>200ms</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Antilock Brake System Control Module Lost Communication With Hybrid Powertrain Control Module on Bus E	U1858	MISSING_PRIV_CTRL_RGN_BRK_TRQ_CE Communication message is missing.	The specified input packet with consistent data was not received by COMMS for a predefined time. Every periodic input packet is monitored for input deadline timeout. The deadline timeout is reset each time new packet data is received. The deadline timeout is either set in DBC file or during the configuration of the COMMS subsystem.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	two trips
		PRIV_REGEN_BRAKE_ARC_ERROR	Out of the 16 received frames, 4 ARC values do not match the calculated values.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		GMLAN_CMD_A XLE_TRQ_ARC _ERROR	Out of the 16 received frames, 4 ARC values do not match the calculated values.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	
		GMLAN_CMD_A XLE_TRQ_PRO T_ERROR	Out of the 16 received frames, 4 protection values do not match the calculated values.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	

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

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

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

Note #3 - Pressure Zeroing Enable. When the vehicle is in a known state that the driver brake pedal should be released, the Pressure Zeroing Enable is set. Typical vehicle conditions are:

- 1) There is no vehicle brake control active
- 2) Vehicle acceleration > -0.5m/s<sup>2</sup> (not decelerating)
- 3) Vehicle velocity > 2.0m/s
- 4) Accelerator pedal position < 10%
- 5) Brake switch is not pressed

Note #4 - See Correlation Table below

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

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

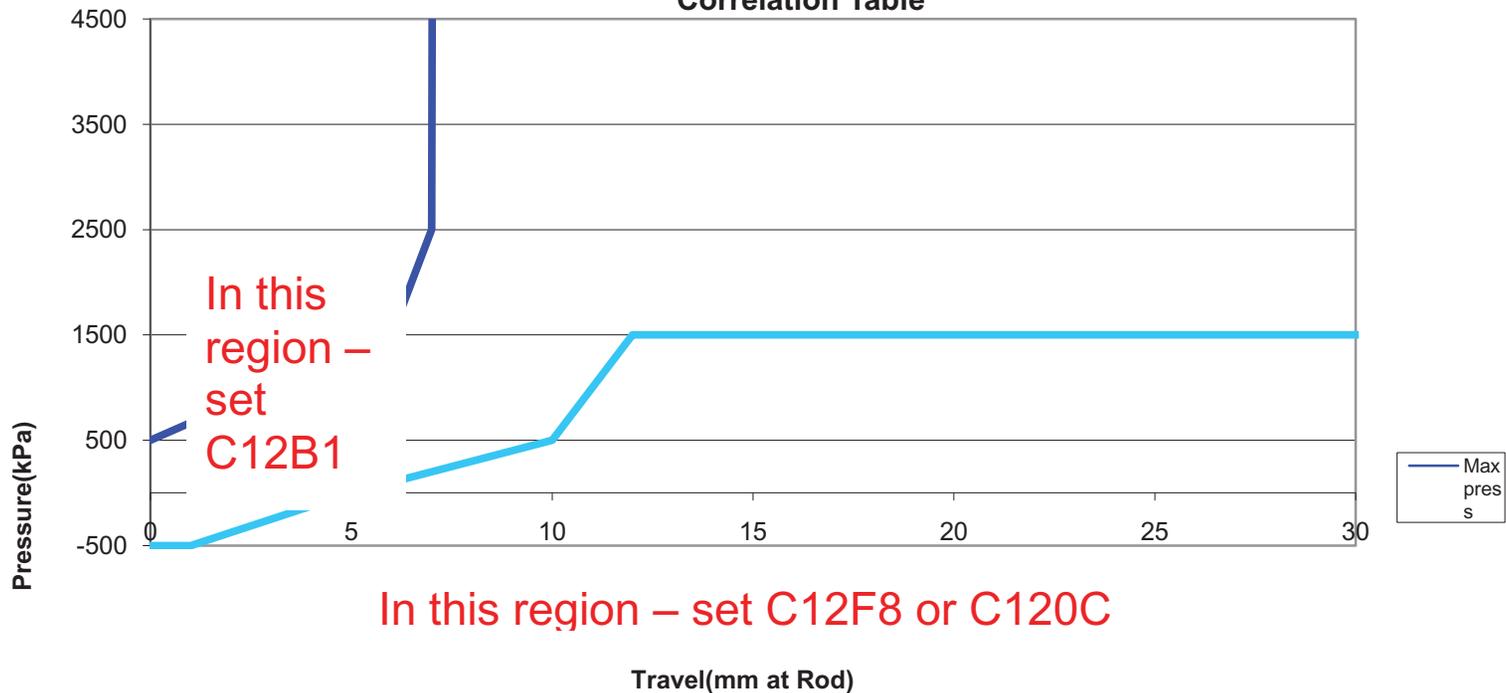
Note #7 - Power Switch Slip Control Enable is used to open the power control FET in the electronics as a safety mechanism for the brake controller. It is set to FALSE when the following DTCs are set to 'Fault': C12C2, C12C5, C12D2, C12D5, C12CC, C12CF, C12C6, C12C8, C12DE, C12D8, C12D2, C1256, C1255, C126E, C123C, C127C, C121E, C121F, C120D, C127B

Note #8 - Power Switch Base Brake Control Enable is used to open the Base Brake power control FET in the electronics as a safety mechanism for the brake controller. It is set to FALSE when the following DTCs are set to 'Fault': C12DB, C12DC, C12D8, C12D3, C1256, C1255, C126E, C123C, C127C, C121E, C121F, C12E6, C127B

Note #9 - Motor\_Enable is used to indicate when the motor is allowed to be commanded on. Motor\_Enable is set to FALSE when the following DTCs are set to 'Fault': C12B7, C12B6, C12B8, C12D8, C12DB, C12DC, C12E9, C12E8, C1256, C1255, C126E, C123C, C123E, C123A, C127A, C123B, C127C, C121E, C121F, C123D, C126F, C121C, C120C, C12E6, C12E7, C127B

Note #10 - Cornering determination is a comparison of the 4 wheel speeds to estimate the percentage of road wheel angle of the drive wheels relative to their full amount of articulation. Wheel slip is the calculated ratio of individual wheel velocities to the calculated average vehicle velocity. Vehicle velocity is calculated from the 4 wheel speed sensors.

Note 4:  
Correlation Table



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense x Circuit Low	P0B3D	Sets when cell voltage is detected below threshold	Cell Voltage X	<= 0.2V	Diagnostic Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTCs associated with VTSM Loss of Comm No Active DTCs associated with VTSM 5V Ref Diagnostic	TRUE TRUE	1.4second in a 2 second window	One Trip
	P0B42					U2603, U2604, U2605, U2606		
	P0B47					P1E93, P1E99, P1E9F, P1EA5		
	P0B4C							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P0B51				No Active DTCs associated with Open Sense Line	P0B3B, P0B40, P0B45, P0B4A, P0B4F, P0B54, P0B59, P0B5E, P0B63, P0B68, P0B6D, P0B77, P0B7C, P0B81, P0B86, P0B8B, P0B95, P0B9A, P0B9F, P0BA4, P0BA9, P0BAE, P0BB3, P0BB8, P1B28, P1B29, P1B2A, P1B2B, P1B2C, P1B2D, P1E4C, P1E4D, P1E4E, P1E4F, P1E50, P1E51, P1E52, P1E53, P1E54, P1E56, P1E57, P1E58, P1E59, P1E5A, P1E5B, P1E5C, P1E5D, P1E5E, P1E5F, P1E60, P1E61, P1E62, P1E63, P1E64,		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P0B56				2nd Protection Self Test Diagnostic	Not Running		
	P0B5B				2nd Protection Self Test Diagnostic	Not Running		
	P0B60				No Active DTCs associated with VTSM Cell	P1E92, P1E98, P1E9E, P1EA4		
	P0B65				Balancing Fault No Active DTCs associated with VTSM Internal Performance	P1E8E, P1E94, P1E9A, P1EA0		
	P0B6A				No Active DTCs on VITM RESS Bus Off	U2401		
	P0B6F							
	P0B74							
	P0B79							
	P0B7E							
	P0B83							
	P0B88							
	P0B8D							
	P0B92							
	P0B97							
	P0B9C							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P0BA1							
	P0BA6							
	P0BAB							
	P0BB0							
	P0BB5							
	P0BBA							
	P1B17							
	P1B1A							
	P1B1D							
	P1B20							
	P1B23							
	P1B26							
	P1B46							
	P1B49							
	P1B4C							
	P1B4F							
	P1B52							
	P1B55							
	P1B58							
	P1B5B							
	P1B5E							
	P1B61							
	P1B64							
	P1B67							
	P1B6A							
	P1B6D							
	P1B70							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P1B73							
	P1B76							
	P1B79							
	P1B7C							
	P1B7F							
	P1B82							
	P1B85							
	P1B88							
	P1B8B							
	P1B8E							
	P1B91							
	P1B94							
	P1B97							
	P1B9A							
	P1B9D							
	P1BA0							
	P1BA3							
	P1BA6							
	P1BA9							
	P1BAC							
	P1BAF							
	P1BB2							
	P1BB5							
	P1BB8							
	P1BBB							
	P1BBE							
	P1BC1							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P1BC4 P1BC7 P1BCA P1BCD P1BD0 P1BD3 P1BD6 P1BD9 P1BDC P1BDF P1BE2 P1BE5 P1BE8 P1BEB P1BEE P1BF1 P1BF4 P1BF7 P1BFA P1BFD P1E02 P1E05							
		DTC Pass		Cell Voltage X > 0.2V			200 ms	
Hybrid Battery Voltage Sense x Circuit High	P0B3E  P0B43	Sets when cell voltage is detected above threshold	Cell Voltage X	>= 4.8V	Diagnostic Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	1.4second in a 2 second window	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P0B48				No Active DTCs associated with VTSM Loss of Comm	U2603, U2604, U2605, U2606		
	P0B4D				No Active DTCs associated with VTSM 5V Ref Diagnostic	P1E93, P1E99, P1E9F, P1EA5		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P0B52				No Active DTCs associated with Open Sense Line	P0B3B, P0B40, P0B45, P0B4A, P0B4F, P0B54, P0B59, P0B5E, P0B63, P0B68, P0B6D, P0B77, P0B7C, P0B81, P0B86, P0B8B, P0B95, P0B9A, P0B9F, P0BA4, P0BA9, P0BAE, P0BB3, P0BB8, P1B28, P1B29, P1B2A, P1B2B, P1B2C, P1B2D, P1E4C, P1E4D, P1E4E, P1E4F, P1E50, P1E51, P1E52, P1E53, P1E54, P1E56, P1E57, P1E58, P1E59, P1E5A, P1E5B, P1E5C, P1E5D, P1E5E, P1E5F, P1E60, P1E61, P1E62, P1E63, P1E64,		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P0B57					P1E65, P1E66, P1E67, P1E68, P1E69, P1E6A, P1E6B, P1E6C, P1E6E, P1E6F, P1E70, P1E71, P1E72, P1E73, P1E74, P1E75, P1E76, P1E77, P1E78, P1E79, P1E7A, P1E7B, P1E7C, P1E7D, P1E7E, P1E7F, P1E80, P1E81, P1E82, P1E83, P1E84, P1E86, P1E87, P1E88, P1E89, P1E8A		
	P0B5C				2nd Protection Self Test Diagnostic	Not Running		
	P0B61				No Active DTCs associated with VTSM Cell Balancing Fault	P1E92, P1E98, P1E9E, P1EA4		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P0B66				No Active DTCs associated with VTSM Internal Performance No Active DTCs on VITM RESS Bus Off	P1E8E, P1E94, P1E9A, P1EA0  U2401		
	P0B6B							
	P0B70							
	P0B75							
	P0B7A							
	P0B7F							
	P0B84							
	P0B89							
	P0B8E							
	P0B93							
	P0B98							
	P0B9D							
	P0BA2							
	P0BA7							
	P0BAC							
	P0BB1							
	P0BB6							
	P0BBB							
	P1B18							
	P1B1B							
	P1B1E							
	P1B21							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P1B24							
	P1B27							
	P1B47							
	P1B4A							
	P1B4D							
	P1B50							
	P1B53							
	P1B56							
	P1B59							
	P1B5C							
	P1B5F							
	P1B62							
	P1B65							
	P1B68							
	P1B6B							
	P1B6E							
	P1B71							
	P1B74							
	P1B77							
	P1B7A							
	P1B7D							
	P1B80							
	P1B83							
	P1B86							
	P1B89							
	P1B8C							
	P1B8F							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P1B92							
	P1B95							
	P1B98							
	P1B9B							
	P1B9E							
	P1BA1							
	P1BA4							
	P1BA7							
	P1BAA							
	P1BAD							
	P1BB0							
	P1BB3							
	P1BB6							
	P1BB9							
	P1BBC							
	P1BBF							
	P1BC2							
	P1BC5							
	P1BC8							
	P1BCB							
	P1BCE							
	P1BD1							
	P1BD4							
	P1BD7							
	P1BDA							
	P1BDD							
	P1BE0							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum	
Hybrid Battery x Circuit	P1BE3								
	P1BE6								
	P1BE9								
	P1BEC								
	P1BEF								
	P1BF2								
	P1BF5								
	P1BF8								
	P1BFB	DTC Pass			Cell Voltage X < 4.8V			200 ms	
	P1BFE	Sets when cell voltage is detected open	1st Cell V – 2nd Cell V	Case 2 :  1st Cell V – 2nd Cell V  > 1V	Diagnostic Enable	TRUE	600 ms out of a 600 ms window	One Trip	
P1E03									
P1E06									
P0B3B									
P0B40		<b>Case 2: General Cell Voltage Sensing Line</b> Affected Cell Voltage- Adjacent			Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE	Frequency-200 ms		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P0B45		Cell	Case 3 : Busbar Cap Voltage > 0.7V & Busbar + Side Cell Voltage < 2.5V	No Active DTCs associated with VTSM Loss of Comm	U2603, U2604, U2605, U2606		
	P0B4A		Affected Cell Voltage- One Cell	Case 4: Bus Bar (-) Side Sensing Line Affected Cell	No Active DTCs associated with VTSM 5V Ref Diagnostic	P1E93, P1E99, P1E9F, P1EA5		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P0B4F		<p>Affected Cell Voltage- One Cell</p> <p><b>Case 5: Common Power Line</b> Affected Cell Voltage- Adjacent Cells (No Power Off)</p> <p>*Note- <b>Case 1: Single Power Line</b> Case 1 causes the slave ASIC to not be powered resulting in all affected cell voltages = 0V</p>	<p>Case 4 : Busbar Cap Voltage &gt; 0.7V &amp; Busbar + Side Cell Voltage &gt; 2.5V</p> <p>Case 5 :  1st Cell V – 2nd Cell V  &gt; 0.5V</p>	No Active DTCs associated with Open Sense Line	P0B3B, P0B40, P0B45, P0B4A, P0B4F, P0B54, P0B59, P0B5E, P0B63, P0B68, P0B6D, P0B77, P0B7C, P0B81, P0B86, P0B8B, P0B95, P0B9A, P0B9F, P0BA4, P0BA9, P0BAE, P0BB3, P0BB8, P1B28, P1B29, P1B2A, P1B2B, P1B2C, P1B2D, P1E4C, P1E4D, P1E4E, P1E4F, P1E50, P1E51, P1E52, P1E53, P1E54, P1E56, P1E57, P1E58, P1E59, P1E5A, P1E5B, P1E5C, P1E5D, P1E5E, P1E5F, P1E60, P1E61, P1E62, P1E63, P1E64,		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P0B54					P1E65, P1E66, P1E67, P1E68, P1E69, P1E6A, P1E6B, P1E6C, P1E6E, P1E6F, P1E70, P1E71, P1E72, P1E73, P1E74, P1E75, P1E76, P1E77, P1E78, P1E79, P1E7A, P1E7B, P1E7C, P1E7D, P1E7E, P1E7F, P1E80, P1E81, P1E82, P1E83, P1E84, P1E86, P1E87, P1E88, P1E89, P1E8A		
	P0B59				2nd Protection Self Test Diagnostic	Not Running		
	P0B5E				No Active DTCs associated with VTSM Cell Balancing Fault	P1E92, P1E98, P1E9E, P1EA4		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P0B63				No Active DTCs associated with VTSM Internal Performance No Active DTCs on VITM RESS Bus Off	P1E8E, P1E94, P1E9A, P1EA0		
	P0B68					U2401		
	P0B6D							
	P0B77							
	P0B7C							
	P0B81							
	P0B86							
	P0B8B							
	P0B95							
	P0B9A							
	P0B9F							
	P0BA4							
	P0BA9							
	P0BAE							
	P0BB3							
	P0BB8							
	P1B28							
	P1B29							
	P1B2A							
	P1B2B							
	P1B2C							
	P1B2D							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P1E4C							
	P1E4D							
	P1E4E							
	P1E4F							
	P1E50							
	P1E51							
	P1E52							
	P1E53							
	P1E54							
	P1E56							
	P1E57							
	P1E58							
	P1E59							
	P1E5A							
	P1E5B							
	P1E5C							
	P1E5D							
	P1E5E							
	P1E5F							
	P1E60							
	P1E61							
	P1E62							
	P1E63							
	P1E64							
	P1E65							
	P1E66							
	P1E67							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P1E68 P1E69 P1E6A P1E6B P1E6C P1E6E P1E6F P1E70 P1E71 P1E72 P1E73 P1E74 P1E75 P1E76 P1E77 P1E78 P1E79 P1E7A P1E7B P1E7C							
	P1E7D P1E7E	DTC Pass		Case 2 :  1st Cell V – 2nd Cell V  <= 1V  Case 3 : Busbar Cap Volt <= 0.7V			600 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P1E7F P1E80			Case 4 : Busbar Cap Volt > 0.7V				
	P1E81 P1E82			Case 5:  1st Cell V - 2nd Cell V  <= 0.5V				
	P1E83 P1E84 P1E86 P1E87 P1E88 P1E89 P1E8A							
Hybrid Battery Temperature Sensor X Circuit Low	P0A9D P0AC7 P0ACC	Sets when Temperature Sensor X falls below a Threshold	Temperature Sensor X	Temperature Sensor X > 87.5C (ADC Count < 680)	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTCs associated with VTSM Loss of Comm	TRUE  TRUE  U2603, U2604, U2605, U2606	1.4 seconds in a 2 second window  Frequency- 200 ms	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P0AEA				No Active DTCs associated with VTSM 5V Ref Diagnostic	P1E93, P1E99, P1E9F, P1EA5		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P0BC4				No Active DTCs associated with Open Sense Line	P0B3B, P0B40, P0B45, P0B4A, P0B4F, P0B54, P0B59, P0B5E, P0B63, P0B68, P0B6D, P0B77, P0B7C, P0B81, P0B86, P0B8B, P0B95, P0B9A, P0B9F, P0BA4, P0BA9, P0BAE, P0BB3, P0BB8, P1B28, P1B29, P1B2A, P1B2B, P1B2C, P1B2D, P1E4C, P1E4D, P1E4E, P1E4F, P1E50, P1E51, P1E52, P1E53, P1E54, P1E56, P1E57, P1E58, P1E59, P1E5A, P1E5B, P1E5C, P1E5D, P1E5E, P1E5F, P1E60, P1E61, P1E62, P1E63, P1E64,		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P0C35					P1E65, P1E66, P1E67, P1E68, P1E69, P1E6A, P1E6B, P1E6C, P1E6E, P1E6F, P1E70, P1E71, P1E72, P1E73, P1E74, P1E75, P1E76, P1E77, P1E78, P1E79, P1E7A, P1E7B, P1E7C, P1E7D, P1E7E, P1E7F, P1E80, P1E81, P1E82, P1E83, P1E84, P1E86, P1E87, P1E88, P1E89, P1E8A		
	P0C7E				2nd Protection Self Test Diagnostic	Not Running		
	P0C83				No Active DTCs associated with VTSM Cell Balancing Fault	P1E92, P1E98, P1E9E, P1EA4		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P0C8A  P0C8F  P0C94 P0C99 P0CAA P0CAF P0CB4 P0CB9				No Active DTCs associated with VTSM Internal Performance No Active DTCs on VITM RESS Bus Off	P1E8E, P1E94, P1E9A, P1EA0  U2401		
		DTC Pass		Temperature Sensor X ≤ 87.5C (ADC Count ≥			2 Seconds	
Hybrid Battery Temperature Sensor X Circuit High	P0A9E  P0AC8  P0ACD  P0AEB	Sets when Temperature Sensor X falls above a Threshold	Temperature Sensor X	Temperature Sensor X < -40C (ADC Count > 4000)	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTCs associated with VTSM Loss of Comm No Active DTCs associated with VTSM 5V Ref Diagnostic	TRUE  TRUE  U2603, U2604, U2605, U2606  P1E93, P1E99, P1E9F, P1EA5	1.4 seconds in a 2 second window  Frequency-200 ms	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P0BC5				No Active DTCs associated with Open Sense Line	P0B3B, P0B40, P0B45, P0B4A, P0B4F, P0B54, P0B59, P0B5E, P0B63, P0B68, P0B6D, P0B77, P0B7C, P0B81, P0B86, P0B8B, P0B95, P0B9A, P0B9F, P0BA4, P0BA9, P0BAE, P0BB3, P0BB8, P1B28, P1B29, P1B2A, P1B2B, P1B2C, P1B2D, P1E4C, P1E4D, P1E4E, P1E4F, P1E50, P1E51, P1E52, P1E53, P1E54, P1E56, P1E57, P1E58, P1E59, P1E5A, P1E5B, P1E5C, P1E5D, P1E5E, P1E5F, P1E60, P1E61, P1E62, P1E63, P1E64,		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P0C36					P1E65, P1E66, P1E67, P1E68, P1E69, P1E6A, P1E6B, P1E6C, P1E6E, P1E6F, P1E70, P1E71, P1E72, P1E73, P1E74, P1E75, P1E76, P1E77, P1E78, P1E79, P1E7A, P1E7B, P1E7C, P1E7D, P1E7E, P1E7F, P1E80, P1E81, P1E82, P1E83, P1E84, P1E86, P1E87, P1E88, P1E89, P1E8A		
	P0C7F				2nd Protection Self Test Diagnostic	Not Running		
	P0C84				No Active DTCs associated with VTSM Cell Balancing Fault	P1E92, P1E98, P1E9E, P1EA4		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P0C8B				No Active DTCs associated with VTSM Internal Performance	P1E8E, P1E94, P1E9A, P1EA0		
	P0C90				No Active DTCs on VITM RESS Bus Off	U2401		
	P0C95 P0C9A P0CAB P0CB0 P0CB5 P0CBA	DTC Pass		Temperature Sensor X >= -40C (ADC Count <=			2 Seconds	
Battery Energy Control Module Hybrid Battery Voltage Isolation Sensor Circuit	P1AE6	Sets when AC (alternating current) Isolation Circuit is detected Faulted	AC (alternating current) Isolation Circuit	If there is no return signal for isolation test signal (sine-wave)	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VICM Isolation Start Request VITM System Voltage	TRUE  TRUE  TRUE  > 11V	1.4 seconds in a 2 second window  Frequency-200 ms	One Trip

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit  VITM System Voltage	P1A07  >= 9V	250 ms	
		DTC Pass		Inlet Temp < 87.9C (ADC Count > 130)			2.5 Seconds	
Hybrid Battery Pack Coolant Temperature Sensor Circuit High	P0C45	Sets when Inlet Coolant Temp Sensor goes above a Threshold	Inlet Temp	Inlet Temp < -40C (ADC Count > 3823)	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit	TRUE  TRUE  P1A07	1.75 seconds in a 2.5 seconds window  Frequency-250 ms	Two Trips

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				130)				
Hybrid/EV Battery Pack Coolant Temperature Sensor B Circuit High	P0CD8	Sets when Outlet Coolant Temp Sensor goes above a Threshold	Outlet Temp	Outlet Temp < -40C (ADC Count > 3823)	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit VITM System Voltage	TRUE  TRUE  P1A07  >= 9V	1.75 seconds in a 2.5 seconds window  Frequency-250 ms	Two Trips
		DTC Pass		Outlet Temp >= -40C (ADC Count <= 3823)			2.5 Seconds	
Hybrid Battery Pack Voltage Sense Circuit Low	P0ABC	If Pack side Voltage is below Threshold	Pack Voltage	< 24V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE  TRUE	175 ms in a 250 ms window  Frequency-25 ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit  VITM System Voltage	P1A07  >= 9V		
		DTC Pass		Pack Voltage >= 24V			250 ms	
Hybrid Battery Pack Voltage Sense Circuit High	P0ABD	If Pack side Voltage is above Threshold	Pack Voltage	> 456V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit	TRUE  TRUE  P1A07	175 ms in a 250 ms window  Frequency- 25 ms	One Trip

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Pack Current Sensor B Circuit High	P0B11	If Fine Current is above Threshold	Fine Current	> 23A	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit  VITM System Voltage	TRUE  TRUE  P1A07  >= 9V	175 ms in a 250 ms window  Frequency-25 ms	One Trip
		DTC Pass		Fine Current <= 23A			250 ms	
Hybrid Battery Pack Current	P0AC1	If Coarse Current is below	Coarse Current	< -470A	Diagnostic Enable	TRUE	175 ms in a 250 ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Sensor Circuit Low		Threshold			Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit  VITM System Voltage	TRUE  P1A07  >= 9V	window  Frequency-25 ms	
		DTC Pass		Coarse Current >= -470A			250 ms	
Hybrid Battery Pack Current Sensor Circuit High	P0AC2	If Coarse Current is above Threshold	Coarse Current	> 280A	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE  TRUE	175 ms in a 250 ms window  Frequency-25ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit  VITM System Voltage	P1A07  >= 9V		
		DTC Pass		Coarse Current <= 280A			250 ms	
Hybrid/EV Battery Pack Current Sensor A Exceeded Learning Limit	P1EBA	If Pack Current Coarse Offset is out of range	Pack Current Coarse Offset	> 8A	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable High Voltage Contactor Status  Charger Contactor Status	TRUE  TRUE  Open  Open	At power up - 185 ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)  VITM System Voltage VITM Initalization Status Extended  No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H	2.8V to 3.2V  *Please note that this is not the 5v Ref. diagnostic, but a reading taken at the point when the Offset diagnostic is about to start  >= 9V  Initializing  U185B		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass		Pack Current Coarse Offset  <= 8A			At power up - 185 ms	
Hybrid/EV Battery Pack Current Sensor B Exceeded Learning Limit	P1EBB	If Pack Current Fine Offset is out of range	Pack Current Fine Offset	Pack Current Fine Offset  > 2.5A	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable High Voltage Contactor Status  Charger Contactor Status  5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	TRUE  TRUE  Open  Open  2.8V to 3.2V  *Please note that this is not the 5v Ref. diagnostic, but a reading taken at the point when the Offset diagnostic is about to start	At power up - 185 ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					VITM System Voltage VITM Initalization Status Extended  No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H	>= 9V  Initializing  U185B		
		DTC Pass		Pack Current Fine Offset  <= 2.5A			At power up - 185 ms	
Battery Energy Control Module 5 Volt Reference Circuit	P1A07	Sets when 5V VITM reference voltage is out of range	5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	5V Reference Value < 2.8V or 5V Reference Value > 3.2V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE  TRUE	600 ms in a 1 second window  Frequency- 25 ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					VITM System Voltage	>= 9V		
		DTC Pass		2.8V <= 5V Reference Value <= 3.2V			1 Second	
Battery Energy Control Module System Voltage Low	P1A0C	If 12V System Voltage is below Threshold	12V System Voltage	< 9.0V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit	TRUE  TRUE  P1A07	5 seconds in a 6 seconds window  Frequency: 1 Second	Special Type C
		DTC Pass		12V System Voltage >= 9.0V			6 Seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Energy Control Module System Voltage High	P1A0D	If 12V System Voltage is above Threshold	12V System Voltage	>18.5V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit	TRUE  TRUE  P1A07	5 seconds in a 6 seconds window  Frequency: 1 Second	Special Type C
		DTC Pass		12V System Voltage >= 18.5V			6 Seconds	
Battery Energy Control Module Communication Bus A Off	U180B	If Bus Off is Detected	Transmit Error Counter (TEC)	TEC > 255	Diagnostic Enable Run/Crank or Accessory/Run VITM System Voltage	TRUE  TRUE  >= 9V	1.4 seconds in a 2 seconds window  Frequency-200 ms	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass		TEC < 255			2 Seconds	
Battery Energy Control Module Communication Bus H Off	U1806	If Bus Off is Detected	Transmit Error Counter (TEC)	TEC > 255	Diagnostic Enable Run/Crank or Accessory/Run VITM System Voltage	TRUE  TRUE  >= 9V	1.4 seconds in a 2 seconds window  Frequency-200 ms	Two Trips
		DTC Pass		TEC < 255			2 Seconds	
Battery Energy Control Module Lost Communication with Hybrid Powertrain Control Module B on Bus H	U185B	If message \$20A is not Received by VITM	Loss of Supervision with VICM module on Charger CAN bus	# of consecutive \$20A message not received > 5	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE  TRUE  >= 9V	700 ms in a 1 second window  Frequency-100 ms	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass		1			1 Second	
Battery Energy Control Module Lost Communication With Hybrid Powertrain Control Module	U1885	If message \$1DF is not Received by VITM	Loss of Supervision with HCP module on HS GMLAN bus	# of consecutive \$20A message not received > 10	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module Communication Bus A Off VITM System Voltage Flashing Programming Session (Other Modules or itself)	TRUE TRUE U180B  >= 9V Completed	1.75 seconds in a 2 second window  Frequency-250 ms	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Mode \$28 Executed on HS Bus	TRUE		
		DTC Pass		1			2 Seconds	
Battery Energy Control Module Random Accessoryess Memory (RAM)	P1A05	RAM Read Write function Failed	RAM Read not Equal to RAM Written	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM Initalization Status Extended  VITM System Voltage	TRUE  TRUE  Initializing  >= 9V	At power up - 10 ms	One Trip
		DTC Pass		1			At power up - 10 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Energy Control Module Read Only Memory (ROM)	P1A06	Flash ROM Checksum method	Flash ROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM Initalization Status Extended  VITM System Voltage	TRUE  TRUE  Initializing  >= 9V	At power up - 5 ms up to 400 ms	One Trip
		DTC Pass		1			At power up - 5 ms up to	
Battery Energy Control Module Internal Performance	P0A1F	VITM Software Watchdog	If Watchdog resets controller	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE  TRUE	N/A Immediate	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					VITM System Voltage	>= 9V		
		DTC Pass		1				
Battery Energy Control Module Ignition Switch Run/Start Position Circuit Low	P1A5E	If RunCrank input state is below Threshold and RunCrank Received Serial Data State = Active	RunCrank Hardwire Input and Serial Data signal	RunCrank Input < 5V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module Communication Bus H Bus Off VITM System Voltage	TRUE TRUE U1806 >= 9V	5 seconds in a 6 second window  Frequency-1000 ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit	P1A07		
					No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H	U185B		
		DTC Pass		RunCrank Input >= 5V			6 seconds	
Battery Energy Control Module Ignition Switch	P1A5F	If RunCrank input state is above Threshold and RunCrank Received Serial Data State =	RunCrank Hardware Input and Serial Data signal	RunCrank Input >= 5V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	5 seconds in a 6 second window Frequency-1000 ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Run/Start Position Circuit High		Inactive			No Active DTC for Battery Energy Control Module Communication Bus H Bus Off VITM System Voltage No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit  No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H	U1806  >= 9V  P1A07  U185B		
		DTC Pass		RunCrank Input < 5V			6 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Energy Control Module Ignition Switch Accessory Position Circuit Low	P1A60	If Accessory input state is below Threshold and received serial data Propulsion System Active state = True	Accessory Hardwire Input and Serial Data signal	RunCrank Input < 5V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module Communication Bus A Off No Active DTC for Battery Energy Control Module Lost Communication With with HCP (TPIM) on Bus A (HS GMLAN Bus) VITM System Voltage	TRUE TRUE U180B U1885 >= 9V	100 ms in a 125 ms window	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit  Run/Crank  Propulsion System Active Accessory Diagnostic Delay	P1A07  Transitions: False to True TRUE  Expired		
		DTC Pass		RunCrank Input >= 5V			100 ms in a 125 ms window	
Battery Energy Control Module Lost Communication with Hybrid	U2603 U2604	If associated message from Slave is not received	Loss of Supervision with VTSMx on Private CAN bus	# of consecutive serial data message from VTSMx not received > 7	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE  TRUE	2.8 seconds in a 4 second window  Frequency-	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Interface Control Module X	U2605				2nd Protection Self Test Diagnostic VITM System Voltage	Not Running	400 ms	
	U2606					>= 9V		
		DTC Pass		1			4 Seconds	
Battery Energy Control Module High Voltage Energy Management Communication Bus Enable Circuit Low	P1EC1	If High Voltage Energy Management (HVEM) Wakeup input state is below Threshold and HVEM Received Serial Data State = Active	HVEM Hardwire Input and Serial Data signal	HVEM Input < 5V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module Communication Bus A Off VITM System Voltage	TRUE TRUE U180B >= 9V	7 seconds in a 10 second window Frequency-1000 ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTC for Battery Energy Control Module System Voltage Low No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit	P1A0C  P1A07  U2602		
		DTC Pass		HVEM Input >= 5V			10 Seconds	
Battery Energy	U2401	If Bus Off is Detected	Transmit Error Counter (TEC)	TEC > 255	Diagnostic Enable	TRUE	1.4 seconds in a 2	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Dedicated Bus 1 Off					Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE  >= 9V	second window  Frequency-200 ms	
		DTC Pass		TEC < 255			2 Seconds	
Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on HS	U2602	If message \$236 is not Received by VITM	Loss of Supervision with VICM module on HS GMLAN bus	# of consecutive \$236 message not received > 3	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module Communication Bus A Off VITM System Voltage	TRUE  TRUE  U180B  >= 9V	2.8 seconds in a 4 second window  Frequency-100 ms	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Flashing Programming Session (Other Modules or itself)  Mode \$28 Executed on HS Bus	Completed  TRUE		
		DTC Pass		1			4 Seconds	
Hybrid Battery Interface Control Module x Cell Balancing Circuit	P1E92	Cell Balance switch output	Cell Balance switch is below threshold	4.0V < Cell Voltage < 5.0V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTCs associated with VTSM Loss of Comm 2nd Protection Self Test Diagnostic	TRUE	14 seconds in a 20 seconds window  Frequency-200 ms	One Trip
	P1E98			Threshold = 66mV		TRUE		
	P1E9E			3.5V < Cell Voltage < 4.0V		U2603, U2604, U2605, U2606		
	P1EA4			3.0V < Cell Voltage < 3.5V		Not Running		
				Threshold				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				= 22mV	No Active DTCs associated with VTSM Internal Performance No Active DTCs on VITM RESS Bus Off	P1E8E, P1E94, P1E9A, P1EA0  U2401		
		DTC Pass		Threshold is above values specified for Cell Voltage			20 Seconds	
Hybrid Battery Interface Control Module x ROM	P1E90 P1E96 P1E9C P1EA2	ROM Checksum method	ROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTCs associated with VTSM Loss of Comm	TRUE  Transitions: TRUE to FALSE (During VTSMx Power down) U2603, U2604, U2605, U2606	At power down- Total of 824 ms for all slaves	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass		1			At power down-	
Hybrid Battery Interface Control Module x RAM	P1E8F	RAM Read Write function Failed	RAM Read not Equal to RAM Written	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTCs associated with VTSM Loss of Comm	TRUE  Transitions: TRUE to FALSE (During VTSMx Power down) U2603, U2604, U2605, U2606	At power up- Total of 58 ms for all slaves	One Trip
	P1E95							
	P1E9B							
	P1EA1							
		DTC Pass		1			At power up- Total of 58	
Hybrid Battery Interface	P1E91	Using Checksum method	EEPROM Checksum Value	1	Diagnostic Enable	TRUE	At power down- Total	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module x KAM	P1E97		Calculated is Different than Stored		Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTCs associated with VTSM Loss of Comm	Transitions: TRUE to FALSE (During VTSMx Power down) U2603, U2604, U2605, U2606	of 26 ms for all Slaves	
	P1E9D							
	P1EA3							
		DTC Pass		1			At power down- Total	
Hybrid Battery Interface Control Module x Performance	P1E8E	VTSMx Software Watchdog	If Watchdog resets controller	1	Diagnostic Enable	TRUE	N/A	One Trip
	P1E94	OR	OR		Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE	s - Watchdog Reset	
	P1E9A	SPI Bus Malfunction (Read Value from Register	Wrong value Read		VITM System Voltage	>= 9V	500us - SPI Bus	
	P1EA0	Not Equal to						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Written Value)						
		DTC Pass		Both should pass			500 us in 200ms window	
Hybrid Battery Interface Control Module x 5V Ref	P1E93	Sets when 5V VTSM reference voltage is out of range	5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	5V Reference Value < 2.8V or 5V Reference Value > 3.2V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTCs associated with VTSM Loss of Comm 2nd Protection Self Test Diagnostic	TRUE	200ms	One Trip
	P1E99					TRUE		
	P1E9F					U2603, U2604, U2605, U2606		
	P1EA5					Not Running		
		DTC Pass		2.8V <= 5V Reference Value <= 3.2V			200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Battery Interface Control Module Software Incompatible Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on HS	P1EB1	VITM Software version and Software version of ALL Slave modules are compatible	If any software version incompatibility is detected	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage No Active DTCs associated with VTSM Loss of Comm No Active DTCs on VITM RESS Bus Off	TRUE TRUE >= 9V U2603, U2604, U2605, U2606 U2401	At power up-200 ms	One Trip
		DTC Pass		1			At power up-200 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Battery Interface Control Module x Not Programmed	P1EB2	If VTSMx did not Program correctly	Wrong or No response from Slave indicating error in Programming	1	After Programming session Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE	As soon as Programming session ends	One Trip
	P1EB3							
P1EB4								
P1EB5								
		DTC Pass		1			As soon as Programming session	
Hybrid/EV Battery Interface Control Module x Processor Performance	P1F06	Compare VTSMx Reported Value with Expected Value in VITM	Reported Key Value by VTSMx is not correct	5	Diagnostic Enable	TRUE	1 second in a 1.4 second window  Frequency-200 ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P1F07				Seed and Key Algorithm Calibration	TRUE		
	P1F08				Run/Crank, Accessory or HVEM EB Comm Enable	TRUE		
	P1F09				No Active DTCs associated with VTSM Loss of Comm No Active DTCs on VITM RESS Bus Off 2nd Protection Self Test Diagnostic	U2603, U2604, U2605, U2606  U2401  Not Running		
		DTC Pass		5			1.4 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
<b>MCP A Phase Current Diagnostics</b>								
Drive Motor "A" Phase U-V-W Correlation	P0BFD	To detect electrical failure of phase current sensor.	Sum of 3 phase currents	>156 A	Wakeup Signal	On	X: 160 ct Y: 190 ct R: 0.11 - 0.5 ms T: 17.6 - 80 ms	One Trip, Type A
Drive Motor "A" Phase U-V-W Current Sensor Overcurrent	P0C01	<b>Fail Case 1:</b> To detect fast, repeated 3 Phase over currents and to protect IGBT.	U, V, or W Phase current sensor	> 725 A	Wakeup Signal	On	X: 2 cts Y: 10 cts R: 2.08 ms T: 4.2 ms	One Trip, Type A
		<b>Fail Case 2:</b> To detect slow, intermittent 3 Phase over currents and to protect IGBT.					X: 5 cts Y: 50 cts R: 2.08 ms T: 10.4 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" Phase U-V-W Circuit/Open	P0C05	Drive Motor "A" Missing Motor Current checks for minimum current in each phase when rotor position is near that peak's phase axis. Each phase is checked individually as rotor turns.	ABS(Peak Phase Axis Current )	< 9 A	Inverter State  Inverter Voltage Rotor Position  Current Commanded	RUN  > 35 V -30 deg < Phase Axis < +30 deg >= 23 A	X: 200 ct Y: N/A R: 0.11-0.5 ms T: 22 - 100 ms	One Trip, Type A
Drive Motor "A" Phase U Current Sensor Circuit Low	P0BE7	Circuit Low monitor to detect the failure of U-phase current sensor circuit below valid range	U Phase current sensor output at highside	< -800 A	Wakeup Signal	On	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" Phase V Current Sensor Circuit Low	P0BEB	Circuit Low monitor to detect the failure of V-phase current sensor circuit below valid range	V Phase current sensor output at highside	< -800 A	Wakeup Signal  PWM Output Enable	On  FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "A" Phase V Current Sensor Circuit High	P0BEC	Circuit High monitor to detect the failure of V-phase current sensor circuit above valid range	V Phase current sensor output current at highside	> 800 A	Wakeup Signal  PWM Output Enable	On  FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A

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

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	> 800 A	Wakeup Signal  PWM Output Enable	On  FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "A" Phase W Current Sensor Offset Out-of Range	P0BEE	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	W Phase offset current output at highside	>30 A	Wakeup Signal  Power Stage No Active DTCs:	On  OPEN P0BEF/P0BF0	X: 8 cts Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
<b>MCP A IGBT Diagnostics</b>								
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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Monitors hw status line to detect internal overcurrent faults, shoot through, or loss of switching control events			High Voltage	> 100V		
Drive Motor "A" Inverter Power Supply Circuit/Open	P0C0B	Detects IGBT Bias Faults  Monitors hw status line to detect loss of power supply to gate drive board	Phase A, B, or C Power Supply	FAILED (Status Fault Bit)	Inverter State  High Voltage	Initialization Complete  > 100V	X: 1 ct Y: N/A R: 2.08ms T: 2.08ms	One Trip, Type A
<b>MCP A High Voltage (HV) Diagnostics</b>								
Drive Motor "A" Hybrid Battery System Voltage High	P1AEE	To detect over voltage and to protect TPIM HV Circuit	HV Sensor Voltage	> 425V	Controller Initialization	Complete	X: 3 cts Y: N/A R: 0.1 - 0.5 ms T: 0.3 - 1.50 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" Control Module Hybrid Battery Voltage Sense Circuit Low Voltage	P1AE8	Circuit Low monitor of HV output voltage sensor	HV Sensor Voltage	<30V	Controller Initialization  Run/Crank Contactors	Complete  Active Closed	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A
Drive Motor "A" Control Module Hybrid Battery Voltage Sense Circuit High Voltage	P1AE9	Circuit High monitor of HV output voltage sensor	HV Sensor Voltage	>500 V	Controller Initialization  Run/Crank	Complete  Active	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A

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 System Voltage	P1AEC	To check correlation of HV with sum of mid-pack voltages and HV_Battery.	ABS(HV - HV_Battery)  AND ABS(HV - sum of mid-pack voltages)	$\geq 40$ V  $\geq 50$ V	No Active DTCs:  Controller Initialization Contactors	P1AE8, P1AE9  Closed	X: 18 cts Y: 30 cts R: 10.4ms T: 187ms	Two Trips, Type B
Drive Motor "A" Control Module Hybrid Battery Voltage System Isolation Fault	P1AF0	Isolation Lost between mid-pack voltage and chassis	Isolation Ratio (Neg mid-pack voltage / Pos mid-pack voltage)	$>4.53$	No Active DTCs:  Controller Initialization	P1AE8, P1AE9, P1AEC  Complete	X: 250 cts Y: 300 cts R: 10.4ms T: 2600ms	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 1 Circuit Low	P1AF4	Circuit 1 Low monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage	<20V	Controller Initialization  Run/Crank Contactors	Complete  Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 1 Circuit High	P1AF5	Circuit 1 High monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage - HV	>40 V	No Active DTCs:  Controller Initialization Run/Crank	P1AE8, P1AE9  Complete Active	X: 50 cts Y: 100 cts R: 10.4ms T: 520ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit Low	P1B0B	Circuit 2 Low monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage	<20V	Controller Initialization  Run/Crank Contactors	Complete  Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit High	P1B0C	Circuit 2 High monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage - HV	>40 V	No Active DTCs:  Controller Initialization Run/Crank	P1AE8, P1AE9  Complete Active	X: 50 cts Y: 100 cts R: 10.4ms T: 520ms	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 Sensing Performance	P1B41	To check correlation of sum of mid-pack voltages against HV and HV_Battery	ABS(Pos mid-pack - Neg mid-pack - HV_Battery)	>= 40 V	No Active DTCs:	P1AE8, P1AE9, P1B0B, P1B0C	X: 100 cts Y: 150 cts R: 10.4ms T: 1040ms	Two Trips, Type B
			and  ABS(Pos mid-pack - Neg mid-pack - HV)	>= 50 V	Controller Initialization Run/Crank	Complete  Active		
<b>Motor A Temp Sensor Diagnostics</b>								
Drive Motor "A" Control Module Temperature Sensor Performance	P0A2B	Motor A Temperature Sensor In-Range Rationality Check	ABS(Motor Thermistor Temperature - the average of (Power Electronic Coolant Temperature and Transmission Fluid	> 20 deg C	Wake Up Signal  Propulsion System Inactive Time  Thermal Conditioning Off Time	On  >=21600s  >=7200s	700 cts Start Delay  PLUS	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Charge Off Time	>=7200s	X: 200 cts Y: 300 cts R: 10.4ms T: 2080ms =9.36 sec total	
					Cold Start Average Temperature	> -40C		
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Tranmission Fluid Temperature Valid	TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		
					Battery Thermal Conditioning Inactive Fault Active	FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Battery Thermal Conditioning Inactive Mask  Plug In Charging Present  No Active Motor Temp Out Of Range Faults:	Use Data  TRUE  P0A2C, P0A2D		
Drive Motor "A" Control Module Temperature Sensor Circuit Out of Range High	P0A2D	To detect temperature sensor voltage Out of Range high.	Motor Temp	< -41 deg C (near 5V)	Warmup Time  Warmup Torque	Controller Initialization Complete  >=90s  >=ABS(20 Nm)	X: 900 cts Y:1800cts R: 10.4ms T: 9378ms	One Trip, Type A
Drive Motor "A" Control Module	P0A2C	To detect temperature sensor voltage	Motor Temp	> 184 degC (near 0V)		Controller Initialization Complete	X: 250 cts Y: 350 cts R: 10.4ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Temperature Sensor Circuit Out of Range Low		Out of Range low.					T: 2600ms	
Drive Motor "A" Over Temperature	P0A2F	To detect a sustained motor overtemperature condition	Motor Temperature exceeds initial fault threshold	> 159 deg C initial fault	Motor Temperature  Temp Performance Fault; P0A2B	IN RANGE  NOT ACTIVE	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
<b>Motor Control Processor Voltage Diagnostics</b>								
Sensor Power Supply "A" Circuit Low	P06B1	Detects Sensor Power Supply (15V) below an acceptable threshold.	Scaled 15V Supply Voltage	< 12.0V	Wakeup Signal	On	X: 40 cts Y: 50 cts R: 10.4ms T: 416 ms  OR continuous fail time > 300 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Sensor Power Supply "A" Circuit High	P06B2	Detects Sensor Power Supply (15V) above an acceptable threshold.	Scaled 15V Supply Voltage	> 18.0V	Wakeup Signal	On	X: 40 cts Y: 50 cts R: 10.4ms T: 416 ms  OR continuous fail time > 300 ms	One Trip, Type A
System Voltage Low	P1ADE	<i>This is the 12V system voltage low diagnostic</i>						Special Type C
		<b>DTC Fail case 1:</b> Sets when the ignition voltage is below a threshold	Ignition Voltage	<= 10 Volts	Enable Cal RunCrankActive Engine Speed	= true = true >= 0 RPM	5 fail counts out of 6 sample counts  Executes in a 1000ms loop  Detects in 6 sec	
		<b>DTC Pass:</b>		Ignition Voltage > 10 Volts			1 second	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
System Voltage Hi	P1ADF	<i>This is the 12V system voltage Hi diagnostic</i>						Special Type C
		<b>DTC Fail case 1:</b> Sets when the ignition voltage is above a threshold	Ignition Voltage	>= 18 Volts	Enable Cal RunCrankActive	= true = true	5 fail counts out of 6 sample counts  Executes in a 1000ms loop  Detects in 6 sec	
		<b>DTC Pass:</b>		Ignition Voltage < 18 Volts			1 second	
<b>Motor A Inverter Temp Sensor Diagnostics</b>								
Drive Motor Inverter Temperature	P0AEE	Inverter A Temperature Sensor #1 In-	ABS (Inverter Temp A - Average of (Power Electronics	>20 deg C	Wake Up Signal	On	700 cts Start Delay	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Sensor A Circuit Range/Performance		Range Rationality Check	Coolant Temp and Transmission Fluid Temp)) "ColdStartAvg"		Propulsion System Inactive Time Thermal Conditioning Off Time Charge Off Time Cold Start Average Temperature Power Electronics Coolant Temperature Available	>=21600s >=7200s >=7200s > -40C TRUE	PLUS X: 200 cts Y: 300 cts R: 10.4ms T: 2080ms =9.36 sec total	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Transmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Off Board Charging Inactive Timer Mask Battery Thermal Conditioning Inactive Fault Active Battery Thermal Conditioning Inactive Mask Plug In Charging Present No Active Power Inverter Temp Out Of Range Faults:	Use Data FALSE Use Data TRUE P0AF0 and P0AEF		
Drive Motor Inverter Temperature	P0AF0	To detect Inverter A Temperature	PIM Temp A	< -58 deg C (near 5V)	Wakeup Signal When	ON	X: 250 cts Y: 350 cts R: 10.4ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Sensor A Circuit High		Sensor #1 voltage Out of Range high			malfunction present at start of trip: Cumulative Inverter Warmup Time at or above Inverter Warmup Torque Threshold	>=90s  >=ABS(20 Nm)	T: 2600ms	
Drive Motor Inverter Temperature Sensor A Circuit Low	P0AEF	To detect Inverter A Temperature Sensor #1 Out of Range low (voltage)	PIM Temp A	> 130 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor Inverter Temperature Sensor C Circuit Range/Performance	P0BD2	Inverter A Temperature Sensor #2 In-Range Rationality Check	ABS(PIM Temp C - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	>20 deg C	Wake Up Signal  Propulsion System Inactive Time	On  >=21600s	700 cts Start Delay	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Thermal Conditioning Off Time	>=7200s	PLUS	
					Charge Off Time	>=7200s	X: 200 cts Y: 300 cts R: 10.4ms T: 2080ms =9.36 sec total	
					Cold Start Average Temperature	> -40C		
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Transmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Time at or above Inverter Warmup Torque Threshold	>=ABS(20 Nm)		
Drive Motor Inverter Temperature Sensor C Circuit Low	P0BD3	To detect Inverter A Temperature Sensor #2 Out of Range low (voltage)	PIM Temp C Temperature	> 130 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor Inverter Temperature Sensor E Circuit Range/Performance	P0BDC	Inverter A Temperature Sensor #3 In-Range Rationality Check	ABS(PIM Temp E - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	>20 deg C	Wake Up Signal  Propulsion System Inactive Time  Thermal Conditioning Off Time  Charge Off Time	On  >=21600s  >=7200s  >=7200s	700 cts Start Delay   PLUS  X: 200 cts Y: 300 cts R: 10.4ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Cold Start Average Temperature	> -40C	T: 2080ms =9.36 sec total	
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Transmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		
					Battery Thermal Conditioning Inactive Fault Active	FALSE		
					Battery Thermal Conditioning Inactive Mask	Use Data		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Plug In Charging Present  No Active Power Inverter Temp Out Of Range Faults:	TRUE  P0BDE and P0BDD		
Drive Motor Inverter Temperature Sensor E Circuit High	P0BDE	To detect Inverter A Temperature Sensor #3 Out of Range high	PIM Temp E Temperature	< -58 deg C (near 5V)	Wakeup Signal  When malfunction present at start of trip: Cumulative Inverter Warmup Time at or above Inverter Warmup Torque Threshold	ON       =>90s  =>ABS(20 Nm)	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor Inverter Temperature Sensor E	P0BDD	To detect Inverter A Temperature Sensor #3 Out of	PIM Temp E Temperature	> 130 degC (near 0V)	Wakeup Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Circuit Low		Range low (voltage).						
Drive Motor "A" Inverter Phase U Over Temperature	P0C11	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp A Temperature	> 98 deg C	PIM Temperature  No Active DTCs: P0AEE	IN RANGE	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
Drive Motor "A" Inverter Phase V Over Temperature	P0C12	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp C Temperature	> 98 deg C	PIM Temperature  No Perf Fault; P0BDC	IN RANGE  NOT ACTIVE	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
Drive Motor "A" Inverter Phase W Over Temperature	P0C13	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp E Temperature	> 98 deg C	PIM Temperature  No Active DTCs: P0BD2	IN RANGE	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
<b>Motor A Resolver Sensors - Discrete Diagnostics</b>								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" Position Sensor Circuit	P0A3F	To detect Loss of Signal or converter error (line open, short) in the Motor Resolver circuit	Sin or Cos Signal	<2.3V	Wakeup Signal  Resolver Initialization Delay	On  2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms  Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	One Trip, Type A
Drive Motor "A" Position Sensor Circuit Range/Performance	P0A40	To detect a Degradation of Signal fault in the angle data read by the Motor Resolver circuit.	Sin or Cos Signal	>4.0V	Wakeup Signal  Resolver Initialization Delay	On  2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms  Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" Position Sensor Circuit Loss of Tracking	P1B03	To detect a Loss of Tracking fault in the Motor Resolver circuit.	Internal Tracking Error	> 5 deg	Wakeup Signal  Resolver Initialization Delay	On  2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms  Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	One Trip, Type A
Drive Motor "A" Position Sensor Circuit Overspeed	P1B0D	To detect when Motor A has exceeded operational maximum speed	ABS(Motor speed)	>6300 rpm	Wakeup Signal	On	X: 10 cts Y: 12 cts R: 10.4ms T: 104ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" Position Sensor Not Learned	P0C17	To detect an unvalidated Resolver Offset Learn Value AND No Stored Previously Valid Value	Offset Learn DIDN'T complete because:		Key Off	TRUE	300 ms learn time	One Trip, Type A
			ABS(Motor Speed)	>50 rpm	Wakeup Signal	ON		
Drive Motor "A" Position Exceeded Learning Limit	P0C4E	<b>Fail Case 1:</b> To detect an OOR Offset Learn Value	Offset Learn Completes AND ABS(Offset Correction Angle)	> 30 degrees	ABS(Motor Speed) High Voltage	< 20 rpm > 192V	300 ms learn time	One Trip, Type A
		<b>Fail Case 2:</b> To detect a sudden jump from previously stored offset learn value	Offset Learn Completes AND ABS(Offset Correction Angle - previously stored value)	> 10 degrees				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum	
Drive Motor "A" Position Sensor Learn Incorrect	P1B0F	To detect an unvalidated Resolver Offset Learn Value AND a Stored Previously Valid Value	Offset Learn DIDN'T complete because: ABS(Motor Speed)	> 50 rpm	Key Off	TRUE	300 ms learn time	Two Trips, Type B	
			OR Filtered DC Voltage	< 192V	Wakeup Signal	TRUE			
			OR ALL Phase Current Max-Min Delta	< 15A	ABS(Motor Speed)	< 20 rpm			X: 30 ct Y: N/A R: 2.08ms T: 62.4ms
			OR TimeOut waiting for entry conditions	> 1.4 second for 1 Timeouts	Valid Stored Offset	TRUE			
					High Voltage	> 192 V			
<b>Motor A Resolver Sensors - Circuit Diagnostics</b>									
Drive Motor "A" Position Sensor Circuit "A" Low	P0C52	To detect Resolver Circuit S1/3 Out of Range Low	Resolver S13 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms T: 520ms	One Trip, Type A	
Drive Motor "A" Position Sensor Circuit	P0C53	To detect Resolver Circuit S1/3 Out of	Resolver S13 Circuit Reference Voltage	> 4.5 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms	One Trip, Type A	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum	
"A" High		Range High					T: 208ms		
Drive Motor "A" Position Sensor Circuit "B" Low	P0C5C	To detect Resolver Circuit S2/4 Out of Range Low	Resolver S24 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms T: 520ms	One Trip, Type A	
Drive Motor "A" Position Sensor Circuit "B" High	P0C5D	To detect Resolver Circuit S2/4 Out of Range High	Resolver S24 Circuit Reference Voltage	> 4.5 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	One Trip, Type A	
<b>MCPA Controller Fault Diagnostics</b>									
Control Module Read Only Memory (ROM)	P1A51	<i>This Diagnostic tests the checksum on ROM (flash) memory</i>						1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5	One Trip, Type A
		<b>DTC Fail case 1:</b> This DTC will be stored if any check sum in the <b>boot</b> is incorrect			Ignition Status	= Run or Crank			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 2:</b> This DTC will be stored if any check sum in the <b>calibration</b> is incorrect</p> <p><b>DTC Fail case 3:</b> This DTC will be stored if any check sum in the <b>software</b> is incorrect</p>	Calculated Checksum does not match stored checksum				failures  Frequency: Runs continuously in the	
		<b>DTC Pass:</b>		ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false				
Control Module Long	P1EB6	<i>This Diagnostic tests for BINVDM errors</i>						One Trip,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Term Memory Reset		<b>DTC Fail case 1:</b> Non-volatile memory ( <b>Static</b> ) 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	Type A
		<b>DTC Fail case 2:</b> Non-volatile memory ( <b>Preserved</b> ) checksum error at controller power-up						
		<b>DTC Fail case 3:</b> Non-volatile memory ( <b>BINVDM</b> ) checksum error at controller power-up						

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 2:</b> Indicates that HCP is unable to correctly write and read data to and from <b>Write Protect RAM</b></p>						
		<p><b>DTC Fail case 3:</b> Indicates that HCP is unable to correctly write and read data to and from <b>2nd SOH RAM</b></p>						
		<p><b>DTC Fail case 4:</b> Indicates that HCP is unable to correctly write and read data to and from <b>Main SOH RAM</b></p>						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 5:</b> Indicates that HCP is unable to correctly write and read data to and from <b>System</b> RAM</p>						
		<p><b>DTC Fail case 6:</b> Indicates that HCP is unable to correctly write and read data to and from <b>Cache</b> RAM</p>						
		<p><b>DTC Fail case 7:</b> Indicates that HCP is unable to correctly write and read data to and from <b>eTPU</b> RAM</p>						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass:		No errors in 1000ms MainSOH RAM faults = false CommFlts = false System RAM faults = false CacheRam faults = false eTPU RAM faults = false				
Control Module	P0A1B	<i>This Diagnostic tests all the internal processor integrity subsystems</i>						One Trip,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Internal Performance		<p><b>DTC Fail case 1:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main DtctdSPI_Flt</p>	HWIO detects Fault	= true (in SPI Hardware)	<p>Run/Crank Voltage OR Powertrain Relay Voltage</p> <p>Diagnostic System Enable</p> <p>Powermoding</p>	<p>&gt; 9.5 Volts</p> <p>= true</p> <p>= Accesory or Off</p>	<p>28 fail counts out of 32 sample counts</p> <p>Executes in a 6.25ms loop</p> <p>Detects in 200ms</p>	Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 2:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_2ndNotRunningSeedKeyTst</p>	Key Value	= Calibration Value	SRAR shutdowns  SPI Fault  RunCrank Active  Ram or ROM fault  12V battery  Seed received in wrong order fault  Vehicle Speed  Seed/Key Timeout  Powermode	= False  =False  = False  = False  >11V  = False    <= 0 MPH  = False  = off for less than 5 seconds	Detects in 150ms	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					12V battery Seed received in wrong order fault Vehicle Speed Seed/Key Timeout Powermode	>11V = false  ≤ 0 MPH = False  = off for less than 5 seconds		
		<b>DTC Fail case 4:</b> Indicates that the HCP has detected an internal processor integrity fault  CePISR_e_2ndRxlIncorrectKeys	Key Value	≠ Calibration Value	1. Number Of Mains 2. IPT status	1. > 0 2. = Not running for > 0.075s	Detects in 150ms or two consecutive faulty keys	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 5:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main DtctdSdKeyTime out</p>	seed does not update	within Calibration threshold	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	Detects in 1 sec	
		<p><b>DTC Fail case 6:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main DtctdSdRxWrong Ordr</p>	Seed sequence	≠ expected order	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	<p>12 fail counts out of 16 sample counts</p> <p>Executes in a 12.5ms loop</p> <p>Detects in 200ms</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 7:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main SequenceFit</p>	<p>Seed timeout</p> <p>PSW Fault</p>	<p>&gt; 200 ms</p> <p>= True</p>	<p>1. Seed Update Key StoreFault Enable OR</p> <p>2. Program Sequence Watch Enable</p>	<p>1. = True</p> <p>2. = True</p>	<p>3 fail counts out of 4 sample counts</p> <p>Executes in a 50ms loop</p> <p>Detects in 200ms</p>	
		<p><b>DTC Fail case 8:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main ALU_Fit</p>	<p>HWIO detects Fault</p>	<p>=2 (ina row)</p>	<p>1. ALU Test Enabled</p> <p>2. Diagnostic system status</p> <p>3. Code clear active</p> <p>4. PMDI Low voltage clear diag enable conditons met</p>	<p>1. = TRUE</p> <p>2. = Enabled</p> <p>3. &gt;= 0.15s</p> <p>4. = True</p>	<p>runs continuously in 12.5ms loop</p> <p>Detects in 12.5ms</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 9:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main CfgRegFlt</p>	HWIO detects Fault	=2 (in arow)	<p>1. Diagnostic Test Enabled</p> <p>2. Diagnostic system status</p> <p>3. Code clear active</p> <p>4. PMDI Low voltage clear diag enable conditons met</p>	<p>1. = TRUE</p> <p>2. = Enabled</p> <p>3. &gt;= 0.15s</p> <p>4. = True</p>	<p>runs continuously in 12.5ms loop</p> <p>Detects in 12.5ms</p>	
		<p><b>DTC Fail case 10:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main StackFlt</p>	HWIO detects Fault	= 5 (Since Powerup)	<p>Diagnostic Test Enabled</p> <p>Diagnostic System Enables</p>	<p>= True</p> <p>=True</p>	<p>Runs Continuously in 100ms loop</p> <p>Detects in 500ms</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 11:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main ADC_Flt</p>	Continuous Fault	> 200ms	<p>1. A2D Converter Test Enabled</p> <p>2. PT Relay Voltage</p> <p>3. Run Crank Voltage</p>	<p>1. = TRUE</p> <p>2. &gt; -1</p> <p>3. &gt; 7</p>	<p>5 fail counts out of 8 sample counts</p> <p>Executes in a 50ms loop</p> <p>Detects in 200ms</p>	
		<p><b>DTC Fail case 12:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Run CrankCorrFlt</p>	Run Crank on Secondary Processor	≠ Run Crank Active	<p>1. Run Crank Discrete Diagnostic Enable</p> <p>2. SPI Faults</p>	<p>1. = True</p> <p>2. = False</p>	<p>5 fail counts out of 8 sample counts</p> <p>Executes in a 25ms loop</p> <p>Detects in 200ms</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 13:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Flash ECC_CktTest</p>	HWIO detects Fault	= 3 /10 5/10	<p>1. Flash ECC Circuit Test Enable</p> <p>2. Power-Up Reset</p>	<p>1. = True</p> <p>2. = True</p>	<p>3 fail counts out of 10 sample counts (turns on MIL)</p> <p>5 fail counts out of 10 sample counts (shutdown vehicle)</p> <p>Executes once at every power up reset</p>	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum	
		<b>DTC Fail case 15:</b> Indicates that the HCP has detected an internal processor integrity fault  CePISR_e_DMA_XferTest	HWIO detects Fault or Memory Copy Error	= True or =True	Diagnostic Test Enabled	= TRUE			
<b>MCPA Torque Security Diagnostics</b>									
Control Module Long Term Memory Performance	P1ADC	<i>This Diagnostic tests for unuseable BINVDM (flash) memory only</i>						1 failure Frequency: Once at power-up	One Trip, Type A
		<b>DTC Fail case 1:</b> Indicates that the NVM Error flag <b>HWIO Bat Write will not succeed</b> set  <b>DTC Fail case 2:</b> Indicates that the NVM Error flag <b>HWIO Assembly Cal</b> set	Last EEPROM write did not complete		Ignition voltage	≥ 5 volts			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<b>DTC Pass:</b>		NV write will not succeed = fail Assembly cal fail = false				
Drive Motor A Torque Delivered Performance	P0C19	<i>This Diagnostic tests that the difference between the motor A torque command slew and the motor torque achieved is greater than a threshold.</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> The slewed MCP torque command is different by the MCP torque achieved	the commanded torque - the achieved torque	< 138	Ignition switch	in crank or run		
Drive Motor A Control Module Not Programmed	P1A4F	<i>This diagnostic prevents flashing different MCP software into MCP A that does not match its ID</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> The MCP ID hardware does not match the calibration for the specific MCP	MCP ID Hardware	≠ Calibration				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum	
Drive Motor A Control Module Internal Control Module Torque Calculation Performance	P1E0A	<i>This diagnostic detects the torque command path calculation errors</i>						30 fail counts out of 32 sample counts  Executes in a 6.25 ms Loop  Detects in 200ms	One Trip, Type A
		<b>DTC Fail case 1:</b> If the difference between the Torque achieved primary path signal and the redundant path signal is greater than a threshold (MTQR)	Difference between Primary and Redundant signals	> 164Nm	Fault Active  TPTKO  Torque Mon Fail	= True  = False  = True			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 2:</b> If the difference between the Torque Commanded primary path signal and the redundant path signal is greater than a threshold</p> <p>(MTDR)</p>	Difference between Primary and Redundant signals	> 164Nm				

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

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

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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 8:</b> Compares the Duty ABC primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold</p> <p>(SVMR)</p>	<p><b>For OverMod:</b> Mod Index Square or PerfSqr</p> <p><b>For Linear:</b> Mod Index Square or PerfSqr</p>	<p>&gt; .2Nm</p> <p>&gt; 1Nm</p> <p>&gt; .1Nm</p> <p>&gt; .15Nm</p>				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 9:</b> Compares the Power Input Watts primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold</p> <p>(HVTR)</p>	Difference between Primary and Redundant signals	>4000				

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 12:</b> Compares the Motor Speed primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold</p> <p>(MSPR)</p>	Difference between Primary and Redundant signals	>116 RadPerSec				
<b>Communication Diagnostics</b>								
Lost Comm'n With	U1876	<i>This diagnostic indicates a lost communication between the MCPA and the ECM on Bus A</i>						Two Trips,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ECM/PCM on Bus A		<b>DTC Fail case 1:</b> Detects that CAN serial data communication has been lost with the ECM on Bus A	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage  PowerMode  Bus Off Fault Active  Normal Communication Enabled  Normal Message Transmission  Diagnostic System Disable	> 9.5 Volts    =RUN  =FALSE  =TRUE  =TRUE  =FALSE	Executes in a 6.25ms loop       Detects in 500 ms	Type B

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

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

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

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

APPENDIX

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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
<b>MCP B Phase Current Diagnostics</b>								
Drive Motor "B" Phase U-V-W Correlation	P0BFE	To detect electrical failure of phase current sensor.	Sum of 3 phase currents	> 156 A	Wakeup Signal	On	X: 160 ct Y: 190 ct R: 0.11 - 0.5 ms T: 17.6 - 80 ms	One Trip, Type A
Drive Motor "B" Phase U-V-W Current Sensor Overcurrent	P0C04	<b>Fail Case 1:</b> To detect fast, repeated 3 Phase over currents and to protect IGBT.	U, V, or W Phase current sensor	> 725 A	Wakeup Signal	On	X: 2 cts Y: 10 cts R: 2.08 ms T: 4.2 ms	One Trip, Type A
		<b>Fail Case 2:</b> To detect slow, intermittent 3 Phase over currents and to protect IGBT.					X: 5 cts Y: 50 cts R: 2.08 ms T: 10.4 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "B" Phase U-V-W Circuit/Open	P0C08	Drive Motor "A" Missing Motor Current checks for minimum current in each phase when rotor position is near that peak's phase axis. Each phase is checked individually as rotor turns.	ABS(Peak Phase Axis Current )	< 9 A	Inverter State  Inverter Voltage Rotor Position  Current Commanded	RUN  > 35 V -30 deg < Phase Axis < +30 deg >= 23 A	X: 200 ct Y: N/A R: 0.11-0.5 ms T: 22 - 100 ms	One Trip, Type A
Drive Motor "B" Phase U Current Sensor Circuit Low	P0BF3	Circuit Low monitor to detect the failure of U-phase current sensor circuit below valid range	U Phase current sensor output at highside	< -800 A	Wakeup Signal	On	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					PWM Output Enable	FALSE		
Drive Motor "B" Phase U Current Sensor Circuit High	P0BF4	Circuit High monitor to detect the failure of U-phase current sensor circuit above valid range	U Phase current sensor output at highside	> 800 A	Wakeup Signal	On	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
					PWM Output Enable	FALSE		
Drive Motor "B" Phase U Current Sensor Offset Out-of Range	P0BF2	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	U Phase offset current output at highside	>30 A	Wakeup Signal	On	X: 8 cts Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
					Power Stage No Active DTCs:	OPEN P0BE7/P0BE8		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "B" Phase V Current Sensor Circuit Low	P0BF7	Circuit Low monitor to detect the failure of V-phase current sensor circuit below valid range	V Phase current sensor output at highside	< -800 A	Wakeup Signal  PWM Output Enable	On  FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "B" Phase V Current Sensor Circuit High	P0BF8	Circuit High monitor to detect the failure of V-phase current sensor circuit above valid range	V Phase current sensor output current at highside	> 800 A	Wakeup Signal  PWM Output Enable	On  FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A

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

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	> 800 A	Wakeup Signal  PWM Output Enable	On  FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "B" Phase W Current Sensor Offset Out-of Range	P0BFA	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	W Phase offset current output at highside	>30 A	Wakeup Signal  Power Stage No Active DTCs:	On  OPEN P0BEF/P0BF0	X: 8 cts Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
<b>MCP B IGBT Diagnostics</b>								
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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Monitors hw status line to detect internal overcurrent faults, shoot through, or loss of switching control events			High Voltage	> 100V		
Drive Motor "B" Inverter Power Supply Circuit/Open	P0C0E	<p>Detects IGBT Bias Faults</p> <p>Monitors hw status line to detect loss of power supply to gate drive board</p>	Phase A, B, or C Power Supply	FAILED (Status Fault Bit)	<p>Inverter State</p> <p>High Voltage</p>	<p>Initialization Complete</p> <p>&gt; 100V</p>	<p>X: 1 ct</p> <p>Y: N/A</p> <p>R: 2.08ms</p> <p>T: 2.08ms</p>	One Trip, Type A
<b>MCP B High Voltage (HV) Diagnostics</b>								
Drive Motor "B" Hybrid Battery System Voltage High	P1AEF	To detect over voltage and to protect TPIM HV Circuit	HV Sensor Voltage	> 425V	Controller Initialization	Complete	<p>X: 3 cts</p> <p>Y: N/A</p> <p>R: 0.1 - 0.5 ms</p> <p>T: 0.3 - 1.50 ms</p>	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 of HV output voltage sensor	HV Sensor Voltage	<30V	Controller Initialization  Run/Crank Contactors	Complete  Active Closed	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A
Drive Motor "B" Control Module Hybrid Battery Voltage Sense Circuit High Voltage	P1AEB	Circuit High monitor of HV output voltage sensor	HV Sensor Voltage	>500 V	Controller Initialization  Run/Crank	Complete  Active	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A

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 System Voltage	P1AED	To check correlation of HV with sum of mid-pack voltages and HV_Battery.	ABS(HV - HV_Battery)	>= 40 V	No Active DTCs:	P1AEA, P1AEB	X: 18 cts Y: 30 cts R: 10.4ms T: 187ms	Two Trips, Type B
			AND ABS(HV - sum of mid-pack voltages)	>= 50 V	Controller Initialization Contactors	Complete Closed		
Drive Motor "B" Control Module Hybrid Battery Voltage System Isolation Fault	P1AF2	Isolation Lost between mid-pack voltage and chassis	Isolation Ratio (Neg mid-pack voltage / Pos mid-pack voltage)	>4.53	No Active DTCs:	P1AEA, P1AEB, P1AED	X: 250 cts Y: 300 cts R: 10.4ms T: 2600ms	Two Trips, Type B
					Controller Initialization	Complete		

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 1 Low monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage	<20V	Controller Initialization  Run/Crank Contactors	Complete  Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensor Circuit High	P1AF7	Circuit 1 High monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage - HV	>40 V	No Active DTCs:  Controller Initialization Run/Crank	P1AEA, P1AEB  Complete Active	X: 50 cts Y: 100 cts R: 10.4ms T: 520ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit Low	P1B43	Circuit 2 Low monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage	<20V	Controller Initialization  Run/Crank Contactors	Complete  Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit High	P1B44	Circuit 2 High monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage - HV	>40 V	No Active DTCs:  Controller Initialization Run/Crank	P1AEA, P1AEB  Complete Active	X: 50 cts Y: 100 cts R: 10.4ms T: 520ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensing Performance	P1B42	To check correlation of sum of mid-pack voltages against HV and HV_Battery	ABS(Pos mid-pack - Neg mid-pack - HV_Battery)	>= 40 V	No Active DTCs:	P1AEA, P1AEB, P1B43, P1B44	X: 100 cts Y: 150 cts R: 10.4ms T: 1040ms	Two Trips, Type B
			and ABS(Pos mid-pack - Neg mid-pack - HV)	>= 50 V	Run/Crank Controller Initialization	Active Complete		
<b>Motor B Temp Sensor Diagnostics</b>								
Drive Motor "B" Control Module Temperature Sensor Performance	P0A31	Motor B Temperature Sensor In-Range Rationality Check	ABS(Motor Thermistor Temperature - the average of (Power Electronic Coolant Temperature and Transmission Fluid	> 20 deg C	Wake Up Signal  Propulsion System Inactive Time	On  >=21600s	700 cts Start Delay	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Thermal Conditioning Off Time	>=7200s	PLUS	
					Charge Off Time	>=7200s	X: 200 cts Y: 300 cts R: 10.4ms T: 2080ms =9.36 sec total	
					Cold Start Average Temperature	> -40C		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Transmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		
					Battery Thermal Conditioning Inactive Fault Active	FALSE		
					Battery Thermal Conditioning Inactive Mask	Use Data		
					Plug In Charging Present	TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active Motor Temp Out Of Range Faults:	P0A32 and P0A33		
Drive Motor "B" Control Module Temperature Sensor Circuit Out of Range High	P0A33	To detect temperature sensor voltage Out of Range high.	Motor Temp	< -41 deg C (near 5V)	Warmup Time Warmup Torque	Init Complete  >=90s >=ABS(20 Nm)	X: 900 cts Y:1800cts R: 10.4ms T: 9378ms	One Trip, Type A
Drive Motor "B" Control Module Temperature Sensor Circuit Out of Range Low	P0A32	To detect temperature sensor voltage Out of Range low.	Motor Temp	> 184 degC (near 0V)		Init Complete	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor "B" Over Temperature	P0A35	To detect a sustained motor overtemperature condition	Motor Temperature exceeds initial fault threshold	> 149 deg C	Motor Temperature	IN RANGE	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			AND  Does not decrease below reset threshold		No Active Temp Performance Fault	P0A31		
<b>Motor Control Processor Voltage Diagnostics</b>								
Sensor Power Supply "B" Circuit Low	P06B4	Detects Sensor Power Supply (15V) below an acceptable threshold.	Scaled 15V Supply Voltage	< 12.0V	Wakeup Signal	On	X: 40 cts Y: 50 cts R: 10.4ms T: 416 ms  OR continuous fail time > 300 ms	One Trip, Type A
Sensor Power Supply "B" Circuit High	P06B5	Detects Sensor Power Supply (15V) above an acceptable threshold.	Scaled 15V Supply Voltage	> 18.0V	Wakeup Signal	On	X: 40 cts Y: 50 cts R: 10.4ms T: 416 ms  OR continuous fail time > 300 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
System Voltage Low	P1AE0	<i>This is the 12V system voltage low diagnostic</i>						Special Type C
		<b>DTC Fail case 1:</b> Sets when the ignition voltage is below a threshold	Ignition Voltage	<= 10 Volts	Enable Cal RunCrankActive Engine Speed	= true = true >= 0 RPM	5 fail counts out of 6 sample counts  Executes in a 1000ms loop  Detects in 6 sec	
		<b>DTC Pass:</b>		Ignition Voltage > 10 Volts			1 second	
System Voltage Hi	P1AE1	<i>This is the 12V system voltage Hi diagnostic</i>						Special Type C

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Thermal Conditioning Off Time	>=7200s	PLUS	
					Charge Off Time	>=7200s	X: 200 cts Y: 300 cts R: 10.4ms T: 2080ms =9.36 sec total	
					Cold Start Average Temperature	> -40C		
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Transmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Time at or above Inverter Warmup Torque Threshold	>=ABS(20 Nm)		
Drive Motor Inverter Temperature Sensor B Circuit Low	P0AF4	To detect Inverter B Temperature Sensor #1 Out of Range low (voltage)	PIM Temp B Temperature	> 130 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor Inverter Temperature Sensor D Circuit Range/Performance	P0BD7	Inverter B Temperature Sensor #2 In-Range Rationality Check	ABS(PIM Temp D - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	>20 deg C	Wake Up Signal  Propulsion System Inactive Time  Thermal Conditioning Off Time  Charge Off Time	On  >=21600s  >=7200s  >=7200s	700 cts Start Delay   PLUS  X: 200 cts Y: 300 cts R: 10.4ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Cold Start Average Temperature	> -40C	T: 2080ms =9.36 sec total	
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Transmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		
					Battery Thermal Conditioning Inactive Fault Active	FALSE		
					Battery Thermal Conditioning Inactive Mask	Use Data		

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Circuit Low		Range low (voltage)						
Drive Motor Inverter Temperature Sensor F Circuit Range/Performance	P0BE1	Inverter B Temperature Sensor #3 In-Range Rationality Check	ABS(PIM Temp F - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	>20 deg C	Wake Up Signal  Propulsion System Inactive Time  Thermal Conditioning Off Time	On  >=21600s  >=7200s	700 cts Start Delay  PLUS	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Charge Off Time	>=7200s	X: 200 cts Y: 300 cts R: 10.4ms T: 2080ms =9.36 sec total	
					Cold Start Average Temperature	> -40C		
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Transmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Time at or above Inverter Warmup Torque Threshold	>=ABS(20 Nm)		
Drive Motor Inverter Temperature Sensor F Circuit Low	P0BE2	To detect Inverter B Temperature Sensor #3 Out of Range low (voltage).	PIM Temp F Temperature	> 130 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor "B" Inverter Phase U Over Temperature	P0C14	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp B Temperature	> 98 deg C initial fault	PIM Temperature  No Active DTCs:	IN RANGE  P0A3F	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
Drive Motor "B" Inverter Phase V Over Temperature	P0C15	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp D Temperature	> 98 deg C initial fault	PIM Temperature  No Active DTCs:	IN RANGE  P0BD7	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "B" Position Sensor Circuit Range/Performance	P0A46	To detect a Degradation of Signal fault in the angle data read by the Motor Resolver circuit.	Sin or Cos Signal	> 4.0v	Wakeup Signal  Resolver Initialization Delay	On  2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms  Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	One Trip, Type A
Drive Motor "B" Position Sensor Circuit Loss of Tracking	P1B04	To detect a Loss of Tracking fault in the Motor Resolver circuit.	Internal tracking Error	>5deg	Wakeup Signal  Resolver Initialization Delay	On  2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	
Drive Motor "B" Position Sensor Circuit Overspeed	P1B0E	To detect when Motor B has exceeded operational maximum speed	ABS(Motor speed)	>9500 rpm	Wakeup Signal	On	X: 10 cts Y: 12 cts R: 10.4ms T: 104ms	One Trip, Type A
Drive Motor "B" Position Sensor Not Learned	P0C18	To detect an unvalidated Resolver Offset Learn Value AND No Stored Previously Valid Value	Offset Learn DIDN'T complete because:  ABS(Motor Speed)  OR Filtered DC Voltage	>50 rpm  < 192 V	Key Off  Wakeup Signal  ABS(Motor Speed)	TRUE  ON  < 20 rpm	300 ms learn time	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			OR ALL Phase Current Max-Min Delta OR TimeOut waiting for entry conditions	<100 A > 1.4 second for 1 timeout	High Voltage Valid Stored Offset	> 192 V FALSE		
Drive Motor B Position Exceeded Learning Limit	P0C4F	<b>Fail Case 1:</b> To detect an Oor Offset Learn Value	Offset Learn Completes AND ABS(Offset Correction Angle)	> 30 degrees	ABS(Motor Speed) High Voltage	< 20 rpm > 192V	300 ms learn time	One Trip, Type A
		<b>Fail Case 2:</b> To detect a sudden jump from previously stored offset learn value	Offset Learn Completes AND ABS(Offset Correction Angle - prevoiusly stored value)	> 10 degrees				
Drive Motor "A" Position Sensor Learn Incorrect	P1B10	To detect an unvalidated Resolver Offset Learn Value AND a Stored Previously Valid Value	Offset Learn DIDN'T complete because: ABS(Motor Speed)	> 50 rpm	Key Off	TRUE	300 ms learn time	Two Trips, Type B
			OR Filtered DC Voltage	< 192V	Wakeup Signal	TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			OR ALL Phase Current Max-Min Delta	< 15A	ABS(Motor Speed)	< 20 rpm	X: 30 ct Y: N/A R: 2.08ms T: 62.4ms	
			OR TimeOut waiting for entry conditions	> 1.4 second for 1 timeout	Valid Stored Offset	TRUE		
					High Voltage	> 192 V		
<b>Motor B Resolver Sensors - Circuit Diagnostics</b>								
Drive Motor "B" Position Sensor Circuit "A" Low	P0C57	To detect Resolver Circuit S1/3 Out of Range Low	Resolver S13 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms T: 520ms	One Trip, Type A
Drive Motor "B" Position Sensor Circuit "A" High	P0C58	To detect Resolver Circuit S1/3 Out of Range High	Resolver S13 Circuit Reference Voltage	> 4.5 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	One Trip, Type A
Drive Motor "B" Position Sensor Circuit "B" Low	P0C61	To detect Resolver Circuit S2/4 Out of Range Low	Resolver S24 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms T: 520ms	One Trip, Type A
Drive Motor "B" Position	P0C62	To detect Resolver Circuit	Resolver S24 Circuit Reference	> 4.5 v	Wakeup Signal	On	X: 20 cts Y: 30 cts	One Trip,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Sensor Circuit "B" High		S2/4 Out of Range High	Voltage				R: 10.4ms T: 208ms	Type A
<b>MCP B Controller Fault Diagnostics</b>								
Control Module Read Only Memory (ROM)	P1A54	<i>This Diagnostic tests the checksum on ROM (flash) memory</i>						One Trip, Type A
		<p><b>DTC Fail case 1:</b> This DTC will be stored if any check sum in the <b>boot</b> is incorrect</p>	Calculated Checksum does not match stored		Ignition Status	= Run or Crank	<p>1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5 failures</p> <p>Frequency: Runs continuously in the background</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 2:</b> This DTC will be stored if any check sum in the <b>calibration</b> is incorrect</p> <p><b>DTC Fail case 3:</b> This DTC will be stored if any check sum in the <b>software</b> is incorrect</p>	checksum					
		<b>DTC Pass:</b>		ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false				
Control Module Long	P1EB7	<i>This Diagnostic tests for BINVDM errors</i>						One Trip,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Term Memory Reset		<p><b>DTC Fail case 1:</b> Non-volatile memory (<b>Static</b>) checksum error at controller power-up</p> <p><b>DTC Fail case 2:</b> Non-volatile memory (<b>Preserved</b>) checksum error at controller power-up</p> <p><b>DTC Fail case 3:</b> Non-volatile memory (<b>BINVDM</b>) checksum error at controller power-up</p>	Checksum at power-up does not match checksum at power-down		Ignition Status	= Run or Crank	1 failure  Frequency: Once at powerup	Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<b>DTC Fail case 4:</b> Non-volatile memory ( <b>ShutdownFinished</b> ) checksum error at controller power-up						
		<b>DTC Pass:</b>		No ROM memory faults				
Control Module Random Access Memory (RAM) Failure	P1A53	<i>This Diagnostic tests the checksum on RAM memory</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> Indicates that HCP is unable to correctly write and read data to and from <b>Dual Store</b> RAM	Data read	does not match data written	Ignition Status	= Run or Crank	Should finish within 30 seconds at all operating conditions	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 2:</b> Indicates that HCP is unable to correctly write and read data to and from <b>Write Protect RAM</b></p>						
		<p><b>DTC Fail case 3:</b> Indicates that HCP is unable to correctly write and read data to and from <b>2nd SOH RAM</b></p>						
		<p><b>DTC Fail case 4:</b> Indicates that HCP is unable to correctly write and read data to and from <b>Main SOH RAM</b></p>						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 5:</b> Indicates that HCP is unable to correctly write and read data to and from <b>System</b> RAM</p>						
		<p><b>DTC Fail case 6:</b> Indicates that HCP is unable to correctly write and read data to and from <b>Cache</b> RAM</p>						
		<p><b>DTC Fail case 7:</b> Indicates that HCP is unable to correctly write and read data to and from <b>eTPU</b> RAM</p>						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass:		No errors in 1000ms MainSOH RAM faults = false CommFlts = false System RAM faults = false CacheRam faults = false eTPU RAM faults = false				
Control Module	P0A1C	<i>This Diagnostic tests all the internal processor integrity subsystems</i>						One Trip,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Internal Performance		<p><b>DTC Fail case 1:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main DtctdSPI_Flt</p>	HWIO detects Fault	= true (in SPI Hardware)	<p>Run/Crank Voltage OR Powertrain Relay Voltage</p> <p>Diagnostic System Enable</p> <p>Powermoding</p>	<p>&gt; 9.5 Volts</p> <p>= true</p> <p>= Accesory or Off</p>	<p>28 fail counts out of 32 sample counts</p> <p>Executes in a 6.25ms loop</p> <p>Detects in 200ms</p>	Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 2:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_2ndNotRunningSeedKeyTst</p>	Key Value	= Calibration Value	SRAR shutdowns  SPI Fault  RunCrank Active  Ram or ROM fault  12V battery  Seed received in wrong order fault  Vehicle Speed  Seed/Key Timeout  Powermode	= False  =False  = False  = false  >11V  = false  <= 0 MPH  = False  = off for less than 5 seconds	Detects in 150ms	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					SPI Fault	=False		
					RunCrank Active	= False		
					Ram or ROM fault	= false		
					12V battery	>11V		
					Seed received in wrong order fault	= false		
					Vehicle Speed			
					Seed/Key Timeout	<= 0 MPH		
					Powermode	= False		
						= off for less than 5 seconds		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 4:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_2ndRxIncorrectKeys</p>	Key Value	≠ Calibration Value	<p>1. Number Of Mains</p> <p>2. IPT status</p>	<p>1. &gt; 0</p> <p>2. = Not running for &gt; 0.075s</p>	Detects in 150ms or two consecutive faulty keys	
		<p><b>DTC Fail case 5:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_MainDtctdSdKeyTime out</p>	seed does not update	within Calibration threshold	<p>1. Number Of Monitors</p> <p>2. SPI faults</p>	<p>1. &gt; 0</p> <p>2. = FALSE</p>	Detects in 1 sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 6:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main DtctdSdRxWrong Ordr</p>	Seed sequence	≠ expected order	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	12 fail counts out of 16 sample counts  Executes in a 12.5ms loop  Detects in 200ms	
		<p><b>DTC Fail case 7:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main SequenceFlt</p>	Seed timeout  PSW Fault	> 200 ms  = True	1. Seed Update Key StoreFault Enable OR 2. Program Sequence Watch Enable	1. = True 2. = True	3 fail counts out of 4 sample counts  Executes in a 50ms loop  Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 8:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main ALU_Flt</p>	HWIO detects Fault	=2 (ina row)	<p>1. ALU Test Enabled</p> <p>2. Diagnostic system status</p> <p>3. Code clear active</p> <p>4. PMDI Low voltage clear diag enable conditons met</p>	<p>1. = TRUE</p> <p>2. = Enabled</p> <p>3. &gt;= 0.15s</p> <p>4. = True</p>	<p>runs continuously in 12.5ms loop</p> <p>Detects in 12.5ms</p>	
		<p><b>DTC Fail case 9:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main CfgRegFlt</p>	HWIO detects Fault	=2 (in arow)	<p>1. Diagnostic Test Enabled</p> <p>2. Diagnostic system status</p> <p>3. Code clear active</p> <p>4. PMDI Low voltage clear diag enable conditons met</p>	<p>1. = TRUE</p> <p>2. = Enabled</p> <p>3. &gt;= 0.15s</p> <p>4. = True</p>	<p>runs continuously in 12.5ms loop</p> <p>Detects in 12.5ms</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 10:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main StackFlt</p>	HWIO detects Fault	= 5 (Since Powerup)	<p>Diagnostic Test Enabled</p> <p>Diagnostic System Enables</p>	<p>= True</p> <p>=True</p>	<p>Runs Continuously in 100ms loop</p> <p>Detects in 500ms</p>	
		<p><b>DTC Fail case 11:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main ADC_Flt</p>	Continuous Fault	> 200ms	<p>1. A2D Converter Test Enabled</p> <p>2. PT Relay Voltage</p> <p>3. Run Crank Voltage</p>	<p>1. = TRUE</p> <p>2. &gt; -1</p> <p>3. &gt; 7</p>	<p>5 fail counts out of 8 sample counts</p> <p>Executes in a 50ms loop</p> <p>Detects in 200ms</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 12:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Run CrankCorrFit</p>	Run Crank on Secondary Processor	≠ Run Crank Active	<p>1. Run Crank Discrete Diagnostic Enable</p> <p>2. SPI Faults</p>	<p>1. = True</p> <p>2. = False</p>	<p>5 fail counts out of 8 sample counts</p> <p>Executes in a 25ms loop</p> <p>Detects in 200ms</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 13:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Flash ECC_CktTest</p>	HWIO detects Fault	= 3 /10 5/10	<p>1. Flash ECC Circuit Test Enable</p> <p>2. Power-Up Reset</p>	<p>1. = True</p> <p>2. = True</p>	<p>3 fail counts out of 10 sample counts (turns on MIL)</p> <p>5 fail counts out of 10 sample counts (shutdown vehicle)</p> <p>Executes once at every power up reset</p>	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 15:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_DMA_XferTest</p>	<p>HWIO detects Fault</p> <p>or</p> <p>Memory Copy Error</p>	<p>= True</p> <p>or</p> <p>=True</p>	Diagnostic Test Enabled	= TRUE		
<b>MCPB Torque Security Diagnostics</b>								
Control Module Long Term Memory Performance	P1ADD	<i>This Diagnostic tests for unuseable BINVDM (flash) memory only</i>						One Trip, Type A
		<p><b>DTC Fail case 1:</b> Indicates that the NVM Error flag <b>HWIO Bat Write will not succeed</b> set</p> <p><b>DTC Fail case 2:</b> Indicates that the NVM Error flag <b>HWIO Assembly Cal</b> set</p>	Last EEPROM write did not complete		Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass:		NV write will not succeed = fail Assembly cal fail = false				
Drive Motor B Torque Delivered Performance	P0C1A	<i>This Diagnostic tests that the difference between the motor B torque command slew and the motor torque achieved is greater than a threshold.</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> The slewed MCP torque command is different by the MCP torque achieved	the commanded torque - the achieved torque	< 138	Ignition switch	in crank or run		
Drive Motor B Control Module Not Programmed	P1A52	<i>This diagnostic prevents flashing different MCP software into MCP B that does not match its ID</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> The MCP ID hardware does not match the calibration for the specific MCP	MCP ID Hardware	≠ Calibration				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor B Control Module Internal Control Module Torque Calculation Performance	P1E0B	<i>This diagnostic detects the torque command path calculation errors</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> If the difference between the Torque achieved primary path signal and the redundant path signal is greater than a threshold (MTQR)	Difference between Primary and Redundant signals	> 164Nm	Fault Active  TPTKO  Torque Mon Fail	= True  = False  = True	30 fail counts out of 32 sample counts  Executes in a 6.25 ms Loop  Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 2:</b> If the difference between the Torque Commanded primary path signal and the redundant path signal is greater than a threshold</p> <p>(MTDR)</p>	Difference between Primary and Redundant signals	> 164Nm				

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

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

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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 8:</b> Compares the Duty ABC primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold</p> <p>(SVMR)</p>	<p><b>For OverMod:</b> Mod Index Square or PerfSqr</p> <p><b>For Linear:</b> Mod Index Square or PerfSqr</p>	<p>&gt; .2Nm</p> <p>&gt; 1Nm</p> <p>&gt; .1Nm</p> <p>&gt; .15Nm</p>				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 9:</b> Compares the Power Input Watts primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold</p> <p>(HVTR)</p>	Difference between Primary and Redundant signals	>4000				

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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ECM/PCM on Bus A		<b>DTC Fail case 1:</b> Detects that CAN serial data communication has been lost with the ECM on Bus A	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage  PowerMode  Bus Off Fault Active  Normal Communication Enabled  Normal Message Transmission  Diagnostic System Disable	> 9.5 Volts    =RUN  =FALSE  =TRUE  =TRUE  =FALSE	Executes in a 6.25ms loop       Detects in 500 ms	Type B

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

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

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

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

APPENDIX

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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
<b>ATPC Voltage Diagnostics</b>								
Sensor Power Supply C Circuit Low	P06E7	Detects Sensor Power Supply (15V) below an acceptable threshold.	Scaled 15V Supply Voltage	< 12.0 V	Wakeup Signal	ON	X: 40 ct Y: 50 ct R: 10.4 ms T: 416 ms OR 300 ms continuous fail time	One Trip, Type A
Sensor Power Supply C Circuit High	P06E8	Detects Sensor Power Supply (15V) above an acceptable threshold.	Scaled 15V Supply Voltage	> 18.0 V	Wakeup Signal	ON	X: 40 ct Y: 50 ct R: 10.4 ms T: 416 ms OR 300 ms continuous fail time	One Trip, Type A
Auxiliary Transmission	P1E19	<i>This is the 12V system voltage low diagnostic</i>						Special Type C

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fluid Pump Control Module System Voltage Low		<b>DTC Fail case:</b> Sets when the ignition voltage is below a threshold	Ignition Voltage	<= 10 Volts	Enable Cal RunCrankActive Engine Speed	= true = true >= 0 RPM	5 fail counts out of 6 sample counts  Executes in a 1000ms loop  Detects in 6 sec	
		<b>DTC Pass:</b>		Ignition Voltage > 10 Volts			1 second	
Auxiliary Transmission Fluid Pump Control Module System Voltage High	P1E1A	<i>This is the 12V system voltage Hi diagnostic</i>						Special Type C
		<b>DTC Fail case:</b> Sets when the ignition voltage is above a threshold	Ignition Voltage	>= 18 Volts	Enable Cal RunCrankActive	= true = true		
		<b>DTC Pass:</b>		Ignition Voltage < 18 Volts			1 second	
<b>ATPC Phase Current Diagnostics</b>								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Auxiliary Transmission Fluid Pump Phase U-V-W Circuit/Open	P0C20	Drive Motor "A" Missing Motor Current checks for minimum current in each phase when rotor position is near that peak's phase axis. Each phase is checked individually as rotor turns.	ABS(Peak Phase Axis Current)	< 1A	Inverter State	Run	X: 200 ct Y: N/A R: 0.11 ms T: 22 ms	One Trip, Type A
					High Voltage	> 35V		
					Rotor Position	-30 deg < Phase Axis < +30 deg		
					Current Command	>= 3A		
Auxiliary Transmission Fluid Pump Motor Current High	P0C28	<b>Fail Case 1:</b> To detect fast, repeated 3 Phase over currents and to protect IGBT.	U, V, or W Phase current sensor	> 35 A	Wakeup Signal	On	X: 2 cts Y: 30 cts R: 2.08 ms T: 4.2 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<b>Fail Case 2:</b> To detect slow, intermittent 3 Phase over currents and to protect IGBT.					X: 5 cts Y: 50 cts R: 2.08 ms T: 10.4 ms	
Auxiliary Transmission Fluid Pump Motor Phase U Current Sensor Circuit Low	P1E2A	Circuit Low monitor to detect the failure of U-phase current sensor circuit below valid range	U Phase current sensor output at highside	< -30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 8 ct Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase U Current Sensor Circuit High	P1E2B	Circuit High monitor to detect the failure of U-phase current sensor circuit above valid range	U Phase current sensor output at highside	> 30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 4 ct Y: 6 ct R: 10.4 ms T: 42 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Auxiliary Transmission Fluid Pump Motor Phase U Current Sensor Circuit Range/Performance	P1E2C	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	U Phase offset current output at highside	> 2A	Wakeup Signal PowerStage No Active DTCs:	ON OPEN P1E2A/P1E2B	X: 8 ct Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase V Current Sensor Circuit Low	P1E2D	Circuit Low monitor to detect the failure of V-phase current sensor circuit below valid range	V Phase current sensor output at highside	< -30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 4 ct Y: 6 ct R: 10.4 ms T: 42 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase V Current Sensor Circuit High	P1E2E	Circuit High monitor to detect the failure of V-phase current sensor circuit above valid range	V Phase current sensor output at highside	> 30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 4 ct Y: 6 ct R: 10.4 ms T: 42 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Auxiliary Transmission Fluid Pump Motor Phase V Current Sensor Circuit Range/Performance	P1E2F	Offset Circuit monitor to detect the failure of V-phase offset current above valid range	V Phase offset current output at highside	> 2A	Wakeup Signal PowerStage No Active DTCs:	ON OPEN P1E2D/P1E2E	X: 8 ct Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase W Current Sensor Circuit Low	P1E30	Circuit Low monitor to detect the failure of W-phase current sensor circuit below valid range	W Phase current sensor output at highside	< -30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 4 ct Y: 6 ct R: 10.4 ms T: 42 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase W Current Sensor Circuit High	P1E31	Circuit High monitor to detect the failure of W-phase current sensor circuit above valid range	W Phase current sensor output at highside	> 30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 4 ct Y: 6 ct R: 10.4 ms T: 42 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Auxiliary Transmission Fluid Pump Motor Phase W Current Sensor Circuit Range/Performance	P1E32	Offset Circuit monitor to detect the failure of W-phase offset current above valid range	W Phase offset current output at highside	> 2A	Wakeup Signal PowerStage No Active DTCs:	ON OPEN P1E30/P1E31	X: 8 ct Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase U-V-W Current Sensor Correlation	P1E33	To detect electrical failure of phase current sensor.	Sum of 3 phase currents	> 5A	Wakeup Signal	ON	X: 160 ct Y: 190 ct R: 0.11 ms T: 17.6 ms	One Trip, Type A
<b>ATPC IGBT Diagnostics</b>								
Auxiliary Transmission Fluid Pump Motor Inverter Power Supply Circuit/Open	P1E38	Detects IGBT Bias Faults	Phase A, B, or C Power Supply	FAILED (Status Fault Bit)	Wakeup Signal	ON	X: 1 ct Y: N/A R: 2.08 ms T: 2.08ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Monitors hw line to detect loss of power supply to gate drive board.			High Voltage	> 100V		
Auxiliary Transmission Fluid Pump Motor Inverter Performance	P1E39	Detects IGBT Desaturation Faults	Phase A, B, or C High or Low Side Devices	OVERDRIVEN (Status Fault Bit)	Inverter State	Initialization Complete	X: 1 ct Y: N/A R: 2.08 ms T: 2.08ms	One Trip, Type A
					High Voltage	> 100V		
<b>ATPC Sensorless Controls Diagnostics</b>								
Auxiliary Transmission Fluid Pump Torque Performance	P1E3A	Detects Sensorless Stall of Aux Fluid Pump	Commanded speed - Actual speed	> 200 rpm	Torque command	> 6.8 Nm	X: 400 ct Y: 2500 R: 2.08 ms T: 832 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Auxiliary Transmission Fluid Pump Overspeed	P179A	To detect when Motor A has exceeded operational maximum speed	ABS(Motor speed) initially	>6500 rpm	Wake up signal	On	X: 10 cts Y: 12 cts R: 10.4ms T: 104ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Control Module Calculated Motor Position Performance	P1E29	Loss of Sensorless Control  OR  Polarity Detection Fault	Motor Speed Speed Command  OR  Rotor Speed ERS	< -500 r/min > 0  > 62.8 rad/s	Wake up signal	On	X: 3 cts Y: 5 cts R: 2ms T: 6ms  X:100 cts Y:N/A R:2ms Retries: 5 T:1s	One Trip, Type A
<b>ATPC High Voltage (HV) Diagnostics</b>								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery System Voltage High	P1E27	To detect over voltage and to protect TPIM HV Circuit	HV Sensor Voltage	> 425V	Controller Initialization	Complete	X: 3 cts Y: N/A R: 0.0001 - 0.0005 ms T: 0.0003 - 0.00150 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Sense Circuit Low Voltage	P1E20	Circuit Low monitor of HV output voltage sensor	HV Sensor Voltage	<30V	Controller Initialization  Run/Crank Contactors	Complete  Active Closed	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Sense Circuit High Voltage	P1E21	Circuit High monitor of HV output voltage sensor	HV Sensor Voltage	>500 V	Controller Initialization	Complete	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A
					Run/Crank	Active		
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery System Voltage	P1E28	To check correlation of HV with sum of mid-pack voltages and HV_Battery.	ABS(HV - HV_Battery)	>= 40 V	No Active DTCs:	P1E20, P1E21	X: 18 cts Y: 30 cts R: 10.4ms T: 187ms	Two Trips, Type B
			AND ABS(HV - sum of mid-pack voltages)	>= 50 V	Contactors	Closed		
<b>ATPC Isolation Diagnostics</b>								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage System Isolation Fault	P1E22	Isolation Lost between mid-pack voltage and chassis	Isolation Ratio (Neg mid-pack voltage / Pos mid-pack voltage)	>4.53	No Active DTCs:  Controller Initialization	P1E20, P1E21, P1E28  Complete	X: 250 cts Y: 300 cts R: 10.4ms T: 2600ms	Two Trips, Type B
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensor Circuit 1 Low	P1E1C	Circuit 1 Low monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage	<20V	Controller Initialization  Run/Crank Contactors	Complete  Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensor Circuit 1 High	P1E1D	Circuit 1 High monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage - HV	>40 V	No Active DTCs:  Controller Initialization Run/Crank	P1E20, P1E21  Complete Active	X: 50 cts Y: 100 cts R: 10.4ms T: 520ms	Two Trips, Type B
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensor Circuit 2 Low	P1E1E	Circuit 2 Low monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage	<20V	Controller Initialization	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
					Run/Crank Contactors	Active Closed		
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensor Circuit 2 High	P1E1F	Circuit 2 High monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage - HV	>40 V	No Active DTCs:  Controller Initialization Run/Crank	P1E20, P1E21  Complete Active	X: 50 cts Y: 100 cts R: 10.4ms T: 520ms	Two Trips, Type B



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					When malfunction present at start of trip: Cumulative Inverter Warmup Time  at or above Inverter Warmup Torque Threshold	>=600s  >=ABS(1 Nm)		
Auxiliary Transmission Fluid Pump Motor Inverter Temperature Sensor Circuit Low	P1E35	To detect Inverter A Temperature Sensor #1 Out of Range low (voltage)	PIM Temp B Temperature	> 130 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	Two Trips, Type B
Auxiliary Transmission Fluid Pump Motor Inverter Temperature Sensor Circuit	P1E36	Inverter A Temperature Sensor #1 In-Range Rationality Check	ABS(PIMTemp - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	> 20 deg C	Wake Up Signal  Propulsion System Inactive Time	On  >=21600s	700 cts Start Delay	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Range/Performance					Thermal Conditioning Off Time  Charge Off Time  Cold Start Average Temperature  Power Electronics Coolant Temperature Available  Power Electronics Coolant Temperature Fault Active	>=7200s  >=7200s  > -40C  TRUE  FALSE	PLUS  X: 200 cts Y: 300 cts R: 10.4ms T: 2080ms =9.36 sec total	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Tranmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Battery Thermal Conditioning Inactive Fault Active	FALSE		
					Battery Thermal Conditioning Inactive Mask	Use Data		
					Plug In Charging Present	TRUE		
					No Active Power Inverter Temp Out Of Range Faults:	P1E34 and P1E35		
Auxiliary Transmission Fluid Pump Motor Inverter Over Temperature	P1E37	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp A Temperature	> 98 deg C initial fault	PIM Temperature	IN RANGE	X: 500 cts  Y: 1500 cts R: 10.4ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTCs:	P1E36	T: 5200ms	
<b>ATPC Controller Diagnostics</b>								
Auxiliary Transmission Fluid Pump Control Module Read Only Memory (ROM)	P1E25	<i>This Diagnostic tests the checksum on ROM (flash) memory</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> This DTC will be stored if any check sum in the <b>boot</b> is incorrect			Ignition Status	= Run or Crank	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5 failures	
		<b>DTC Fail case 2:</b> This DTC will be stored if any check sum in the <b>calibration</b> is incorrect	Calculated Checksum does not match stored checksum				Frequency: Runs continuously in the background	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum	
		<p><b>DTC Fail case 3:</b> This DTC will be stored if any check sum in the <b>software</b> is incorrect</p>					background		
		<p><b>DTC Pass:</b></p>		<p>ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false</p>					
Auxiliary Transmission Fluid Pump Control Module Long Term Memory Performance	P1E24	<p><i>This Diagnostic tests for BINVDM errors</i></p>							One Trip, Type A
		<p><b>DTC Fail case 1:</b> Non-volatile memory (<b>Static</b>) checksum error at controller power-up</p>			Ignition Status	= Run or Crank	<p>1 failure  Frequency: Once at powerup</p>		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<b>DTC Fail case 2:</b> Non-volatile memory <b>(Preserved)</b> checksum error at controller power-up	Checksum at power-up does not match checksum at power-down					
		<b>DTC Fail case 3:</b> Non-volatile memory <b>(BINVDM)</b> checksum error at controller power-up						
		<b>DTC Fail case 4:</b> Non-volatile memory <b>(ShutdownFinished)</b> checksum error at controller power-up						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum	
		<b>DTC Pass:</b>		No ROM memory faults					
Auxiliary Transmission Fluid Pump Control Module Random Access Memory (RAM)	P1E23	<i>This Diagnostic tests the checksum on RAM memory</i>							One Trip, Type A
		<b>DTC Fail case 1:</b> Indicates that HCP is unable to correctly write and read data to and from <b>Dual Store</b> RAM				Ignition Status	= Run or Crank	Should finish within 30 seconds at all operating conditions	
		<b>DTC Fail case 2:</b> Indicates that HCP is unable to correctly write and read data to and from <b>Write Protect</b> RAM							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 3:</b> Indicates that HCP is unable to correctly write and read data to and from <b>2nd SOH RAM</b></p>	Data read	does not match data written				
	<p><b>DTC Fail case 4:</b> Indicates that HCP is unable to correctly write and read data to and from <b>Main SOH RAM</b></p>							
	<p><b>DTC Fail case 5:</b> Indicates that HCP is unable to correctly write and read data to and from <b>System RAM</b></p>							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 6:</b> Indicates that HCP is unable to correctly write and read data to and from <b>Cache RAM</b></p>						
		<p><b>DTC Fail case 7:</b> Indicates that HCP is unable to correctly write and read data to and from <b>eTPU RAM</b></p>						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass:		No errors in 1000ms MainSOH RAM faults = false CommFlts = false System RAM faults = false CacheRam faults = false eTPU RAM faults = false				
Auxiliary Transmission	P0B0D	<i>This Diagnostic tests all the internal processor integrity subsystems</i>						One Trip,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fluid Pump Motor Control Module		<p><b>DTC Fail case 1:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main DtctdSPI_Flt</p>	HWIO detects Fault	= true (in SPI Hardware)	<p>Run/Crank Voltage OR Powertrain Relay Voltage</p> <p>Diagnostic System Enable</p> <p>Powermoding</p>	<p>&gt; 9.5 Volts</p> <p>= true</p> <p>= Accesory or Off</p>	<p>28 fail counts out of 32 sample counts</p> <p>Executes in a 6.25ms loop</p> <p>Detects in 200ms</p>	Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 2:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_2ndNotRunningSeedKeyTst</p>	Key Value	= Calibration Value	SRAR shutdowns  SPI Fault  RunCrank Active  Ram or ROM fault  12V battery  Seed received in wrong order fault  Vehicle Speed  Seed/Key Timeout  Powermode	= False  =False  = False  = false  >11V  = false  <= 0 MPH  = False  = off for less than 5 seconds	Detects in 150ms	

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 5:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main DtctdSdKeyTime out</p>	seed does not update	within Calibration threshold	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	Detects in 1 sec	
		<p><b>DTC Fail case 6:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main DtctdSdRxWrong Ordr</p>	Seed sequence	≠ expected order	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	<p>12 fail counts out of 16 sample counts</p> <p>Executes in a 12.5ms loop</p> <p>Detects in 200ms</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 7:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main SequenceFlt</p>	<p>Seed timeout</p> <p>PSW Fault</p>	<p>&gt; 200 ms</p> <p>= True</p>	<p>1. Seed Update Key StoreFault Enable OR</p> <p>2. Program Sequence Watch Enable</p>	<p>1. = True</p> <p>2. = True</p>	<p>3 fail counts out of 4 sample counts</p> <p>Executes in a 50ms loop</p> <p>Detects in 200ms</p>	
		<p><b>DTC Fail case 8:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main ALU_Flt</p>	<p>HWIO detects Fault</p>	<p>=2 (ina row)</p>	<p>1. ALU Test Enabled</p> <p>2. Diagnostic system status</p> <p>3. Code clear active</p> <p>4. PMDI Low voltage clear diag enable conditons met</p>	<p>1. = TRUE</p> <p>2. = Enabled</p> <p>3. &gt;= 0.15s</p> <p>4. = True</p>	<p>runs continuously in 12.5ms loop</p> <p>Detects in 12.5ms</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 9:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main CfgRegFlt</p>	HWIO detects Fault	=2 (in arow)	<p>1. Diagnostic Test Enabled</p> <p>2. Diagnostic system status</p> <p>3. Code clear active</p> <p>4. PMDI Low voltage clear diag enable conditons met</p>	<p>1. = TRUE</p> <p>2. = Enabled</p> <p>3. &gt;= 0.15s</p> <p>4. = True</p>	<p>runs continuously in 12.5ms loop</p> <p>Detects in 12.5ms</p>	
		<p><b>DTC Fail case 10:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main StackFlt</p>	HWIO detects Fault	= 5 (Since Powerup)	<p>Diagnostic Test Enabled</p> <p>Diagnostic System Enables</p>	<p>= True</p> <p>=True</p>	<p>Runs Continuously in 100ms loop</p> <p>Detects in 500ms</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 11:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Main ADC_Flt</p>	Continuous Fault	> 200ms	<p>1. A2D Converter Test Enabled</p> <p>2. PT Relay Voltage</p> <p>3. Run Crank Voltage</p>	<p>1. = TRUE</p> <p>2. &gt; -1</p> <p>3. &gt; 7</p>	<p>5 fail counts out of 8 sample counts</p> <p>Executes in a 50ms loop</p> <p>Detects in 200ms</p>	
		<p><b>DTC Fail case 12:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Run CrankCorrFIt</p>	Run Crank on Secondary Processor	≠ Run Crank Active	<p>1. Run Crank Discrete Diagnostic Enable</p> <p>2. SPI Faults</p>	<p>1. = True</p> <p>2. = False</p>	<p>5 fail counts out of 8 sample counts</p> <p>Executes in a 25ms loop</p> <p>Detects in 200ms</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p><b>DTC Fail case 13:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_Flash ECC_CktTest</p>	HWIO detects Fault	= 3 /10 5/10	<p>1. Flash ECC Circuit Test Enable</p> <p>2. Power-Up Reset</p>	<p>1. = True</p> <p>2. = True</p>	<p>3 fail counts out of 10 sample counts (turns on MIL)</p> <p>5 fail counts out of 10 sample counts (shutdown vehicle)</p> <p>Executes once at every power up reset</p>	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum	
		<p><b>DTC Fail case 15:</b> Indicates that the HCP has detected an internal processor integrity fault</p> <p>CePISR_e_DMA_XferTest</p>	<p>HWIO detects Fault</p> <p>or</p> <p>Memory Copy Error</p>	<p>= True</p> <p>or</p> <p>=True</p>	Diagnostic Test Enabled	= TRUE			
Auxiliary Transmission Fluid Pump Control Module Long Term Memory Reset	P1EB8	<i>This Diagnostic tests for unuseable BINVDM (flash) memory only</i>							One Trip, Type A
		<p><b>DTC Fail case 1:</b> Indicates that the NVM Error flag</p> <p><b>HWIO Bat Write will not succeed</b> set</p>	Last EEPROM write did not complete		Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<b>DTC Fail case 2:</b> Indicates that the NVM Error flag <b>HWIO Assembly Cal</b> set			Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up	
		<b>DTC Pass:</b>		NV writewillnotsucceed = fail Assemblycalfail = false				
Auxiliary Transmission Fluid Pump Motor Control Module Not Programmed	P1BFF	<i>This diagnostic prevents flashing different MCP software into MCP C that does not match its ID</i>						One Trip, Type A
		<b>DTC Fail case 1:</b> The MCP ID hardware does not match the calibration for the specific MCP	MCP ID Hardware	≠ Calibration				
Control Module Long	P1EB8	<i>This Diagnostic tests for BINVDM errors</i>						One Trip,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Term Memory Reset		<b>DTC Fail case 1:</b> Non-volatile memory ( <b>Static</b> ) 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	Type A
		<b>DTC Fail case 2:</b> Non-volatile memory ( <b>Preserved</b> ) checksum error at controller power-up						
		<b>DTC Fail case 3:</b> Non-volatile memory ( <b>BINVDM</b> ) checksum error at controller power-up						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<b>DTC Fail case 4:</b> Non-volatile memory ( <b>ShutdownFinished</b> ) checksum error at controller power-up						
		<b>DTC Pass:</b>		No ROM memory faults				
<b>ATPC Comm'n</b>								
Lost Comm'n With ECM/PCM on Bus A	U1839	<i>This diagnostic indicates a lost communication between the ATPC and the ECM on Bus A</i>						Two Trips, Type B
		<b>DTC Fail case 1:</b> Detects that CAN serial data communication has been lost with the ECM on Bus A	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage  PowerMode	> 9.5 Volts  =RUN	Executes in a 6.25ms loop  Detects in 500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With TCM	U183B	<i>This diagnostic indicates a lost communication between the ATPC and the TCM on Bus A</i>						Two Trips,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<b>DTC Fail case 1:</b> Detects that CAN serial data communication has been lost with the TCM on Bus A	Missed TCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage  PowerMode  Bus Off Fault Active  Normal Communication Enabled  Normal Message Transmission  Diagnostic System Disable	> 9.5 Volts   =RUN  =FALSE  =TRUE  =TRUE  =FALSE	Executes in a 6.25ms loop      Detects in 500 ms	Type B

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

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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
A/C Compressor Control Module Ignition Switch Run/Start Position Circuit High	P15BA	Run/Crank circuit is stuck on	Run/Crank input	ON	System Voltage	12V System Status > 9 V	5 fails out of 10 samples. Continuous sampling at 50 msec/sampl	One Trip, Type A
			AND		Comm with VICM	Message \$236 recd.		
			GMLAN Signal "VICM Run Crank Terminal Status"	INACTIVE				
			Status Pass	Run/Crank input	ON	System Voltage		
		AND		HW Inputs	Accessory			
		GMLAN Signal "VICM Run Crank Terminal Status"	ACTIVE	Comm with VICM	Message \$236 recd.			
		OR						
		Run/Crank input	OFF					
		AND						
		GMLAN Signal "VICM Run Crank Terminal Status"	INACTIVE					
		OR						
		Run/Crank input	OFF					
		AND						
		GMLAN Signal "VICM Run Crank Terminal Status"	INACTIVE					
A/C Compressor Control	P15B9	Run/Crank circuit is stuck off	Run/Crank input =OFF & GMLAN Signal "VICM Run		System Voltage	12V System Status > 9 V	5 fails out of 10 samples. Continuous	One Trip, Type A
					HW Inputs	Accessory		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Module Ignition Switch Run/Start Position Circuit Low			Crank Terminal Status"=ACTIVE"		Comm with VICM	Message \$236 recd.	sampling at 50 msec/sampl	
		Status Pass	Run/Crank input =ON & GMLAN Signal "VICM Run Crank Terminal Status"=ACTIVE" OR Run/Crank input =OFF & GMLAN Signal "VICM Run Crank Terminal Status"=INACTIVE" OR Run/Crank input =ON & GMLAN		System Voltage	12V System Status > 9 V	5 passes out of 10 samples. Continuous sampling at 50 msec/sampl e	
					HW Inputs	Accessory		
					Comm with VICM	Message \$236 recd.		
A/C Compressor Motor Voltage Sensor Circuit High	P0D6A	Monitor High Voltage input to ACCM	Sets when HV >= Threshold	450V	System Voltage	12V System Status > 9 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					HV Battery Normal Operation	Battery Cell Voltage Fault Active is FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						Compressor Input Voltage reading within 10 V of Battery Cell Voltage reading		
		Status Pass	HV <= Threshold	440V	System Voltage	12V System Status > 9 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.		
A/C Compressor Motor Voltage Sensor Circuit Low	P0D6B	Monitor High Voltage input to ACCM	Sets when HV <= Threshold	190V	System Voltage	12V System Status > 9 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Contactors Closed with no faults	High Voltage Battery Contactor is CLOSED for > 1 sec AND High Voltage Battery Contactor Fault Active is FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HV Battery Normal Operation	Battery Cell Voltage Fault Active is FALSE Compressor Input Voltage reading within 10 V of Battery Cell Voltage reading	30 passes out of 60 samples. Continuous 50 msec sampling rate	
		Status Pass	HV >= Threshold	200V	System Voltage	12V System Status > 9 V		
					HW Inputs	Accessory OR Run/Crank		
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.		
A/C Compressor Motor Instantaneous Voltage High	P1ECA	Monitor High Voltage input to ACCM	Sets when HV >= Threshold	480V	System Voltage	12V System Status > 9 V	1 fail out of 1 sample Continuous 50 msec sampling	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	HV <= Threshold	440V	System Voltage	12V System Status > 9 V	1 pass out of 1 sample Continuous 50 msec	
					HW Inputs	Accessory OR Run/Crank		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.	sampling rate	
A/C Compressor Motor Phase U Current Low	P0D7A	Monitor U-phase motor current	U-phase Input >= Threshold	68 Amps	System Voltage	12V System Status > 9 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		
		Status Pass	U-phase Input < Threshold	68 Amps	System Voltage	12V System Status > 9 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Motor Phase U Current	P0D7B	Monitor U-phase motor current	U-phase Input <= Threshold	-68 Amps	System Voltage	12V System Status > 9 V	30 fails out of 60 samples. Continuous	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum				
High					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM	50 msec sampling rate					
					Status Pass	U-phase Input > Threshold	-68 Amps		System Voltage	12V System Status > 9 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
									HW Inputs	Accessory OR Run/Crank		
									ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Motor Phase V Current Low	P0D7C	Monitor V-phase motor current	V-phase Input >= Threshold	68 Amps	System Voltage	12V System Status > 9 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B				
					HW Inputs	Accessory OR Run/Crank						
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM						
					Status Pass	V-phase Input < Threshold			68 Amps	System Voltage	12V System Status > 9 V	30 passes out of 60 samples. Continuous
										HW Inputs	Accessory OR Run/Crank	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.	50 msec sampling rate	
A/C Compressor Motor Phase V Current High	P0D7D	Monitor V-phase motor current	V-phase Input <= Threshold	-68 Amps	System Voltage	12V System Status > 9 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		
		Status Pass	V-phase Input > Threshold	-68 Amps	System Voltage	12V System Status > 9 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Motor Phase W Current	P0D7E	Monitor W-phase motor current	W-phase Input >= Threshold	68 Amps	System Voltage	12V System Status > 9 V	30 fails out of 60 samples. Continuous	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum				
Low					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM	50 msec sampling rate					
					Status Pass	W-phase Input < Threshold	68 Amps		System Voltage	12V System Status > 9 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
									HW Inputs	Accessory OR Run/Crank		
									ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Motor Phase W Current High	P0D7F	Monitor W-phase motor current	W-phase Input <= Threshold	-68 Amps	System Voltage	12V System Status > 9 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B				
					HW Inputs	Accessory OR Run/Crank						
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM						
					Status Pass	W-phase Input > Threshold			-68 Amps	System Voltage	12V System Status > 9 V	30 passes out of 60 samples. Continuous
										HW Inputs	Accessory OR Run/Crank	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.	50 msec sampling rate	
A/C Compressor Motor Instantaneous Current High	P1EC9	Monitor DC Link current	Sets when DC Link > Threshold	60A	System Voltage	12V System Status > 9 V Accessory OR Run/Crank	1 fail out of 1 sample Continuous 50 msec sampling	Two Trips, Type B
					HW Inputs			
		Status Pass	DC Link <= Threshold	60A	System Voltage	12V System Status > 9 V Accessory OR Run/Crank	1 pass out of 1 sample Continuous 50 msec sampling rate	
					HW Inputs			
Motor Running	Motor Spinning and reaching Speed Request (Thermal Refrigerant Compressor Speed Request > 0 RPM)							
Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Clear Codes	After 10 fails, need clear code from VICM		
A/C Compressor Motor Current High	P0D6F	Monitor DC Link current	Sets when DC Link > Threshold	27A	System Voltage	12V System Status > 9 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM		
		Status Pass	Input <= Threshold	27A	System Voltage	12V System Status > 9 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Motor Running	Motor Spinning and reaching Speed Request (Thermal Refrigerant Compressor Speed Request > 0 RPM)		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.		
A/C Compressor Control Module Random Access Memory (RAM) Error	P16B8	RAM memory read/write check	Sets on read/write fault to RAM		System Voltage	12V System Status > 9 V	< 250 msec after boot	One Trip, Type A
					HW Inputs	Accessory OR Run/Crank		
					Start up	Upon CPU boot (Run/Crank or ACC transition high)		
	Status Pass				System Voltage	12V System Status > 9 V		
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Control Module Read	P16B9	ROM memory check sum	Sets on check sum error with ROM		System Voltage	12V System Status > 9 V	< 250 msec after boot	One Trip, Type A
					HW Inputs	Accessory OR Run/Crank		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Only Memory (ROM) Error		Status Pass			Start up	Upon CPU boot (Run/Crank or ACC transition high)		
					System Voltage HW Inputs	12V System Status > 9 V Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Control Module Keep Alive Memory (KAM) Error	P16BA	EEPROM memory check sum	Sets on check sum error with EEPROM		System Voltage HW Inputs	12V System Status > 9 V Accessory OR Run/Crank	< 250 msec after boot	One Trip, Type A
					Start up	Upon CPU boot (Run/Crank or ACC transition high)		
					System Voltage HW Inputs	12V System Status > 9 V Accessory OR Run/Crank		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
Electric A/C Compressor Control Module Lost Communication with Hybrid Powertrain Control Module B	U1860	Loss of communication with VICM ECU	Message \$236 missed	30 times	System Voltage	12V System Status > 9 V	3 sec	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Bus ON			
		Status Pass	Message \$236 detected	1 time	System Voltage	12V System Status > 9 V	< 110 msec. 10 msec scan rate	
Electric A/C Compressor Control Module Lost Communication with Hybrid Powertrain Control Module 1	U2608	Loss of communication with HCP ECU	Message \$1DF missed	30 times	System Voltage	12V System Status > 9 V	3 sec	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Status Pass	Message \$1DF detected		
		HW Inputs	Accessory OR Run/Crank					
Electric A/C Compressor Control Module	P0D72	Monitor ACCM CPU temperature	Tcpu input < Threshold	-40 deg C	System Voltage	12V System Status > 9 V	30 fails out of 60 samples. Continuous	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Internal Temperature Sensor Circuit High		Status Pass	Tcpu input >= Threshold	-40 deg C	Outside Air Temperature	OAT > -7 deg C	50 msec sampling	
					System Voltage	12V System Status > 9 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
Outside Air Temperature	OAT > -7 deg C							
Electric A/C Compressor Control Module Internal Temperature Sensor Circuit Low	P0D73	Monitor ACCM CPU temperature	Tcpu input > Threshold	274 deg C	System Voltage	12V System Status > 9 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	Tcpu input <= Threshold	274 deg C	System Voltage	12V System Status > 9 V	30 passes out of 60 samples. Continuous	
					HW Inputs	Accessory OR Run/Crank		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.	50 msec sampling rate	
Electric A/C Compressor Control Module Output Driver Temperature Sensor Circuit High	P0D77	Monitor ACCM IGBT temperature	Tigt input = Threshold	-40 deg C	System Voltage	12V System Status > 9 V	30 fails out of 60 samples. Continuous 50 msec sampling	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Outside Air Temperature	OAT > -7 deg C		
					Status Pass	Tigt input >= Threshold		
		HW Inputs	Accessory OR Run/Crank					
		ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.					
		Outside Air Temperature	OAT > -7 deg C					
		Electric A/C Compressor Control Module	P0D78	Monitor ACCM IGBT temperature	Tigt input > Threshold	274 deg C	System Voltage	
HW Inputs	Accessory OR Run/Crank							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Output Driver Temperature Sensor Circuit Low		Status Pass	Tight input <= Threshold	274 deg C	ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.	30 passes out of 60 samples. Continuous 50 msec	
Electric A/C Compressor Control Module Communication Bus A Off	U180A	GMLAN Bus Off	Set in driver		HW Inputs	Accessory OR Run/Crank	1 sec	Two Trips, Type B
		Status Pass	Cleared in driver		System Voltage	12V System Status > 9 V	160 msec	
					HW Inputs	Accessory OR Run/Crank		
A/C Compressor Control Module Wake-up Circuit Performance	P16B7	ACC circuit is stuck off	Accessory	OFF	System Voltage	12V System Status > 9 V	500 msec	Two Trips, Type B
					HW Inputs	Run/Crank		
					Prop Sys Active	Propulsion System Active = True		
					Timer	500 msec		
		Status Pass	Accessory	ON	System Voltage	12V System Status > 9 V	500 msec	
					HW Inputs	Run/Crank		
					Prop Sys Active	Propulsion System Active = True		
			Timer	500msec				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
A/C Compressor Motor Start-Up Current Performance	P1F0B	Monitor Inverter Phase Currents	During driver circuit check for all U/V/W Phases, if any current < Threshold	1 A	System Voltage	12V System Status > 9 V	< 50 msec	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Startup			
					Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM		
		Status Pass	During driver circuit check for all U/V/W Phases, all currents >= Threshold	1 A	System Voltage	12V System Status > 9 V	1 pass out of 1 sample Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
					Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM		
Electric A/C Compressor	P1F0D	Monitor ACCM DC Link Current	Current input >= Threshold	36.7 Amps	System Voltage	12V System Status > 9 V	30 fails out of 60	Two Trips,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum			
Control Module A/C Compressor Motor Current Feedback Circuit High					HW Inputs	Accessory OR Run/Crank	samples. Continuous 50 msec sampling rate	Type B			
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM					
					Status Pass	Current input < Threshold	36.7 Amps		System Voltage	12V System Status > 9 V	30 passes out of 60 samples. Continuous 50 msec sampling rate
									HW Inputs	Accessory OR Run/Crank	
									Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM	
					Electric A/C Compressor Control Module A/C Compressor Motor Current Feedback Circuit Low	P1F0C	Monitor ACCM DC Link Current		Current input <= Threshold	-2.5 Amps	System Voltage
HW Inputs	Accessory OR Run/Crank										
Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM										

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum				
		Status Pass	Current input > Threshold	-2.5 Amps	System Voltage	12V System Status > 9 V	30 passes out of 60 samples. Continuous 50 msec sampling					
					HW Inputs	Accessory OR Run/Crank						
					Motor Running	\$236 Speed Request > 0						
A/C Compressor Motor Speed Performance	P1F0A	Monitor ACCM Motor Speed	Motor Speed < Threshold	1800 rpm	System Voltage	12V System Status > 9 V	20 sec	Two Trips, Type B				
					HW Inputs	Accessory OR Run/Crank						
					Motor Startup	Motor Spinning but not reaching 1800 RPM						
					IGBT Temp	Tigt < 85 degC						
					Timer	> 20 sec after motor starts spinning						
					OR						1 min	
					System Voltage	12V System Status > 9 V						
					HW Inputs	Accessory OR Run/Crank						
					Motor Startup	Motor Spinning but not reaching 1800 RPM						
					IGBT Temp	Tigt > 85 degC						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Increase in IGBT Temp Timer	$\Delta T_{igt} \geq 10 \text{ degC}$ > 1 min after motor starts spinning and IGBT Temp increases 10 deg		
		Status Pass	Motor Speed $\geq$ Threshold	1800 rpm	System Voltage HW Inputs Motor Running ECU Reset	12V System Status > 9 V Accessory OR Run/Crank Thermal Refrigerant Compressor Speed Request > 0 RPM after a FAIL a 12V reset and 15 minutes is required to re-try the compressor.	< 1min	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger 14 Volt Output Current Sensor Circuit Low (12VC)	P0D49	DTC Fail Sets when the LV Current raw data, (12VC_AD_READ), is less than or equal to a threshold	Low Voltage DC Current (sensor reading)	$\leq 0.293$ Amps	Diagnostic enable calibration  Low Voltage DC (Secondary) micro status	is Enabled  is AWAKE	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Low Voltage DC Current (sensor reading)	$> 0.293$ Amps			500 ms	
Battery Charger 14 Volt Output Current Sensor Circuit High (12VC)	P0D4A	DTC Fail Sets when the LV Current raw data, (12VC_AD_READ), is greater than or equal to a threshold	Low Voltage DC Current (sensor reading)	$\geq 54$ Amps	Diagnostic enable calibration  Low Voltage DC (Secondary) micro status	is Enabled  is AWAKE	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Low Voltage DC Current (sensor reading)	$< 54$ Amps			500 ms	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Cold Plate Temperature Sensor Circuit Low (THCP)	P1ED6	DTC Fail Sets when the Cold Plate Temperature raw data, (THCP_AD_READ), is less than or equal to a threshold	Cold Plate Temperature (sensor reading)	<= -49.5	Diagnostic enable calibration  Low Voltage DC (Secondary) micro status	is Enabled  is AWAKE	1000 ms in a 1275 ms window	One Trip, Type A
		DTC Pass	Cold Plate Temperature (sensor reading)	> -49.5			1275 ms	
Battery Charger Cold Plate Temperature Sensor Circuit High (THCP)	P1ED7	DTC Fail Sets when the Cold Plate Temperature raw data, (THCP_AD_READ), is greater than or equal to a threshold	Cold Plate Temperature (sensor reading)	>= 135	Diagnostic enable calibration  Low Voltage DC (Secondary) micro status	is Enabled  is AWAKE	1000 ms in a 1275 ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Cold Plate Temperature (sensor reading)	< 135			1275 ms	
Battery Charger Control Module Reference Voltage "B" Circuit Low (Sec Reference Voltage)	P1EE9	DTC Fail Sets when the SEC Reference Voltage raw data,(SecVref_AD_READ), is less than or equal to a threshold	Low Voltage DC (Secondary) Micro Reference Voltage	<= 1.215 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Low Voltage DC (Secondary) Micro Reference Voltage	> 1.215 Volts	Low Voltage DC (Secondary) micro status	is AWAKE		
Battery Charger Control Module Reference Voltage "B" Circuit High (Sec Reference Voltage)	P1EEA	DTC Fail Sets when the Sec Reference Voltage raw data,(SecVref_AD_READ), is greater than or equal to a threshold	Low Voltage DC (Secondary) Micro Reference Voltage	>= 1.235 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Low Voltage DC (Secondary) micro status	is AWAKE		
		DTC Pass	Low Voltage DC (Secondary) Micro Reference Voltage	< 1.235 Volts			500 ms	
Battery Charger Hybrid/EV Battery Output Voltage Sensor Circuit Low (HVS)	P0D4E	DTC Fail Sets when the HV Voltage raw data,(HVS_AD_READ), is less than or equal to a threshold	High Voltage DC Voltage (sensor reading)	<= 2.62 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
					Low Voltage DC (Secondary) micro status	is AWAKE		
					High Voltage DC (HV) micro status	is AWAKE		
		DTC Pass	High Voltage DC Voltage (sensor reading)	> 2.62 Volts			500 ms	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					High Voltage DC (HV) micro status	is AWAKE		
		DTC Pass	High Voltage DC Current (sensor reading)	> 0.098 Amps			500 ms	
Battery Charger Hybrid/EV Battery Output Current Sensor Circuit High (HVC)	P0D54	DTC Fail Sets when the HV Current raw data,(HVC_AD_READ), is greater than or equal to a threshold	High Voltage DC Current (sensor reading)	>= 18 Amps	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
					Low Voltage DC (Secondary) micro status	is AWAKE		
					High Voltage DC (HV) micro status	is AWAKE		
		DTC Pass	High Voltage DC Current (sensor reading)	< 18 Amps			500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Control Module Reference Voltage "C" Circuit Low (HV Reference Voltage)	P1EEB	DTC Fail Sets when the HV Reference Voltage raw data,(HVVref_AD_READ), is less than or equal to a threshold	High Voltage DC (HV) Micro Reference Voltage	<= 1.215 Volts	Diagnostic enable calibration  Low Voltage DC (Secondary) micro status High Voltage DC (HV) micro status	is Enabled  is AWAKE is AWAKE	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	High Voltage DC (HV) Micro Reference Voltage	> 1.215 Volts			500 ms	
Battery Charger Control Module Reference Voltage "C" Circuit High (HV Reference Voltage)	P1EEC	DTC Fail Sets when the HV Reference Voltage raw data,(HVVref_AD_READ), is greater than or equal to a threshold	High Voltage DC (HV) Micro Reference Voltage	>= 1.235 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Low Voltage DC (Secondary) micro status	is AWAKE		
					High Voltage DC (HV) micro status	is AWAKE		
		DTC Pass	High Voltage DC (HV) Micro Reference Voltage	< 1.235 Volts			500 ms	
Battery Charger Control Module Ignition Switch Run/Start Position Circuit Low(PROG)	P1EF6	DTC Fail Sets if Run/Crank hardwire input state is low when Run/Crank Terminal Status serial data signal indicates hardwire state should be high	Run/Crank hardwire input state	= LOW	Diagnostic enable calibration	is Enabled	300 ms in a 375 ms window	One Trip, Type A
			VICM Run/Crank Terminal Status signal (CC)	= HIGH	Low Voltage DC (Secondary) micro status	is AWAKE		
		DTC Pass	Run/Crank hardwire input state	= HIGH, OR			375 ms	
			VICM Run/Crank Terminal Status signal (CC)	= LOW				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Control Module Ignition Switch Run/Start Position Circuit High(PROG)	P1EF7	DTC Fail Sets if Run/Crank hardwire input state is high when Run/Crank Terminal Status serial data signal indicates hardwire state should be low	Run/Crank hardwire input state	= HIGH	Diagnostic enable calibration	is Enabled	300 ms in a 375 ms window	One Trip, Type A
			VICM Run/Crank Terminal Status signal (CC)	= LOW	Low Voltage DC (Secondary) micro status	is AWAKE		
		DTC Pass	Run/Crank hardwire input state	= LOW, OR			375 ms	
			VICM Run/Crank Terminal Status signal (CC)	= HIGH				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Control Module High Voltage Energy Management Communication Bus Enable Circuit Low (HVCEN)	P1EF8	DTC Fail Sets if HVEM Comm Enable hardware input state is low when HVEM Comm Enable Terminal Status serial data signal indicates hardware state should be high	HVEM Comm Enable hardware input state	= LOW	Diagnostic enable calibration	is Enabled	300 ms in a 375 ms window	One Trip, Type A
			VICM HVEM Comm Enable Terminal Status signal (HS)	= HIGH	Low Voltage DC (Secondary) micro status	is AWAKE		
		DTC Pass	HVEM Comm Enable hardware input state VICM HVEM Comm Enable Terminal Status signal (HS)	= HIGH, OR  = LOW			375 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Control Module High Voltage Energy Management Communication Bus Enable Circuit High (HVCEN)	P1EF9	DTC Fail Sets if HVEM Comm Enable hardware input state is high when HVEM Comm Enable Terminal Status serial data signal indicates hardware state should be low	HVEM Comm Enable hardware input state	= HIGH	Diagnostic enable calibration	is Enabled	300 ms in a 375 ms window	One Trip, Type A
			VICM HVEM Comm Enable Terminal Status signal (HS)	= LOW	Low Voltage DC (Secondary) micro status	is AWAKE		
		DTC Pass	HVEM Comm Enable hardware input state VICM HVEM Comm Enable Terminal Status signal (HS)	= LOW, OR  = HIGH			375 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
On Board Charger Control Module Lost Communication with Hybrid Powertrain Control Module 2 on Bus H	U185C	DTC Fail Sets if signal supervision timeout detected while the OBCM is in communication with the VICM on the HVEM Expansion Bus.	Supervised signal timeout detected:  Supervised signal	HVChgrBsOut CrntCmd  Message ID - \$304 Message - High_V_Control_Energy_Mgmt CC	Diagnostic enable calibration    Low Voltage DC (Secondary) micro status Charger CAN Bus State	is Enabled    is AWAKE  is ACTIVE	250 ms	One Trip, Type A
		DTC Pass	Supervised signal received within timeout window				< 250 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
On Board Charger Control Module Lost Communication with Engine Control Module	U1861	DTC Fail Sets if signal supervision timeout detected while the OBCM is in communication with the ECM on the HSGMLAN bus.	Supervised signal timeout detected:  Supervised signal	LegDiagStndCndMet  Message ID - \$4C1 Message - PPEI_Engine_General_Status 4	Diagnostic enable calibration    Low Voltage DC (Secondary) micro status HSGMLAN bus State	is Enabled    is AWAKE  is ACTIVE	1250 ms	Two Trips, Type B
		DTC Pass	Supervised signal received within timeout window				< 1250 ms	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Low Voltage DC (Secondary) micro status HSGMLAN bus State	is AWAKE  is ACTIVE		
		DTC Pass	Supervised signal received within timeout window				< 250 ms	
On Board Charger Control Module Communications Bus A Off	U180C	DTC Fail Sets if HSGMLAN Bus off error is detected	HSGMLAN Bus off error	= TRUE	Diagnostic enable calibration	is Enabled	40 ms in a 40 ms window	Two Trips, Type B
		DTC Pass	HSGMLAN Bus off error	= FALSE	Low Voltage DC (Secondary) micro status	is AWAKE	40ms	
On Board Charger Control Module Communications Bus H Off	U1807	DTC Fail Sets if HVEM Expansion Bus off error is detected	HVEM Expansion Bus off error	= TRUE	Diagnostic enable calibration	is Enabled	40 ms in a 40 ms window	One Trip, Type A
		DTC Pass	HVEM Expansion Bus off error	= FALSE	Low Voltage DC (Secondary) micro status	is AWAKE	40ms	



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Case 1: Low Voltage Output voltage Case 2: Low Voltage Output voltage	> 9 Volts  >= 8 Volts and never falls below 8 Volts for more than 2 sec			500ms	
		Sub-Test 2 of 2 CAN Voltage Limit System Check  DTC Fail Sets when Low Voltage voltage is beyond CAN voltage limits.	Low Voltage voltage	< 7 Volts OR > 18 Volts	Diagnostic enable calibration  Low Voltage DC (Secondary) micro status	is Enabled  is AWAKE	5 ms in a 5 ms window	
		DTC Pass	Low Voltage voltage	>= 7 Volts AND <= 18 Volts			5ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Control Module Random Access Memory (RAM) Error	P16C2	DTC Fail Each RAM location is written with a predefined value and verified. Sets when verification on any RAM location fails.	Verification on any RAM location fails		Diagnostic enable calibration	is Enabled	10 ms in a 10 ms window, only execute at end of program mode	One Trip, Type A
					Low Voltage DC (Secondary) micro status	is AWAKE		
					High Voltage DC (HV) micro status	is AWAKE		
		High Voltage AC (Primary) micro status	is AWAKE					
		DTC Pass	Verification on all RAM locations passes.	Positive Acknowledgment			10ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Control Module Read Only Memory (ROM) Error	P16C1	DTC Fail Sets When checksum verification on application/calibration area fails	Checksum verification fails		Diagnostic enable calibration	is Enabled	20 ms in a 20 ms window, only execute at end of program mode	One Trip, Type A
		DTC Pass	Checksum verification passes		Low Voltage DC (Secondary) micro status	is AWAKE	20ms	
Battery Charger Control Module SPI Bus 1 (SPI Communication Fault - Primary)	P16C4	Sub-Test 1 of 5 SPI Primary Mico Message Checksum Error  DTC Fail Sets when any Primary SPI checksum error count for a SPI Message is greater than or equal to the counter threshold	MessageChkSumEr rCtr[AC Meas Msg], OR MessageChkSumEr rCtr[OBD Msg], OR MessageChkSumEr rCtr[Primary Status], OR MessageChkSumEr rCtr[Temperature Msg]	>= 2  >= 2  >= 2  >= 2	Diagnostic enable calibration	is Enabled	44 ms in a 44 ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Low Voltage DC (Secondary) micro status SPI mode	is AWAKE  = NORMAL		
		DTC Pass	MessageChkSumEr rCntr[AC Meas Msg], AND MessageChkSumEr rCntr[OBD Msg], AND MessageChkSumEr rCntr[Primary Status], AND MessageChkSumEr rCntr[Temperature Msg]	< 2  < 2  < 2  < 2			22 ms (message trans rate)	
		Sub-Test 2 of 5 SPI Primary Micro Message Timeout Error  DTC Fail Sets when any Primary SPI Message is not received within an expected time window	MessageTimer[AC Meas Msg], OR MessageTimer[OB D Msg], OR MessageTimer[Prim ary Status], OR MessageTimer[Tem perature Msg]	>= 65 ms  >= 65 ms  >= 65 ms  >= 65 ms	Diagnostic enable calibration	is Enabled	65 ms	



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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 5 of 5 SPI Primary Micro Driver Hardware Error  DTC Fail Sets when Primary SPI hardware driver errors received	spi_ResultStatus	Failed	Diagnostic enable calibration	is Enabled	1 ms	
		DTC Pass	spi_ResultStatus	Passed	Low Voltage DC (Secondary) micro status	is AWAKE	1 ms	
Battery Charger Control Module SPI Bus 1 (SPI Communication Fault - HV DC)	P16C5	Sub-Test 1 of 5 SPI HV DC Micro Message Checksum Error  DTC Fail Sets when any HV DC SPI checksum error count for a SPI Message is greater than or equal to the counter threshold	MessageChkSumErrCnt[HV DC Meas Msg]	>= 2	Diagnostic enable calibration	is Enabled	44 ms in a 44 ms window	One Trip, Type A



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 3 of 5 SPI HV DC Micro Node Timeout Error  DTC Fail Sets when HV DC SPI Resynch Error Counter is greater than or equal to the counter threshold	SpiResynchErrorCounter[PRI]	>= 1	Diagnostic enable calibration  SPI mode Low Voltage DC (Secondary) micro status	is Enabled  = NORMAL OR SYNCH is AWAKE	3 - 5 ms	
		DTC Pass	SpiResynchErrorCounter[PRI]	< 1			< 3 - 5 ms (depends on message received)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 4 of 5 SPI HV DC Micro Channel Rationality Error  DTC Fail Sets when HV DC Channel SPI Mode takes longer than a timer threshold to reach Normal Mode	SpiChannelRationalityTimerInst[PRI]	>= 1000 ms	Diagnostic enable calibration       Low Voltage DC (Secondary) micro status SPI mode Primary channel SPI mode HV channel	is Enabled      is AWAKE  = NORMAL  = SYNCH OR VERIFY	1000 ms	
		DTC Pass	SpiChannelRationalityTimerInst[PRI]	< 1000 ms			< 1000 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 5 of 5 SPI HV DC Micro Driver Hardware Error  DTC Fail Sets when HV DC SPI hardware driver errors received	spi_ResultStatus	Failed	Diagnostic enable calibration          Low Voltage DC (Secondary) micro status	is Enabled       is AWAKE	1 ms	
		DTC Pass	spi_ResultStatus	Passed			1 ms	
Battery Charger Hybrid/EV Battery Output Power Performance (HV Output Power Rationality)	P0D5C	DTC Fail Sets when the measured High Voltage output power exceeds the theoretical power available (calculated as charger real AC input power X charger efficiency + offset)	High Voltage Power (HV Voltage x HV Current)	> AC Power x 1.99951171875 + 30 Watts	Diagnostic enable calibration          HV Current Sensor faults	is Enabled       P0D53 or P0D54 not set	1.6 seconds in a 2 seconds window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HV Voltage Sensor faults High Voltage DC (HV) Micro Ref Voltage faults  AC Input Power Status	P0D4E or P0D4F not set P1EEB or P1EEC not set  not FAILED		
		DTC Pass	High Voltage Power (HV Voltage x HV Current)	$\leq$ AC Power x 1.99951171875 + 30 Watts			2 seconds	
Battery Charger 14 Volt Output Power Performance (LV Output Power Rationality)	P0D5B	DTC Fail Sets when the measured Low Voltage output power exceeds the theoretical power available (calculated as charger real AC input power X charger efficiency + offset)	Low Voltage Power (LV Voltage x LV Current)	$>$ AC Power x 1.99951171875 + 2.5 Watts	Diagnostic enable calibration  LV Current Sensor faults	is Enabled  P0D49 or P0D4A not set	1.6 seconds in a 2 seconds window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					LV Voltage Sensor faults Low Voltage DC (Secondary) Micro Ref Voltage faults AC Input Power Status	P0D44 or P0D45 not set P1EE9 or P1EEA not set  not FAILED		
		DTC Pass	Low Voltage Power (LV Voltage x LV Current)	$\leq$ AC Power x 1.99951171875 + 2.5 Watts			2 seconds	
Battery Charger Total Output Power Performance (Total Output Power Rationality)	P1ECE	DTC Fail Sets when the sum of the measured High Voltage output power and Low Voltage output power exceeds the theoretical power available (calculated as charger real AC input power X charger efficiency + offset)	High Voltage Power (HV Voltage x HV Current) + Low Voltage Power (LV Voltage x LV Current)	$>$ AC Power x 1.99951171875 + 30 Watts	Diagnostic enable calibration	is Enabled	1.6 seconds in a 2 seconds window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HV Current Sensor faults HV Voltage Sensor faults LV Current Sensor faults LV Voltage Sensor faults High Voltage DC (HV) Micro Ref Voltage faults  Low Voltage DC (Secondary) Micro Ref Voltage faults AC Input Power Status	P0D53 or P0D54 not set P0D4E or P0D4F not set P0D49 or P0D4A not set P0D44 or P0D45 not set P1EEB or P1EEC not set  P1EE9 or P1EEA not set not FAILED		
		DTC Pass	High Voltage Power (HV Voltage x HV Current) + Low Voltage Power (LV Voltage x LV Current)	$\leq \text{AC Power} \times 1.99951171875 + 30 \text{ Watts}$	AC Input Power Status	is Updated via SPI bus	2 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger 14 Volt Output Voltage Comparator Circuit(12Volt Alarm Rationality)	P1EED	DTC Fail Monitors for an irrational combination of states consisting of: LV Converter Over/Under voltage input = HIGH, with a non-zero LV Current output.	12V Alarm hardware detection (triggered) AND Low Voltage Current	= High  > 0.5 Amps	Diagnostic enable calibration          Low Voltage DC (Secondary) micro status LV Current Sensor faults LV ON Command from Primary   LV Hardware Shutdown (12V Alarm)	is Enabled      is AWAKE  P0D49 or P0D4A not set = ON  = Shutdown	1.6sec in a 2sec window	One Trip, Type A
		DTC Pass	12V Alarm hardware detection (triggered) AND Low Voltage Current	= High  <= 0.5 Amps			2 seconds	



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	ABS(PFC temperature current cycle - PFC temperature previous cycle)	< 2			800ms	
		Sub-Test 2 of 3 Excessively Small Rate of Change (Stuck In Range)  DTC Fail Sets when the difference of the max and min temperature value is below the threshold. max and min temperature are captured over a calibrated amount of time when the change in power requested is above a calibration threshold,	PFC temperature max - PFC temperature min	< 0.03125	Diagnostic enable calibration	is Enabled	40ms in a 40ms window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Low Voltage DC (Secondary) micro status PFC Temperature Sensor faults HV Current Sensor faults HV Voltage Sensor faults Primary MCU normal mode run time	is AWAKE  P1EDF or P1EE0 not set  P0D53 or P0D54 not set P0D4E or P0D4F not set > 1 second		
		DTC Pass	PFC temperature max - PFC temperature min	>= 0.03125			40ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 3 of 3 Zero Offset Check  DTC Fail Charger contains multiple temperature sensors. After a sufficient charger off time to allow sensor normalization, temperature sensor values are compared at start up to detect sensor reading offset errors. All sensors should report within a deadband.	Pfc_Failures==3   (Pfc_Failures==2&&(Min_failures=2&&Max_failures=2)  Min_failures<=1) the variables are calculate in following way: Temperature ABS(PFC -HV1), Pfc_Failures++,Hv1_Failures++; Temperature ABS(PFC -HV2), Pfc_Failures++,Hv2_Failures++; Temperature ABS(PFC -Case), Pfc_Failures++,Case_Failures++; Temperature ABS(HV1 -HV2), Hv1_Failures++,Hv2_Failures++; Temperature	°C  >=20  °C  >=20  °C  >=20  °C  >=20  °C	Diagnostic enable calibration	is Enabled	640ms in a 800ms window	



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HV 2kW Temperature Sensor faults Cold Plate Temperature Sensor faults Charger Off Time V Charger Off Time M Charger Off Time V Charger Off Time M The test only run as long as the module has not yet charged or precharged. After (pre)charge has been started the algorithm is allowed to run a delay time.	P1ED0 or P1ED1 not set P1ED6 or P1ED7 not set >20 minutes ==use Data ==Valid ==Valid is true is true 10 seconds		



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HV 1kW Temperature Sensor faults Primary MCU normal mode run time	P1ECB or P1ECC not set  > 1 second		
		DTC Pass	ABS(HV 1kW temperature current cycle - HV 1kW temperature previous cycle)	< 2			800ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p>Sub-Test 2 of 3 Excessively Small Rate of Change (Stuck In Range)</p> <p>DTC Fail Sets when the difference of the max and min temperature value is below the threshold. max and min temperature are captured over a calibrated amount of time when the change in power requested is above a calibration threshold,</p>	<p>HV 1kW temperature max - HV 1kW temperature min</p>	<p>&lt; 0.03125</p>	<p>Diagnostic enable calibration</p> <p>Low Voltage DC (Secondary) micro status</p>	<p>is Enabled</p> <p>is AWAKE</p>	<p>40ms in a 40ms window</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HV 1kW Temperature Sensor faults HV Current Sensor faults HV Voltage Sensor faults Primary MCU normal mode run time	P1ECB or P1ECC not set  P0D53 or P0D54 not set P0D4E or P0D4F not set P0D4E or P0D4F not set > 1 second		
		DTC Pass	HV 1kW temperature max - HV 1kW temperature min	>= 0.03125			40ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 3 of 3 Zero Offset Check  DTC Fail Charger contains multiple temperature sensors. After a sufficient charger off time to allow sensor normalization, temperature sensor values are compared at start up to detect sensor reading offset errors. All sensors should report within a deadband. Diagnostic fails	HV1_Failures==3   (HV1_Failures==2 &&(Min_failures=2& &Max_failures=2)   Min_failures<=1) the variables are calculate in following way: Temperature ABS(PFC -HV1), Pfc_Failures++,Hv1_Failures++; Temperature ABS(PFC -HV2), Pfc_Failures++,Hv2_Failures++; Temperature ABS(PFC -Case), Pfc_Failures++,Case_Failures++; Temperature ABS(HV1 -HV2), Hv1_Failures++,Hv2_Failures++; Temperature	  °C >=20  °C >=20  °C >=20  °C >=20  °C >=20  °C	Diagnostic enable calibration	is Enabled	640ms in a 800ms window	



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HV 2kW Temperature Sensor faults Cold Plate Temperature Sensor faults Charger Off Time  Charger Off Time V Charger Off Time M Charger Off Time  Charger Off Time V Charger Off Time M The test only run as long as the module has not yet charged or precharged. After (pre)charge has been started the algorithm is allowed to run a delay time.	P1ED0 or P1ED1 not set  P1ED6 or P1ED7 not set  >20 minutes  ==use Data  ==Valid  ==Valid  is true  is true  10 seconds		



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HV 2kW Temperature Sensor faults Primary MCU normal mode run time	P1ED0 or P1ED1 not set  > 1 second		
		DTC Pass	ABS(HV 2kW temperature current cycle - HV 2kW temperature previous cycle)	< 2			800ms	



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HV 2kW Temperature Sensor faults HV Current Sensor faults HV Voltage Sensor faults Primary MCU normal mode run time	P1ED0 or P1ED1 not set  P0D53 or P0D54 not set P0D4E or P0D4F not set > 1 second		
		DTC Pass	HV 2kW temperature max - HV 2kW temperature min	>= 0.03125			40ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 3 of 3 Zero Offset Check  DTC Fail Charger contains multiple temperature sensors. After a sufficient charger off time to allow sensor normalization, temperature sensor values are compared at start up to detect sensor reading offset errors. All sensors should report within a deadband. Diagnostic fails	HV1_Failures==3   (HV1_Failures==2 &&(Min_failures=2& &Max_failures=2)   Min_failures<=1) the variables are calculate in following way: Temperature ABS(PFC -HV1), Pfc_Failures++,Hv1_Failures++; Temperature ABS(PFC -HV2), Pfc_Failures++,Hv2_Failures++; Temperature ABS(PFC -Case), Pfc_Failures++,Case_Failures++; Temperature ABS(HV1 -HV2), Hv1_Failures++,Hv2_Failures++; Temperature	  °C >=20  °C >=20  °C >=20  °C >=20  °C >=20  °C	Diagnostic enable calibration	is Enabled	640ms in a 800ms window	



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HV 2kW Temperature Sensor faults Cold Plate Temperature Sensor faults Charger Off Time  Charger Off Time V Charger Off Time M Charger Off Time  Charger Off Time V Charger Off Time M The test only run as long as the module has not yet charged or precharged. After (pre)charge has been started the algorithm is allowed to run a delay time.	P1ED0 or P1ED1 not set  P1ED6 or P1ED7 not set  >20 minutes  ==use Data ==Valid ==Valid  is true is true  10 seconds		



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Cold Plate Temperature Sensor faults Primary MCU normal mode run time	P1ED6 or P1ED7 not set  > 1 second		
		DTC Pass	ABS(Cold Plate temperature current cycle - Cold Plate temperature previous cycle)	< 2			800ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		<p>Sub-Test 2 of 3 Excessively Small Rate of Change (Stuck In Range)</p> <p>DTC Fail Sets when the difference of the max and min temperature value is below the threshold. max and min temperature are captured over a calibrated amount of time when the change in power requested is above a calibration threshold,</p>	<p>Cold Plate temperature max - Cold Plate temperature min</p>	<p>&lt; 0.03125</p>	<p>Diagnostic enable calibration</p> <p>Low Voltage DC (Secondary) micro status</p>	<p>is Enabled</p> <p>is AWAKE</p>	<p>40ms in a 40ms window</p>	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Cold Plate Temperature Sensor faults HV Current Sensor faults HV Voltage Sensor faults Primary MCU normal mode run time	P1ED6 or P1ED7 not set  P0D53 or P0D54 not set P0D4E or P0D4F not set > 1 second		
		DTC Pass	Cold Plate temperature max - Cold Plate temperature min	>= 0.03125			40ms	



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			AND(HV2_Case), Hv2_Failures++++, Case_Failures++; Min_failures=MIN(PFC,HV1,HV2,Case) ; Max_failures=MAX(PFC,HV1,HV2,Case);		PFC Temperature Sensor faults HV 1kW Temperature Sensor faults HV 2kW Temperature Sensor faults Cold Plate Temperature Sensor faults Charger Off Time  Charger Off Time V Charger Off Time M Charger Off Time  Charger Off Time V Charger Off Time M	P1EDF or P1EE0 not set  P1ECB or P1ECC not set  P1ED0 or P1ED1 not set  P1ED6 or P1ED7 not set  >20 minutes  ==use Data  ==Valid  ==Valid  is true  is true		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Compliment of fail conditions		The test only run as long as the module has not yet charged or precharged. After (pre)charge has been started the algorithm is allowed to run a a delay time.  Secondary micro has to run	10 seconds  1 second		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger 14 Volt Output Voltage Sensor Circuit Range/Performance (LV Output Voltage Sensor Rationality)	P0D43	DTC Fail The Low Voltage Output Voltage Sensor is rationalized against other analog measurements of vehicle system voltage. The diagnostic fails if a deviation limit is exceeded:	Case 1: Run/Crank = High ABS(LV Voltage-RunCrank Voltage) AND ABS(LV Voltage-HVEMB Enable Voltage )  Case 2: Run/Crank = Low ABS(LV Voltage-HVEMB Enable Voltage )	>= 6 Volts  >= 6 Volts  >= 6 Volts	Diagnostic enable calibration       Low Voltage DC (Secondary) micro status Low Voltage DC (Secondary) Micro Ref Voltage faults LV Voltage Sensor faults	is Enabled       is AWAKE  P1EE9 or P1EEA not set  P0D44 or P0D45 not set	4sec in a 5sec window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Case 1: Run/Crank = High ABS(LV Voltage-RunCrank Voltage) OR ABS(LV Voltage-HVEMB Enable Voltage )  Case 2: Run/Crank = Low ABS(LV Voltage-HVEMB Enable Voltage )	< 6 Volts  < 6 Volts  < 6 Volts			5sec	

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



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass			High Voltage DC (HV) Micro Ref Voltage faults	P1EEB or P1EEC not set		
			One of followings condition is true. 1,HV Voltage - HV Voltage Command &&(ABS(HV Voltage-HV Voltage Command)   ABS(HV Current-HV Current Command)) 2,HV Voltage - HV Voltage Command &&HV Current	<=25V <=25V <=1A >25V <=2A			2sec	
			HV Current - HV Current Command	>1A	Diagnostic enable calibration  Low Voltage DC (Secondary) micro status HV Voltage - HV Command from HV DC HV DC HV ON Command	is Enabled  is AWAKE  <= 25V  =ON	1.6sec in a 2sec window	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HighlineTap mode HV DC HV ON Command HV Voltage - HV Command from HV DC  Diagnostic enable calibration  Low Voltage DC (Secondary) micro status	is Updated via SPI bus is Updated via SPI bus <= 25V  is Enabled  is AWAKE		



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			HV Current  HV Current Command		HV Voltage ref  HV Current  HV Voltage  HighlineTap mode	!= Range Low or High is Updated via SPI bus is Updated via SPI bus ==Active		
		DTC Pass		one of followings condition is true. 1,HV Voltage - HV Voltage Command<=25V&&(ABS(HV Voltage-HV Voltage Command)<=25V  ABS(HV Current-HV Current Command)<=1A) 2,HV Voltage - HV Voltage Command>25V&&HV Current<=2A	HV DC HV ON Command	==ON	2sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HighlineTap mode HV DC HV ON Command Low Voltage DC (Secondary) micro status Diagnostic enable calibration	is Updated via SPI bus is Updated via SPI bus is AWAKE  is Enabled		
		Sub-Test 2 of 2 HV 2KW Current PWM Regulation Functional  Sets when the difference of the HV Current and HV Current Command is above a threshold.	HV Current        HV Current Command	HV Current - HV Current Command > 1A	HV Voltage    HV Current HV Voltage ref HV Current	!= Range Low or High    != Range Low or High != Range Low or High is Updated via SPI bus	1.6sec in a 2sec window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HV Voltage HighlineTap mode	is Updated via SPI bus ==Active		
		DTC Pass		HV Current - HV Current Command<=1A	HV DC HV ON Command  HighlineTap mode HV DC HV ON Command HV Voltage - HV Voltage Command Low Voltage DC (Secondary) micro status Diagnostic enable calibration	==ON  is Updated via SPI bus is Updated via SPI bus <= 25V  is AWAKE  is Enabled	2sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger 14V Converter Output Power Regulation Performance (LV PWM Regulation Test-Functional Check)	P1EEF	Sub-Test 1 of 2 LV Voltage PWM Regulation Functional  Sets when one more of the following conditions is true: 1 the difference of the LV Voltage and LV_Voltage_SetPointFromCmd is below or equal the overshoot Threshold and the absolute difference of LV Voltage and the LV_Voltage_SetPointFromCmd is above voltage	LV Voltage	one of following conditions is true. 1,LV Voltage - LV_Voltage_SetPointFromCmd <=1.5V&&(ABS(LV Voltage-LV_Voltage_SetPointFromCmd )>2V&&ABS(LV Current-LV_Current_SetPointFromCmd )>3A) 2,LV Voltage - LV_Voltage_SetPointFromCmd > 1.5V && LV Current>1A	LV Voltage Sensor faults	!= Range Low or High	1.6sec in a 2sec window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Threshold and the absolute difference of LV Current and the LV_Current_SetPointFromCmd is above Current Threshold 2 the difference of the LV Voltage and LV Voltage_SetPointFromCmd Command is above the overshoot Threshold and the LV Current is above the Current diff Threshold.	LV_Voltage_SetPointFromCmd		LV Current	!= Range Low or High		
			LV Current		Low Voltage DC (Secondary) Micro Ref Voltage faults	!= Range Low or High		
			LV_Current_SetPointFromCmd		HV DC LV ON Command HV DC LV ON Command	==ON is Updated via SPI bus		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Low Voltage DC (Secondary) micro status	is AWAKE		
		DTC Pass		one of followings condition is true. 1,LV Voltage - LV_Voltage_SetPointFromCmd <=1.5V&&(ABS (LV Voltage-LV_Voltage_SetPointFromCmd )<=2V  ABS(LV Current-LV_Current_SetPointFromCmd )<=3A) 2,LV Voltage - LV_Voltage_SetPointFromCmd >1.5V&&LV Curren<=2A	Diagnostic enable calibration	is Enabled	2sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 2 of 2 LV Current PWM Regulation Functional  Sets when the difference of the LV Current and LV_Current_SetPointFromCmd is above a threshold.	LV Current	LV Current - LV_Current_SetPointFromCmd >3A	LV Voltage Sensor faults	!= Range Low or High	1.6sec in a 2sec window	
			LV_Current_SetPointFromCmd		LV Current Low Voltage DC (Secondary) Micro Ref Voltage faults HV DC LV ON Command HV DC LV ON Command LV Voltage - LV Voltage Command	!= Range Low or High != Range Low or High ==ON is Updated via SPI bus <= 1.5V		
		DTC Pass		LV Current - LV_Current_SetPointFromCmd <=3A	Low Voltage DC (Secondary) micro status	is AWAKE	2sec	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					High Voltage DC (HV) Micro Ref Voltage faults  Low Voltage DC (Secondary) Micro Ref Voltage faults AC Input Power Status	P1EEB or P1EEC not set  P1EE9 or P1EEA not set  not FAILED		
		DTC Pass	ABS(AC Power - (HV Voltage*HV Current + LV Voltage*LV Current))	< 3300 Watts			2 seconds	



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	High Voltage Output voltage  Case 1: 1.5 seconds after receiving the High Voltage Charger Active Discharge Command OR Case 2: 1.5 seconds after a 5.25 second shut down delay timer has elapsed following confirmation of OBCM Loss of Comm With VICM (DTC U185C confirmed) - total elapsed time 6.75 seconds	< 60 Volts			< 1.5 sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Reverse Polarity Protection Circuit Performance (Reverse Battery Functional)	P1EFE	DTC Fail Sets when the Low Voltage Switch Enable signal is not equal to the LV Switch Enable Check (Relay status input should reflect relay control output state).	Low Voltage Switch Enable	≠ Low Voltage Switch Enable Check	Diagnostic enable calibration	is Enabled	1.6sec in a 2sec window	Two Trips, Type B
		DTC Pass	Low Voltage Switch Enable	= Low Voltage Switch Enable Check	Low Voltage DC (Secondary) micro status	is AWAKE	2sec	
Battery Charger Control Module Long Term Memory (KAM) Error (EEPROM Integrity)	P16C3	DTC Fail Sets when the presence of predefined values at predefined locations in EEPROM cannot be confirmed	eeepromPage00DiagDataByte OR eeepromPage0ADia gDataByte	≠A5 (hex) ≠A5 (hex)	Diagnostic enable calibration	is Enabled	40 ms in a 40 ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Low Voltage DC (Secondary) micro status	is AWAKE		
		DTC Pass	eeepromPage00DiagDataByte AND eeepromPage0ADia gDataByte	= A5 (hex) = A5 (hex)			40 ms	
Battery Charger Input Current Sensor Exceeded Learning Limit (AC Current Sensor Integrity)	P1F14	DTC Fail Sets if the AC Current Sensor calibration process has not been completed or if the calibration complete status flag in EEPROM has been erased or corrupted.	AC Current Sensor Cal Complete Flag (AC_Current_Cal_Hist_Status)	= 0	Diagnostic enable calibration	is Enabled	640ms in a 800ms window	One Trip, Type A
					Low Voltage DC (Secondary) micro status	is AWAKE		
		DTC Pass	AC Current Sensor Cal Complete Flag (AC_Current_Cal_Hist_Status)	≠ 0			800 ms	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger 14 Volt Output Current Sensor Exceeded Learning Limit (LV Current Sensor Integrity)	P1F15	DTC Fail Sets if the Low Voltage Output Current Sensor calibration process has not been completed or if the calibration complete status flag in EEPROM has been erased or corrupted.	Low Voltage Current Sensor Cal Complete Flag (LV_Current_Cal_Hist_Status)	= 0	Diagnostic enable calibration  Low Voltage DC (Secondary) micro status	is Enabled  is AWAKE	640ms in a 800ms window	One Trip, Type A
		DTC Pass	Low Voltage Current Sensor Cal Complete Flag (LV_Current_Cal_Hist_Status)	≠ 0			800 ms	
Battery Charger Control Module Wake-Up Circuit Performance (ACC)	P16C6	DTC Fail Sets when the Accessory Wake Up is detected as low when expected to be high.	Accessory Wake Up High State Timer (accOnTimer)	<= 100ms	Diagnostic enable calibration	is Enabled	<= 100ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Low Voltage DC (Secondary) micro status Prop System Active Status HSGMLAN bus State HSGMLAN Comm Faults HCP_HS_LossOfComm	is AWAKE  is Active  is ACTIVE  U2609 not set  is False		
		DTC Pass	Accessory Wake Up High State Timer (accOnTimer)	> 100ms			> 100ms	



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	PBIAS Voltage (BIASRAW)  If the charger outputs (HV & LV) are off, PBIAS voltage must be: Else If the charger outputs are on (either HV or LV), PBIAS must be:	>= 10.5 Volts OR <= 13.5 Volts  >= 10.0 Volts OR <= 15.0 Volts			1 ms	
Battery Charger High Voltage Converter "B" Input Current Too High (CSEN2-Functional )	P1EFB	DTC Fail Sets if the input current to the HV DC side of the 2kW converter exceeds a threshold	HV DC HV CurrentSense2 ShutdownStatus	> 1.5 Volts	Diagnostic enable calibration  High Voltage AC (Primary) micro status HV Output High Tap Mode (2kW conv)	is Enabled  is powered (AC connected or Bulk residual power) is ON = ACTIVE	1ms in a 1ms window	One Trip, Type A
		DTC Pass	HV DC HV CurrentSense2 ShutdownStatus	<= 1.5 Volts			1 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger High Voltage Converter "A" Input Current Too High (CSEN1-Functional )	P1EFA	DTC Fail Sets if the input current to the HV DC side of the 1kW converter exceeds a threshold	HV DC HV CurrentSense1 ShutdownStatus	> 1.5 Volts	Diagnostic enable calibration  High Voltage AC (Primary) micro status HV Output	is Enabled  is powered (AC connected or Bulk residual power) is ON	1ms in a 1ms window	One Trip, Type A
		DTC Pass	HV DC HV CurrentSense1 ShutdownStatus	<= 1.5 Volts			1 ms	
Battery Charger 14 Volt Output Voltage Performance (12VALM-Functional)	P1EEE	DTC Fail Sets if the charger low voltage output (system voltage) is detected out of range	Low Voltage	< 3 Volts OR > 18 Volts	Diagnostic enable calibration  High Voltage AC (Primary) micro status	is Enabled  is powered (AC connected or Bulk residual power)	10 ms in a 10 ms window	Two Trips, Type B
		DTC Pass	Low Voltage	≥ 3 Volts OR ≤ 18 Volts			10 ms	



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					PFC Status	= ON		
		DTC Pass	Bulk Voltage (BLKRAW)  If the charger outputs (HV & LV) are off, Bulk Voltage must be: Else If the charger outputs are on (either HV or LV), Bulk Voltage must be:	>= 377 Volts OR <= 438 Volts  >= 330 Volts OR <= 454.49 Volts			1 ms	
		Sub-Test 2 of 2  DTC Fail Sets if the PFC module is off and the Bulk Voltage is less than the AC peak voltage (Bulk Voltage should be approximately equal to AC peak voltage, when the PFC module is off)	Bulk Voltage (BLKRAW)	< AC Voltage Peak Value (AcVoltPeak-measured value)	Diagnostic enable calibration	is Enabled	1ms in a 1ms window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					High Voltage AC (Primary) micro status PFC Status	is powered (AC connected or Bulk residual power) = OFF		
		DTC Pass	Bulk Voltage (BLKRAW)	>= AC Voltage Peak Value (AcVoltPeak-measured value)			1 ms	
Battery Charger Input Voltage Conditioner Temperature Too High (PFC Thermal System Fault)	P1EF5	DTC Fail Diagnostic uses a hysteresis pair. FAIL sets when the PFC Thermister reported equivalent temperature is greater than or equal to an upper temperature threshold value	PFC Temperature	>= 100C	Diagnostic enable calibration  High Voltage AC (Primary) micro status	is Enabled  is AWAKE	1ms in a 1ms window	One Trip, Type A

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					High Voltage AC (Primary) micro status	is AWAKE		
		DTC Pass Diagnostic uses a hysteresis pair. PASS sets when the 1kW Converter Thermister reported equivalent temperature is less than or equal to a lower temperature threshold value	1kW High Voltage Converter Temperature	<= 90C			1 ms	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass Diagnostic uses a hysteresis pair. PASS sets when the 2kW Converter Thermister reported equivalent temperature is less than or equal to a lower temperature threshold value	2kW High Voltage Converter Temperature	<= 90C			1 ms	
Battery Charger Converter Input Voltage Sensor "A" Circuit High (BLKS1)	P1EDA	DTC Fail Sets when the reported Bulk Voltage1 is greater than a voltage threshold	Bulk Voltage1	> 468 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Bulk Voltage1	<= 468 Volts	AC Present	is TRUE	500 ms	
Battery Charger Converter Input Voltage Sensor "A" Circuit Low (BLKS1)	P1ED9	DTC Fail Sets when the reported Bulk Voltage1 is less than a voltage threshold	Bulk Voltage1	< 25 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					AC Present	is TRUE		
		DTC Pass	Bulk Voltage1	>= 25 Volts			500 ms	
Battery Charger Converter Input Voltage Sensor "B" Circuit High (BLKS2)	P1EDD	DTC Fail Sets when the reported Bulk Voltage2 is greater than a voltage threshold	Bulk Voltage2	> 468 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Bulk Voltage2	<= 468 Volts	AC Present	is TRUE	500 ms	
Battery Charger Converter Input Voltage Sensor "B" Circuit Low (BLKS2)	P1EDC	DTC Fail Sets when the reported Bulk Voltage2 is less than a voltage threshold	Bulk Voltage2	< 25 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Bulk Voltage2	>= 25 Volts	AC Present	is TRUE	500 ms	
Battery Charger Control Module Supply Voltage Sensor Circuit High (PBIAS)	P1F02	DTC Fail Sets when the reported PBIAS Voltage is greater than a voltage threshold	PBIAS Voltage	> 16 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
					AC Present	is TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	PBIAS Voltage	<= 16 Volts			500 ms	
Battery Charger Control Module Supply Voltage Sensor Circuit Low (PBIAS)	P1F01	DTC Fail Sets when the reported PBIAS Voltage is less than a voltage threshold	PBIAS Voltage	< 6 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	PBIAS Voltage	>= 6 Volts	AC Present	is TRUE	500 ms	
Battery Charger Input Current Sensor Circuit High (IACS)	P0D3B	DTC Fail Sets when the reported AC Current is greater than a current threshold	AC Current	> 24.78 Amps	Diagnostic enable calibration	is Enabled	160 ms in a 200 ms window	One Trip, Type A
		DTC Pass	AC Current	<= 24.78 Amps	AC Present	is TRUE	200 ms	
Battery Charger Input Current Sensor Circuit Low (IACS)	P0D3A	DTC Fail Sets when the reported AC Current is less than a current threshold	AC Current	< 0.8 Amps	Diagnostic enable calibration	is Enabled	160 ms in a 200 ms window	One Trip, Type A
		DTC Pass	AC Current	>= 0.8 Amps	AC Present	is TRUE	200 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger High Voltage Converter "A" Temperature Sensor Circuit High (THMOD)	P1ECC	DTC Fail Sets when the 1kW HV Converter Temperature sensor voltage (THMOD) is greater than a voltage threshold	1kW HV Converter Temperature Sensor Voltage (THMOD)	> 3.28 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	1kW HV Converter Temperature Sensor Voltage (THMOD)	<= 3.28 Volts	AC Present	is TRUE	500 ms	
Battery Charger High Voltage Converter "A" Temperature Sensor Circuit Low (THMOD)	P1ECB	DTC Fail Sets when the 1kW HV Converter Temperature sensor voltage (THMOD) is less than a voltage threshold	1kW HV Converter Temperature Sensor Voltage (THMOD)	< 0.03 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	1kW HV Converter Temperature Sensor Voltage (THMOD)	>= 0.03 Volts	AC Present	is TRUE	500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Input Voltage Conditioner Temperature Sensor Circuit High (THPFC)	P1EE0	DTC Fail Sets when the PFC Temperature sensor voltage is greater than a voltage threshold	PFC Temperature Sensor Voltage	> 3.28 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	PFC Temperature Sensor Voltage	<= 3.28 Volts	AC Present	is TRUE	500 ms	
Battery Charger Input Voltage Conditioner Temperature Sensor Circuit Low (THPFC)	P1EDF	DTC Fail Sets when the PFC Temperature sensor voltage is less than a voltage threshold	PFC Temperature Sensor Voltage	< 0.03 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	PFC Temperature Sensor Voltage	>= 0.03 Volts	AC Present	is TRUE	500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Control Module Reference Voltage "A" Circuit High (HV DC Ref Voltage)	P1EE8	DTC Fail Sets when the High Voltage AC (HV DC) Micro reference voltage is greater than a voltage threshold	High Voltage AC (HV DC) Micro Reference Voltage	> 1.25 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	High Voltage AC (HV DC) Micro Reference Voltage	<= 1.25 Volts	AC Present	is TRUE	500 ms	
Battery Charger Control Module Reference Voltage "A" Circuit Low (HV DC Ref Voltage)	P1EE7	DTC Fail Sets when the High Voltage AC (HV DC) Micro reference voltage is less than a voltage threshold	High Voltage AC (HV DC) Micro Reference Voltage	< 1.00 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	High Voltage AC (HV DC) Micro Reference Voltage	>= 1.00 Volts	AC Present	is TRUE	500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Input Voltage Sensor Circuit High (VACS)	P0D40	DTC Fail Sets when the reported AC Voltage is greater than a voltage threshold	AC Peak Voltage	> 422 Volts	Diagnostic enable calibration	is Enabled	160 ms in a 200 ms window	One Trip, Type A
		DTC Pass	AC Peak Voltage	<= 422 Volts	AC Present	is TRUE	200 ms	
Battery Charger Input Voltage Sensor Circuit Low (VACS)	P0D3F	DTC Fail Sets when the reported AC Voltage is less than a voltage threshold	AC Peak Voltage	< 90 Volts	Diagnostic enable calibration	is Enabled	1500 ms in a 1875 ms window	One Trip, Type A
		DTC Pass	AC Peak Voltage	>= 90 Volts	AC Present	is TRUE	1875 ms	
Battery Charger High Voltage Converter "B" Temperature Sensor Circuit High (THMOD2)	P1ED1	DTC Fail Sets when the 2kW HV Converter Temperature sensor voltage (THMOD2) is greater than a voltage threshold	2kW HV Converter Temperature Sensor Voltage (THMOD2)	> 3.28 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
					AC Present	is TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	2kW HV Converter Temperature Sensor Voltage (THMOD2)	<= 3.28 Volts			500 ms	
Battery Charger High Voltage Converter "B" Temperature Sensor Circuit Low (THMOD2)	P1ED0	DTC Fail Sets when the 2kW HV Converter Temperature sensor voltage (THMOD2) is less than a voltage threshold	2kW HV Converter Temperature Sensor Voltage (THMOD2)	< 0.03 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	2kW HV Converter Temperature Sensor Voltage (THMOD2)	>= 0.03 Volts	AC Present	is TRUE	500 ms	
Battery Charger High Voltage Converter "A" Input Current Sensor Circuit High (CSEN1)	P1EE3	DTC Fail CSEN1 Input is greater than a voltage threshold, (the micro performs this test internally)	CSEN1 Input Voltage	> 1.5 Volts	Diagnostic enable calibration	is Enabled	950 ms in a 1000 ms window	One Trip, Type A
					AC Present HV Output	is TRUE is OFF		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	CSEN1 Input Voltage	<= 1.5 Volts			1000 ms	
Battery Charger High Voltage Converter "A" Input Current Sensor Circuit Low (CSEN1)	P1EE2	DTC Fail CSEN1 Input is less than or equal to a voltage threshold (the micro preforms this test internally)	CSEN1 Input Voltage	<= 0.016 Volts	Diagnostic enable calibration	is Enabled	950 ms in a 1000 ms window	One Trip, Type A
		DTC Pass	CSEN1 Input Voltage	> 0.016 Volts	AC Present HV Output	is TRUE is ON	1000 ms	
Battery Charger High Voltage Converter "B" Input Current Sensor Circuit High (CSEN2)	P1EE5	DTC Fail CSEN2 Input is greater than a voltage threshold, (the micro performs this test internally)	CSEN2 Input Voltage	> 1.5 Volts	Diagnostic enable calibration	is Enabled	950 ms in a 1000 ms window	One Trip, Type A
		DTC Pass	CSEN2 Input Voltage	<= 1.5 Volts	AC Present HV Output	is TRUE is OFF	1000 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger High Voltage Converter "B" Input Current Sensor Circuit Low (CSEN2)	P1EE4	DTC Fail CSEN2 Input is less than or equal to a voltage threshold (the micro performs this test internally)	CSEN2 Input Voltage	<= 0.016 Volts	Diagnostic enable calibration	is Enabled	950 ms in a 1000 ms window	One Trip, Type A
		DTC Pass	CSEN2 Input Voltage	> 0.016 Volts	AC Present HV Output	is TRUE is ON	1000 ms	



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	ABS(AC Peak Voltage - Bulk1 Voltage) AND ABS(AC Peak Voltage - Bulk2 Voltage)	<= 34 Volts  <= 34 Volts			640ms	
Battery Charger Input Current Sensor Circuit Range/Performance (AC Input Current Sensor-Rationality)	P0D39	DTC Fail Sets when the AC Current zero offset value is greater than or equal to a current threshold.	AC Current	>= 5.4 Amps	Diagnostic enable calibration  AC Present AC Voltage Sensor faults PFC Discharged delay	is Enabled  is TRUE P0D3F or P0D40 not set is TRUE (delay expired)	512ms in a 640ms window	One Trip, Type A
							DTC Pass	





Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					PFC Discharged delay  Bulk1 Voltage Sensor faults Bulk2 Voltage Sensor faults AC Voltage Sensor faults	is TRUE (delay expired)  P1ED9 or P1EDA not set P1EDC or P1EDD not set P0D3F or P0D40 not set		
		DTC Pass	ABS(Bulk2 Voltage AC Peak Voltage) AND ABS(Bulk2 Voltage Bulk1 Voltage)	<= 34 Volts  <= 10 Volts			640ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Input Voltage Conditioner Enable Circuit Performance (PFC Enable-Functional Check)	P1F04	Sub-Test 1 of 2 PFC On Functionality  DTC Fail Sets when the Bulk Voltage is less than or equal to a voltage threshold, when the PFC is commanded on - a low Bulk Voltage condition indicates the PFC is not operating.	Bulk Voltage	<= 350 Volts	Diagnostic enable calibration	is Enabled	2112ms in a 2640ms window	One Trip, Type A
					AC Present HV Output LV Output Bulk1 Voltage Sensor faults	is TRUE is ON, or is ON P1ED9 or P1EDA not set		
		DTC Pass	Bulk Voltage	> 350 Volts			2640ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 2 of 2 PFC Off Functionality  DTC Fail Sets when the Bulk Voltage is either i) greater than or equal to a voltage threshold or ii) not decreasing, when the PFC is commanded off - a high Bulk Voltage condition indicates the PFC is operating.	Bulk Voltage OR Bulk Voltage 3 sec after PFC turn off	>= 290 Volts  Bulk Voltage ≥ Bulk Voltage (at PFC turn off) - 1V	Diagnostic enable calibration          AC Present Bulk1 Voltage Sensor faults AC RMS Voltage	is Enabled          is TRUE P1ED9 or P1EDA not set < 200 Volts	768ms in a 960ms window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Bulk Voltage	< 290 Volts OR Bulk Voltage < Bulk Voltage (at PFC turn off) - 1V			960ms	
Battery Charger Input Power Up Protection Circuit Performance (AC Inrush RelayFunctionality)	P1EFF	DTC Fail Sets when the AC Relay Check input and the AC relay output are equal.(The AC Relay Check input should be opposite polarity of the AC Relay Output)	AC Relay Output	= AC Relay Check input	Diagnostic enable calibration	is Enabled	2400ms in a 3000ms window	Two Trips, Type B
		DTC Pass	AC Relay Output	≠ AC Relay Check input	AC Present	is TRUE	3000ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger High Voltage Converter "A" Output Power Regulation Performance( HV 1kW PWM Regulation Test-Functional Check)	P1EF0	Sub-Test 1 of 2 HV 1kW Voltage PWM Regulation Check  DTC Fail Sets when one more of the following conditions is true: 1 the difference of the HV Voltage and HV Voltage Command is below or equal to the overshoot Threshold and the absolute difference of HV Voltage and the Voltage command is above voltage Threshold and the absolute	One of following two conditions are true: 1.HV Voltage - HV Voltage Command AND (ABS(HV Voltage-HV Voltage Command) AND ABS(HV Current-HV Current Command)) OR 2.HV Voltage - HV Voltage Command AND HV Current	<=25V  >25V  >1A  >25V >2A	Diagnostic enable calibration	is Enabled	1.6sec in a 2sec window	One Trip, Type A



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	One of followings condition is true. 1,HV Voltage - HV Voltage Command &&(ABS(HV Voltage-HV Voltage Command)   ABS(HV Current-HV Current Command)) 2,HV Voltage - HV Voltage Command &&HV Current	<=25V <=25V <=1A >25V <=2A			2sec	
		Sub-Test 2 of 2 HV 1kW Current PWM Regulation Check  DTC Fail Sets when the difference of the HV Current and HV Current Command is above a threshold.	HV Current - HV Current Command	>1A	Diagnostic enable calibration	is Enabled	1.6sec in a 2sec window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Low Voltage DC (Secondary) micro status HV Voltage - HV Command from HV DC HV DC HV ON Command HighlineTap mode HV Voltage Sensor faults HV Current Sensor faults High Voltage DC (HV) Micro Ref Voltage faults	is AWAKE  ≤ 25V  =ON  =Inactive  P0D4E or P0D4F not set P0D53 or P0D54 not set P1EEB or P1EEC not set		
		DTC Pass	HV Current - HV Current Command	≤1A			2sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger High Voltage Converter "B" Output Power Regulation Performance (HV 2kW PWM Regulation Test-Functional Check)	P1EF1	Sub-Test 1 of 2 HV 2kW Voltage PWM Regulation Check  DTC Fail Sets when one more of the following conditions is true: 1 the difference of the HV Voltage and HV Voltage Command is below or equal to the overshoot Threshold and the absolute difference of HV Voltage and the Voltage command is above voltage Threshold and the absolute	One of following two conditions are true: 1.HV Voltage - HV Voltage Command AND (ABS(HV Voltage-HV Voltage Command) AND ABS(HV Current-HV Current Command)) OR 2.HV Voltage - HV Voltage Command AND HV Current	<=25V  >25V  >1A  >25V >2A	Diagnostic enable calibration	is Enabled	1.6sec in a 2sec window	One Trip, Type A



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	One of followings condition is true. 1,HV Voltage - HV Voltage Command &&(ABS(HV Voltage-HV Voltage Command)   ABS(HV Current-HV Current Command)) 2,HV Voltage - HV Voltage Command &&HV Current	<=25V <=25V <=1A >25V <=2A			2sec	
		Sub-Test 2 of 2 HV 2kW Current PWM Regulation Check  DTC Fail Sets when the difference of the HV Current and HV Current Command is above a threshold.	HV Current - HV Current Command	>1A	Diagnostic enable calibration	is Enabled	1.6sec in a 2sec window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Low Voltage DC (Secondary) micro status HV Voltage - HV Command from HV DC HV DC HV ON Command HighlineTap mode HV Voltage Sensor faults HV Current Sensor faults High Voltage DC (HV) Micro Ref Voltage faults	is AWAKE  ≤ 25V  =ON  =Active  P0D4E or P0D4F not set P0D53 or P0D54 not set P1EEB or P1EEC not set		
		DTC Pass	HV Current - HV Current Command	≤1A			2sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger 14V Converter Output Power Regulation Performance (LV PWM Regulation Test-Functional Check)	P1EEF	Sub-Test 1 of 2 LV Voltage PWM Regulation Functional  DTC Fail Sets when one or more of the following conditions is true: 1 the difference of the LV Voltage and LV_Voltage_SetPointFromCmd is below or equal the overshoot Threshold and the absolute difference of LV Voltage and the LV_Voltage_SetPointFromCmd is above voltage Threshold and the absolute	one of following conditions is true. 1,LV Voltage - LV_Voltage_SetPointFromCmd &&(ABS(LV Voltage- LV_Voltage_SetPointFromCmd &&ABS(LV Current-LV_Current_SetPointFromCmd)) 2,LV Voltage - LV_Voltage_SetPointFromCmd && LV Current	<=1.5V  >2V  >3A  > 1.5V >1A	Diagnostic enable calibration	is Enabled	1.6sec in a 2sec window	One Trip, Type A



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	one of followings condition is true. 1,LV Voltage - LV_Voltage_SetPointFromCmd &&(ABS(LV Voltage-LV_Voltage_SetPointFromCmd)   ABS(LV Current-LV_Current_SetPointFromCmd)) 2,LV Voltage - LV_Voltage_SetPointFromCmd &&LV Current	<=1.5V  <=2V  <=3A  >1.5V <=2A			2sec	
		Sub-Test 2 of 2 LV Current PWM Regulation Functional  DTC Fail Sets when the difference of the LV Current and LV_Current_SetPointFromCmd is above a threshold.	LV Current - LV_Current_SetPointFromCmd	>3A	Diagnostic enable calibration	is Enabled	1.6sec in a 2sec window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Low Voltage DC (Secondary) micro status HV DC LV ON Command  LV Voltage Sensor faults LV Current Sensor faults Low Voltage DC (Secondary) Micro Ref Voltage faults LV Voltage - LV Voltage Command	is AWAKE  =ON  P0D44 or P0D45 not set P0D49 or P0D4A not set P1EE9 or P1EEA not set  <= 1.5V		
		DTC Pass	LV Current - LV_Current_SetPointFromCmd	<=3A			2sec	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Low Voltage DC (Secondary) Micro Ref Voltage faults AC Input Power Status	P1EE9 or P1EEA not set  not FAILED		
		DTC Pass	ABS(AC Power - (HV Voltage*HV Current + LV Voltage*LV Current))	< 3300 Watts			2 seconds	



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	High Voltage Output voltage  Case 1: 1.5 seconds after receiving the High Voltage Charger Active Discharge Command OR Case 2: 1.5 seconds after a 5.25 second shut down delay timer has elapsed following confirmation of OBCM Loss of Comm With VICM (DTC U185C confirmed) - total elapsed time 6.75 seconds	< 60 Volts			< 1.5 sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Reverse Polarity Protection Circuit Performance (Reverse Battery Functional)	P1EFE	DTC Fail Sets when the Low Voltage Switch Enable signal is not equal to the LV Switch Enable Check (Relay status input should reflect relay control output state).	Low Voltage Switch Enable	≠ Low Voltage Switch Enable Check	Diagnostic enable calibration	is Enabled	1.6sec in a 2sec window	Two Trips, Type B
		DTC Pass	Low Voltage Switch Enable	= Low Voltage Switch Enable Check	Low Voltage DC (Secondary) micro status	is AWAKE	2sec	
Battery Charger Control Module Long Term Memory (KAM) Error (EEPROM Integrity)	P16C3	DTC Fail Sets when the presence of predefined values at predefined locations in EEPROM cannot be confirmed	eeepromPage00DiagDataByte OR eeepromPage0ADia gDataByte	≠A5 (hex) ≠A5 (hex)	Diagnostic enable calibration	is Enabled	40 ms in a 40 ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Low Voltage DC (Secondary) micro status	is AWAKE		
		DTC Pass	EEPROM Page 00 Diagnostic Data Byte AND EEPROM Page 0A Diagnostic Data Byte	= A5 (hex) = A5 (hex)			40 ms	
Battery Charger Input Current Sensor Exceeded Learning Limit (AC Current Sensor Integrity)	P1F14	DTC Fail Sets if the AC Current Sensor calibration process has not been completed or if the calibration complete status flag in EEPROM has been erased or corrupted.	AC Current Sensor Cal Complete Flag (AC_Current_Cal_Hist_Status)	= 0	Diagnostic enable calibration	is Enabled	640ms in a 800ms window	One Trip, Type A
					Low Voltage DC (Secondary) micro status	is AWAKE		
		DTC Pass	AC Current Sensor Cal Complete Flag (AC_Current_Cal_Hist_Status)	≠ 0			800 ms	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger 14 Volt Output Current Sensor Exceeded Learning Limit (LV Current Sensor Integrity)	P1F15	DTC Fail Sets if the Low Voltage Output Current Sensor calibration process has not been completed or if the calibration complete status flag in EEPROM has been erased or corrupted.	Low Voltage Current Sensor Cal Complete Flag (LV_Current_Cal_Hist_Status)	= 0	Diagnostic enable calibration  Low Voltage DC (Secondary) micro status	is Enabled  is AWAKE	640ms in a 800ms window	One Trip, Type A
		DTC Pass	Low Voltage Current Sensor Cal Complete Flag (LV_Current_Cal_Hist_Status)	≠ 0			800 ms	
Battery Charger Control Module Wake-Up Circuit Performance (ACC)	P16C6	DTC Fail Sets when the Accessory Wake Up is detected as low when expected to be high.	Accessory Wake Up High State Timer (accOnTimer)	<= 100ms	Diagnostic enable calibration	is Enabled	<= 100ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Low Voltage DC (Secondary) micro status Prop System Active Status HSGMLAN bus State HSGMLAN Comm Faults HCP_HS_LossOfComm	is AWAKE  is Active  is ACTIVE  U2609 not set  is False		
		DTC Pass	Accessory Wake Up High State Timer (accOnTimer)	> 100ms			> 100ms	



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	PBIAS Voltage (BIASRAW)  If the charger outputs (HV & LV) are off, PBIAS voltage must be: Else If the charger outputs are on (either HV or LV), PBIAS must be:	>= 10.5 Volts OR <= 13.5 Volts  >= 10.0 Volts OR <= 15.0 Volts			1 ms	
Battery Charger High Voltage Converter "B" Input Current Too High (CSEN2-Functional )	P1EFB	DTC Fail Sets if the input current to the HV DC side of the 2kW converter exceeds a threshold	HV DC HV CurrentSense2 ShutdownStatus	> 1.5 Volts	Diagnostic enable calibration  High Voltage AC (Primary) micro status HV Output High Tap Mode (2kW conv)	is Enabled  is powered (AC connected or Bulk residual power) is ON = ACTIVE	1ms in a 1ms window	One Trip, Type A
		DTC Pass	HV DC HV CurrentSense2 ShutdownStatus	<= 1.5 Volts			1 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger High Voltage Converter "A" Input Current Too High (CSEN1-Functional )	P1EFA	DTC Fail Sets if the input current to the HV DC side of the 1kW converter exceeds a threshold	HV DC HV CurrentSense1 ShutdownStatus	> 1.5 Volts	Diagnostic enable calibration  High Voltage AC (Primary) micro status HV Output	is Enabled  is powered (AC connected or Bulk residual power) is ON	1ms in a 1ms window	One Trip, Type A
		DTC Pass	HV DC HV CurrentSense1 ShutdownStatus	<= 1.5 Volts			1 ms	
Battery Charger 14 Volt Output Voltage Performance (12VALM-Functional)	P1EEE	DTC Fail Sets if the charger low voltage output (system voltage) is detected out of range	Low Voltage	< 3 Volts OR > 18 Volts	Diagnostic enable calibration  High Voltage AC (Primary) micro status	is Enabled  is powered (AC connected or Bulk residual power)	10 ms in a 10 ms window	Two Trips, Type B
		DTC Pass	Low Voltage	≥ 3 Volts OR ≤ 18 Volts			10 ms	



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					PFC Status	= ON		
		DTC Pass	Bulk Voltage (BLKRAW)  If the charger outputs (HV & LV) are off, Bulk Voltage must be: Else If the charger outputs are on (either HV or LV), Bulk Voltage must be:	>= 377 Volts OR <= 438 Volts  >= 330 Volts OR <= 454.49 Volts			1 ms	
		Sub-Test 2 of 2  DTC Fail Sets if the PFC module is off and the Bulk Voltage is less than the AC peak voltage (Bulk Voltage should be approximately equal to AC peak voltage, when the PFC module is off)	Bulk Voltage (BLKRAW)	< AC Voltage Peak Value (AcVoltPeak-measured value)	Diagnostic enable calibration	is Enabled	1ms in a 1ms window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					High Voltage AC (Primary) micro status PFC Status	is powered (AC connected or Bulk residual power) = OFF		
		DTC Pass	Bulk Voltage (BLKRAW)	>= AC Voltage Peak Value (AcVoltPeak-measured value)			1 ms	
Battery Charger Input Voltage Conditioner Temperature Too High (PFC Thermal System Fault)	P1EF5	DTC Fail Diagnostic uses a hysteresis pair. FAIL sets when the PFC Thermister reported equivalent temperature is greater than or equal to an upper temperature threshold value	PFC Temperature	>= 100C	Diagnostic enable calibration  High Voltage AC (Primary) micro status	is Enabled  is AWAKE	1ms in a 1ms window	One Trip, Type A

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					High Voltage AC (Primary) micro status	is AWAKE		
		DTC Pass Diagnostic uses a hysteresis pair. PASS sets when the 1kW Converter Thermister reported equivalent temperature is less than or equal to a lower temperature threshold value	1kW High Voltage Converter Temperature	<= 90C			1 ms	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass Diagnostic uses a hysteresis pair. PASS sets when the 2kW Converter Thermister reported equivalent temperature is less than or equal to a lower temperature threshold value	2kW High Voltage Converter Temperature	<= 90C			1 ms	
Battery Charger Converter Input Voltage Sensor "A" Circuit High (BLKS1)	P1EDA	DTC Fail Sets when the reported Bulk Voltage1 is greater than a voltage threshold	Bulk Voltage1	> 468 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Bulk Voltage1	<= 468 Volts	AC Present	is TRUE	500 ms	
Battery Charger Converter Input Voltage Sensor "A" Circuit Low (BLKS1)	P1ED9	DTC Fail Sets when the reported Bulk Voltage1 is less than a voltage threshold	Bulk Voltage1	< 25 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					AC Present	is TRUE		
		DTC Pass	Bulk Voltage1	>= 25 Volts			500 ms	
Battery Charger Converter Input Voltage Sensor "B" Circuit High (BLKS2)	P1EDD	DTC Fail Sets when the reported Bulk Voltage2 is greater than a voltage threshold	Bulk Voltage2	> 468 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Bulk Voltage2	<= 468 Volts	AC Present	is TRUE	500 ms	
Battery Charger Converter Input Voltage Sensor "B" Circuit Low (BLKS2)	P1EDC	DTC Fail Sets when the reported Bulk Voltage2 is less than a voltage threshold	Bulk Voltage2	< 25 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Bulk Voltage2	>= 25 Volts	AC Present	is TRUE	500 ms	
Battery Charger Control Module Supply Voltage Sensor Circuit High (PBIAS)	P1F02	DTC Fail Sets when the reported PBIAS Voltage is greater than a voltage threshold	PBIAS Voltage	> 16 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
					AC Present	is TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	PBIAS Voltage	<= 16 Volts			500 ms	
Battery Charger Control Module Supply Voltage Sensor Circuit Low (PBIAS)	P1F01	DTC Fail Sets when the reported PBIAS Voltage is less than a voltage threshold	PBIAS Voltage	< 6 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	PBIAS Voltage	>= 6 Volts	AC Present	is TRUE	500 ms	
Battery Charger Input Current Sensor Circuit High (IACS)	P0D3B	DTC Fail Sets when the reported AC Current is greater than a current threshold	AC Current	> 24.78 Amps	Diagnostic enable calibration	is Enabled	160 ms in a 200 ms window	One Trip, Type A
		DTC Pass	AC Current	<= 24.78 Amps	AC Present	is TRUE	200 ms	
Battery Charger Input Current Sensor Circuit Low (IACS)	P0D3A	DTC Fail Sets when the reported AC Current is less than a current threshold	AC Current	< 0.8 Amps	Diagnostic enable calibration	is Enabled	160 ms in a 200 ms window	One Trip, Type A
		DTC Pass	AC Current	>= 0.8 Amps	AC Present	is TRUE	200 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger High Voltage Converter "A" Temperature Sensor Circuit High (THMOD)	P1ECC	DTC Fail Sets when the 1kW HV Converter Temperature sensor voltage (THMOD) is greater than a voltage threshold	1kW HV Converter Temperature Sensor Voltage (THMOD)	> 3.28 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	1kW HV Converter Temperature Sensor Voltage (THMOD)	<= 3.28 Volts	AC Present	is TRUE	500 ms	
Battery Charger High Voltage Converter "A" Temperature Sensor Circuit Low (THMOD)	P1ECB	DTC Fail Sets when the 1kW HV Converter Temperature sensor voltage (THMOD) is less than a voltage threshold	1kW HV Converter Temperature Sensor Voltage (THMOD)	< 0.03 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	1kW HV Converter Temperature Sensor Voltage (THMOD)	>= 0.03 Volts	AC Present	is TRUE	500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Input Voltage Conditioner Temperature Sensor Circuit High (THPFC)	P1EE0	DTC Fail Sets when the PFC Temperature sensor voltage is greater than a voltage threshold	PFC Temperature Sensor Voltage	> 3.28 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	PFC Temperature Sensor Voltage	<= 3.28 Volts	AC Present	is TRUE	500 ms	
Battery Charger Input Voltage Conditioner Temperature Sensor Circuit Low (THPFC)	P1EDF	DTC Fail Sets when the PFC Temperature sensor voltage is less than a voltage threshold	PFC Temperature Sensor Voltage	< 0.03 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	PFC Temperature Sensor Voltage	>= 0.03 Volts	AC Present	is TRUE	500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Control Module Reference Voltage "A" Circuit High (HV DC Ref Voltage)	P1EE8	DTC Fail Sets when the High Voltage AC (HV DC) Micro reference voltage is greater than a voltage threshold	High Voltage AC (HV DC) Micro Reference Voltage	> 1.25 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	High Voltage AC (HV DC) Micro Reference Voltage	<= 1.25 Volts	AC Present	is TRUE	500 ms	
Battery Charger Control Module Reference Voltage "A" Circuit Low (HV DC Ref Voltage)	P1EE7	DTC Fail Sets when the High Voltage AC (HV DC) Micro reference voltage is less than a voltage threshold	High Voltage AC (HV DC) Micro Reference Voltage	< 1.00 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	High Voltage AC (HV DC) Micro Reference Voltage	>= 1.00 Volts	AC Present	is TRUE	500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Input Voltage Sensor Circuit High (VACS)	P0D40	DTC Fail Sets when the reported AC Voltage is greater than a voltage threshold	AC Peak Voltage	> 422 Volts	Diagnostic enable calibration	is Enabled	160 ms in a 200 ms window	One Trip, Type A
		DTC Pass	AC Peak Voltage	<= 422 Volts	AC Present	is TRUE	200 ms	
Battery Charger Input Voltage Sensor Circuit Low (VACS)	P0D3F	DTC Fail Sets when the reported AC Voltage is less than a voltage threshold	AC Peak Voltage	< 90 Volts	Diagnostic enable calibration	is Enabled	1500 ms in a 1875 ms window	One Trip, Type A
		DTC Pass	AC Peak Voltage	>= 90 Volts	AC Present	is TRUE	1875 ms	
Battery Charger High Voltage Converter "B" Temperature Sensor Circuit High (THMOD2)	P1ED1	DTC Fail Sets when the 2kW HV Converter Temperature sensor voltage (THMOD2) is greater than a voltage threshold	2kW HV Converter Temperature Sensor Voltage (THMOD2)	> 3.28 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
					AC Present	is TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	2kW HV Converter Temperature Sensor Voltage (THMOD2)	<= 3.28 Volts			500 ms	
Battery Charger High Voltage Converter "B" Temperature Sensor Circuit Low (THMOD2)	P1ED0	DTC Fail Sets when the 2kW HV Converter Temperature sensor voltage (THMOD2) is less than a voltage threshold	2kW HV Converter Temperature Sensor Voltage (THMOD2)	< 0.03 Volts	Diagnostic enable calibration	is Enabled	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	2kW HV Converter Temperature Sensor Voltage (THMOD2)	>= 0.03 Volts	AC Present	is TRUE	500 ms	
Battery Charger High Voltage Converter "A" Input Current Sensor Circuit High (CSEN1)	P1EE3	DTC Fail CSEN1 Input is greater than a voltage threshold, (the micro performs this test internally)	CSEN1 Input Voltage	> 1.5 Volts	Diagnostic enable calibration	is Enabled	950 ms in a 1000 ms window	One Trip, Type A
					AC Present HV Output	is TRUE is OFF		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	CSEN1 Input Voltage	<= 1.5 Volts			1000 ms	
Battery Charger High Voltage Converter "A" Input Current Sensor Circuit Low (CSEN1)	P1EE2	DTC Fail CSEN1 Input is less than or equal to a voltage threshold (the micro preforms this test internally)	CSEN1 Input Voltage	<= 0.016 Volts	Diagnostic enable calibration	is Enabled	950 ms in a 1000 ms window	One Trip, Type A
		DTC Pass	CSEN1 Input Voltage	> 0.016 Volts	AC Present HV Output	is TRUE is ON	1000 ms	
Battery Charger High Voltage Converter "B" Input Current Sensor Circuit High (CSEN2)	P1EE5	DTC Fail CSEN2 Input is greater than a voltage threshold, (the micro performs this test internally)	CSEN2 Input Voltage	> 1.5 Volts	Diagnostic enable calibration	is Enabled	950 ms in a 1000 ms window	One Trip, Type A
		DTC Pass	CSEN2 Input Voltage	<= 1.5 Volts	AC Present HV Output	is TRUE is OFF	1000 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger High Voltage Converter "B" Input Current Sensor Circuit Low (CSEN2)	P1EE4	DTC Fail CSEN2 Input is less than or equal to a voltage threshold (the micro performs this test internally)	CSEN2 Input Voltage	<= 0.016 Volts	Diagnostic enable calibration	is Enabled	950 ms in a 1000 ms window	One Trip, Type A
		DTC Pass	CSEN2 Input Voltage	> 0.016 Volts	AC Present HV Output	is TRUE is ON	1000 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Input Voltage Sensor Circuit Range/Performance (AC Input Voltage Sensor-Rationality)	P0D3E	DTC Fail AC Peak Voltage is compared to two equivalent voltage measurements (Bulk1 and Bulk2). Fail is set if the deviation between AC Peak Voltage and each of the two equivalent measurements is greater than voltage deviation thresholds.	ABS(AC Peak Voltage - Bulk1 Voltage) AND ABS(AC Peak Voltage - Bulk2 Voltage)	> 34 Volts  > 34 Volts	Diagnostic enable calibration            AC Present PFC Discharged delay  Bulk1 Voltage Sensor faults Bulk2 Voltage Sensor faults AC Voltage Sensor faults	is Enabled            is TRUE is TRUE (delay expired)  P1ED9 or P1EDA not set P1EDC or P1EDD not set P0D3F or P0D40 not set	512ms in a 640ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	ABS(AC Peak Voltage - Bulk1 Voltage) AND ABS(AC Peak Voltage - Bulk2 Voltage)	<= 34 Volts  <= 34 Volts			640ms	
Battery Charger Input Current Sensor Circuit Range/Performance (AC Input Current Sensor-Rationality)	P0D39	DTC Fail Sets when the AC Current zero offset value is greater than or equal to a current threshold.	AC Current	>= 5.4 Amps	Diagnostic enable calibration  AC Present AC Voltage Sensor faults PFC Discharged delay	is Enabled  is TRUE P0D3F or P0D40 not set is TRUE (delay expired)	512ms in a 640ms window	One Trip, Type A
		DTC Pass	AC Current	< 5.4 Amps			640ms	





Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					PFC Discharged delay  Bulk1 Voltage Sensor faults Bulk2 Voltage Sensor faults AC Voltage Sensor faults	is TRUE (delay expired)  P1ED9 or P1EDA not set P1EDC or P1EDD not set P0D3F or P0D40 not set		
		DTC Pass	ABS(Bulk2 Voltage AC Peak Voltage) AND ABS(Bulk2 Voltage Bulk1 Voltage)	<= 34 Volts  <= 10 Volts			640ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Input Voltage Conditioner Enable Circuit Performance (PFC Enable-Functional Check)	P1F04	Sub-Test 1 of 2 PFC On Functionality  DTC Fail Sets when the Bulk Voltage is less than or equal to a voltage threshold, when the PFC is commanded on - a low Bulk Voltage condition indicates the PFC is not operating.	Bulk Voltage	<= 350 Volts	Diagnostic enable calibration	is Enabled	2112ms in a 2640ms window	One Trip, Type A
					AC Present HV Output LV Output Bulk1 Voltage Sensor faults	is TRUE is ON, or is ON P1ED9 or P1EDA not set		
		DTC Pass	Bulk Voltage	> 350 Volts			2640ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 2 of 2 PFC Off Functionality  DTC Fail Sets when the Bulk Voltage is either i) greater than or equal to a voltage threshold or ii) not decreasing, when the PFC is commanded off - a high Bulk Voltage condition indicates the PFC is operating.	Bulk Voltage OR Bulk Voltage 3 sec after PFC turn off	>= 290 Volts  Bulk Voltage ≥ Bulk Voltage (at PFC turn off) - 1V	Diagnostic enable calibration       AC Present Bulk1 Voltage Sensor faults AC RMS Voltage	is Enabled       is TRUE P1ED9 or P1EDA not set < 200 Volts	768ms in a 960ms window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Bulk Voltage	< 290 Volts OR Bulk Voltage < Bulk Voltage (at PFC turn off) - 1V			960ms	
Battery Charger Input Power Up Protection Circuit Performance (AC Inrush RelayFunctionality)	P1EFF	DTC Fail Sets when the AC Relay Check input and the AC relay output are equal.(The AC Relay Check input should be opposite polarity of the AC Relay Output)	AC Relay Output	= AC Relay Check input	Diagnostic enable calibration	is Enabled	2400ms in a 3000ms window	Two Trips, Type B
		DTC Pass	AC Relay Output	≠ AC Relay Check input	AC Present	is TRUE	3000ms	



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## Supporting Tables - ECM

3600	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
4000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
4400	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
4800	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
5200	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
5600	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
6000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
6400	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
6800	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000

**P0014**  
KtPHSD\_t\_StablePositionTimeEc1

X axis is Deg C  
Y axis is RPM

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

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

Z axis is the pass/fail result (see note below)

X axis is Lean to Rich response time (msec)

Y axis is Rich to Lean response time (msec)

Note: If the cell contains a "0" then the fault is not indicated, if it contains a "1" a fault is indicated

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

# 11 OBDG01 HYBRID Diagnostics

## Supporting Tables - ECM

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

Z axis is the pass/fail result (see note below)

X axis is Lean to Rich response time (msec)

Y axis is Rich to Lean response time (msec)

Note: If the cell contains a "0" then the fault is not indicated, if it contains a "1" a fault is indicated

	0.000	0.020	0.030	0.040	0.050	0.060	0.070	0.080	0.090	0.100	0.110	0.120	0.130	0.140	0.150	0.160	1.000
0.000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.050	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.100	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.149	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.159	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.170	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.180	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.189	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.199	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.210	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.220	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.229	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.239	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.250	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.300	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.350	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.399	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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

Z axis is Limit for L/R HC switches

Y axis is Average flow during the response test (gps)

X axis is estimated Ethanol percentage

Note: The cell contains the minimum switches

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

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

Z axis is Limit for R/L HC switches

Y axis is Average flow during the response test (gps)

X axis is estimated Ethanol percentage

Note: The cell contains the minimum switches

# 11 OBDG01 HYBRID Diagnostics

## Supporting Tables - ECM

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

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

Z axis is Limit for L/R HC switches

Y axis is Average flow during the response test (gps)

X axis is estimated Ethanol percentage

Note: The cell contains the mininum switches

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

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

Z axis is Limit for R/L HC switches

Y axis is Average flow during the response test (gps)

X axis is estimated Ethanol percentage

Note: The cell contains the mininum switches

	0.0	10.0	50.0	70.0	80.0
0.0	30	30	30	30	30
6.3	30	30	30	30	30
12.5	40	40	40	40	40
18.8	40	40	40	40	40
25.0	60	60	60	60	60

# 11 OBDG01 HYBRID Diagnostics

## Supporting Tables - ECM

31.3	60	60	60	60	60
37.5	60	60	60	60	60
43.8	60	60	60	60	60
50.0	60	60	60	60	60
56.3	60	60	60	60	60
62.5	60	60	60	60	60
68.8	60	60	60	60	60
75.0	60	60	60	60	60
81.3	60	60	60	60	60
87.5	60	60	60	60	60
93.8	60	60	60	60	60
100.0	60	60	60	60	60

### Green Sensor Delay Criteria:

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

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

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

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

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

-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
80	80	80	60	60	40	40	30	30	30	30	30	30	30	30	30	30

### 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
100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

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

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

Remove for application

	IAT Range		-40	-28	-16	-4	8	20	32	44	56	68	80
	Low	Hi											
single Primary	-7.0 ° C	60.0 ° C	1600	1250	700	310	260	230	200	180	150	140	140
Alternate	-50.0 ° C	-50.0 ° C	1600	1250	700	310	260	230	200	180	150	140	140

# 11 OBDG01 HYBRID Diagnostics

## Supporting Tables - ECM

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

TPS Residual Weight Factor based on RPM																	
RPM	0	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6500
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
MAF Residual Weight Factor based on RPM																	
RPM	0	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6500
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
MAF Residual Weight Factor Based on MAF Estimate																	
gm/sec	0.0	50.0	70.0	73.0	76.0	79.0	82.0	85.0	89.0	95.0	100.0	110.0	120.0	150.0	200.0	280.0	350.0
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
MAP1 Residual Weight Factor based on RPM																	
RPM	0	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6500
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
MAP2 Residual Weight Factor based on RPM																	
RPM	0	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6500
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
MAP3 Residual Weight Factor based on RPM																	
RPM	0	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6500
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
TIAP1 Residual Weight Factor based on RPM																	
RPM	0	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6500
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
SCIAP1 Residual Weight Factor based on RPM																	
RPM	0	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6500
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
SCIAP2 Residual Weight Factor based on RPM																	
RPM	0	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000	6500
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Boost Residual Weight Factor based on % of Boost																	
% Boost	0.00	0.06	0.13	0.19	0.25	0.31	0.38	0.44	0.50	0.56	0.63	0.69	0.75	0.81	0.88	0.94	1.00
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

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

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

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

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

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

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

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

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

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

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

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

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













# 11 OBDG01 HYBRID Diagnostics

## Supporting Tables - ECM

led In Cell? Yes Yes Yes Yes Yes Yes Yes NO Yes Yes Yes Yes Yes Yes NO

### P219A:

AvgFlow / A	KtFABD_U_VarThresh1																
	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
80	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
120	15	1	1	2	2	15	1	1	1	15	1	1	1	1	1	15	15
160	15	1	1	2	2	3	1	1	1	3	2	1	1	1	15	15	15
200	15	2	2	3	3	2	2	1	2	3	3	1	2	2	15	15	15
240	15	4	4	3	3	2	2	3	2	4	3	2	2	2	15	15	15
275	15	4	4	4	4	3	3	4	3	3	4	2	2	2	15	15	15
310	15	3	3	3	3	2	5	4	3	4	3	4	3	2	15	15	15
360	15	3	3	3	3	3	3	3	3	2	2	3	2	2	15	15	15
400	15	15	15	15	15	3	3	3	3	2	2	2	2	2	15	15	15
440	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
480	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
520	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
560	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
640	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
720	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
800	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15

AvgFlow / A	KtFABD_U_VarThresh1_DoD (AFM applications only)																
	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
80	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
120	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
160	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
200	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
240	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
275	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
310	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
360	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
400	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
440	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
480	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
520	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
560	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
640	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
720	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
800	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30

AvgFlow / A	KtFABD_U_VarThresh2																
	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
80	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
120	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
160	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
200	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
240	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
275	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
310	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
360	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
400	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
440	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
480	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
520	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
560	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30

# 11 OBDG01 HYBRID Diagnostics

## Supporting Tables - ECM

640	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
720	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
800	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30

### KtFABD\_U\_VarThresh2\_DoD (AFM applications only)

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

### KtFABD\_K\_QualFactor1

AvgFlow / A	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	1.00	0.75	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.95	0.80	0.00	0.00	0.00
200	0.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00	0.80	1.00	1.00	0.80	0.00	0.00	0.00
240	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00
275	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	1.00	1.00	1.00	0.80	0.00	0.00	0.00
310	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
360	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00
400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
440	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
560	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
640	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
720	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

### KtFABD\_K\_QualFactor1\_DoD (AFM applications only)

AvgFlow / A	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
120	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
160	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
200	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
240	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
275	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
310	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
360	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
400	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
440	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
480	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
520	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
560	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00



# 11 OBDG01 HYBRID Diagnostics

## Supporting Tables - ECM

640	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
720	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
800	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15

KtFABD_U_Normalizer1_DoD (AFM applications only)																	
AvgFlow / A	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
80	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
120	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
160	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
200	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
240	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
275	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
310	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
360	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
400	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
440	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
480	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
520	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
560	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
640	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
720	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
800	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30

KtFABD_U_Normalizer2																	
AvgFlow / A	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
80	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
120	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
160	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
200	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
240	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
275	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
310	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
360	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
400	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
440	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
480	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
520	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
560	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
640	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
720	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
800	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30

KtFABD_U_Normalizer2_DoD (AFM applications only)																	
AvgFlow / A	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200
40	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
80	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
120	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
160	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
200	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
240	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
275	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
310	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
360	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
400	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
440	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
480	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
520	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
560	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30

# 11 OBDG01 HYBRID Diagnostics

## Supporting Tables - ECM

640	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
720	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30
800	3	3	3	3	4	5	6	8	10	13	15	18	20	23	25	28	30

### Closed Loop Enable Criteria

Engine run time greater than

KtFSTA\_t\_(HYBRID ONLY)

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

and

KtFSTA\_t\_ClosedLoopTime

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

and pre converter O2 sensor voltage less than

KfFULC\_U\_O2\_SensorReadyThrshLo

< 1100  
Voltage *milliVolts*

for

KcFULC\_O2\_SensorReadyEvents

> 25  
milliseconds) *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 CylinderDeacDriverTFTKO = False

### Long Term FT Enable Criteria

Closed Loop Enable and

Coolant greater than

KfFCLL\_T\_AdaptiveLoCoolant

> 40  
Coolant *Celcius*

or less than

KfFCLL\_T\_AdaptiveHiCoolant

< 120  
Coolant *Celcius*

and

KtFCLL\_p\_AdaptiveLowMAP\_Limit

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

and

TPS\_ThrottleAuthorityDefaulted = False

and

Flex Fuel Estimate Algorithm is not active

and

Excessive fuel vapors boiling off from the engine oil algorithm (BOFR) is not enabled

and

Catalyst or EVAP large leak test not intrusive

# 11 OBDG01 HYBRID Diagnostics

## Supporting Tables - ECM

### Secondary Fuel Trim Enable Criteria

Closed Loop Enable and  
KfFCLP\_U\_O2ReadyThrshLo

< 1100  
Voltage milliVolts

for

KcFCLP\_Cnt\_O2RdyCyclesThrsh

> 80  
milliseconds) events

### Long Term Secondary Fuel Trim Enable Criteria

KtFCLP\_t\_PostIntgIDisableTime

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

Plus

KtFCLP\_t\_PostIntgIRampInTime

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

and

KeFCLP\_T\_IntegrationCatalystMax

< 1000  
Modeled C<sub>a</sub> Celcius

and

KeFCLP\_T\_IntegrationCatalystMin

> 300  
Modeled C<sub>a</sub> Celcius

and

PO2S\_Bank\_1\_Snsr\_2\_FA and PO2S\_Bank\_2\_Snsr\_2\_FA = False

### P0068: MAP / MAF / TPS Correleation

X-axis is TPS (%)

Data is MAP threshold (kPa)

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

X axis is TPS (%)

Data is MAF threshold (grams/sec)

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

X axis is Engine Speed (RPM)

Data is max MAF vs RPM (grams/sec)

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

X axis is Battery Voltage (V)

Data is max MAF vs Voltage (grams/sec)

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

### P1682: Ignition Voltage Correleation

X-axis is IAT (DegC)

Data is Voltage threshold (V)

X-axis	23.00	85.00	95.00	105.00	125.00
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# 11 OBDG01 HYBRID Diagnostics

## Supporting Tables - ECM

Data	7.00	8.70	9.00	9.20	10.00
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**P0606: Processor Performance Check - ETC software is not executed in proper order**

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

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

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

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

**P16F3: No fast unmanaged retarded spark above the applied spark**

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

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

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

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

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

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

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

	-40.00	-20.00	-10.00	0.00	50.00	90.00
700.00	4096.00	4096.00	4096.00	4096.00	4096.00	4096.00
900.00	4096.00	4096.00	4096.00	4096.00	4096.00	4096.00
1100.00	70.00	70.00	70.00	70.00	60.00	50.00
1400.00	45.00	42.00	38.00	35.00	35.00	35.00
1600.00	32.89	29.44	27.18	25.55	18.09	15.26
1800.00	34.82	31.10	28.67	26.92	19.35	16.51
2000.00	37.64	32.56	30.68	29.85	21.71	18.36
2200.00	40.80	35.20	33.13	32.22	23.24	19.84

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## Supporting Tables - ECM

2500.00	43.58	39.76	37.58	36.01	26.21	23.06
2700.00	42.72	38.90	36.72	35.15	25.34	22.19
3000.00	40.65	36.83	34.65	33.08	23.27	20.13
3300.00	36.87	33.05	30.87	29.30	19.49	16.35
3500.00	13.41	9.58	7.41	5.84	-3.97	-7.12
3700.00	7.50	3.67	1.50	-0.08	-9.88	-13.03
4000.00	4.25	0.43	-1.75	-3.32	-13.13	-16.28
4500.00	4.25	0.43	-1.75	-3.32	-13.13	-16.28
5000.00	4.25	0.43	-1.75	-3.32	-13.13	-16.28

Spark ESC PDT

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

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

P0325/P0330

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

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

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

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

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## Supporting Tables - ECM

TEST SPEED (RPM)	1	1	1	1
7000	1	1	1	1
7500	1	1	1	1
8000	1	1	1	1
8500	1	1	1	1

### Open Circuit Thresholds:

#### 1. 20 kHz Method:

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

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

#### 2. Normal Noise Method:

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

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

### P06B6/P06B7

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

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

### P0442: EONV Pressure Threshold Table (in Pascals)

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

	0.0000	6.2499	12.4998	18.7497	24.9996	31.2495	37.4994	43.7493	49.9992	56.2491	62.4990	68.7490	74.9989	81.2488	87.4987	93.7486	99.9985
<b>-10.0000</b>	-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
<b>-4.3750</b>	-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
<b>1.2500</b>	-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
<b>6.8750</b>	-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
<b>12.5000</b>	-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
<b>18.1250</b>	-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
<b>23.7500</b>	-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
<b>29.3750</b>	-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
<b>35.0000</b>	-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
<b>40.6250</b>	-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
<b>46.2500</b>	-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
<b>51.8750</b>	-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
<b>57.5000</b>	-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



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## Supporting Tables - ECM

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

### ob Genslak

#### Residual Calculation Time Weight Factors

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

#### Extended Engine Exit Time

%Eth/Catmc	0	25	50	75	100
0.000	30	30	30	30	30
0.125	30	30	30	30	30
0.250	30	30	30	30	30
0.375	30	30	30	30	30
0.500	30	30	30	30	30
0.625	30	30	30	30	30
0.750	30	30	30	30	30
0.875	30	30	30	30	30
1.000	30	30	30	30	30

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

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

#### P0300-P0308: Idle SCD ddt

400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000
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## Supporting Tables - ECM

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

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

**P0300-P0308: Idle Cyl Mode ddt**

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

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

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

# 11 OBDG01 HYBRID Diagnostics

## Supporting Tables - ECM

	42	6000	6000	6000	6000	6000	6000	5400	4900	4400	2075	1450	800	500	320	320	210	125	120	120
	48	6000	6000	6000	6000	6000	6000	5700	5200	4700	2075	1450	900	525	320	320	315	220	130	130
	54	6000	6000	6000	6000	6000	6000	5800	5300	4800	2770	1500	1000	525	360	360	350	250	235	145
	61	6000	6000	6000	6000	6000	6000	5900	5400	4900	2770	2760	1300	855	450	375	365	300	260	150

P0300-P0308: Cyl Mode ddt

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

P0300-P0308: Rev Mode Table

OR (decel index > Rev Mode Table)

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

P0300-P0308: AFM Mode Table

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

Load		400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000
	0	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	6	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	13	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	19	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	25	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	31	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	38	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	44	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
	50	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767

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## Supporting Tables - ECM

56	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
63	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
69	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
75	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
81	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
88	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
94	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
100	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767

### P0300-P0308: Zero torque engine load

Zero Torque: All Cylinders active

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

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

Zero Torque: Active Fuel Management (AFM)

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

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

### Catalyst Damaging Misfire Percentage

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

# 11 OBDG01 HYBRID Diagnostics

## Supporting Tables - ECM

100	18.0	18.0	18.0	11.0	8.0	6.0	6.0	5.0
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RoughRoadSource = CeRRDR\_e\_TOSS

Rough Road Threshold

Engine Speed

Trans  
Speed

	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3500	4000	4500	5000	5500
100	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
200	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
300	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
400	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
500	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
600	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
700	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
800	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
900	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1000	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1100	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1200	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1300	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1400	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

RoughRoadSource = CeRRDR\_e\_WheelSpeedInECM or CeRRDR\_e\_SerialDataFromABS

Rough Road Threshold

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

### P0300-P0308: Abnormal Engine Speed

Cylinder Mode Abnormal Speed

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

SCD Mode Abnormal Speed

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

Rev Mode Abnormal Speed

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

### P0300-P0308: Pattern Recognition Min and Max Multipliers

Min Multiplier

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

Max Multiplier

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

# 11 OBDG01 HYBRID Diagnostics

## Supporting Tables - ECM

### P0300-P0308: Driveline Ring Filter

Ring Filter

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

Number of Normals

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

### P0531

**HSPRat\_DeltaPredictedTable**      **AXIS is Ambient Temp & Fan Speed, Curve is Predicted Delta**

Axis		10	20	30	40	50	60	70	80	100
Curve	-40	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
	-20	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
	0	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
	20	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
	40	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
	60	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
	80	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
	100	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
	120	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00

**HSPRat\_QualityFactorTable**      **AXIS is Ambient Temp & Fan Speed, Curve is Quality Factor**

Axis		10	20	30	40	50	60	70	80	100
Curve	-40	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998
	-20	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998
	0	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998
	20	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998
	40	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998
	60	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998
	80	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998
	100	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998
	120	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998	0.99998

**HSPRat\_CoolantFactorTable**      **AXIS is Coolant Temp, Curve is Weighting Factor**

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

**HSPRat\_OnTestThresholdTable**      **AXIS is ambient Temp, Curve is Threshold**

Axis		-20	0	20	60	100
Curve		250.0	300.0	400.0	600.0	800.0

## 11 OBDG01 HYBRID Diagnostics

### Supporting Tables - HPC2 (VICM)

**Cell Rationality Table:**

Fault Code	Diagnostic	Sensor
P0B3C	Hybrid Battery Voltage Sense A Circuit Range/Performance	1
P0B41	Hybrid Battery Voltage Sense B Circuit Range/Performance	2
P0B46	Hybrid Battery Voltage Sense C Circuit Range/Performance	3
P0B4B	Hybrid Battery Voltage Sense D Circuit Range/Performance	4
P0B50	Hybrid Battery Voltage Sense E Circuit Range/Performance	5
P0B55	Hybrid Battery Voltage Sense F Circuit Range/Performance	6
P0B5A	Hybrid Battery Voltage Sense G Circuit Range/Performance	7
P0B5F	Hybrid Battery Voltage Sense H Circuit Range/Performance	8
P0B64	Hybrid Battery Voltage Sense I Circuit Range/Performance	9
P0B69	Hybrid Battery Voltage Sense J Circuit Range/Performance	10
P0B6E	Hybrid Battery Voltage Sense K Circuit Range/Performance	11
P0B73	Hybrid Battery Voltage Sense L Circuit Range/Performance	12
P0B78	Hybrid Battery Voltage Sense M Circuit Range/Performance	13
P0B7D	Hybrid Battery Voltage Sense N Circuit Range/Performance	14
P0B82	Hybrid Battery Voltage Sense O Circuit Range/Performance	15
P0B87	Hybrid Battery Voltage Sense P Circuit Range/Performance	16
P0B8C	Hybrid Battery Voltage Sense Q Circuit Range/Performance	17
P0B91	Hybrid Battery Voltage Sense R Circuit Range/Performance	18
P0B96	Hybrid Battery Voltage Sense S Circuit Range/Performance	19
P0B9B	Hybrid Battery Voltage Sense T Circuit Range/Performance	20
P0BA0	Hybrid Battery Voltage Sense U Circuit Range/Performance	21
P0BA5	Hybrid Battery Voltage Sense V Circuit Range/Performance	22
P0BAA	Hybrid Battery Voltage Sense W Circuit Range/Performance	23
P0BAF	Hybrid Battery Voltage Sense X Circuit Range/Performance	24
P0BB4	Hybrid Battery Voltage Sense Y Circuit Range/Performance	25
P0BB9	Hybrid Battery Voltage Sense Z Circuit Range/Performance	26
P1B16	Hybrid Battery Voltage Sense AA Circuit Range/Performance	27
P1B19	Hybrid Battery Voltage Sense AB Circuit Range/Performance	28
P1B1C	Hybrid Battery Voltage Sense AC Circuit Range/Performance	29
P1B1F	Hybrid Battery Voltage Sense AD Circuit Range/Performance	30
P1B22	Hybrid Battery Voltage Sense AE Circuit Range/Performance	31
P1B25	Hybrid Battery Voltage Sense AF Circuit Range/Performance	32
P1B45	Hybrid Battery Voltage Sense AG Circuit Range/Performance	33
P1B48	Hybrid Battery Voltage Sense AH Circuit Range/Performance	34
P1B4B	Hybrid Battery Voltage Sense AI Circuit Range/Performance	35
P1B4E	Hybrid Battery Voltage Sense AJ Circuit Range/Performance	36
P1B51	Hybrid Battery Voltage Sense AK Circuit Range/Performance	37
P1B54	Hybrid Battery Voltage Sense AL Circuit Range/Performance	38
P1B57	Hybrid Battery Voltage Sense AM Circuit Range/Performance	39
P1B5A	Hybrid Battery Voltage Sense AN Circuit Range/Performance	40
P1B5D	Hybrid Battery Voltage Sense AO Circuit Range/Performance	41
P1B60	Hybrid Battery Voltage Sense AP Circuit Range/Performance	42
P1B63	Hybrid Battery Voltage Sense AQ Circuit Range/Performance	43
P1B66	Hybrid Battery Voltage Sense AR Circuit Range/Performance	44

## 11 OBDG01 HYBRID Diagnostics

### Supporting Tables - HPC2 (VICM)

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P1B69	Hybrid Battery Voltage Sense AS Circuit Range/Performance	45
P1B6C	Hybrid Battery Voltage Sense AT Circuit Range/Performance	46
P1B6F	Hybrid Battery Voltage Sense AU Circuit Range/Performance	47
P1B72	Hybrid Battery Voltage Sense AV Circuit Range/Performance	48
P1B75	Hybrid Battery Voltage Sense AW Circuit Range/Performance	49
P1B78	Hybrid Battery Voltage Sense AX Circuit Range/Performance	50
P1B7B	Hybrid Battery Voltage Sense AY Circuit Range/Performance	51
P1B7E	Hybrid Battery Voltage Sense AZ Circuit Range/Performance	52
P1B81	Hybrid Battery Voltage Sense BA Circuit Range/Performance	53
P1B84	Hybrid Battery Voltage Sense BB Circuit Range/Performance	54
P1B87	Hybrid Battery Voltage Sense BC Circuit Range/Performance	55
P1B8A	Hybrid Battery Voltage Sense BD Circuit Range/Performance	56
P1B8D	Hybrid Battery Voltage Sense BE Circuit Range/Performance	57
P1B90	Hybrid Battery Voltage Sense BF Circuit Range/Performance	58
P1B93	Hybrid Battery Voltage Sense BG Circuit Range/Performance	59
P1B96	Hybrid Battery Voltage Sense BH Circuit Range/Performance	60
P1B99	Hybrid Battery Voltage Sense BI Circuit Range/Performance	61
P1B9C	Hybrid Battery Voltage Sense BJ Circuit Range/Performance	62
P1B9F	Hybrid Battery Voltage Sense BK Circuit Range/Performance	63
P1BA2	Hybrid Battery Voltage Sense BL Circuit Range/Performance	64
P1BA5	Hybrid Battery Voltage Sense BM Circuit Range/Performance	65
P1BA8	Hybrid Battery Voltage Sense BN Circuit Range/Performance	66
P1BAB	Hybrid Battery Voltage Sense BO Circuit Range/Performance	67
P1BAE	Hybrid Battery Voltage Sense BP Circuit Range/Performance	68
P1BB1	Hybrid Battery Voltage Sense BQ Circuit Range/Performance	69
P1BB4	Hybrid Battery Voltage Sense BR Circuit Range/Performance	70
P1BB7	Hybrid Battery Voltage Sense BS Circuit Range/Performance	71
P1BBA	Hybrid Battery Voltage Sense BT Circuit Range/Performance	72
P1BBD	Hybrid Battery Voltage Sense "BU" Circuit Range/Performance	73
P1BC0	Hybrid Battery Voltage Sense "BV" Circuit Range/Performance	74
P1BC3	Hybrid Battery Voltage Sense "BW" Circuit Range/Performance	75
P1BC6	Hybrid Battery Voltage Sense "BX" Circuit Range/Performance	76
P1BC9	Hybrid Battery Voltage Sense "BY" Circuit Range/Performance	77
P1BCC	Hybrid Battery Voltage Sense "BZ" Circuit Range/Performance	78
P1BCF	Hybrid Battery Voltage Sense "CA" Circuit Range/Performance	79
P1BD2	Hybrid Battery Voltage Sense "CB" Circuit Range/Performance	80
P1BD5	Hybrid Battery Voltage Sense "CC" Circuit Range/Performance	81
P1BD8	Hybrid Battery Voltage Sense "CD" Circuit Range/Performance	82
P1BDB	Hybrid Battery Voltage Sense "CE" Circuit Range/Performance	83
P1BDE	Hybrid Battery Voltage Sense "CF" Circuit Range/Performance	84
P1BE1	Hybrid Battery Voltage Sense "CG" Circuit Range/Performance	85
P1BE4	Hybrid Battery Voltage Sense "CH" Circuit Range/Performance	86
P1BE7	Hybrid Battery Voltage Sense "CI" Circuit Range/Performance	87
P1BEA	Hybrid Battery Voltage Sense "CJ" Circuit Range/Performance	88
P1BED	Hybrid Battery Voltage Sense "CK" Circuit Range/Performance	89
P1BF0	Hybrid Battery Voltage Sense "CL" Circuit Range/Performance	90
P1BF3	Hybrid Battery Voltage Sense "CM" Circuit Range/Performance	91

# 11 OBDG01 HYBRID Diagnostics

## Supporting Tables - HPC2 (VICM)

P1BF6	Hybrid Battery Voltage Sense "CN" Circuit Range/Performance	92
P1BF9	Hybrid Battery Voltage Sense "CO" Circuit Range/Performance	93
P1BFC	Hybrid Battery Voltage Sense "CP" Circuit Range/Performance	94
P1E01	Hybrid Battery Voltage Sense "CQ" Circuit Range/Performance	95
P1E04	Hybrid Battery Voltage Sense "CR" Circuit Range/Performance	96

### Temp Rationality Table:

Fault Code	Diagnostic	Sensor
P0A9C	Hybrid Battery Temperature Sensor Range/Performance	1
P0AC6	Hybrid Battery 2 Temperature Sensor Performance	2
P0ACB	Hybrid Battery 3 Temperature Sensor Performance	3
P0AE9	Hybrid Battery 4 Temperature Sensor Performance	4
P0BC3	Hybrid Battery Temperature Sensor E Circuit Range/Performance	5
P0C34	Hybrid Battery Temperature Sensor F Range/Performance	6
P0C7D	Hybrid Battery Temperature Sensor G Circuit Range/Performance	7
P0C82	Hybrid Battery Temperature Sensor H Circuit Range/Performance	8
P0C89	Hybrid Battery Temperature Sensor I Circuit Range/Performance	9
P0C8E	Hybrid Battery Temperature Sensor J Circuit Range/Performance	10
P0C93	Hybrid Battery Temperature Sensor K Circuit Range/Performance	11
P0C98	Hybrid Battery Temperature Sensor L Circuit Range/Performance	12
P0CA9	Hybrid Battery Temperature Sensor "M" Circuit Range/Performance	13
P0CAE	Hybrid Battery Temperature Sensor "N" Circuit Range/Performance	14
P0CB3	Hybrid Battery Temperature Sensor "O" Circuit Range/Performance	15
P0CB8	Hybrid Battery Temperature Sensor "P" Circuit Range/Performance	16

<b>KtBSED_U_BLF_CellVoltThresh</b>	Temperature (°C, average battery temp)	-30	-20	-10	0	10	20	30	40	50	
	Voltage (V)	1.85	1.86	1.96	1.96	1.98	2.05	2.05	2.05	2.05	
<b>KtBSED_U_BLF_PackVoltThresh</b>	Temperature (°C, average battery temp)	-30	-20	-10	0	10	20	30	40	50	
	Voltage (V)	184.1	186.07	195.67	195.67	198.87	205.27	205.27	205.27	205.27	
<b>KtBSED_U_BOV_CellVoltThresh</b>	Temperature (°C, average battery temp)	-30	-20	-10	0	10	20	30	40	50	
	Voltage (V)	4.348	4.354	4.358	4.398	4.398	4.398	4.398	4.398	4.398	
<b>KtBSED_U_BOV_PackVoltThresh</b>	Temperature (°C, average battery temp)	-30	-20	-10	0	10	20	30	40	50	
	Voltage (V)	414.3	414.94	415.26	419.1	419.1	419.1	419.1	419.1	419.1	
<b>KtBSED_R_SOH_ResistanceThresh</b>	Temperature(°C, average battery temp) / SOC (%)	10	20	30	40	50	60	70	80	90	
		-30	20.0000	20.0000	20.0000	20.0000	20.0000	20.0000	20.0000	20.0000	20.0000
		-20	20.0000	3.5080	2.8756	2.6482	2.5508	2.5248	2.5183	2.5151	2.5072
		-10	20.0000	1.8023	1.6748	1.5861	1.5518	1.5674	1.6084	1.7255	1.8580

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## Supporting Tables - HPC2 (VICM)

0	20.0000	1.4197	1.1950	1.0809	1.0417	1.0212	1.0193	1.0174	1.0149
10	20.0000	0.8401	0.7702	0.7147	0.6880	0.6695	0.6731	0.6702	0.6652
20	20.0000	0.6317	0.582	0.5415	0.518	0.505	0.5091	0.5093	0.504
30	20.0000	0.4806	0.4448	0.4168	0.3973	0.3874	0.391	0.3933	0.3887
40	20.0000	0.3868	0.3586	0.3404	0.3258	0.3167	0.3189	0.3222	0.3194
50	20.0000	0.293023	0.272363	0.264074	0.254405	0.246081697	0.246765	0.251	0.25

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

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

Axis: Desired Current in Amps

Axis  
Curve

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

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## Supporting Tables - FPCM (FSCM)

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

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

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

P2635 Fuel Injector Flow curve ( grams / second )

X-axis= Fuel Pressure ( kiloPascals)

128	148	168	188	208	228	248	268	288	308	328	348	368	388	408	428	448	468	488	508	528	548	568	588	608	628	648	668	688	708	728	748	768
1.014893	1.091064	1.162109	1.229004	1.291992	1.351074	1.407959	1.462891	1.516113	1.565918	1.61499	1.663086	1.709961	1.756104	1.800049	1.843018	1.884033	1.925049	1.965088	2.00293	2.040039	2.075928	2.112061	2.146973	2.180908	2.214111	2.24707	2.281982	2.315918	2.349121	2.38208	2.414063	2.447021

P2635 Minimum Fuel Injector Pulse Width curve ( seconds )

X-axis= engine speed ( revolutions / minute)

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

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## Fault Bundles (ECM)

Cert Doc Bundle Name	Pcodes											
AnyCamPhaser_FA	P0010	P0011	P0013	P0014	P0020	P0021	P0023	P0024				
AnyCamPhaser_TFTKO	P0010	P0011	P0013	P0014	P0020	P0021	P0023	P0024				
IntkCamPhaser_FA	P0010	P0011	P0020	P0021								
EGRValvePerformance_FA	P0401	P042E										
EGRValveCircuit_FA	P0403	P0404	P0405	P0406								
EGRValve_FP	P0405	P0406	P042E									
EGRValveCircuit_TFTKO	P0403	P0404	P0405	P0406								
EGRValvePerformance_TFTKO	P0401	P042E										
O2S_Bank_1_TFTKO	P0131	P0132	P0134	P2A00								
O2S_Bank_2_TFTKO	P0151	P0152	P0154	P2A03								
O2S_Bank_1_Sensor_1_FA	P2A00	P0131	P0132	P0133	P0134	P0135	P0053	P1133	P015A	P015B	P0030	
O2S_Bank_1_Sensor_2_FA	P013A	P013B	P013E	P013F	P2270	P2271	P0137	P0138	P0140	P0141	P0054	P0036
O2S_Bank_2_Sensor_1_FA	P2A03	P0151	P0152	P0153	P0154	P0155	P0059	P1153	P015C	P015D	P0050	
O2S_Bank_2_Sensor_2_FA	P013C	P013D	P014A	P014B	P2272	P2273	P0157	P0158	P0160	P0161	P0060	P0056
PO2S_Bank_1_Snsr_2_FA	P0137	P0138	P0140	P0036	P0054	P0141	P2270	P2271				
PO2S_Bank_2_Snsr_2_FA	P0157	P0158	P0160	P0056	P0060	P0161	P2272	P2273				
ECT_Sensor_Ckt_FA	P0117	P0118										
ECT_Sensor_Ckt_TPTKO	P0117	P0118										
ECT_Sensor_Ckt_TFTKO	P0117	P0118										
ECT_Sensor_DefaultDetected	P0117	P0118	P0116	P0119								
ECT_Sensor_FA	P0117	P0118	P0116	P0119	P0128							
ECT_Sensor_TFTKO	P0117	P0118	P0116	P0119								
ECT_Sensor_Perf_FA	P0116											
ECT_Sensor_Ckt_FP	P0117	P0118										
ECT_Sensor_Ckt_High_FP	P0118											
ECT_Sensor_Ckt_Low_FP	P0117											
THMR_Insuff_Flow_FA	P00B7											
THMR_Therm_Control_FA	P0597	P0598	P0599									
THMR_RCT_Sensor_Ckt_FA	P00B3	P00B4										
THMR_ECT_Sensor_Ckt_FA	P0117	P0118	P0116	P00B6								
AAP_SnsrFA	naturally aspirated: turbocharged:	P2227	P2228	P2229	P2230							
AAP_SnsrCktFP	naturally aspirated: turbocharged:	P2228	P2229									
AAP_SnsrTFTKO	naturally aspirated: turbocharged:	P2227	P2228	P2229	P2230							
AAP2_SnsrFA	P2227	P2228	P2229	P2230								
AAP2_SnsrCktFP	P2228	P2229										
AAP2_SnsrTFTKO	P2227	P2228	P2229	P2230								
TC_BoostPresSnsrCktFA	P0237	P0238										
TC_BoostPresSnsrFA	P0236	P0237	P0238									
AmbPresSnsrCktFA	P2228	P2229										
AmbPresSnsrCktFP	P2228	P2229										
AmbientAirDefault	Baro sensor present:	P2227	P2228	P2229	P2230							

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## Fault Bundles (ECM)

	No Baro sensor present:	P0101	P0102	P0103	P0106	P0107	P0108	P0111	P0112	P0113	P0114	P0121	P0122	P0123	P012B	P012C	P012D	P0222	P0223	P1221
	Baro sensor present:	P2227	P2228	P2229	P2230															
	No Baro sensor present:	P0101	P0102	P0103	P0106	P0107	P0108	P0111	P0112	P0113	P0114	P0121	P0122	P0123	P012B	P012C	P012D	P0222	P0223	P1221
IAT_SensorCircuitTFTKO		P0112	P0113																	
IAT_SensorCircuitFA		P0112	P0113																	
IAT_SensorCircuitFP		P0112	P0113																	
IAT_SensorTFTKO		P0111	P0112	P0113	P0114															
IAT_SensorFA		P0111	P0112	P0113	P0114															
	Turbocharged or supercharged, without Humidity sensor:	P0097	P0098																	
MnfdTempSensorCktTFTKO																				
	Turbocharged or supercharged, with Humidity sensor:	P112C	P112D																	
	Naturally aspirated: Turbocharged or supercharged, without Humidity sensor:	P0097	P0098																	
MnfdTempSensorCktFA																				
	Turbocharged or supercharged, with Humidity sensor:	P112C	P112D																	
	Naturally aspirated: Turbocharged or supercharged, without Humidity sensor:	P0097	P0098																	
MnfdTempSensorCktFP																				

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## Fault Bundles (ECM)

	Turbocharged or supercharged, with Humidity sensor:	P112C	P112D		
	Naturally aspirated: Turbocharged or supercharged, without Humidity sensor:	P0112	P0113		
MnfdTempSensorTFTKO		P0096	P0097	P0098	P0099
	Turbocharged or supercharged, with Humidity sensor:	P112B	P112C	P112D	P112E
	Naturally aspirated: Turbocharged or supercharged, without Humidity sensor:	P0111	P0112	P0113	P0114
MnfdTempSensorFA		P0096	P0097	P0098	P0099
	Turbocharged or supercharged, with Humidity sensor:	P112B	P112C	P112D	P112E
	Naturally aspirated: Turbocharged, without Humidity sensor:	P0111	P0112	P0113	P0114
ThrotTempSensorTFTKO		P0096	P0097	P0098	P0099
	Turbocharged, with Humidity sensor: Naturally aspirated or supercharged	P112B	P112C	P112D	P112E
		P0111	P0112	P0113	P0114

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## Fault Bundles (ECM)

ThrotTempSensorFA	Turbocharged, without Humidity sensor:	P0096	P0097	P0098	P0099				
	Turbocharged, with Humidity sensor:	P112B	P112C	P112D	P112E				
	Naturally aspirated or supercharged	P0111	P0112	P0113	P0114				
HumTempSnsrCktFA		P0097	P0098						
HumTempSnsrCktFP		P0097	P0098						
HumTempSnsrFA		P0096	P0097	P0098	P0099				
IAT_ContCorrFA		P2199							
HumidityFA		P0097	P0098	P11C2	P11C3	P2227	P2228	P2229	P2230
SuperchargerBypassValveFA		P2261							
CylDeacSystemTFTKO		P3400							
MAF_SensorPerfFA		P0101							
MAF_SensorPerfTFTKO		P0101							
MAP_SensorPerfFA		P0106							
MAP_SensorPerfTFTKO		P0106							
SCIAP_SensorPerfFA		P012B							
SCIAP_SensorPerfTFTKO		P012B							
ThrottlePositionSnsrPerfFA		P0121							
ThrottlePositionSnsrPerfTFTKO		P0121							
TIAP_SensorPerfFA		P0236							
MAF_SensorFA		P0101	P0102	P0103	P010C	P010D			
MAF_SensorTFTKO		P0101	P0102	P0103	P010C	P010D			
MAF_SensorFP		P0102	P0103	P010C	P010D				
MAF_SensorCircuitFA		P0102	P0103	P010C	P010D				
MAF_SensorCircuitTFTKO		P0102	P0103	P010C	P010D				
MAF_SnsrCktFA		P121B	P121C						
MAF_SnsrCktTFTKO		P121B	P121C						
MAP_SensorTFTKO		P0106	P0107	P0108					
MAP_SensorFA		P0106	P0107	P0108					
MAP_SensorCircuitFP		P0107	P0108						
SCIAP_SensorFA		P012B	P012C	P012D					
SCIAP_SensorTFTKO		P012B	P012C	P012D					
SCIAP_SensorCircuitFP		P012C	P012D						
	naturally aspirated or turbocharged:								
AfterThrottlePressureFA	supercharged:	P0106	P0107	P0108					
	supercharged:	P012B	P012C	P012D					
	naturally aspirated or turbocharged:								
AfterThrottleVacuumTFTKO		P0106	P0107	P0108					

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## Fault Bundles (ECM)

SCIAP_SensorCircuitFA	supercharged: P012B P012C P012D	P012C	P012D										
AfterThrottlePressTFTKO	naturally aspirated or turbocharged: P0106	P0107	P0108										
MAP_SensorCircuitFA	supercharged: P0107 P0108	P012C	P012D										
MAP_EngineVacuumStatus	MAP_SensorFA OR P0107, P0108 Pending												
OAT_AmbientFilteredFA OAT_AmbientSensorFA OAT_PtEstFiltFA													
CrankCamCorrelationTFTKO	P0016	P0017	P0018	P0019									
CrankSensorFA	P0335	P0336											
CrankSensorTFTKO	P0335	P0336											
CamSensorFA	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391	
CamSensorTFTKO	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391	
CrankIntakeCamCorrelationFA	P0016	P0018											
CrankExhaustCamCorrelationFA	P0017	P0019											
IntakeCamSensorTFTKO	P0016	P0018	P0340	P0341	P0345	P0346							
IntakeCamSensorFA	P0016	P0018	P0340	P0341	P0345	P0346							
ExhaustCamSensorTFTKO	P0017	P0019	P0365	P0366	P0390	P0391							
ExhaustCamSensorFA	P0017	P0019	P0365	P0366	P0390	P0391							
IntakeCamSensor_FA	P0016	P0018	P0340	P0341	P0345	P0346							
IntakeCamSensor_TFTKO	P0016	P0018	P0340	P0341	P0345	P0346							
ExhaustCamSensor_FA	P0017	P0019	P0365	P0366	P0390	P0391							
ExhaustCamSensor_TFTKO	P0017	P0019	P0365	P0366	P0390	P0391							
CrankIntakeCamCorrFA	P0016	P0018											
CrankExhaustCamCorrFA	P0017	P0019											
CrankSensorFaultActive	P0335	P0336											
CrankSensor_FA	P0335	P0336											
CrankSensorTestFailedTKO	P0335	P0336											
CrankSensor_TFTKO	P0335	P0336											
CamSensor_FA	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391	
CamSensorAnyLocationFA	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391	
CamSensor_TFTKO	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391	
EngModeNotRunTmErr	P2610												
FuelTrimSystemB1_FA	P0171	P0172											
FuelTrimSystemB2_FA	P0174	P0175											
FuelTrimSystemB1_TFTKO	P0171	P0172											
FuelTrimSystemB2_TFTKO	P0174	P0175											
NA	P2096	P2097	P2098	P2099									
A/F Imbalance Bank1	P219A												
A/F Imbalance Bank2	P219B												
A/F Imbalance Bank1	P219A												
A/F Imbalance Bank2	P219B												

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## Fault Bundles (ECM)

AIRSystemPressureSensor FA	P2430	P2431	P2432	P2433	P2435	P2436	P2437	P2438						
AIR System FA	P0411	P2440	P2444											
AIRValveControlCircuit FA	P0412													
AIRPumpControlCircuit FA	P0418													
Clutch Sensor FA	P0806	P0807	P0808											
ClutchPositionSensorCircuitLo FA	P0807													
ClutchPositionSensorCircuitHi FA	P0808													
Ethanol Composition Sensor FA	P0178	P0179	P2269											
PPS1_OutOfRange_Composite	P2122	P2123	P06A3											
PPS2_OutOfRange_Composite	P2127	P2128	P0697											
PPS1_OutOfRange_Composite	P2122	P2123	P06A3											
PPS2_OutOfRange_Composite	P2127	P2128	P0697											
PPS1_OutOfRange	P2122	P2123												
PPS2_OutOfRange	P2127	P2128												
PPS1_OutOfRange	P2122	P2123												
PPS2_OutOfRange	P2127	P2128												
AcceleratorPedalFailure	P2122	P2123	P2127	P2128	P2138	P0697	P06A3							
ControllerRAM_Error_FA	P0604													
ControllerProcessorPerf_FA	P0606													
TPS1_OutOfRange_Composite	P0122	P0123	P06A3											
TPS2_OutOfRange_Composite	P0222	P0223	P06A3											
TPS_FA	P0122	P0123	P0222	P0223	P2135									
TPS_TFTKO	P0122	P0123	P0222	P0223	P2135									
TPS_Performance_FA	P0068	P0121	P1104	P2100	P2101	P2102	P2103							
TPS_Performance_TFTKO	P0068	P0121	P1104	P2100	P2101	P2102	P2103							
TPS_FaultPending	P0122	P0123	P0222	P0223	P2135									
TPS_FaultPending	P0122	P0123	P0222	P0223	P2135									
TPS_ThrottleAuthorityDefaulted	P0068	P0122	P0123	P0222	P0223	P16F3	P1104	P2100	P2101	P2102	P2103	P2135		
EnginePowerLimited	P0068	P0122	P0123	P0222	P0223	P0606	P16F3	P1104	P2100	P2101	P2102	P2103	P2135	
	P160E	P160D	P0191	P0192	P0193	P00C8	P00C9	P00CA	P0090	P0091	P0092	P228C		
	P2135	P2138	P2122	P2123	P2127	P2128	P228D	P06A3	P0697					
5VoltReferenceA_FA	P0641													
5VoltReferenceB_FA	P0651													
5VoltReferenceMAP_OOR_Fit	P0697													
FuelInjectorCircuit_FA	P0201	P0202	P0203	P0204	P0205	P0206	P0207	P0208						
	P0261	P0264	P0267	P0270	P0273	P0276	P0279	P0282						
	P0262	P0265	P0268	P0271	P0274	P0277	P0280	P0283						
	P2147	P2150	P2153	P2156	P216B	P216E	P217B	P217E						
	P2148	P2151	P2154	P2157	P216C	P216F	P217C	P217F						
	P1248	P1249	P124A	P124B	P124C	P124D	P124E	P124F						
FuelInjectorCircuit_TFTKO	P0201	P0202	P0203	P0204	P0205	P0206	P0207	P0208						
	P0261	P0264	P0267	P0270	P0273	P0276	P0279	P0282						
	P0262	P0265	P0268	P0271	P0274	P0277	P0280	P0283						
	P2147	P2150	P2153	P2156	P216B	P216E	P217B	P217E						
	P2148	P2151	P2154	P2157	P216C	P216F	P217C	P217F						
	P1248	P1249	P124A	P124B	P124C	P124D	P124E	P124F						
FHPR_b_PumpCkt_FA	P0090	P0091	P0092	P00C8	P00C9	P00CA								
FHPR_b_PumpCkt_TFTKO	P0090	P0091	P0092	P00C8	P00C9	P00CA								
FHPR_b_FRP_SnsrCkt_FA	P0192	P0193												
FHPR_b_FRP_SnsrCkt_TFTKO	P0192	P0193												
FHPD_b_HPC_Windup_FA	P0089													
FHPD_b_HPC_Windup_TFTKO	P0089													
FHPD_b_PumpCurr_FA	P163A													
FHPD_b_PumpCurr_TFTKO	P163A													
FHPD_b_HPC_PresErrPos_FA	P228C													

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## Fault Bundles (ECM)

FHPD_b_HPC_PresErrPos_TFTKO	P228C											
FHPD_b_HPC_PresErrNeg_FA	P228D											
FHPD_b_HPC_PresErrNeg_TFTKO	P228D											
FHPR_b_FRP_SnsrPerfDiag_FA	P0191											
FHPR_b_FRP_SnsrPerfDiag_TFTKO	P0191											
EngineMetalOvertempActive	P1258											
KS_Ckt_Perf_B1B2_FA	P0324	P0325	P0326	P0327	P0328	P0330	P0332	P0333	P06B6	P06B7		
IgnitionOutputDriver_FA	P0351	P0352	P0353	P0354	P0355	P0356	P0357	P0358				
CatalystSysEfficiencyLoB1_FA	P0420											
CatalystSysEfficiencyLoB2_FA	P0430											
EvapPurgeSolenoidCircuit_FA	P0443											
EvapFlowDuringNonPurge_FA	P0496											
EvapVentSolenoidCircuit_FA	P0449											
EvapSmallLeak_FA	P0442											
EvapEmissionSystem_FA	P0455	P0446										
FuelTankPressureSnsrCkt_FA	P0452	P0453										
VentCircuit_FA	P0449	P0498	P0499									
ELCP_Circuit_FA	P1459	P145A										
FTP_SensorCircuit_FA	P0452	P0453										
ELCP_PumpCircuit_FA	P2400	P2401	P2402									
ELCP_SwitchCircuit_FA	P2418	P2419	P2420									
VICM_WakeupDiag_FA	P06E4											
VICM_WakeupDiag_TFTKO	P06E4											
LostCommBCM_FA	U0140											
LostCommBusB_VICM_FA	U182D											
CommBusAOff_VICM_FA	U0073											
CommBusBOff_VICM_FA	U0074											
AccCktLo_FA	P2537											
	Only											
	EREV											
	sealed											
	fuel											
OAT_EstAmbTemp_FA	system				P0071	P0072	P0073	P0502	P0503	P0722	P0723	
	Conventio											
	nal fuel											
OAT_EstAmbTemp_FA	system				P0071	P0072	P0073	P0074	P2610			
	Conventio											
	nal fuel											
EvapExcessPurgePsb1_FA	system				P0442	P0443	P0455	P0496				
	Only											
	EREV											
	sealed											
	fuel											
EvapExcessPurgePsb1_FA	system				P0442	P0455	P0458					
	Conventio											
	nal fuel											
EvapReducedPurgePsb1_FA	system				P0443	P0446	P0449	P0455				
	Only											
	EREV											
	sealed											
	fuel											
EvapReducedPurgePsb1_FA	system				P0443	P0446	P0449	P0459	P0497	P0499	P2419	P2422
CoolingFanSpeedTooHigh_FA	P0495											
FanOutputDriver_FA	P0480	P0481	P0482	P0691	P0692	P0693	P0694	P0695	P0696			

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## Fault Bundles (ECM)

FuelLevelDataFault	P1682	P0461	P0462	P0463	P2066	P2067	P2068		
PowertrainRelayFault	P1682								
PowertrainRelayStateOn_FA	P0685								
PowertrainRelayStateOn_Error	P0685								
IgnitionOffTimer_FA	P2610								
IgnitionOffTimeValid	P2610								
EngineModeNotRunTimerError	P2610								
EngineModeNotRunTimer_FA	P2610								
ModuleOffTime_FA	P2610								
VehicleSpeedSensor_FA	P0502	P0503	P0722	P0723					
VehicleSpeedSensorError	P0502	P0503	P0722	P0723					
IAC_SystemRPM_FA	P0506	P0507							
TCM_EngSpdReqCkt	P150C								
ControllerProcessorPerf_FA	P0606								
ControllerRAM_Error_FA	P0604								
EngineMisfireDetected_TFTKO	P0300	P0301	P0302	P0303	P0304	P0305	P0306	P0307	P0308
EngineMisfireDetected_FA	P0300	P0301	P0302	P0303	P0304	P0305	P0306	P0307	P0308
EngOilTempSensorCircuitFA	P0197	P0198							
EngOilModeledTempValid	ECT_Sensor_FA	IAT_SensorCircuitFA							
EngOilPressureSensorCktFA	P0522	P0523							
EngOilPressureSensorFA	P0521	P0522	P0523						
CylinderDeacDriverTFTKO	P3401	P3409	P3417	P3425	P3433	P3441	P3449		
BrakeBoosterSensorFA	P0556	P0557	P0558						
BrakeBoosterVacuumValid	P0556	P0557	P0558						
BrakeBoosterVacuumValid	VehicleSpeedSensor_FA	MAP_SensorFA							
CylinderDeacDriverTFTKO	P3401	P3409	P3417	P3425	P3433	P3441	P3449		
EngineTorqueEstInaccurate	EngineMisfireDetected_FA	FuelInjectorCircuit_TFTKO	FuelInjectorCircuit_TFTKO	FuelTrimSystemB1_FA	FuelTrimSystemB2_FA	MAF_SensorTFTKO	MAP_SensorTFTKO	EGRValvePerformance_FA	
ACHighSidePressSnsrCktFA	P0532	P0533							
ACFailedOnSD	See ACCM Document								
ACThrmlRefrigSpdVld	See ACCM Document								
ACCMLostComm	U016B								

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## Fault Bundles (ECM)

LowFuelConditionDiagnostic	<p>Flag set to TRUE if the fuel level &lt; 10 % AND</p> <p>No Active DTCs: FuelLevel DataFault P0462 P0463</p> <p>for at least 30 seconds.</p>
Transfer Pump is Commanded On	<p>Fuel Volume in Primary Fuel Tank &lt; 0.0 liters AND</p> <p>Fuel Volume in Secondary Fuel Tank ≥ 0.0 liters AND Transfer Pump on Time &lt; <b>Transfer PumpOn TimeLimit</b> Table AND Transfer Pump had been Off for at least 0.0 seconds AND Evap Diagnostic (Purge Valve Leak Test, Large Leak AND Engine Running</p>

<u>Long Name</u>	<u>Short Name</u>
Bank	B
Brake	Brk
Circuit	Ckt
Engine	Eng
Fault Active	FA
Intake	Intk
Naturally Aspirated	NA
Performance	Perf
Position	Pstn
Pressure	Press

## 11 OBDG01 HYBRID Diagnostics

### Fault Bundles (ECM)

Sensor  
Supercharged  
System  
Test Failed This Key On

Snsr  
SC  
Sys  
TFTKO

## 11 OBDG01 HYBRID Diagnostics

### Fault Bundles - HPC2 (VICM)

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

#### CellVoltageRationalityFA

P0B3D	P1B79	P0B48	P1B80	U2401	P1B2A	P1E7B	P1B4B	P1BDE
P0B42	P1B7C	P0B4D	P1B83	P1E90	P1B2B	P1E7C	P1B4E	P1BE1
P0B47	P1B7F	P0B52	P1B86	P1E8F	P1B2C	P1E7D	P1B51	P1BE4
P0B4C	P1B82	P0B57	P1B89	P1E91	P1B2D	P1E7E	P1B54	P1BE7
P0B51	P1B85	P0B5C	P1B8C	P1E8E	P1E4C	P1E7F	P1B57	P1BEA
P0B56	P1B88	P0B61	P1B8F	P1E93	P1E4D	P1E80	P1B5A	P1BED
P0B5B	P1B8B	P0B66	P1B92	P1E96	P1E4E	P1E81	P1B5D	P1BF0
P0B60	P1B8E	P0B6B	P1B95	P1E95	P1E4F	P1E82	P1B60	P1BF3
P0B65	P1B91	P0B70	P1B98	P1E97	P1E50	P1E83	P1B63	P1BF6
P0B6A	P1B94	P0B75	P1B9B	P1E94	P1E51	P1E84	P1B66	P1BF9
P0B6F	P1B97	P0B7A	P1B9E	P1E99	P1E52	P1E86	P1B69	P1BFC
P0B74	P1B9A	P0B7F	P1BA1	P1E9C	P1E53	P1E87	P1B6C	P1E01
P0B79	P1B9D	P0B84	P1BA4	P1E9B	P1E54	P1E88	P1B6F	P1E04
P0B7E	P1BA0	P0B89	P1BA7	P1E9D	P1E56	P1E89	P1B72	P1B76
P0B83	P1BA3	P0B8E	P1BAA	P1E9A	P1E57	P1E8A	P1B75	P0B43
P0B88	P1BA6	P0B93	P1BAD	P1E9F	P1E58	P0B3C	P1B78	P1B7D
P0B8D	P1BA9	P0B98	P1BB0	P1EA2	P1E59	P0B41	P1B7B	U2606
P0B92	P1BAC	P0B9D	P1BB3	P1EA1	P1E5A	P0B46	P1B7E	P1B29
P0B97	P1BAF	P0BA2	P1BB6	P1EA3	P1E5B	P0B4B	P1B81	P1E7A
P0B9C	P1BB2	P0BA7	P1BB9	P1EA0	P1E5C	P0B50	P1B84	P1B48
P0BA1	P1BB5	P0BAC	P1BBC	P1EA5	P1E5D	P0B55	P1B87	P1BDB
P0BA6	P1BB8	P0BB1	P1BBF	P1EB1	P1E5E	P0B5A	P1B8A	P1B73
P0BAB	P1BBB	P0BB6	P1BC2	P1EB5	P1E5F	P0B5F	P1B8D	P0B3E
P0BB0	P1BBE	P0BBB	P1BC5	P0B3B	P1E60	P0B64	P1B90	P1B7A
P0BB5	P1BC1	P1B18	P1BC8	P0B40	P1E61	P0B69	P1B93	U2605
P0BBA	P1BC4	P1B1B	P1BCB	P0B45	P1E62	P0B6E	P1B96	P1B28
P1B17	P1BC7	P1B1E	P1BCE	P0B4A	P1E63	P0B73	P1B99	P1E79
P1B1A	P1BCA	P1B21	P1BD1	P0B4F	P1E64	P0B78	P1B9C	P1B45
P1B1D	P1BCD	P1B24	P1BD4	P0B54	P1E65	P0B7D	P1B9F	P1BD8
P1B20	P1BD0	P1B27	P1BD7	P0B59	P1E66	P0B82	P1BA2	P1B70

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### Fault Bundles - HPC2 (VICM)

P1B23	P1BD3	P1B47	P1BDA	P0B5E	P1E67	P0B87	P1BA5	P1E05
P1B26	P1BD6	P1B4A	P1BDD	P0B63	P1E68	P0B8C	P1BA8	P1B77
P1B46	P1BD9	P1B4D	P1BE0	P0B68	P1E69	P0B91	P1BAB	U2604
P1B49	P1BDC	P1B50	P1BE3	P0B6D	P1E6A	P0B96	P1BAE	P0BB8
P1B4C	P1BDF	P1B53	P1BE6	P0B77	P1E6B	P0B9B	P1BB1	P1E78
P1B4F	P1BE2	P1B56	P1BE9	P0B7C	P1E6C	P0BA0	P1BB4	P1B25
P1B52	P1BE5	P1B59	P1BEC	P0B81	P1E6E	P0BA5	P1BB7	P1BD5
P1B55	P1BE8	P1B5C	P1BEF	P0B86	P1E6F	P0BAA	P1BBA	P1B6D
P1B58	P1BEB	P1B5F	P1BF2	P0B8B	P1E70	P0BAF	P1BBD	P1E02
P1B5B	P1BEE	P1B62	P1BF5	P0B95	P1E71	P0BB4	P1BC0	P1B74
P1B5E	P1BF1	P1B65	P1BF8	P0B9A	P1E72	P0BB9	P1BC3	U2603
P1B61	P1BF4	P1B68	P1BFB	P0B9F	P1E73	P1B16	P1BC6	P0BB3
P1B64	P1BF7	P1B6B	P1BFE	P0BA4	P1E74	P1B19	P1BC9	P1E77
P1B67	P1BFA	P1B6E	P1E03	P0BA9	P1E75	P1B1C	P1BCC	P1B22
P1B6A	P1BFD	P1B71	P1E06	P0BAE	P1E76	P1B1F	P1BCF	P1BD2

#### VICMVoltageFA

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

## 11 OBDG01 HYBRID Diagnostics

### Fault Bundles - HPC2 (VICM)

P0B7E	P1B6A	P1BC7	P0B70	P1B62	P1BBF	P1E91	P0B77	P1BED
P0B83	P1B6D	P1BCA	P0B75	P1B65	P1BC2	P1E8E	P0B7C	P1BF0
P0B88	P1B70	P1BCD	P0B7A	P1B68	P1BC5	P1E93	P0B81	P1BF3
P0B8D	P1B73	P1BD0	P0B7F	P1B6B	P1BC8	P1E96	P0B86	P1BF6
P0B92	P1B76	P1BD3	P0B84	P1B6E	P1BCB	P1E95	P0B8B	P1BF9
P0B97	P1B79	P1BD6	P0B89	P1B71	P1BCE	P1E97	P0B95	P1BFC
P0B9C	P1B7C	P1BD9	P0B8E	P1B74	P1BD1	P1E94	P0B9A	P1E01
P0BA1	P1B7F	P1BDC	P0B93	P1B77	P1BD4	P1E99	P0B9F	P1E04
P0BA6	P1B82	P1BDF	P0B98	P1B7A	P1BD7	P1E9C	P0BA4	P1E57
P0BAB	P1B85	P1BE2	P0B9D	P1B7D	P1BDA	P1E9B	P0BA9	P1E68
P0BB0	P1B88	P1BE5	P0BA2	P1B80	P1BDD	P1E9D	P0BAE	P1E7A
P0BB5	P1B8B	P1BE8	P0BA7	P1B83	P1BE0	P1E9A	P0BB3	P0B41
P0BBA	P1B8E	P1BEB	P0BAC	P1B86	P1BE3	P1E9F	P0BB8	P0B96
P1B28	P1E58	P1E69	P1E7B	P0B46	P0B9B	P1B51	P1B84	P1B4E
P1B29	P1E59	P1E6A	P1E7C	P0B4B	P0BA0	P1B54	P1B87	P1B81
P1B2A	P1E5A	P1E6B	P1E7D	P0B50	P0BA5	P1B57	P1B8A	P1BB4
P1B2B	P1E5B	P1E6C	P1E7E	P0B55	P0BAA	P1B5A	P1B8D	P1E56
P1B2C	P1E5C	P1E6E	P1E7F	P0B5A	P0BAF	P1B5D	P1B90	P1E67
P1B2D	P1E5D	P1E6F	P1E80	P0B5F	P0BB4	P1B60	P1B93	P1E79
P1E4C	P1E5E	P1E70	P1E81	P0B64	P0BB9	P1B63	P1B96	P0B3C
P1E4D	P1E5F	P1E71	P1E82	P0B69	P1B16	P1B66	P1B99	P0B91
P1E4E	P1E60	P1E72	P1E83	P0B6E	P1B19	P1B69	P1B9C	P1B4B
P1E4F	P1E61	P1E73	P1E84	P0B73	P1B1C	P1B6C	P1B9F	P1B7E
P1E50	P1E62	P1E74	P1E86	P0B78	P1B1F	P1B6F	P1BA2	P1BB1
P1E51	P1E63	P1E75	P1E87	P0B7D	P1B22	P1B72	P1BA5	
P1E52	P1E64	P1E76	P1E88	P0B82	P1B25	P1B75	P1BA8	
P1E53	P1E65	P1E77	P1E89	P0B87	P1B45	P1B78	P1BAB	
P1E54	P1E66	P1E78	P1E8A	P0B8C	P1B48	P1B7B	P1BAE	

#### TempRationalityFA

P0A9C	P0C82	P0CB3	P1EA0
P0A9D	P0C83	P0CB4	P1EA1
P0A9E	P0C84	P0CB5	P1EA2
P0AC6	P0C89	P0CB8	P1EA3
P0AC7	P0C8A	P0CB9	P1EA5

## 11 OBDG01 HYBRID Diagnostics

### Fault Bundles - HPC2 (VICM)

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P0AC8	P0C8B	P0CBA	P1EB1
P0ACB	P0C8E	P1E8E	P1EB2
P0ACC	P0C8F	P1E8F	P1EB3
P0ACD	P0C90	P1E90	P1EB4
P0AE9	P0C93	P1E91	P1EB5
P0AEA	P0C94	P1E93	U2401
P0AEB	P0C95	P1E94	U2603
P0BC3	P0C98	P1E95	U2604
P0BC4	P0C99	P1E96	U2605
P0BC5	P0C9A	P1E97	U2606
P0C34	P0CA9	P1E99	
P0C35	P0CAA	P1E9A	
P0C36	P0CAB	P1E9B	
P0C7D	P0CAE	P1E9C	
P0C7E	P0CAF	P1E9D	
P0C7F	P0CB0	P1E9F	

# 11 OBDG01 HYBRID Diagnostics

## Supporting Definitions

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

## Glossary of Key Terms

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

### Time Required

X: Fail Counts

R: Loop Time

T: Fault Detect Time