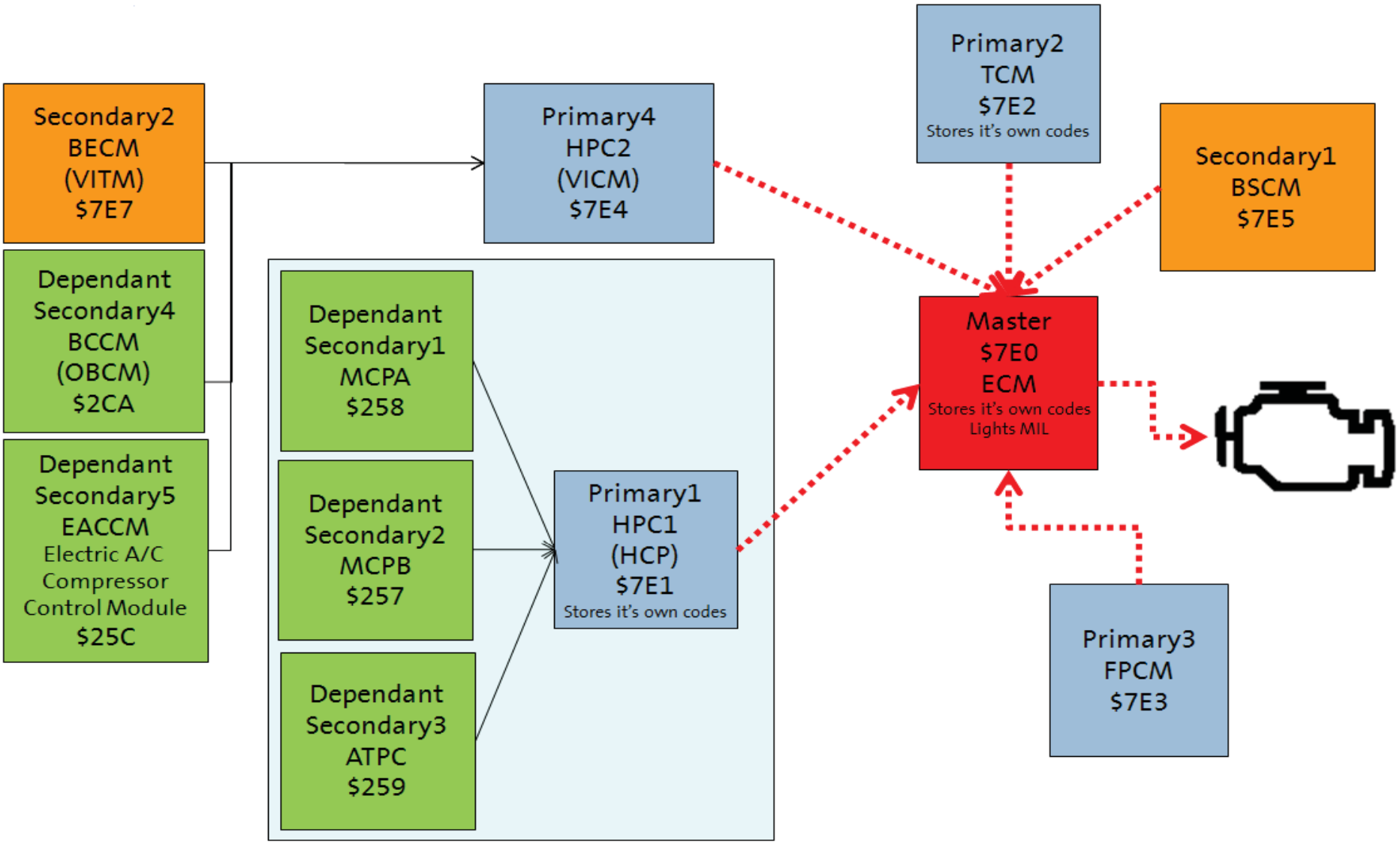
13 OBDG01 Hybrid TCM Diagnostics



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
Power Moding Diagnostics								
System Voltage Low	P0562	Sets when the low voltage system voltage is below a threshold	Ignition Voltage	Ignition Voltage <= 10 Volts	RunCrankActive Engine Speed	= 1 >= 0 RPM	5 seconds in a 6 second window	Special Type C
		DTC Pass		Ignition Voltage > 10 Volts			1 second	
System Voltage Hi	P0563	Sets when the low voltage system voltage is above a threshold	Ignition Voltage	Ignition Voltage >= 18 Volts	RunCrankActive	= 1	5 seconds in a 6 second window	Special Type C
		DTC Pass		Ignition Voltage < 18 Volts			1 second	
Shift Solenoid Hydraulic Diagnostics								
Shift Solenoid Hydraulic Diagnostics P0751, P0752, P0756, P0757 have the following common enable criteria	***				Line Pressure Estimate Propulsion System Active	> 325 kpa AND >= 325 kpa FOR > 1 seconds AND > 100 kpa = 1		
Shift Solenoid Valve A Stuck Off	P0751	This DTC will indicate when Shift Solenoid Valve A (X Valve) is stuck in the hydraulically low position This detection only occurs during an X valve transition	X valve is determined to be in a hydraulically Low state when it has been commanded hydraulically High.	X Commanded Hi for > XvalveTurnOnTime + 1 seconds Where XValveTurnOnTime: Trans Fluid Temp Time -40 0.50 -30 0.35 -20 0.250 -10 0.09 20 0.05 140 0.02	X Command X Position	1 0	Fail conditions met for 3 seconds. 3 retries with failure to move solenoid required to set MIL	One Trip, Type A
		DTC Pass	X valve completes Low to High transition without failure		X Command X Position	1 1	1 loop execution at 0.0125 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Shift Solenoid Valve A Stuck On	P0752	This DTC will indicate when Shift Solenoid Valve A (X Valve) is stuck in the hydraulically hi position This DTC is linked to both a steady state and transitional test.	X valve is determined to be in a hydraulically high state when it has been commanded to a low state.	**Transition Case:** X commanded Low for > (XvalveTurnOffTm + 1) seconds Where XValveTurnOffTime: Trans Fluid Temp Time -40 4 -30 2.25 -20 1.4 -10 .5 20 0.265 140 0.0325	X Command X Position	0 1	Fail conditions met for 3 seconds. 3 retries with failure to move solenoid required to set MIL	One Trip, Type A
		DTC Pass (**Transitional Pass**)	X valve completes High to Low transition without failure		X Command X position PCS2 and PCS4 Monitors	0 0 No Fault Pending	5 seconds	
				Steady State Case: Simultaneous failures occur on both PCS2 and PCS4 monitors	XY state PCS2 and PCS4 faults	EVT Lo **OR** EVT Hi Occur Simultaneously - within (VlvXStckHiSteadyStWindow + 0.1) seconds Where VlvXStckHiSteadyStWindow: Trans Fluid Temp Time -50 0.50 -32 0.50 -24 0.50 -5 0.50 4 0.50 40 0.50	Fail Conditions met for 2 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass (**Steady State Pass**)	X valve completes High to Low transition without failure		X Command X position PCS2 and PCS4 Monitors	0 0 No Fault Pending	5 seconds	
Shift Solenoid Valve B Stuck Off	P0756	This DTC will indicate when Shift Solenoid Valve B (Y Valve) is stuck in the hydraulically low position This detection only occurs during an Y valve transition	The Y valve is determined to be in a hydraulically Low state when it has been commanded hydraulically High.	Y Commanded Hi for > (Yvalve_TurnOnTm + 1 seconds Where Yvalve_TurnOnTm: Trans Fluid Temp Time -40 15 -30 10 -20 5 -10 0.30 20 0.15 140 0.05	Y Command Y Position	1 0	Fail Conditions met for 4.5 seconds. 3 retries with failure to move solenoid required to set MIL	One Trip, Type A
		DTC Pass	Y valve completes Low to High transition without failure		Y command Y Position	1 1 (as indicated by YPSw showing 0 value)	Pass conditions met for 2 seconds	
Shift Solenoid Valve B Stuck On	P0757	This DTC will indicate when Shift Solenoid Valve B (Y Valve) is stuck in the hydraulically hi position This detection only occurs during an Y valve transition	The Y valve is determined to be in a hydraulically Hi state when it has been commanded hydraulically Lo	Y Commanded Lo for > (Yvalve_TurnOffTm + 1) seconds Where Yvalve_TurnOffTm: Trans Fluid Temp Time -40 4 -30 2.7 -20 1.4 -10 .7 20 .2 140 .05	Y Command Y Position	0 1	Fail Conditions met for 4.5 seconds. 3 retries with failure to move solenoid required to set MIL	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Y valve completes High to Low transition without failure		Y Command Y Position	0 0 (as indicated by YPSw showing 1 value)	Pass conditions met for 2 seconds	
Pressure Control Solenoid Hydraulic Diagnostics								
Pressure Control Solenoid hydraulic diagnostics P0777, P0797, P2715, share these common secondary parameter enable conditions	***				Xvalve transition X Valve Stuck Hi Detection LinePressure Estimate Propulsion System Active	X valve is not in a transition, and hasn't transitioned in the last 0.275 seconds (0.025 + .25) No fault pending > 325 kpa AND >=325 kpa FOR > 1 seconds =1		
Pressure Control (PC) Solenoid B Stuck ON	P0777	This DTC will determine if Pressure Control Solenoid 2 (B) is stuck in the hydraulically hi position. This DTC has two fail cases.	The pressure switch associated with pressure control solenoid B (PCS2) is indicating that the PCS is in the full feed position when the PCS has been commanded regulating exhaust.	**Fail Case 1:** PCS2PS (PSw3) indicates hi hydraulic pressure	PCS commanded pressure *** Common Hydraulic Enables	<= 5 kpa for >= (FFDelay + 0.1) seconds Where FFDelay: Temp Time -50 4.50 -30 1.40 -18 0.80 -4 0.30 13 0.19 40 0.08	Failure exists for 30 seconds (2400 * 0.0125)	One Trip, Type A
		DTC Pass	Pass when PCS2PS and PCS2Cmnd are in agreement (Reg Exhaust)	PCS2PS (PSw3) indicates Low hydraulic pressure			1.25 seconds ((2500 - 2400) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			The warning threshold for Fail Case 1 has been met 5 times in a single key cycle	**Fail Case 2:** Fail case 1 criteria met for at least 0.5 seconds (40 * 0.0125), more than 10 times in a given key cycle	Same as **Fail Case 1.**		N/A	
Pressure Control (PC) Solenoid C Stuck ON	P0797	This DTC will determine if Pressure Control Solenoid 3 (C) is stuck in the hydraulically hi position. This DTC has two fail cases.	The pressure switch associated with pressure control solenoid C (PCS3) is indicating that the PCS is in the full feed position when the PCS has been commanded regulating exhaust.	**Fail Case 1:** PCS3PS (PSw1) indicates hi hydraulic pressure	PCS commanded pressure *** Common Hydraulic Enables	<=5 kpa for >= (FFDelay + 0.1) seconds Where FFDelay: Trans Fluid Temp Time -50 4.50 -30 1.40 -18 0.80 -4 0.30 13 0.19 40 0.08	Failure exists for 30 seconds (2400 * 0.0125)	One Trip, Type A
		DTC Pass	Pass when PCS3PS and PCS3Cmnd are in agreement (Reg Exhaust)	PCS3PS (PSw1) indicates Low hydraulic pressure			1.25 seconds ((2500 - 2400) * 0.0125)	
			The warning threshold for Fail Case 1 has been met 5 times in a single key cycle	**Fail Case 2:** Fail case 1 criteria met for at least 0.5 seconds (40 * 0.0125), more than 10 times in a given key cycle	Same as **Fail Case 1.**		N/A	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control (PC) Solenoid D Stuck ON	P2715	This DTC will determine if Pressure Control Solenoid 4 (D) is stuck in the hydraulically hi position. This DTC has two fail cases.	The pressure switch associated with pressure control solenoid D (PCS4) is indicating that the PCS is in the full feed position when the PCS has been commanded regulating exhaust.	**Fail Case 1:** PCS4PS (PSw4) indicates hi hydraulic pressure	PCS commanded pressure *** Common Hydraulic Enables	<= 5 kpa for >= (FFDelay + 0.1) seconds Where FFDelay: Trans Fluid Temp Time -50 4.50 -30 1.40 -18 0.80 -4 0.30 13 0.19 40 0.08	Failure exists for 30 seconds (2400 * 0.0125)	Two Trips, Type B
		DTC Pass	Pass when PCS4PS and PCS4Cmnd are in agreement (Reg Exhaust)	PCS4PS (PSw4) indicates Low hydraulic pressure			1.25 seconds ((2500 - 2400) * 0.0125)	
			The warning threshold for Fail Case 1 has been met 5 times in a single key cycle	**Fail Case 2:** Fail case 1 criteria met for at least 0.2 seconds (16 * 0.0125), more than 5 times in a given key cycle	Same as **Fail Case 1.**		N/A	
Clutch Slip Diagnostics								
Clutch slip diagnostics P079A, P079B, P079C share these common secondary parameter enable conditions	***				LinePressureEstimate	> 235 kpa **AND** > (MinLinePressure - 2) kpa Where MinLinePressure is a lookup table Trans Fluid Temp vs Line Pressure: Temp Kpa -40 1200 -30 1200 -20 1000 -10 700 0 500 10 265		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Clutch 1 Slip	P079A	This DTC sets when excessive slip is observed on C1 while commanded on	Clutch 1 Slip Speed	C1 Slip > 200 RPM	C1 Pressure Command C1 Torq Estimate C1 Fill detected	> = 1800 kpa > = 200 Nm =1 Predicted Mtr A spd Predicted Mtr B spd	63 seconds (3 retries * 1s failtime * 30 seconds between attempts **OR** Instantly if >6300 **OR** >9500	One Trip, Type A
		DTC Pass	Clutch 1 Slip Speed	C1 Slip < 50 RPM	C1 Pressure Command C1 Torq Estimate C1 Fill detected	> = 1800 kpa > = 20 Nm = 1	0.125 seconds (10 * 0.0125)	
Clutch 2 Slip	P079B	This DTC sets when excessive slip is observed on C2 while commanded on	C2 Slip Speed	C2 Slip > 200 RPM	C2 Pressure Command C2 Torq Estimate C2 Fill detected	> = 1800 kpa > = 200 Nm = 1 Predicted Mtr A spd Predicted Mtr B spd	63 seconds (3 retries * 1s failtime * 30 seconds between attempts **OR** Instantly if >6300 **OR** >9500	One Trip, Type A
		DTC Pass	C2 Slip Speed	C2 Slip < 50 RPM	C2 Pressure Command C2 Torq Estimate C2 Fill detected	> = 1800 kpa > = 20 Nm =1	0.125 seconds (10 * 0.0125)	
Clutch 3 Slip	P079C	This DTC sets when excessive slip is observed on C3 while C3 has been commanded on	C3 Slip Speed	C3 Slip > 300 RPM	C3 Pressure Command C3 Torq Estimate C3 Fill detected	> = 1800 kpa > = 200 Nm = 1 Predicted Mtr A spd Predicted Mtr B spd	63 seconds (3 retries * 1s failtime * 30 seconds between attempts **OR** Instantly if >6300 **OR** >9500	One Trip, Type A
		DTC Pass	C3 Slip Speed	C3 Slip < 50 RPM	C3 Pressure Command C3 Torq Estimate C3 Fill detected	> = 1800 kpa > = 20 Nm = 1	0.125 seconds (10 * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control Solenoid Electrical Diagnostics								
All Pressure Control Solenoid electrical diagnostics P0961, P0962, P0963, P0965, P0966, P0967, P0969, P0970, P0971, P2719, P2720, P2721, P2728, P2729, P2730, P0973, P0974, P0976, P0977 share these common	***				Ignition voltage Engine Speed Vehicle Speed PropSysActive	> = 11 Volts && <= 16 Volts >= 0 RPM && <= 7500 RPM for >= 5 seconds <= 200 mph for >= 5 seconds =1		
Pressure Control (PC) Solenoid A System Performance	P0961	This DTC sets when an invalid voltage in PCS1 control circuit has been detected	PCS1 electrical status	HWIO circutry detects out of range error is present	DTC P0961 *** Common Electrical Enables	Not failed this key on	Failure detected for 4 seconds (320 * 0.0125) out of a 5 second (400 * 0.0125) window	Two Trips, Type B
		DTC Pass		HWIO circuitry detects an out of range error is not present			1 second ((400 - 320) * 0.0125)	
Pressure Control (PC) Solenoid A Control Circuit Low Voltage	P0962	This DTC sets when the PCS1 control circuit has been detected to be shorted to ground	PCS1 electrical status	HWIO circuitry detects an electrical low pressure error is present	DTC P0962 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Pressure Control (PC) Solenoid C System Performance	P0969	This DTC sets when an invalid voltage in PCS3 control circuit has been detected	PCS3 electrical status	HWIO circutry detects out of range error is present.	DTC P0965 *** Common Electrical Enables	Not failed this key on	Failure detected for 4 seconds (320 * 0.0125) out of a 5 second (400 * 0.0125) window	Two Trips, Type B
		DTC Pass		HWIO circuitry detects an out of range error is not present			1 second ((400 - 320) * 0.0125)	
Pressure Control (PC) Solenoid C Control Circuit Low Voltage	P0970	This DTC sets when the PCS3 control circuit has been detected to be shorted to ground	PCS3 electrical status	HWIO circuitry detects an electrical low pressure error is present.	DTC P0966 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Pressure Control (PC) Solenoid C Control Circuit High Voltage	P0971	This DTC sets when PCS3 has been detected to be shorted to power or open circuited.	PCS3 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P0967 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.2 seconds (16 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 16) * 0.0125)	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass		HWIO circuitry detects an out of range error is not present			1 second ((400 - 320) * 0.0125)	
Pressure Control (PC) Solenoid E Control Circuit Low Voltage	P2729	This DTC sets when the PCS5 control circuit has been detected to be open circuit or shorted to power	PCS5 electrical status	HWIO circuitry detects an electrical low pressure error is present.	DTC P2720 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Pressure Control (PC) Solenoid E Control Circuit High Voltage	P2730	This DTC sets when PCS5 has been detected to be shorted to ground	PCS5 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P2721 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Shift Solenoid A Control Circuit Low	P0973	This DTC detects a short to power or open circuit in the X valve control circuit.	X Valve Electrical Status	HWIO circuitry detects an open circuit or short to power error is present.	DTC P0973 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32*0.0125) out of a 0.5 second (40*0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an open circuit or short to power error is not present.			0.1 seconds ((20 - 16) * 0.025)	

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 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32*0.0125) out of a 0.5 second (40*0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an open circuit or short to power error is not present.			0.1 seconds ((20 - 16) * 0.025)	
Shift Solenoid B Control Circuit High	P0977	This DTC detects a short to ground in the Y valve control circuit.	Y Valve Electrical Status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P0977 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (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)	
Power Moding Diagnostics								
Ignition Switch Run/Start Position Circuit Low	P2534	Detects a run crank relay open circuit	Runk Crank Line voltage	Ignition Run Crank line voltage <= 2 Volts	CAN Communication	enabled	60 seconds (2400 * 0.025) in a 65 second window (2600 * 0.025)	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					ECM run crank active data	available and active		
		DTC Pass	Run Crank Line Voltage	Ignition Run Crank line voltage > 2 Volts			5 seconds (200 * 0.025)	
Ignition Switch Run/Start Position Circuit High	P2535	Detects a run crank relay short to power	Runk Crank Line voltage	Ignition Run Crank line voltage > 5 V	CAN Communication ECM run crank active data	enabled available and false	12 seconds (480 * 0.025) in a 15 second window (600 * 0.025)	One Trip, Type A
		DTC Pass	Run Crank Line Voltage	Ignition Run Crank line voltage < 2V			3 seconds (120 * 0.025)	
Ignition Switch Accessory Position Circuit Low	P2537	Detects an accessory position circuit open	Accessory On	FALSE	P2537	Not Test Failed This Key On and Not Test Passed This Key On	0.2 seconds (8 * 0.025)	One Trip, Type A
					Propulsion System	Active		
					Propulsion System Active Time	> 0.5 seconds		
		DTC Pass	Accessory On	TRUE			0.2 seconds (8 * 0.025)	
TCM Substrate Temp Sensor								
Transmission Control Module (TCM) Internal Temperature Too High	P0634	The DTC detects the electronic circuitry is at high operating temperature.	Transmission Substrate Temperature OR Ignition Voltage AND Substrate Temperature	≥ 142 °C ≥ 18 V ≥ 50 °C	Transmission Substrate Temperature	-50 °C ≤ Transmission Substrate Temperature ≤ 146 °C for 0.25 seconds	≥ 5 seconds ≥ 2 seconds **Pass Conditions** Transm'n Substrate Temp ≤ 142 °C and Ignition Voltage is ≤ 18 V for 10 seconds **OR** Transm'n Substrate Temp ≤ 50 °C and Ignition Voltage is ≥ 18 V for 10 seconds	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Transmission Control Module (TCM) Substrate Temperature Sensor Circuit Range/Performance	P0667	The DTC detects the TCM substrate temperature sensor is reporting an incorrect value	Delta between TCM substrate temperature sensor and transmission fluid temperature sensor (TFT)	> Highest of transmission temperature sensors Temp Delta -40.1 256 -40 50 -20 30 0 30 30 30 60 30 100 30 149.0 30 149.1 256	IF vehicle speed is < 5 mph and accelerator position is > 20% for more than 7 seconds, then diagnostic is disabled. Once above conditions are removed > 20 seconds, diagnostic is re-enabled		> 300 seconds (3000 counts at 100ms)	Two Trips, Type B
			AND					
			Delta between TCM substrate temperature sensor and TCM powerup temperature sensor	> Highest of transmission temperature sensors Temp Delta -40.1 256 -40 15 -20 15 0 15 30 15 60 15 100 15 149.0 15 149.1 256	Transmission state	NOT in park/neutral		
					Engine Torque Inaccurate	Must be FALSE		
					Accelerator Position Sensor Failure	Must be FALSE		
					P0721, P0722, P0723, P215C, P0658, P0668, P0669, P0712, P0713, P06AD, P06AE	NOT Fault Active OR Failed This Key On		
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
					Vehicle Speed	≤ 124 MPH for 5 seconds		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Transm'n substrate temp delta between powerup temp sensor AND fluid temp sensor	< value in fail criteria table			> 70 sec (700 counts at 100ms)	
Transmission Control Module (TCM) Substrate Temperature Sensor Circuit Low (Failed at a low temperature - circuit short to ground).	P0668	The DTC detects TCM substrate temperature sensor short to ground error.	TCM Substrate Temperature Sensor	≤ -60 °C	Engine Speed Vehicle Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 124 MPH for 5 seconds	≥ 60 seconds **Pass Conditions** Transm'n Substrate Temp ≥ -55 °C for 4 seconds	Two Trips, Type B
Transmission Control Module (TCM) Substrate Temperature Sensor Circuit High (Failed at a high temperature - circuit open or short to power).	P0669	The DTC detects TCM substrate temperature sensor open or short to power error.	TCM Substrate Temperature Sensor	≥ 160 °C	Engine Speed Vehicle Speed Transmission Output Speed Estimated Motor Power Loss	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 124 MPH for 5 seconds Transmission Output Speed ≥ 200 RPM for 5 seconds cumulative. Estimated Motor Power Loss ≥ 0.4 kW for 200 seconds cumulative.	≥ 60 seconds	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							Pass Conditions Transm'n Substrate Temp ≤ 150 °C for 4 seconds	
TCM Powerup Temp Sensor								
Transmission Control Module (TCM) Powerup Temperature Sensor Circuit Range/Performance	P06AC	The DTC detects the TCM powerup temperature sensor is reporting an incorrect value	Delta between TCM powerup temperature sensor and transmission fluid temperature sensor (TFT) AND Delta between TCM powerup temperature sensor 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 > 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	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 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	> 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
					Engine Speed Vehicle Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 124 MPH for 5 seconds		
		DTC Pass	Transm'n substrate temp delta between powerup temp sensor AND fluid temp sensor	< value in fail criteria table			> 70 sec (700 counts at 100ms)	
Transmission Control Module (TCM) Powerup Temperature Sensor Low (Failed at a low temperature - circuit short to ground).	P06AD	The DTC detects TCM powerup sensor short to ground error.	TCM Power Up Temperature Sensor	≤ -59 °C	Engine Speed Vehicle Speed Estimated Motor Power Loss NOT Fault Active OR Failed This Key On	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 124 MPH for 5 seconds Estimated Motor Power Loss ≥ 0.4 kW for 200 seconds cumulative. P0721, P0722, P0723, P215C	≥ 60 seconds **Pass Conditions** Transm'n Substrate Temp ≥ -40 °C for 4 seconds	Two Trips, Type B
Transmission Control Module (TCM) Powerup Temperature Sensor Circuit High (Failed at a	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	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
high temperature - circuit open or short to power).							**Pass Conditions** Transm'n Substrate Temp ≤ 150 °C for 4 seconds	
Transmission Fluid Temp Sensor								
Transmission Fluid Temperature Sensor Circuit Range/Performance	P0711	The DTC detects the transmission fluid temperature is reporting an incorrect value	Delta between transmission fluid temperature (TFT) and TCM powerup temperature sensor	> 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 is re-enabled		> 300 seconds (3000 counts at 100ms)	Two Trips, Type B
			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 P0721, P0722, P0723, P215C, P0658, P0668, P0669, P0712, P0713, P06AD, P06AE	NOT in park/neutral Must be FALSE Must be FALSE NOT Fault Active OR Failed This Key On		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Engine Speed Vehicle Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 124 MPH for 5 seconds		
		DTC Pass	Transm'n substrate temp delta between powerup temp sensor AND fluid temp sensor	< value in fail criteria table			> 70 sec (700 counts at 100ms)	
Transmission Fluid Temperature Sensor Circuit Low (Failed at a low temperature - circuit short to ground).	P0712	The DTC detects transmission fluid sensor short to ground error.	Transmission Sump Temperature Sensor	≤ -60 °C	P0721, P0722, P0723, P077B, P215C Engine Speed Vehicle Speed Estimated Motor Power Loss	NOT Fault Active OR Failed This Key On 0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 124 MPH for 5 seconds Estimated Motor Power Loss ≥ 0.4 kW for 200 seconds cumulative.	≥ 60 seconds **Pass Conditions** Transm'n Sump Temp ≥ -50 °C for 4 seconds	One Trip, Type A
Transmission Fluid Temperature Sensor Circuit High (Failed at a high temperature - circuit open or short to power).	P0713	The DTC detects substrate sensor open or short to power error.	Transmission Sump Temperature Sensor	≥ 160 °C	P0721, P0722, P0723, P077B, P215C Engine Speed Vehicle Speed	NOT Fault Active OR Failed This Key On 0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 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
							Pass Conditions Transm'n Substrate Temp ≤ 149 °C for 4 seconds	
Transmission Output Speed Sensor								
Transmission Output Speed (TOS) Sensor Wrong Direction	P0721	The DTC detects incorrect TOS direction.	TOS Raw Direction	TOS Direction Raw is not Forward or Reverse	TOS Sample Period	≠ 0	≥ 2.5 seconds (100 counts at 25ms) **Pass Conditions** TOS Direction Raw = Forward or Reverse for 3.125 seconds (125 counts at 25ms)	One Trip, Type A
Output Speed Sensor Circuit - Direction Error	P077B	The DTC detects if the Transmission Output Speed Sensor Direction is Incorrect by Comparing with Calculated Direction from Motor Speed Sign	Transmission Output Speed Direction Raw	≠ Motor Direction	CAN Communication Lost With Transmission P215C TOS Hardware Input Output Transmission Hybrid Motor Speed based Estimated Output Speed is Valid Transmission Output	FALSE NOT Fault Active Valid Calculated based on M1 or M2 Speed Equation ≤ 50 RPM	0.35 seconds (14 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
					Speed and Motor Output Speed Difference		**Pass Conditions** Opposite as FAIL for 5 seconds (200 counts at 25ms)	
					Motor Estimated Transmission Output Speed	≥ 50 RPM		
Output Shaft Speed (OSS) - Wheel Speed Correlation	P215C	The DTC Correlates the Transmission Output Speed with the ABS Wheel Speed and Motor Speed to Detect any Failures in the Transmission Output Speed Sensor.	Difference between Transmission Output Speed and the Calculated Average of Output Speed from the Motors and Wheel Speed Sensors	≥ 175 RPM	WHEN Output Speed Calculated from Wheel Speeds AND Output Speed Calculated from Motor Speeds	> 150 RPM	200 ms (8 counts at 25ms)	Two Trips, Type B
					Output Speed Calculated from Motor Speeds AND Output Speed Calculated from Wheel Speeds Difference	≤ 40 RPM		
					OBD Wheel Speed Sensors	TRUE	**Pass Conditions** Difference between Transm'n Output Speed and the Calculated Average of Output Speed from the Motors and Wheel Speed Sensors ≤ 125 RPM for 0.5 seconds (20 counts at 25ms)	
					Driven Wheel Estimated Vehicle Speed Fault	FALSE		
					Propulsion System Active	TRUE		
					Hybrid Motor Speed based Estimated Output Speed is Valid	Calculated based on M1 or M2 Speed Equation		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Transmission Internal Mode Switch								
Internal Mode Switch P Circuit High Voltage	P1824	The DTC monitors if the IMS P Circuit is shorted to a High Voltage	Transmission Direction State	PARK	P1824	NOT Fault Active OR Failed This Key On	2.5 seconds + 1 count at 6.25ms	Two Trips, Type B
			PRNDL P Circuit Sensed	Has Not Been Observed Low	Transmission Direction State Fault Active	FALSE	Pass Conditions PRNDL P Circuit Has Been Observed Low for 1.5875 seconds	
					Ignition Voltage	11V < IGN < 32V		
					Run/Crank Active	TRUE		
					Vehicle Speed	≤ 124 MPH for 5 seconds		
					Engine Speed	0 ≤ Engine Speed < 7500RPM		
Internal Mode Switch A Circuit Low Voltage	P182A	The DTC monitors if the IMS A Circuit is shorted to a Low Voltage	PRNDL State	Transitional 1	Automatic Transmission Type	EVT	8 seconds + 1 count at 6.25ms	Two Trips, Type B

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

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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			PRNDL C Circuit Sensed	Has Not Been Observed Low	P182F	NOT Fault Active OR Failed This Key On	**Pass Conditions** PRNDL C Circuit Has Been Observed Low for 4 seconds + 1 count at 6.25ms	
					Trans Direction State Fault Active	FALSE		
					Ignition Voltage	11V < IGN < 31.99		
					Run/Crank Active	TRUE		
					TOS Sensor	Not Fault Active		
Internal Mode Switch A Circuit High Voltage	P1838	The DTC monitors if the IMS A Circuit is shorted to a High Voltage	Transmission Direction State	PARK	P1838	NOT Fault Active OR Failed This Key On	2.5 seconds + 1 count at 6.25ms	Two Trips, Type B
			PRNDL A Circuit Sensed	Has Not Been Observed Low	Trans Direction State Fault Active	FALSE	**Pass Conditions** PRNDL A Circuit Has Been Observed Low for 1.5875 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Ignition Voltage Run/Crank Active	11V < IGN < 31.99 TRUE		
Internal Mode Switch C Circuit Low Voltage	P1839	The DTC monitors if the IMS C Circuit is shorted to a Low Voltage	Transmission Direction State PRNDL C Circuit Sensed	PARK PRNDL C Circuit Has Not Been Observed High	P1839 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 **Pass Conditions** PRNDL C Circuit Has Been Observed Low for 1.5875 seconds	Two Trips, Type B
Controller Diagnostics								
Control Module Read Only Memory	P0601	*This Diagnostic tests the checksum on ROM (flash) memory*						One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
(ROM)		**DTC Fail case 1:** This DTC will be stored if any check sum in the **boot** is incorrect	Calculated Checksum does not match stored checksum		Ignition Status	= Run or Crank	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5 failures Frequency: Runs continuously in the background	
		DTC Fail case 2: This DTC will be stored if any check sum in the **calibration** is incorrect						
		DTC Fail case 3: This DTC will be stored if any check sum in the **software** is incorrect						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass:		ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false				
Control Module Not Programmed	P0602	*This Diagnostic tests for whether a controller has been programmed*						One Trip, Type A
		DTC Fail case 1: Indicates that the HCP needs to be programmed	Fails if No Start Calibration is set to true which is only available on a new un-programmed HCP		Ignition Status	= Run or Crank	Runs once at power up	
		DTC Pass:		Enable cal = false				
Control Module Long Term Memory Reset	P0603	*This Diagnostic tests for BINVDM errors*						One Trip, Type A
		DTC Fail case 1: Non-volatile memory (**Static**) checksum error at controller power-up			Ignition Status	= Run or Crank	1 failure Frequency: Once at powerup	
		DTC Fail case 2: Non-volatile memory (**Preserved**) checksum error at controller power-up	Checksum at power-up does not match checksum at power-down					

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 4: WD error counter doesn't reach its desired level (sdi_Ufet = 1)	WD error count is higher than threshold	- WD error count: 0	IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 5: WD error counter does not reach its desired level (sdi_Ufet = 4)	WD error count is equal or higher than threshold	- WD error count: 4	IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 6: WD error counter does not reach its desired level (sdi_Ufet = 6)	WD error count is equal or higher than threshold	- WD error count: 6	IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 7: HSD(High Side Driver) cannot be switched on at WD error counter <= 4	Actuator supply is lower than 90% of Batt. Voltage or WD error count is higher than threshold during more than 40 msec. AND Output stage is not interlocked AND Actuator supply voltage is within range	- WD error counter: > 0 - actuator supply voltage: >1.5 volts and <= 5.5 volts	IPT test started	end of Initialization	3.125ms loop	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 8: DReset line = low level, HSD cannot be switched on (fgtr_DReset = True)	Actuator supply is lower than 90% of Batt. Voltage or WD error count is higher than 0 during more than 40 msec. AND Output stage is interlocked.		IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 9: HSD cannot be switched off at WD error counter >= 5	Actuator supply voltage is out of range or WD error count is lower than threshold during more than 40 msec. AND Output stage is interlocked AND Actuator supply voltage is equal or higher than 90% of the Batt. Voltage.	- actuator supply voltage: < 1.5 volts or > 5.5 volts -WD error counter:<5	IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 10: DReset line = high level, HSD cannot be switched off (fgtr_DReset = False)	Actuator supply voltage is out of threshold range during more than 40 msec. AND WD error count is equal or higher than threshold	- 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
			AND Output stage is not interlocked					
		DTC Fail case 11: Run time of IPT function too long	IPT execution time is equal or greater than time threshold.	- time threshold : 300ms	IPT test started	end of Initialization	3.125ms loop	
Internal Control Module A/D Processing Performance	P060B	*HWIO executes the A/D converter test. This test checks the Vref voltage at 3 levels.*						One Trip, Type A
		DTC Fail case 1: AtoD converter test result is failed	0 x Vref is higher than voltage threshold	> approx. 0.01467 Volts	Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	6.25ms	
		DTC Fail case 2: AtoD converter test result is failed	0.5 x Vref is out of voltage threshold	< approx. 2.479 Volts OR > approx. 2.518 Volts			6.25ms	
		DTC Fail case 3: AtoD converter test result is failed	1.0 x Vref is out of voltage threshold.	< approx. 4.978 Volts OR > approx. 2.518 Volts			6.25ms	
Torque Security								
Control Module Long Term Memory	P062F	*This Diagnostic tests for unuseable BINVDM (flash) memory only*						One Trip, Type A

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 4:	Control State Request for Clutch 2 is NOT Active AND X Valve Command is 1 AND Y Valve Command is 0 AND Clutch 2 Pressure Command has been corrupted to higher than threshold	Clutch 2 Pressure > 178kpa time threshold: 200msec				
		DTC Fail case 5:	Control State Request for Clutch 3 is NOT Active AND X Valve Command is 1 AND Y Valve Command is 0 AND Clutch 3 Pressure Command has been corrupted to higher than threshold	Clutch 3 Pressure > 199kpa time threshold: 200msec				
		DTC Fail case 6:	Control State Request for Clutch 2 is NOT Active AND X Valve Command is 1 AND Y Valve Command is 1 AND	Clutch 2 Pressure > 178kpa time threshold: 200msec				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Clutch 2 Pressure Command has been corrupted to higher than threshold					
		DTC Fail case 7:	Control State Request for Clutch 3 is NOT Active AND X Valve Command is 1 AND Y Valve Command is 1 AND Clutch 3 Pressure Command has been corrupted to higher than threshold	Clutch 3 Pressure > 199kpa time threshold: 200msec				
Alive Rolling Count / Protection Value fault	P179B	*This Diagnostic checks for corruption in signals sent over CAN for the Hybrid Range State*						One Trip, Type A
		DTC Fail case 1: Detect the ARC (Alive Rolling Count) or Protection Value fault by checking the ARC and Protection Value of the Hybrid Range State	Current ARC is not equal to previous ARC + 1 and Primary Value is not equal to protection value		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	14 fail counts out of 16 sample counts Executes in a 12.5ms loop	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							Detects in 200ms	
		DTC Pass:		No errors in 1000ms				
Communication Diagnostics								
Control Module Comm'n Bus A Off	U0073	*This diagnostic indicates a bus off condition on HSGMLAN (Bus A)*						One Trip, Type A
		DTC Fail case 1: Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.	CAN device driver	= bus-off state.	Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	4 fail counts out of 5 samples counts Executes in a 12.5ms loop Detects in 450 ms	
					Power Mode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With ECM/PCM on Bus A	U0100	*This diagnostic indicates a lost communication between the TCM and the ECM on Bus A*						One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the ECM on Bus A	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop	
							Detects in 500 ms	
					Power Mode	=RUN/ACC		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Brake System Control Module	U0129	*This diagnostic indicates a lost communication between the TCM and the BSCM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the EBCM on Bus A	Missed EBCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 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	*This diagnostic indicates a lost communication between the HCP and the BCM on Bus A*						Special Type C
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the BCM on Bus A	Missed BCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop	
					Power Mode	=RUN/ACC	Detects in 500 ms	
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With	U0293	*This diagnostic indicates a lost communication between the TCM and the HCP*						One Trip,

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

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

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	<= 0.6 mph < 50 RPM for >= 5 seconds		
Idle Air Control (IAC) System - RPM Too Low	P0506	This DTC sets when the idle speed is lower than the targeted idle speed	Idle speed	Filtered input speed error (desired - actual) is greater than fail threshold 75 RPM. Filter coefficient for engine speed = 0.002	** Common Enables		1 loop execution at 100 ms rate	Two Trips, Type B
		DTC Pass	Idle speed		** Common Enables		Pass condition met for 15 seconds	
		DTC RePass after failure	Idle Speed	Filtered input speed error (desired - actual), is less than fail threshold 50. Filter coefficient for engine speed = 0.002	No Active DTCs: ** Common Enables	P0507	Pass condition met for 15 seconds	
Idle Air Control (IAC) System - RPM Too High	P0507	This DTC sets when the idle speed is higher than the targeted idle speed	Idle speed	Filtered input speed error (desired - actual) is less than fail threshold -150 RPM. Filter coefficient for engine speed = 0.002	** Common Enables		1 loop execution at 100 ms rate	Two Trips, Type B
		DTC Pass	Idle speed		** Common Enables		Pass condition met for 15 seconds	
		DTC RePass after failure	Idle Speed	Filtered input speed error (desired - actual), is greater than fail threshold -140. Filter coefficient for engine speed = 0.00375	No Active DTCs: ** Common Enables	P0506	Pass condition met for 15 seconds	
Power Moding Diagnostics								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
System Voltage Low	P0562	Sets when the low voltage system voltage is below a threshold	Ignition Voltage	<= 10 Volts	Ignition Key Status Engine Speed	RUN/CRANK >= 0 RPM	5 seconds in a 6 second window	Special Type C
		DTC Pass		> 10 Volts			1 second	
System Voltage Hi	P0563	Sets when the low voltage system voltage is above a threshold	Ignition Voltage	>= 18 Volts	Ignition Key Status	RUN/CRANK	5 seconds in a 6 second window	Special Type C
		DTC Pass		Ignition Voltage < 18 Volts			1 second	
Ignition Switch Run/Start Position Circuit Low	P2534	Detects a run crank relay open circuit	Runk Crank Line voltage	<= 2 Volts	CAN Communication ECM run crank active data	enabled available and active	60 seconds (2400 * 0.025) in a 65 second window (2600 * 0.025)	One Trip, Type A
		DTC Pass	Run Crank Line Voltage	> 5 Volts			5 seconds (200 * 0.025)	
Ignition Switch Run/Start Position Circuit High	P2535	Detects a run crank relay short to power	Runk Crank Line voltage	> 5 V	CAN Communication ECM run crank active data	enabled available and false	12 seconds (480 * 0.025) in a 15 second window (600 * 0.025)	One Trip, Type A
		DTC Pass	Run Crank Line Voltage	< 2V			3 seconds (120 * 0.025)	
Ignition Switch Accessory Position Circuit Low	P2537	Detects an accessory position circuit open	Accessory	FALSE	P2537 Propulsion System Propulsion System Active Time	Not Test Failed This Key On and Not Test Passed This Key On Active > 0.5 seconds	0.2 seconds (8 * 0.025)	One Trip, Type A
		DTC Pass	Accessory	TRUE			0.2 seconds (8 * 0.025)	
Stuck Clutch Diagnostics								
Transmission Friction Element A Stuck On	P07A3	Detects an applied or welded clutch (C1)	Clutch slip observed	=0	C1 clutch state	=offgoing	2s * 3 fail attempts + 2 *30 second wait between attempts	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Clutch slip	<= 30 RPM/s	3 time retry strategy	
		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	C2 clutch state	=offgoing	.9s	One Trip, Type A
			OR		Clutch slip	<= 30 RPM/s	20.6s = (.2s * 3 fail attempts + 2 *10 second wait between attempts)	
		Detects an applied or welded clutch (C2)	Clutch slip ref	>360 rpm				
			Clutch slip actual	<100 rpm				
		DTC Pass	C2 Slip observed	=1	C2 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
			Clutch slip actual	<100 rpm				
		DTC Pass	Clutch slip reference	>360 rpm			.3 s (12*.025s)	
			Clutch slip actual	>200 rpm				
Transm'n Auxilary Oil Pump Diagnostics								
Auxiliary Transmission Fluid Pump Performance	P2797	This diagnostic monitors the aux pump performance based on aux pump filtered desired and actual speed values	Difference between desired and actual aux pump speed	>650 rpm for >.25s	Aux Pump Speed Command	>= 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
					RunCrankActive	= 1 for > 0.2 s		
		DTC Pass	Aux pump speed	|Aux pump speed - Commanded Aux pump Speed| <= 650 RPM			Pass met for 0.5 seconds ((165-160) * 0.025)	
Transm'n Output Speed Sensor								
Output Speed Sensor Circuit	P077B	The DTC detects if the Transmission	Transmission Output Speed Direction Raw	≠ Motor Direction	Transmission Output Speed	Not FAULT ACTIVE	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
Direction Error		Output Speed Sensor Direction is Incorrect by Comparing with Calculated Direction from Motor Speed Sign			Hybrid Motor Speed based Estimated Output Speed is Valid	Calculated based on M1 or M2 Speed Equation		
					Transmission Output Speed and Motor Output Speed Difference	≤ 50 RPM	**Pass Conditions** Opposite of FAIL for 5 seconds (200 counts at 25ms)	
					Motor Estimated Transmission Output Speed	≥ 50 RPM		
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	**Pass Conditions** Opposite of Fail for 20 seconds (800 counts at 25ms)	
					Secured Vehicle Speed Use Wheel Speed	TRUE		
Internal Mode Switch 2								
** Common Enable Criteria All IMS Diagnostics have the following Common Enable	***				Ignition Voltage	11V < IGN < 32V		
					Run/Crank Active	TRUE		
					Vehicle Speed	< 124 mph for 5 seconds		

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		
Internal Mode Switch 2 R1 Circuit Low Voltage	P181C	The DTC Monitors if the IMS R1 Circuit is Shorted to a Low Voltage	Converted Directional IMS AND Directional IMS R1	Transitional 17 R1 Circuit Has Not Been Observed High	Converted Directional IMS AND Directional IMS R1 **Common Enable Criteria	Transitional 2 R1 Circuit NOT High for 5 seconds	2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS R1 Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 R1 Circuit High Voltage	P181D	The DTC Monitors if the IMS R1 Circuit is Shorted to a High Voltage	Converted Directional IMS AND Directional IMS R1	Transitional 30 R1 Circuit Has Not Been Observed Low	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS R1 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 R2 Circuit Low Voltage	P181E	The DTC Monitors if the IMS R2 Circuit is Shorted to a Low Voltage	Converted Directional IMS AND Directional IMS R2	DRIVE R2 Circuit Has Not Been Observed High	Converted Directional IMS AND Directional IMS R2 Directional IMS R2	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		**Pass Conditions** 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) **Pass Conditions** IMS R2 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 D1 Circuit Low Voltage	P183A	The DTC Monitors if the IMS D1 Circuit is Shorted to a Low Voltage	Converted Directional IMS AND Directional IMS D1	Transitional 8 OR Transitional 20 D1 Circuit Has Not Been Observed High	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS D1 Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 D1 Circuit High Voltage	P183B	The DTC Monitors if the IMS D1 Circuit is Shorted to a High Voltage	Converted Directional IMS AND Directional IMS D1	Transitional 27 D1 Circuit Has Not Been Observed Low	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS D1 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Internal Mode Switch 2 D2 Circuit Low Voltage	P183C	The DTC Monitors if the IMS D2 Circuit is Shorted to a Low Voltage	Converted Directional IMS AND Directional IMS D1	Transitional 24 D2 Circuit Has Not Been Observed High	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS D2 Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 D2 Circuit High Voltage	P183D	The DTC Monitors if the IMS D2 Circuit is Shorted to a High Voltage	Converted Directional IMS AND Directional IMS D2	Transitional 11 AND Transitional 23 D2 Circuit Has Not Been Observed Low	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS D2 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2-Invalid Range	P183E	The DTC Monitors if the IMS is in an Invalid Range	Converted Directional IMS	Illegal (All Circuits Open)	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** Opposite of Fail for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 1-2 Correlation	P183F	The DTC Monitors if the IMS Direction and Range Correlation is Invalid	Converted Directional IMS	Correlation Fault Neutral (With No IMS Faults the Direction IMS and Range IMS Indicate Different Detent	**Common Enable Criteria		1.25 seconds (50 counts at 25ms) **Pass Conditions** Opposite of Fail for 1.7 seconds (68 counts at 25ms)	One Trip, Type A

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							Pass: High voltage bus delta > 75V after 500ms of a commanded discharge event	
Autostart Diagnostic								
Hybrid System Performance	P0AB9	This diagnostic indicates an autostart or autostop attempt failed.	Engine state	not running	Clutch 3 slip state	Not fault pending or fault active	15s	One Trip, Type A
Engine Performance Diagnostic								
Engine Performance - No Torque Detected	P16E0	This diagnostic indicates that the engine is not producing torque.	Measured Engine Sensed Torque	< 0 Nm	All Secondary Parameters Listed below must be meet for 2 seconds		3.5s out of a 4s window (12.5ms)	One Trip, Type A
			AND Sensed Engine Torque Error	> 50 Nm	Engine Actual Torque Fault	FALSE		
					DTC's not Fault Active	U0100		
					Engine Start Stop State	= Engine Running		
					Engine Torque Command Immediate	≥ 50 Nm		
					Low Fuel Condition	FALSE		
					Fuel Level Data Fault	FALSE		
Controller Diagnostics								
Control Module Read Only Memory (ROM)	P0601	*This Diagnostic tests the checksum on ROM (flash) memory*						One Trip, Type A
		DTC Fail case 1: This DTC will be stored if any check sum in the **boot** is incorrect	Calculated Checksum does not match stored checksum		Ignition Status	= Run or Crank	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5 failures Frequency: Runs continuously in the background	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 2: This DTC will be stored if any check sum in the **calibration** is incorrect						
		DTC Fail case 3: This DTC will be stored if any check sum in the **software** is incorrect						
		DTC Pass:		ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false				
Control Module Not Programmed	P0602	*This Diagnostic tests for whether a controller has been programmed*						One Trip, Type A
		DTC Fail case 1: Indicates that the HCP needs to be programmed	Fails if No Start Calibration is set to true which is only available on a new un-programmed HCP		Ignition Status	= Run or Crank	Runs once at power up	
		DTC Pass:		Enable cal = false				
Control Module Long Term Memory Reset	P0603	*This Diagnostic tests for BINVDM errors*						One Trip, Type A
		DTC Fail case 1: Non-volatile memory (**Static**) checksum error at controller power-up	Checksum at power-up does not match checksum at power-down		Ignition Status	= Run or Crank	1 failure Frequency: Once at powerup	
		DTC Fail case 2: Non-volatile memory (**Preserved**) checksum error at controller power-up						
		DTC Fail case 3: Non-volatile memory (**BINVDM**) checksum error at controller power-up						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 4: Non-volatile memory (**ShutdownFinished**) checksum error at controller power-up						
		DTC Pass:		No ROM memory faults				
Control Module Random Access Memory (RAM) Failure	P0604	*This Diagnostic tests that the RAM is functioning correctly*						One Trip, Type A
		DTC Fail case 1: The primary Ye variable does not match the redundant Ya variable **Dual Store** RAM	Ye variable	≠ Ya Variable	Ignition Status	= Run or Crank	Runs real time	
		DTC Fail case 2: Indicates that HCP is unable to correctly write to **Write Protect** RAM	Memory location is locked	Function is trying to write to that location			1 failure Frequency: Once at powerup	
		DTC Fail case 3: During a running reset the RAM fault is still present during Init **Main SOH** RAM	RAM fault	= true @ init				
		DTC Fail case 4: Indicates that HCP is unable to correctly write and read data to and from **System** RAM	HWIO detects Fault	= true				
		DTC Fail case 5: Indicates that HCP is unable to correctly write and read data to and from **Cache** RAM	HWIO detects Fault	= true				
		DTC Fail case 6: Indicates that HCP is unable to correctly write and read data to and from **eTPU** RAM	HWIO detects Fault	= true				

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 Internal Performance	P0606	*This Diagnostic tests all the internal processor integrity subsystems*						One Trip, Type A
		DTC Fail case 1: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctd SPI_Flt	HWIO detects Fault	= true (in SPI Hardware)	Run/Crank Voltage OR Powertrain Relay Voltage Diagnostic System Enable Powermoding	> 9.5 Volts = true = Accesory or Off	28 fail counts out of 32 sample counts Executes in a 6.25ms loop Detects in 200ms	

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

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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 13: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_FlashECC_CktTest	HWIO detects Fault	= 3 /10 5/10	1. Flash ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	
		DTC Fail case 14: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RAM_ECC_CktTest	HWIO detects Fault	= 3 /10 5/10	1. RAM ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	
		DTC Fail case 15: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_DMA_Xfer Test	HWIO detects Fault or Memory Copy Error	= True or =True	Diagnostic Test Enabled	= TRUE		
Torque Security Diagnostics								
Internal Control Module Torque Performance	P061A	*This Diagnostic tests if the regen is reported accurately to the brake control module*						One Trip, Type A
		DTC Fail case 1: The Estimated output torque Commanded exceeds the upper Regen torque limit	The Estimated output torque Commanded	>The drivers output torque Request + .2g (534Nm)	Regenerative Braking Torque	> 0 Nm	14 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 5: Output torque negative when driver request is positive Sign Diff Fault	When the PRNDL equals drive and the driver requested torque is positive while the commanded output torque is negative and below a -0.2g (-534Nm) threshold for greater than 200ms.	-534Nm (equivalent to -0.2g)	Vehicle Speed TOSS sensor fault is active or vehicle speed sensor fault is active	< 7mph		
		DTC Fail case 6: Output torque positive when driver request is negative Sign Diff Fault	When the PRNDL equals reverse and driver requested torque is negative while the commanded output torque is positive and greater than a 0.2g (534Nm) threshold for greater than 200ms.	534Nm (equivalent to 0.2g)				
		DTC Fail case 7: The primary Input Torque Correction does not equal the redundant calculation Ti Corr Fault	When the redundant calculation of the input torque correction is .2g (534Nm)	> or < the primary calculation		Runs continuously when a torque source is present		
		DTC Fail case 8: The Traction Motor torque command exceeds the motor torque capacity Tm Cmd Fault	The Traction Motor torque command	>Maximum motor torque capacity plus .2g (534Nm) or less than the minimum torque capacity minus .2g (534Nm)				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Long Term Memory Performance	P062F	*This Diagnostic tests for unuseable BINVDM (flash) memory only*						One Trip, Type A
		DTC Fail case 1: Indicates that the NVM Error flag **HWIO Bat Write will not succeed** set	Last EEPROM write did not complete		Ignition State	= accesory, run, or crank	1 failure Frequency: Once at power-up	
		DTC Fail case 2: Indicates that the NVM Error flag **HWIO Assembly Cal** set						
		DTC Pass:		NV writewillnotsucceed = fail Assemblycalfail = false				
Torque Management System – Forced Engine Shutdown	P06AF	*This Diagnostic checks that the ECM is still functioning correctly*						One Trip, Type A
		DTC Fail case 1: The main processor monitor ring compares the ECM 2nd pattern (nibble pattern) to known good pattern to determine ECM state of health.	The nibble pattern is incorrect	The pattern does not match (F, 5, B, D, A, 6, 3, 0)	Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	8 fail counts out of 12 sample counts Executes in a 12.5 ms Loop Detects in 200ms	
		DTC Pass:		2nd RX pattern smpl > Smpl Limit Nibble pattern completed				
Supply Voltage Circuit Diagnostics								
Supply Voltage Circuit 2 Low Voltage	P150D							Special Type C

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 1: Supply Voltage Circuit 2 Low Voltage	Ignition Voltage	< 8V	Enable Cals Diag System Disable	= true = false	20 Fail count out of 25 sample counts Executes in a 100ms loop Detects in 2.5s	
		DTC Pass:		No failure in 2.5s				
Supply Voltage Circuit 1 Low Voltage	P150E							Special Type C
		DTC Fail case 1: Supply Voltage Circuit 1 Low Voltage	Ignition Voltage	< 8V	Enable Cals Diag System Disable	= true = false	20 Fail count out of 25 sample counts Executes in a 100ms loop Detects in 2.5s	
		DTC Pass:		No failure in 2.5s				
Alive Rolling Count Diagnostics								
Alive Rolling Count / Protection Value fault for the Engine Actual Torque Steady State	P15F0	*This Diagnostic checks for corruption in signals sent over CAN for the Engine Actual Torque Steady State*						One Trip, Type A
		DTC Fail case 1: Detect the ARC (Alive Rolling Count) or Protection Value fault by checking the ARC and Protection Value of the Engine Actual Torque Steady State	The current alive rolling count value does not equal the previous alive rolling count value incremented by 1 OR The primary signal value does not equal the protection value	Current ARC ≠ Previous ARC +1 Primary Value ≠ Protection Value	Ignition Key Status	Run/Crank for > 0.5 seconds	14 fail counts out of 16 sample counts Executes in a 12.5 ms Loop Detects in 200ms	
Alive Rolling Count / Protection Value fault for the	P15F1	*This Diagnostic checks for corruption in signals sent over CAN for the commanded predicted axle torque*						One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
commanded predicted axle torque		**DTC Fail case 1:** Detect the ARC (Alive Rolling Count) or Protection Value fault by checking the ARC and Protection Value of the commanded predicted axle torque	The current alive rolling count value does not equal the previous alive rolling count value incremented by 1 OR The primary signal value does not equal the protection value	Current ARC ≠ Previous ARC +1 Primary Value ≠ Protection Value	Ignition Key Status	Run/Crank for > 0.5 seconds	14 fail counts out of 16 sample counts Executes in a 12.5 ms Loop Detects in 200ms	
Alive Rolling Count / Protection Value fault for the Regenerative Braking Axle Torque	P1B15	*This Diagnostic checks for corruption in signals sent over CAN for the Regenerative Braking Axle Torque*						One Trip, Type A
		DTC Fail case 1: Detect the ARC (Alive Rolling Count) Protection Value fault by checking the ARC and Protection Value of the Regenerative Braking Axle Torque	The current alive rolling count value does not equal the previous alive rolling count value incremented by 1 OR The primary signal value does not equal the protection value	Current ARC ≠ Previous ARC +1 Primary Value ≠ Protection Value	Ignition Key Status	Run/Crank for > 0.5 seconds	21 fail counts out of 32 sample counts Executes in a 6.25 ms Loop Detects in 200ms	
Internal Control Module Transmission Direction Range Switch	P16F2	*Detect transmission direction errors by reading the states of the Direction IMS switches as well as determining a transmission direction and comparing it to the transmission direction from the primary controls path.*						One Trip, Type A
		DTC Fail case 1: No direction match with no IMS failures	Read the Direction IMS switches and determine that they represent a valid transmission direction (P,R,N,D) but it does not match the transmission direction determined by the		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 2: Multiple transmission directions with no IMS failures	Read the Direction IMS switches and determine that they represent more than one valid transmission direction (P,R,N,D).					
		DTC Fail case 3: No direction match with one IMS failure	Read the Direction IMS switches and determine that one switch has failed and calculate a transmission direction, but it does not match the transmission direction determined by the primary controls path.					
		DTC Fail case 4: Multiple transmission directions with one IMS failure	Read the Direction IMS switches and determine that one switch has failed and calculate a transmission direction and determine that they represent more than one valid transmission direction (P,R,N,D).					
		DTC Fail case 5: Unable to determine transmission direction	Reads the Direction IMS switches and determine that more than one switch has failed and cannot calculate a transmission direction.					
Internal Control Module Redundant Memory Performance	P16F3	*Detect the dual store memory fault by comparing the primary value and the dual store value of the individual variables*						One Trip, Type A
		DTC Fail case 1: Detect the dual store memory fault by comparing the primary Ve signals and the We redundant signals	The primary value and the dual store value are not equal			Runs continuously	Signal DependendantX fail counts out of Y sample counts Executes in a Xms loop **All Detected in 200ms**	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 2: Detect the dual store memory fault by comparing the primary Ye signals and the Ya redundant signals				Fail Timer incremented Runs continuously	> 175ms Detects in 200ms	
		DTC Pass:		No errors in 1000ms				
Internal Control Module Transmission Range Control Performance	P16F4	*Detect transmission range errors by comparing the Direction IMS switches with the Range IMS information from the TCM.*						One Trip, Type A
		DTC Fail case 1: Positive transmission ranges that do not match	The Range IMS and Direction IMS from the primary controls path and both have valid transmission positions (P, R, N, D) but the two do not match.		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		DTC Fail case 2: Error corrected Direction IMS does not match	The Range IMS has a valid transmission position and the Direction IMS from the primary controls path has an error corrected transmission position, but the two do not match.					
		DTC Fail case 3: Range IMS is between valid transmission positions and Direction IMS is error corrected	The Range IMS indicates a transitional PRNDL position and the Direction IMS has an error corrected transmission position.					
		DTC Fail case 4: Range IMS is invalid and Direction IMS is error corrected	The Range IMS is invalid due to a fault or a problem with the TCM, and the Direction IMS has an error corrected transmission position.					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 5: Range IMS is between valid transmission positions and Direction IMS is invalid	The Range IMS indicates a transitional PRNDL position and the Direction IMS is invalid due to a fault or a problem with the HCP					
		DTC Fail case 6: Range IMS and Direction IMS are both invalid	The Range IMS is invalid due to a fault or a problem with the TCM, and the Direction IMS is invalid due to a fault or a problem with the HCP					
Internal Control Module Commanded Range State	P16F6	*The Transmission Range State monitor verifies that there are no mismatches in system equations, the transmission range state being executed is valid, and the transmission range state has not performed an invalid transition*						One Trip, Type A
		DTC Fail case 1: Invalid Transmission Range State	The current Transmission Range State being used by the system is detected to be an invalid value within the current Transmission Range State Group.			Runs continuously	1 failure Detected within 25ms of failure	
		DTC Fail case 2: Invalid Transmission Range State Group	The current Transmission Range State Group being used by the system is an invalid value.					
		DTC Fail case 3: Invalid Transmission Range State transition	The current Transmission Range State has changed, and the change in value is not one of the supported transitions from the previous Transmission Range State.					
		DTC Fail case 4: Range Equation mismatches current Transmission Range State	The Range Equation can not be rationalized against the current Transmission Range State.					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 5: Torque Determination State mismatches current Transmission Range State	The Torque Determination State can not be rationalized against the current Transmission Range State.					
		DTC Fail case 6: Input Torque Optimization State mismatches current Transmission Range State	The Input Torque Optimization State can not be rationalized against the current Transmission Range State					
Redundant Speed Sensor Circuit Diagnostics								
Control Module Redundant Drive Motor A Speed Sensing Circuit	P1E4A	*This Diagnostic rationalizes the HCP calculated MTR Aspeed against MCP A calculated MTR A speed*						One Trip, Type A
		DTC Fail case 1: The difference between Mtr A calculated speed and HCP calculated MTR A speed exceeds a threshold	The difference between Mtr A calculated speed and HCP calculated MTR A speed	> 400	Enable Cal Run/Crank Voltage OR Run/Crank Voltage Secured	= true = true	21 fail counts out of 32 sample counts Executes in a 6.25ms loop Detects in 200ms	
Control Module Redundant Drive Motor B Speed Sensing Circuit	P1E4B	*This Diagnostic rationalizes the HCP calculated MTR B speed against MCP B calculated MTR B speed*						One Trip, Type A
		DTC Fail case 1: The difference between Mtr B calculated speed and HCP calculated MTR B speed exceeds a threshold	The difference between Mtr B calculated speed and HCP calculated MTR B speed	> 400	Enable Cal Run/Crank Voltage OR Run/Crank Voltage Secured	= true = true	21 fail counts out of 32 sample counts Executes in a 6.25ms loop Detects in 200ms	
Communication Diagnostics								
Control Module Comm'n Bus A Off	U0073	*This diagnostic indicates a bus off condition on HSGMLAN (Bus A)*						One Trip, Type A

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	=TRUE =FALSE >=3 sec		
Control Module Comm'n Bus E Off	U0077	*This diagnostic indicates a bus off condition on the CE (Bus E)*						One Trip, Type A
		DTC Fail case 1: Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.	CAN device driver	= bus-off state.	Run/Crank Voltage OR Powertrain Relay Voltage Power Mode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	> 9.5 Volts =RUN =FALSE =TRUE =TRUE =FALSE >=3 sec	4 fail counts out of 5 samples counts Executes in a 12.5ms loop Detects in 450 ms	
Lost Comm'n With ECM/PCM on Bus A	U0100	*This diagnostic indicates a lost communication between the HCP and the ECM on Bus A*						One Trip, Type A

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

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 Brake System Control Module	U0129	*This diagnostic indicates a lost communication between the HCP and the BSCM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the EBCM on Bus A	Missed EBCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop	
							Detects in 500 ms	
					Power Mode	=RUN/ACC		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Communication With Body Control Module	U0140	*This diagnostic indicates a lost communication between the HCP and the BCM on Bus A*						Special Type C
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the BCM on Bus A	Missed BCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 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 Hybrid Powertrain Control Module B	U179A	*This diagnostic indicates a lost communication between the HCP and the VICM on Bus A*						One Trip, Type A
		DTC Fail case 1: Lost Communication with Hybrid Powertrain 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	
					Power Mode	=RUN/ACC	Detects in 500 ms	
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With ECM/PCM on Bus B	U1818	*This diagnostic indicates a lost communication between the HCP and the ECM on Bus B*						One Trip, Type A
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the ECM on Bus B	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	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Powertrain Control Module B on Bus B	U182D	*This diagnostic indicates a lost communication between the HCP and the VICM on Bus B*						One Trip, Type A
		DTC Fail case 1: Lost Communication with Hybrid Powertrain Control Module B on Bus B (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop	
							Detects in 500 ms	
					Power Mode	=RUN/ACC		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With BSCM on Bus E	U1833	*This diagnostic indicates a lost communication between the HCP and the BSCM on Bus E*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the BSCM	Missed BSCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop	
							Detects in 500 ms	

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage System Isolation Fault	P0AA6	This DTC will determine if the measured resistance between the high voltage bus and chassis ground Is too low which indicates that the internals of the battery are no longer adequately isolated from chassis ground	Case 1 Active Isolation Resistance	< 325 KOhm	P0AA6 Positive Contactor Negative Contactor	DTC Not Active Open for 10 Seconds Open for 10 Seconds	Fail if last resistance measurement is below theshold AND any (5) measurements out of last (10) measurements are below resistance theshold. No more than one resistance measurement is taken per HPC2 Wakeup Cycle.	One Trip, Type A
			OR Case 2 Active Isolation Resistance	< 400 KOhm	P0AA6 Positive Contactor Negative Contactor	DTC Active Open for 10 Seconds Open for 10 Seconds		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass					Pass if any single resistance measurement exceeds resistance threshold	
Hybrid Battery Positive Contactor Control Circuit	P0AD9	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Short to Ground Fault	Open Load detected while OFF and output voltage > 4V. Short to VBATT detected while OFF and output voltage is > (VPWR -0.4V) Open while ON detected when current sense feedback < 194 mA	12V Battery Voltage	> 10.2V	40 failures out of 50 samples 12.5 ms /sample Continuous	One Trip, Type A
		DTC Pass					625 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Negative Contactor Control Circuit	P0ADD	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Short to Ground Fault	Open Load detected while OFF and output voltage > 4V. Short to VBATT detected while OFF and output voltage is > (VPWR -0.4V) Open while ON detected when current sense feedback < 194 mA	12V Battery Voltage	> 10.2V	40 failures out of 50 samples 12.5 ms /sample Continuous	Two Trips, Type B
		DTC Pass					625 ms	
Hybrid Battery Precharge Contactor Circuit Stuck Closed	P0AE2	This DTC detects when the Precharge FET is Stuck Closed by comparing the the Bus Voltage to the Battery Voltage.	Bus Voltage / Battery Voltage	> 60%	Positive Contactor Precharge FET Bus Voltage Sensor Battery Voltage Sensor Negative Contactor Multipurpose Contactor	Open for > 8 seconds Off for > 8 seconds Not Failed Not Failed Closed Closed	3 failures out of 9 samples 12.5 ms /sample Executed Once Per Precharge Event	One Trip, Type A
		DTC Pass					112.5 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Precharge Contactor Control Circuit	P0AE4	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Open Ckt Fault and the Short to Ground Fault	Open Load detected while OFF and output voltage > 4V. Short to VBATT detected while OFF and output volage is > (VPWR -0.4V)	12V Battery Voltage	> 10.2V	40 failures out of 50 samples 12.5 ms /sample Continuous	One Trip, Type A
		DTC Pass					625 ms	
Hybrid Battery System Precharge Time Too Short	P0C77	This DTC sets if Bus Voltage gets too high too fast during contactor precharge.	Bus Voltage / Battery Voltage	> 95% in less than 50 ms from the start of precharge	Battery Current Sensor Bus Voltage Bus Voltage Sensor	Valid < 40 Volts before the start of precharge Valid	50 ms Executed Once Per Precharge Event	One Trip, Type A
		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 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	Valid	700 ms Executed Once Per Precharge Event	One Trip, Type A
					Bus Voltage Sensor	Valid		
			or					
			Battery Current	> Battery Voltage/27.63 for longer than 87.5 ms while waiting for Bus Voltage to reach 95% of Battery Voltage	Battery Current Sensor	Valid	Executed Once Per Precharge Event	
		DTC Pass					700 ms or less	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charging System Positive Contactor Control Circuit	P0D0A	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Short to Ground Fault	Open Load detected while OFF and output voltage > 4V. Short to VBATT detected while OFF and output voltage is > (VPWR -0.4V) Open while ON detected when current sense feedback < 57 mA	12V Battery Voltage	> 10.2V	40 failures out of 50 samples 12.5 ms /sample Continuous	One Trip, Type A
		DTC Pass					625 ms	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Charging HVIL Sensed % of Reference Voltage	> 44%	Charging HVIL Source Status 12V Battery Voltage	Sourced (5V) > 10.2V	4 failures out of 6 samples 12.5 ms /sample	
		DTC Pass					75 ms	
Battery Charger Hybrid/EV System Discharge Time Too Long	P0D5E	This DTC stores the result of the OBCM test (refer to OBCM Parameter Page) or when a discharge cannot be confirmed will run an intrusive backup/safety test which checks to see if battery current is flowing through what could be a stuck closed multifunction contactor	Condition A OBCM Status for P0D5E	Fail 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 no status is received from the OBCM for P0D5E	
		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 > 4V. Short to VBATT detected while OFF and output voltage is > (VPWR -0.4V) Open while ON detected when current sense feedback < 57 mA	12V Battery Voltage	> 10.2V	40 failures out of 50 samples 12.5 ms /sample Continuous	Two Trips, Type B
		DTC Pass					625 ms	

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	> 10.2V	190 failures out of 250 samples, 12.5 ms /sample Runs once near the beginning of each Charge Cycle	One Trip, Type A
					Battery Current Sensor	No Faults		
					Charger Commanded Current	> 1 A		
					Charger Current Sensor	No Faults		
					Charge Control Mode	Constant Current or Constant Voltage		
					Charge System Mode	Not Heat Only AND Not Idle		
					Charge Contactor Status	Closed		
					Main Contactor Status	Open		
					Multifunction Contactor Status	Closed		
		DTC Pass					3.125 sec	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							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 Battery Voltage Sensor Time since Main Contactors have closed 12V Battery Voltage	No Faults No Faults > 1 sec > 10.2V	6 failures out of 6 samples 12.5 ms /sample Continuous	One Trip, Type A
		DTC Pass					0.5 sec	
Hybrid Battery Pack Heater Transistor Stuck Off	P1EC4	This DTC determines if the Heater FET is Stuck Off by commanding it on for 2 sec and observing the accumulated difference between charger and battery current during the Accumulation Time	Accumulated (Charger Current -Battery Current)	< 200 A	12V Battery Voltage Battery Current Sensor Charger Current Sensor Charge Control Mode Charge System Mode Charge Contactor Status Main Contactor Status Multifunction Contactor Status Accumulation Time	> 10.2V No Faults No Faults Constant Current or Constant Voltage Not Heat Only AND Not Idle Closed Open Closed = 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
		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	> 10.2V	4 failures out of 48 samples 12.5 ms /sample Once per Charge Cycle	One Trip, Type A
					Charger Positive Contactor	Closed		
					Charger Negative Contactor	Closed		
					Multipurpose Contactor	Open		
					Heater Commanded Duty Cycle	< 5% for at least 2 seconds		
					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 theshold AND any (5) measurements out of last (10) measurements are below resistance theshold. No more than one resistance measurement is taken per HPC2 Wakeup Cycle.	One Trip, Type A
					Charge Only Mode	10 seconds		
			OR					
			Active Isolation Resistance	< 400 KOhm	P1F0E	DTC Active		
					Charge Only Mode	10 seconds		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass					Pass if any single resistance measurement exceeds resistance threshold	
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 Control Module Hybrid Battery Voltage System Isolation Fault (P1AF0,P1AF2, or P1E22)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
			Control Module Hybrid Battery Voltage System Isolation Fault (P1AF0,P1AF2, or P1E22)in HPC1	Active	Lost Communication with Inflatable Restraint Sensing and Diagnostic Module on Bus F (U184E)	Active		
			Condition 3 Lost Comm with HPC1	Active	Lost Communication with Inflatable Restraint Sensing and Diagnostic Module on Bus F (U184E)	Active		
			Condition 4 Lost Comm with HPC1	Active	Rollover or Airbag or Inertial Sensors	Not working		
		DTC Pass					Once set, this DTC cannot pass. DTC passes when latch is not set.	
Battery Pack Coolant Valve Diagnostics								
Hybrid/EV Battery Pack Coolant Control Valve A Stuck	P1F56	This performance fault detects if the 4 port valve is not functioning as intended.			System Voltage No active DTCs	>10.2V P0CE2, P0CE3, P0CE6, P0CE7, P1EC7, P1EC8		Two Trips, Type B
			State A:					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			IF: Either valve end stop is out of range	30.28% < Low End Stop < 69.52% OR 50.64% < High End Stop < 69.52%		State A has not already run this key cycle.	1 fail / 1 sample at 6.25ms (22s) in State A	
			OR IF: End stop span is out of range	15% < Span < 33%				
			OR IF: Feedback spikes out of range during end stop	Feedback > 69.52% OR Feedback < 30.28%				
			IF valve does not reach the endstop	<=22s	Propulsion System Active	= True		
			State B:					
Hybrid/EV Battery Pack Coolant Control Valve Position Sensor Performance	P0CE5	If valve has not reached commanded position.	Valve has not reached its commanded position	<=22s	State A is	not running (or has completed)	1280 fails / 1600 samples at 6.25ms in State B/C	
			State C:					
Hybrid/EV Battery Pack Coolant Control Valve Position Sensor Performance - Unexpected Position Change Detected	P1F58	If valve feedback has drifted out of position.	Valve feedback position	>3%	State A is Valve has not moved for	not running (or has completed) >15s	1280 fails / 1600 samples at 6.25ms in State B/C	

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 Low	P0CE2	Valve Motor drive 1 has a short to low fault.	Valve Motor Driver 1 State	LOW	System Voltage Valve	>10.2V must be moving in reverse direction	90 fails / 100 samples at 6.25ms	Two Trips, Type B
Hybrid/EV Battery Pack Coolant Control Valve A Control Circuit High	P0CE3	Valve Motor drive 1 has a short to high fault.	Valve Motor Driver 1 State	HIGH	System Voltage Valve	>10.2V must be stopped or moving in forward direction	90 fails / 100 samples at 6.25ms	Two Trips, Type B
Hybrid/EV Battery Pack Coolant Control Valve Position Sensor Circuit Low	P0CE6	Valve Feedback signal has a out of range low circuit fault	Valve feedback voltage	< 28% of reference voltage	System Voltage	>10.2V	640 fails / 800 samples at 6.25ms	Two Trips, Type B
Hybrid/EV Battery Pack Coolant Control Valve Position Sensor Circuit High	P0CE7	Valve Feedback signal has a out of range high circuit fault	Valve feedback voltage	> 72% of reference voltage	System Voltage	>10.2V	640 fails / 800 samples at 6.25ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Battery Pack Coolant Control Valve B Control Circuit Low	P1EC7	Valve Motor drive 2 has a short to low fault.	Valve Motor Driver 2 State	LOW	System Voltage Valve	>10.2V must be moving in forward direction	90 fails / 100 samples at 6.25ms	Two Trips, Type B
Hybrid/EV Battery Pack Coolant Control Valve B Control Circuit High	P1EC8	Valve Motor drive 2 has a short to high fault.	Valve Motor Driver 2 State	HIGH	System Voltage Valve	>10.2V must be stopped or moving in reverse direction	90 fails / 100 samples at 6.25ms	Two Trips, Type B
Battery Thermal Controls Diagnostics								
Hybrid Battery Pack Coolant Temperature Sensor Circuit Range/Performance	P0C43	Coolant Temp. Sensor 1 is not reading a rational value.	IF RESS Thermal conditioning mode = Active Heat then IF: ABS (RESS Inlet Temperature - RESS Outlet Temperature) AND IF: ABS (RESS Inlet Temperature - Battery Cell Average Temperature Sensor)	>=30C >=30C	System Voltage	>10.2V	32 fails / 40 samples at 250ms	Two Trips, Type B

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					If RESS Thermal conditioning mode changes then	>= 70 sec has elapsed since the change		
			IF RESS Thermal conditioning mode = Passive Cool then IF: ABS (RESS Inlet Temperature - RESS Outlet Temperature) AND	>= 55C	System Voltage	>10.2V		
			IF: ABS (RESS Inlet Temperature - Battery Cell Average Temperature Sensor)	>= 55C				
					No active DTCs:	P1F18, P0C44, P0C47, P0C45, P0C4A, P0CD7, P0CD8, P0A9C,P0A9D,P0A9E,U0111		
					Coolant Pump speed	>= 20% for more than 1 min		
					If RESS Thermal conditioning mode changes then	>= 70sec has elapsed since the change		
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	>=20C	System Voltage	>10.2V	32 fails / 40 samples at 250ms	Two Trips, Type B
			IF: ABS (RESS Outlet Temperature - Battery Cell Average Temperature Sensor)	>=20C				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs: Coolant Pump speed	P1F18, P0C44, P0C47, P0C45, P0C4A, P0CD7, P0CD8,P0A9C,P0A9D,P0A9E, U0111 >=20% for more than 1 min		
Hybrid Battery Pack Coolant Pump Control Circuit/Open	P0C47	Coolant Pump Control line has a circuit fault	Coolant Pump Control line is open, shorted to voltage or shorted to ground	Board Support Package returns coolant pump control line fault = True	System Voltage Coolant Pump Enable	>10.2V = High	40 fails / 50 samples at 100ms	Two Trips, Type B
Hybrid Battery Pack Coolant Pump Control Performance	P0C4A	Coolant Pump is not performing as intended	Turn pump on IF: RESS Inlet Coolant Temperature rate of temperature decrease	90% DC < 0.3°C/s	System Voltage Propulsion System Active Diagnostic has completed: No active DTCs:	>10.2V TRUE P1EC6 P1EC6, P0C47, P1F18, P0C44, P0C45, U0111	24s	Two Trips, Type B
Hybrid Battery Pack Coolant Pump Enable Circuit/Open	P1F18	Coolant Pump Enable has a circuit fault	Coolant Pump Enable line is open, shorted to voltage or shorted to ground		System Voltage	>10.2V	40 fails / 50 samples at 100ms	Two Trips, Type B
Hybrid/EV Battery Pack Heater Transistor Control Circuit/Open	P1EC3	Heater Transistor Control Circuit has a circuit fault	Heater Transistor Control Circuit is open, shorted to voltage or shorted to ground		System Voltage	>10.2V	40 fails / 50 samples at 100ms	Two Trips, Type B
Hybrid Battery Pack Heater Performance	P1EC6	Battery Heater is not performing as intended	IF: RESS Inlet Coolant Temperature rate of temperature rise	< 0.5°C/s	Propulsion System Active	TRUE	40s	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Delta between RESS Inlet and Outlet	<25°C		
					RESS Inlet temp	<50°C		
					MPC Status	Closed		
					Move Battery Pack Coolant Valve	Position 10,9,8,7 or 6		
					Turn pump on	90% DC for 50s		
					Turn pump off			
					Turn heater on	90% DC for 20s		
					Turn heater off			
					System Voltage	>10.2V		
					Propulsion System Active	TRUE		
					No Test Failed This Key On:	P1EC3		
					No active DTCs:	P1EC4, P1EC5, P0C44, P0C45, P1F18, P0C47, U0111,P0CE0,P0CE2,P0CE3,P0CE6,P0CE7,P1EC7, P1EC8		
Outside Air Temperature Sensor Diagnostics								
Ambient Air Temperature Sensor Range/Performance	P0071	Outside Air Temperature sensor is not performing as intended	ABS (Outside Air Temperature - Inlet Air Temperature)	> 30°C	System Voltage	>10.2V	32 fails / 40 samples at 250ms	Two Trips, Type B
					Power mode	= Run for less than 20 seconds		
					Test Complete this trip	= FALSE		
					No active DTCs:	P0111, P0112, P0113, P0114, P0116, P0117, P0118, P0119, P0CED, P0072. P0073. U0100		
					ABS(Power Up IAT - Power Up ECT)	< 10 degC		
					Propulsion Off Timer	>21600 seconds		
					Power Electronic Pump off soak time before Enable	>3600 seconds		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Compressor Off soak time	>3600 seconds		
Ambient Air Temperature Sensor Circuit Low Input	P0072	Outside Air Temperature sensor has an out of range low circuit fault	Sensor voltage	< 2% (0.1V) of reference voltage	System Voltage	>10.2V	16 fails / 20 samples at 250ms	Two Trips, Type B
Ambient Air Temperature Sensor Circuit High Input	P0073	Outside Air Temperature sensor has an out of range high circuit fault	Sensor voltage	> 98% (4.9V) of reference voltage	System Voltage	>10.2V	16 fails / 20 samples at 250ms	Two Trips, Type B
Cooling Fan Diagnostics								
Cooling Fan 1 Control Circuit	P0480	Engine Cooling Fan has a circuit fault	Engine Cooling Fan line is open, shorted to voltage or shorted to ground		System Voltage	>10.2V	16 fails / 20 samples at 250ms	Two Trips, Type B
Cooling Fan Signal Circuit Performance	P148A	Engine Cooling fan signal is not performing as intended	IF ABS (Hardware I/O Radiator fan period from ECM - 7.8125)	> 0.15625	System Voltage	>10.2V	32 fails / 40 samples at 250ms	Two Trips, Type B
					Power mode	≠ crank		
					No active DTCs:	P148B, P148C, U0293		
			OR		If ABS(Current Engine Cooling Fan Speed - Previoius Engine Cooling Fan Speed)	>5%		
					Then wait for	40sec before Enable		
					AND			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			ABS (Hardware I/O Radiator fan duty cycle from ECM - Engine Cooling Fan Speed from CAN bus)	> 30%	Propulsion system active OR (Propulsion system active AND Energy storage system thermal condition request AND Engine Cooling fan operation enable)	= True for longer than 10 seconds = False = ActiveCool = True for longer than 10 seconds		
Cooling Fan Signal Circuit Low	P148B	Engine Cooling fan signal has a out of range low circuit fault	HWIO duty cycle (from ECM)	< 3%	System Voltage	>10.2V	16 fails / 20 samples at 250ms	Two Trips, Type B
Cooling Fan Signal Circuit High	P148C	Engine Cooling fan signal has a out of range high circuit fault	HWIO duty cycle (from ECM)	> 97%	System Voltage Propulsion system active OR (Propulsion system active AND Energy storage system thermal condition request AND Engine Cooling fan operation enable)	>10.2V = True for longer than 10 seconds = False = ActiveCool = True for longer than 10 seconds	16 fails / 20 samples at 250ms	Two Trips, Type B
Power Electronics Cooling Diagnostics								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Electronics Coolant Pump Control Circuit/Open	P0CE9	Coolant Pump Control line has a circuit fault	Coolant Pump Control line is open, shorted to voltage or shorted to ground		System Voltage HWIO Pump Control Circuit Status Coolant Pump Enable	>10.2V ≠ Indeterminate = True	16 fails / 20 samples at 250ms	Two Trips, Type B
Hybrid/EV Electronics Coolant Pump Enable Circuit Open	P0CED	Coolant Pump Enable signal has an open circuit fault	Coolant Pump Enable line is open		System Voltage HWIO Pump Enable Circuit Status Coolant Pump Enable	>10.2V ≠ Indeterminate = False	16 fails / 20 samples at 250ms	Two Trips, Type B
Hybrid/EV Electronics Coolant Pump Enable Circuit Low	P1F44	Coolant Pump Enable signal has a shorted to ground circuit fault	Coolant Pump Enable line is shorted to ground		System Voltage HWIO Pump Enable Circuit Status Coolant Pump Enable	>10.2V ≠ Indeterminate = True	16 fails / 20 samples at 250ms	Two Trips, Type B
Hybrid/EV Electronics Coolant Pump Enable Circuit High	P1F45	Coolant Pump Enable signal has a shorted to voltage circuit fault	Coolant Pump Enable line is shorted to voltage		System Voltage HWIO Pump Enable Circuit Status Coolant Pump Enable	>10.2V ≠ Indeterminate = False	16 fails / 20 samples at 250ms	Two Trips, Type B
Hybrid/EV Electronics Coolant Temperature Sensor Circuit Low	P0CF0	Power Electronics Coolant Temp Sensor has a out of range low circuit fault	Sensor voltage	< 2% (0.1V) of reference voltage	System Voltage	>10.2V	16 fails / 20 samples at 250ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Electronics Coolant Temperature Sensor Circuit High	P0CF1	Power Electronics Coolant Temp Sensor has a out of range high circuit fault	Sensor voltage	> 98% (4.9V) of reference voltage	System Voltage	>10.2V	16 fails / 20 samples at 250ms	Two Trips, Type B
Hybrid/EV Electronics Coolant Temperature Sensor Circuit Range/Performance	P0CEF	Power Electronics Coolant Temp Sensor is not functioning as intended	IF Power Inverter Module request pump speed,		System Voltage No active DTCs: Power Electronics Coolant pump speed AND Power Electronics Coolant pump enabled High Voltage Charger Temperature	>10.2V P0CF1, P0CF0, P0CE9, P0CED, P1F44, P1F45, P1ED7, P1ED6, P1ED8 >30% to Enable AND <25% to Disable (Hysterisis) >300 s >-40C	32 fails / 40 samples at 250ms	Two Trips, Type B
Engine Coolant Bypass Valve Diagnostics								
Engine Coolant Bypass Valve Control Circuit / Open	P2681	Valve Drive (control) Circuit has a circuit fault	Valve Deive Circuit is open, shorted to voltage or shorted to ground		System Voltage HWIO Valve Drive Circuit Status	>10.2V ≠ Indeterminate	40 fails / 50 samples at 100ms	Two Trips, Type B
Engine Coolant Bypass Valve Position Sensor Stuck	P26A9	Valve is stuck or end position learn failed	Valve end postion learn request	=FAIL	System Voltage	>10.2V	1 fails / 1 samples at 100ms (15s)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs: Engine Coolant Temperature Propulsion system active System Voltage	P2681, P26A6, P26A7, P0119; P0118, P0117, P0116, >50C = True >10.2V		
			Valve has not reached its commanded position THEN attempt valve relearn IF Valve still does not reach its commanded position	<=15s up to 3 times <=10s	No active DTCs: Propulsion system active	P2681, P26A6, P26A7 = True		
Engine Coolant Bypass Valve Position Sensor Circuit Low	P26A6	Valve Feedback signal has a out of range low circuit fault	Valve feedback percentage	< 5% of reference voltage	System Voltage	>10.2V	40 fails / 50 samples at 100ms	Two Trips, Type B
Engine Coolant Bypass Valve Position Sensor Circuit High	P26A7	Valve Feedback signal has a out of range high circuit fault	Valve feedback percentage	> 95% of reference voltage	System Voltage	>10.2V	40 fails / 50 samples at 100ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Engine Coolant Bypass Valve Position Sensor Stop/Minimum Stop Performance	P26A5	If valve has not reached commanded position	State A: IF Valve feedback percentage is OR IF Valve feedback percentage is	5% < Feedback percentage < 30% 70% < Feedback percentage < 95%	System Voltage No active DTCs: Propulsion system active	>10.2V P2681, P26A6, P26A7 = True	3 fails / 5 samples at 100ms	Two Trips, Type B
Engine Coolant Bypass Valve Position Sensor Circuit Range/Performance - Unexpected Position Change Detected	P15C5	If valve feedback has drifted out of position	Valve feedback Drift	>3%	System Voltage No active DTCs: Propulsion system active	>10.2V P2681, P26A6, P26A7 = True	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
Air Conditioning Compressor and Rationality Diagnostics								
Air Conditioner (A/C) Refrigerant Charge Loss	P0534	Cooling performance not adequate/Low charge/Plugged refrigerant line.	CASE 1		System Voltage	>10.2V		Two Trips, Type B
			IF Power mode AND Pump Performance diagnostic OR Power mode THEN	=Run Mode AND =Complete = Not Run Mode				
			Start Timer if Energy Storage System Thermal conditioning request = Active Cooling	>2s				
			THEN					
			Start Total Run Timer THEN	=491s	No active DTCs:	P0CE0; P0CE2; P0CE3; P0CE6; P0CE7; P1CE7; P1CE8		
			Override Flag THEN	=TRUE				
			RESS Thermal Valve Position THEN	=100% Chill				
			For Secondary Run Timer Coolant Pump Duty Cycle AND For Secondary Run Timer Coolant Pump Duty Cycle AND	<= 180 =35% > 180 =53%	No active DTCs:	P0c47; P0c4a; P1f18		
			For this Active Cooling cycle, one time check if Compressor RPM has been	>2200				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Continuous Compressor RPM check	>2250RPM to Enable <2200RPM to Disable (Hysterisis)	No active DTCs:	P0c44, P0c45, P0c43		
			Start Secondary Run Timer THEN	=300s	Inlet Temperature sensor validity	= Valid		
			RESS Coolant Outlet Temperature Sensor - RESS Coolant Inlet Temperature Sensor	< P0534 Fail Threshold Table 1 if the compressor is on for cabin & RESS cooling OR < P0534 Fail Threshold Table 2 if the compressor is on for RESS cooling only	No active DTCs:	P0cd7, p0cd8, P0cd6		
					Outlet Temp Sensor Status	= Valid		
					Complete Flag	=False		
					Compressor On	>2s		
					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
					HighSidePressure	>2250kpa for greater than 20 consecutive seconds, disable for current active cooling cycle. Re-enable if <2000kpa within that 20 second count.		
					OAT Arb Status	= valid or unitialized		
			CASE 2		CASE 2			
			IF Low Side Refrigerant Pressure based on OAT Arb AND	<150Kpa when OAT >=20C OR 0Kpa when OAT <=15C (Linear Interoplation between 20C and 15C)	System Voltage	>10.2V		
			Low Side Pressure Time	>30s	No active DTCs: No active DTCs: No active DTCs: OAT Arb Status Compressor Off Time	P2517; P2518; P2516 P0606 P0073; P0072; P0071 = Valid or uninitalized >240s		
			CASE 3		CASE 3			
			IF Low Side Refrigerant Pressure based on OAT Arb AND Low Side Pressure Time	< 150Kpa when OAT >=5C OR 0Kpa when OAT <5C >30s	System Voltage No active DTCs: No active DTCs: OAT Arb Status Compressor running flag	>10.2V P2517; P2518; P2516 P0073; P0072; P0071 = Valid or uninitalized = ON		
			CASE 4		CASE 4			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			IF High Side Refrigerant Pressure	>5000Kpa	System Voltage	>10.2V		
			AND					
			High Side Pressure Time	>30s	No active DTCs:	P0533; P0532; P0531		
					HSRP Status	= Valid		
					No active DTCs:	P0606		
					No active DTCs:	P0073; P0072; P0071		
					OAT Arb Status	= Valid or uninitalized		
					Compressor Off Time	>240s		
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	>10.2V	35 fails / 40 samples at 100ms	Two Trips, Type B
					No active DTCs:	P0D6A; P0D6B		
					Compressor High Voltage Status	= Valid		
					No active DTCs:	P0ABC, P0ABD, P0ABB, P0AF8, P1A07, (U1111 AND U185A)		
					Battery Cell Voltage Status	= Valid		
					No active DTCs:	P0AE4, P0AD9, P0AA1, P0ADD, P1EBC, P0AE2		
					Power mode	≠ Crank		
					High Voltage Battery Contactor	= 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)	>10C	System Voltage	>10.2V	35 fails / 40 samples at 100ms	Two Trips, Type B
			AND					
			IF ABS (Compressor CPU Temperature Sensor - Compressor IGBT Sensor)	>10C	No active DTCs:	P0D77; P0D78		
					IGBT Status	= Valid		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs: No active DTCs: OAT_Filtd Status OAT_Filtd No active DTCs: No active DTCs: ECT Status No active DTCs: CPU Temp Status Power mode Engine Coolant Temp - Outside Air Temperature Filtered Compressor Off Time	P0606 P0073; P0072; P0071 = Valid or uninitalized >-7C P0113, P0112, P0111, P0114 P0119; P0118; P0117; P0116 = Valid P0D72; P0D73 = Valid ≠ Crank < 15C > 21600s		
Electric A/C Compressor Control Module Output Driver Temperature Sensor Performance	P0D76	ACCM IGBT Temp. Sensor is not performing as intended	IF ABS (Compressor IGBT Temperature Sensor - OAT_Raw Temperature Sensor) AND	>15C	System Voltage	>10.2V	35 fails / 40 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 (Compressor IGBT Temperature Sensor - Intake Air Temperature Sensor)	>10C	No active DTCs: IGBT Status No active DTCs: No active DTCs: 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	P0D77; P0D78 = Valid P0606 P0073; P0072; P0071 = Valid or uninitalized >-7C P0073; P0072; P0071 = Valid or uninitalized P0113, P0112, P0111, P0114 P0119; P0118; P0117; P0116 = Valid ≠ Crank < 15C > 21600s		
A/C Refrigerant Pressure Sensor B Rationality	P151C	Low Side Refrigerant Pressure Sensor is not functioning as intended	ABS (Low Side Refrigerant Pressure - High Side Refrigerant pressure)	>200kpa	System Voltage No active DTCs: Power mode No active DTCs: OAT Raw/Filtd Status	>10.2V P2517; P2518 ≠ Crank P0073; P0072; P0071 = Valid	32 fails / 40 samples at 100ms	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:	P0119; P0118; P0117; P0116		
					ECT Status	= Valid		
					Outside Air Temp raw reading	0C < OAT_raw < 25C		
					HSRP	0 Kpa < HSRP < 675 Kpa		
					Engine Coolant Temp - Outside Ambient Temperature Filtered	< 15C		
					No active DTCs:	P0533; P0532; P0531		
					HSRP Status	= Valid		
					No active DTCs:	P0537;P0538;P153B		
					No active DTCs:	P0606		
					Compressor Off Time	> 3600s		
A/C Refrigerant Pressure Sensor B Stuck Performance	P2516	Low Side Refrigerant Pressure Sensor is not functioning as intended	IF Low Side Refrigerant Pressure Start Of Diag - Low Side Refrigerant Pressure End of Diag	< 4kpa after 180s	System Voltage	>10.2V		One Trip, Type A
					No active DTCs:	P2517;P2518		
					Power mode	≠ Crank		
					No active DTCs:	P0073; P0072; P0071		
					OAT_Filtd Status	= Valid or uninitalized		
					No active DTCs:	P0119; P0118; P0117; P0116		
					Engine Coolant Tempeature Status	= Valid		
					Engine Coolant Temp - Outside Air Temperature	< 15C		
					No active DTCs:	P0606		
					Compressor Off Time	>3600s		
					Compressor Running Flag TRUE for	<185 s		
					Compressor Running Flag	TRUE		

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	>10.2V	40 fails / 50 samples at 100ms	Two Trips, Type B
A/C Refrigerant Pressure Sensor B Circuit High Input	P2518	Signal has a out of range high circuit fault	Sensor voltage	> 98% (4.9V) of reference voltage	System Voltage	>10.2V	40 fails / 50 samples at 100ms	One Trip, Type A
High Voltage Battery Diagnostics								
Hybrid Battery Voltage Sense A Circuit Range/Performance	P0B3C	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense B Circuit Range/Performance	P0B41	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense C Circuit Range/Performance	P0B46	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense D Circuit Range/Performance	P0B4B	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Average Cell Voltage Movement No active DTCs:	> 0.006V U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense E Circuit Range/Performance	P0B50	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense F Circuit Range/Performance	P0B55	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense G Circuit Range/Performance	P0B5A	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense H Circuit Range/Performance	P0B5F	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense I Circuit Range/Performance	P0B64	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense J Circuit Range/Performance	P0B69	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense K Circuit Range/Performance	P0B6E	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense L Circuit Range/Performance	P0B73	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense M Circuit Range/Performance	P0B78	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense N Circuit Range/Performance	P0B7D	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense O Circuit Range/Performance	P0B82	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense P Circuit Range/Performance	P0B87	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense Q Circuit Range/Performance	P0B8C	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense R Circuit Range/Performance	P0B91	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense S Circuit Range/Performance	P0B96	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense T Circuit Range/Performance	P0B9B	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense U Circuit Range/Performance	P0BA0	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense V Circuit Range/Performance	P0BA5	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense AA Circuit Range/Performance	P1B16	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AB Circuit Range/Performance	P1B19	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AC Circuit Range/Performance	P1B1C	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AD Circuit Range/Performance	P1B1F	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AE Circuit Range/Performance	P1B22	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Average Cell Voltage Movement No active DTCs:	> 0.006V U185A	 Frequency: 200ms	
Hybrid Battery Voltage Sense AF Circuit Range/Performance	P1B25	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AG Circuit Range/Performance	P1B45	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AH Circuit Range/Performance	P1B48	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AI Circuit Range/Performance	P1B4B	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense AR Circuit Range/Performance	P1B66	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AS Circuit Range/Performance	P1B69	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AT Circuit Range/Performance	P1B6C	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense AU Circuit Range/Performance	P1B6F	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AV Circuit Range/Performance	P1B72	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AW Circuit Range/Performance	P1B75	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AX Circuit Range/Performance	P1B78	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AY Circuit Range/Performance	P1B7B	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Average Cell Voltage Movement No active DTCs:	> 0.006V U185A	 Frequency: 200ms	
Hybrid Battery Voltage Sense AZ Circuit Range/Performance	P1B7E	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BA Circuit Range/Performance	P1B81	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BB Circuit Range/Performance	P1B84	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BC Circuit Range/Performance	P1B87	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense BD Circuit Range/Performance	P1B8A	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BE Circuit Range/Performance	P1B8D	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BF Circuit Range/Performance	P1B90	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BG Circuit Range/Performance	P1B93	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BH Circuit Range/Performance	P1B96	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense BI Circuit Range/Performance	P1B99	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense BJ Circuit Range/Performance	P1B9C	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense BK Circuit Range/Performance	P1B9F	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense BL Circuit Range/Performance	P1BA2	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense BM Circuit Range/Performance	P1BA5	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BN Circuit Range/Performance	P1BA8	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BO Circuit Range/Performance	P1BAB	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BP Circuit Range/Performance	P1BAE	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BQ Circuit Range/Performance	P1BB1	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Average Cell Voltage Movement No active DTCs:	> 0.006V U185A	 Frequency: 200ms	
Hybrid Battery Voltage Sense BR Circuit Range/Performance	P1BB4	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BS Circuit Range/Performance	P1BB7	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BT Circuit Range/Performance	P1BBA	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BU Circuit Range/Performance	P1BBD	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense BV Circuit Range/Performance	P1BC0	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BW Circuit Range/Performance	P1BC3	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BX Circuit Range/Performance	P1BC6	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BY Circuit Range/Performance	P1BC9	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BZ Circuit Range/Performance	P1BCC	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Average Cell Voltage Movement No active DTCs:	> 0.006V U185A	 Frequency: 200ms	
Hybrid Battery Voltage Sense CA Circuit Range/Performance	P1BCF	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CB Circuit Range/Performance	P1BD2	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CC Circuit Range/Performance	P1BD5	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CD Circuit Range/Performance	P1BD8	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Average Cell Voltage Movement No active DTCs:	> 0.006V U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense CE Circuit Range/Performance	P1BDB	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CF Circuit Range/Performance	P1BDE	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CG Circuit Range/Performance	P1BE1	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CH Circuit Range/Performance	P1BE4	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense CI Circuit Range/Performance	P1BE7	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense CJ Circuit Range/Performance	P1BEA	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense CK Circuit Range/Performance	P1BED	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense CL Circuit Range/Performance	P1BF0	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CM Circuit Range/Performance	P1BF3	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CN Circuit Range/Performance	P1BF6	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CO Circuit Range/Performance	P1BF9	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement	= FALSE > 0.006V	20 Failures out of 40 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense CP Circuit Range/Performance	P1BFC	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense CQ Circuit Range/Performance	P1E01	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery Voltage Sense CR Circuit Range/Performance	P1E04	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page)	= FALSE	20 Failures out of 40 Samples	One Trip, Type A
					Average Cell Voltage Movement	> 0.006V		
					No active DTCs:	U185A	Frequency: 200ms	
Hybrid Battery 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	60 Failures out of 80 Samples	One Trip, Type A
					No active DTCs:	U0111	Frequency: 100ms	
						U185A		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Pack Voltage Sense Circuit 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 P1AEB P1AE21 P1AE8 P1AEA P1AE20 U1817	Frequency: 25ms	
			OR					
			|Battery Pack voltage - Charger Bus Voltage |	> 12 V	Charger and Multipurpose Contactor Status No active DTCs:	= Closed P0ABC P0ABD P1A07 P0ABB P0D4E P0D4F P1EEB P1EEC P0D5C	400 Failures out of 1995 Samples	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						P1ECE P16C5 U1838	Frequency: 25ms	
Hybrid Battery System Voltage High	P0AFB	Voltage too high	High Voltage Battery Pack Voltage	> KtBSED_U_BOV_PackVoltThresh (V) (see VICM Supporting Tables)	No active DTCs:	P0ABC P0ABD P1A07 P0AF8 P0ABB U0111 U185A	320 Failures out of 1595 Samples Frequency: 25ms	One Trip, Type A
			OR					
			Any Cell Voltage	> KtBSED_U_BOV_CellVoltThresh (V) (see VICM Supporting Tables)	VICMVoltageFA (see Fault Bundle Page) No active DTCs:	= FALSE U0111 U185A	40 Failures out of 195 Samples Frequency: 25ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Energy Control Module Hybrid/EV Battery Cell Overvoltage	P1EAB	Voltage too high	Cell Voltage	> 4.5 V	No active DTC's: U185A	P1EAC	80 Failures out of 80 Samples Frequency: 25ms	One Trip, Type A
Hybrid/EV Battery Cell Overvoltage Signal/Circuit Performance	P1EAC	Over voltage circuit 2nd protection - Fault Flag Test	Circuit Key Off Test counts (Hardware line is pulled down for 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 Test Active Bit Transitions to	= OFF = 1	2 Failures out of 2 Samples, across key cycles 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
			OR					
		Test Active Stuck On	Test active Bit	= 1	RUN/CRANK Transitions to	= OFF for > 800 samples	400 Failures out of 500 Samples Frequency: 25ms	
			OR					
		Test Active Stuck Off	Test active Bit	= 0	RUN/CRANK Transitions to	= OFF for < 320 samples	2 Failures out of 2 Samples, across key cycles Frequency: 25ms	
Hybrid Battery System Voltage Low	P0AFA	Voltage too low	High Voltage Battery Pack Voltage	< KtBSED_U_BLF_PackVoltThresh (V) (see VICM Supporting Tables)	No active DTCs:	P0ABC P0ABD P1A07 P0AF8 P0ABB U0111	320 Failures out of 1595 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
						U185A		
			OR					
			Any Cell Voltage	< KtBSED_U_BLF_CellVoltThresh (V) (see VICM Supporting Tables)			40 Failures out of 195 Samples	
					VICMVoltageFA (see Fault Bundle Page) No active DTCs:	= FALSE U0111 U185A	Frequency: 25ms	
Hybrid Battery Pack Voltage Variation	P0BBE	Cell Voltage deviation	Maximum Cell Voltage - Minimum Cell Voltage	> 0.3 V	CellVoltageRationalityFA No active DTCs:	= FALSE U0111 U185A	500 Failures out of 600 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery Pack Current Sensor A/B Correlation	P0B13	Checks for deviation between Fine and Coarse current sensors	| Fine Current - Coarse Current |	> 10 A	Fine Current measured	Between -20A and 20A	400 Failures out of 1995 Samples	One Trip, Type A
					OR			
					Coarse Current measured No active DTCs:	Between -20A and 20A P0AC1 P0AC2 P1EBA P1A07 P0B13 P0B10	Frequency: 25ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						P0B11 P1EBB U0111 U185A		
Hybrid Battery Temperature Sensor Range/Performance	P0A9C	Rationality compares temperature with the other sensor values read	| Temperature input deviates from the average battery temperature of other Module_Groups |	> 20 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery 2 Temperature Sensor Performance	P0AC6	Rationality compares temperature with the other sensor values read	| Temperature input deviates from the average battery temperature of other Module_Groups |	> 20 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery 3 Temperature Sensor Performance	P0ACB	Rationality compares temperature with the other sensor values read	Temperature input deviates from the average battery temperature	| Temperature input deviates from the average battery temperature of other Module_Groups |	> 20 ºC	= FALSE	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery 4 Temperature Sensor Performance	P0AE9	Rationality compares temperature with the other sensor values read	| Temperature input deviates from the average battery temperature of other Module_Groups |	> 20 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery Temperature Sensor E Circuit Range/Performance	P0BC3	Rationality compares temperature with the other sensor values read	| Temperature input deviates from the average battery temperature of other Module_Groups |	> 20 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery Temperature Sensor F Range/Performance	P0C34	Rationality compares temperature with the other sensor values read	| Temperature input deviates from the average battery temperature of other Module_Groups |	> 20 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery Temperature Sensor G Circuit Range/Performance	P0C7D	Rationality compares temperature with the other sensor values read	| Temperature input deviates from the average battery temperature of other Module_Groups |	> 20 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery Temperature Sensor H Circuit Range/Performance	P0C82	Rationality compares temperature with the other sensor values read	| Temperature input deviates from the average battery temperature of other Module_Groups |	> 20 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							Frequency: 100ms	
Hybrid Battery Temperature Sensor I Circuit Range/Performance	P0C89	Rationality compares temperature with the other sensor values read	| Temperature input deviates from the average battery temperature of other Module_Groups |	> 20 ºC	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_ResistanceThresh (ohm) - see VICM Supporting Tables	Average Battery Temperature Battery State Estimator Battery State of Charge (SOC) TempRationalityFA (see fault bundle page)	> 10 ºC = ACTIVE > 20 % < 80 % = FALSE	4000 Failures out of 5000 Samples	One Trip, Type A
Hybrid Battery Pack Over temperature	P0A7E	Battery temp. too high	Battery Module Temperature	> 73.5 ºC	TempRationalityFA (see fault bundle page)	= FALSE	50 Failures out of 60 Samples Frequency: 100ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Calculated Hybrid Performance	P1E3D	Redundant Voltage monitor	Pack Voltage - Redundant Pack Voltage	> 1 V			50 Failures out of 60 Samples Frequency: 100ms	One Trip, Type A
Miscellaneous Diagnostics								
Engine Hood Switch Performance	P257D	Rationality Check for the Vehicle Hood Switch	Hood Switch Position Sensor reading within an invalid range	Within the following ranges: 67.8% - 71.5% 43.4% - 45.7% 14.6% - 17.2%	Diagnostic Enabled Propulsion System Active	=TRUE =TRUE	6 failed samples within 8 samples 1 sample every 12.5ms	Two Trips, Type B
Engine Hood Switch Circuit Low Voltage	P257E	Detects if the Vehicle Hood Switch is Shorted to Ground	Hood Switch Position Sensor reading below a threshold	<14.6%	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	>71.5%	Diagnostic Enabled Propulsion System Active	=TRUE =TRUE	6 failed samples within 8 samples 1 sample every 12.5ms	Two Trips, Type B

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

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 LED Commanded On Charge Cord Plugged In	=TRUE = FALSE =FALSE	40 failed samples within 50 samples; 1 sample every 100ms	
Control Module Power Off Timer Performance	P262B	Detects a fault in the internal Control Module off-timer	The aboslute value of the difference between the Control Module 'Off' Timer and Control Module 'On' Timer (both timers operating during Controller 'On') exceeds a threshold	Difference > 5.6%	Diagnostic Enabled Controller 'On' Time RunCrank DTCs Not Active	=TRUE > 60 seconds =TRUE P0601, P0602, P0603, P062F, P0604 and P0606	Runs once per drive cycle (when Run/Crank transitions from TRUE to FALSE).	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
High Voltage Energy Management Communication Bus Enable Circuit	P1EB9	Detects a fault in the High Voltage Energy Management Communication (HVEM) Bus Enable Circuit	Case 1: Short to Ground		Diagnostic Enabled HVEM Bus Enabled	=TRUE =TRUE	480 failed samples within 560 samples 1 sample every 12.5ms	One Trip, Type A
			Case 2: Short to Battery or open circuit		Diagnostic Enabled HVEM Bus Enabled	=TRUE =FALSE		
Control Module Wake-up Circuit Performance	P06E4	Detects a fault in the Control Module Output Wake-Up Circuit	Case 1: Short to Ground		Diagnostic Enabled Control Module Output Wake-Up Circuit Enabled	=TRUE =TRUE	480 failed samples within 560 samples 1 sample every 12.5ms	One Trip, Type A
			Case 2:Short to Battery or Open circuit		Diagnostic Enabled Control Module Output Wake-Up Circuit Enabled	=TRUE =FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Ignition Switch Run/Start Position Circuit Low	P2534	Detects if the Run/Crank input circuit is low	Short to Ground or Open condition	<2volts	Diagnostic Enabled CAN Communication ECM Run/Crank Active Data	=TRUE Enabled Available and Active	10 failed samples within 20 samples 1 sample every 250ms	One Trip, Type A
Ignition Switch Run/Start Position Circuit High	P2535	Detects if the Run/Crank input circuit is high	Short to Battery	>5volts	Diagnostic Enabled CAN Communication ECM Run/Crank Active Data	=TRUE Enabled Available and False	10 failed samples within 20 samples 1 sample every 250ms	One Trip, Type A
Ignition Switch Accessory Position Circuit Low	P2537	Detects an accessory position circuit open	Accessory	FALSE	P2537 Propulsion System Propulsion System Active Time	Not Test Failed This Key On and Not Test Passed This Key On Active > 0.5 seconds	0.1 seconds (8 * 0.0125)	Two Trips, Type B
		DTC Pass	Accessory	TRUE			0.1 seconds (8 * 0.0125)	
System Voltage Low	P0562	Detects if Battery input voltage is below a threshold	Battery voltage is below a threshold	≤ 10.2volts		Continuous	1 failed sample for 500ms below Threshold value	Special Type C

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 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
Control Module Long Term Memory Reset	P0603	Non-volatile memory checksum error	Checksum at power-up does not match checksum at power-down			Runs at battery connect OR after a controller reset OR When Battery Backed RAM failure detected OR next controller init when Failure counter increments to 1 OR Fault is active OR Test not passed since code clear OR Test failed this key on OR MIL Request is ON	2 consecutive failed samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Random Access Memory (RAM) Failure	P0604	Control Module is unable to correctly write and read data to and from RAM	Data read does not match data written			Continuous	~~Runs at controller shutdown~~ 100ms loop, 1 failure in powerup cycle	One Trip, Type A
		RAM ECC Circuit Test	Failed validation of test data written to ECC			Continuous	1s loop, 3 failures in powerup cycle	
Control Module Internal Performance	P0606	ALU and Register Test	Control Module fails to execute a diagnostic test algorithm			Continuous	1s loop, 3 failures in powerup cycle	One Trip, Type A
		Configuration Registers Test	Comparison of current configuration register settings with predefined values fails			Continuous	1s loop, 3 failures in powerup cycle	
		MMU Test	Test of memory management related instructions fails	Fails MMU instruction		Continuous	1s loop, 3 failures in powerup cycle	
		MMU Configuration Fault	Verifies MMU TLB's are properly configured for the application	TLB set incorrectly		Continuous	1s loop, 3 failures in powerup cycle	
		Stack Limits Test	Verifies stack usage does not exceed maximum stack size	Stack usage exceeds 100%		Continuous	1s loop, 3 failures in powerup cycle	
		Clock Status	Checks for loss of lock/clock, forces a reset if failed			Continuous	1s loop, 3 failures in powerup cycle	
		Auxiliary ALU Test	Auxiliary microprocessor fails to run a defined diagnostic algorithm			Continuous	100ms loop, 3 failures in powerup cycle	
		Auxiliary RAM Test	Auxiliary microprocessor fails a write/read data diagnostic RAM test			Continuous	1s loop, 3 failures in powerup cycle	
		Auxiliary ROM Test	Auxiliary microprocessor ROM checksum error			Continuous	2.5s loop, 3 failures in powerup cycle	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Auxiliary Register Configuration Test	Configuration register values do not match expected pre-configured values			Continuous	100ms loop, 3 failures in powerup cycle	
		Auxiliary Stack Test	Auxiliary microprocessor stack underflow or overflow			Continuous	100ms loop, 3 failures in powerup cycle	
		Seed and Key Test	Seed and key test failed - invalid order, timeout, incorrect seed, incorrect key			Continuous	100ms loop, 3 failures in powerup cycle	
		Main Detected Seed Incorrect Order	Seed and key test failed - main microprocessor received seed from the auxiliary icroprocessor out of order			Continuous	100ms loop, 3 failures in powerup cycle	
		Main Detected Unknown Seed	Seed and key test failed - main microprocessor received an unknown seed			Continuous	100ms loop, 3 failures in powerup cycle	
		Internal IO Diagnostic (BVREF)	5V reference voltages out of range	10.46 % 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		Never	1s loop, 3 failures in powerup cycle	
		Internal IO Diagnostic (IVBAT)	IVBAT voltage out of range	IVBAT less than 9V or greater than 18V		Never	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	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Internal IO Diagnostic (Analog 75% reference line)	75% reference line out of range	Reference less than 72% or greater than 78%		Continuous	1s loop, 3 failures in powerup cycle	
		Control Module Wake-up Circuit Performance (Self Wakeup Fault)	Control module unable to do a Self Wakeup when there is a request to do so		Diagnostic Enabled Self-Wakeup Requested	=TRUE =TRUE	Runs once at powerup if a Self-Wakeup request was active last power down	
		SPI Fault Detection Test	SPI B, C, or D fault detected			Continuous	1s loop, 3 failures in powerup cycle	
		SPI B Fault Detection Test	Fault detected via echo test on SPI bus B			Continuous	1s loop, 3 failures in powerup cycle	
		SPI C Fault Detection Test	Fault detected via echo test on SPI bus C			Continuous	1s loop, 3 failures in powerup cycle	
		SPI D Fault Detection Test	Fault detected via echo test on SPI bus D			Continuous	1s loop, 3 failures in powerup cycle	
Control Module Long Term Memory Performance	P062F	Update BINVDM operation	Battery independent non-volatile status update failed				Runs at controller shutdown and after new data is written to EEPROM (which is checked every 255 seconds) 2 consecutive failed samples	One Trip, Type A
Communication Faults								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Communication Bus A Off	U0073	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.			Controller On Bus A Communication Enabled	=TRUE > 2 seconds	5 failures out of 5 samples 1 s loop	Two Trips, Type B
Control Module Communication Bus B Off	U0074	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.			Controller On Bus B Communication Enabled	=TRUE > 2 seconds	5 failures out of 5 samples 1 s loop	One Trip, Type A
Control Module Communication Bus H Off	U007A	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.			Controller On Bus H Communication Enabled	=TRUE > 2 seconds	5 failures out of 5 samples 1 s loop	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Lost Communication With ECM on Bus A	U0100	Detects that CAN serial data communication has been lost with the ECM on Bus A	Messages have not been received from the ECM for a specified time	≥ 500ms	Controller On	=TRUE	Runs in 10ms loop	Two Trips, Type B
					Bus A Communication Enabled	> 2 seconds		
					Battery Voltage	>10.2V		
		DTC Pass					10ms after receiving any message from the supervised source	
Lost Communication with Transmission Control Module	U0101	Detects that CAN serial data communication has been lost with the TCM on Bus A	Messages have not been received from the TCM for a specified time	≥ 1500ms	Controller On	=TRUE	Runs in 10ms loop	Two Trips, Type B
					Bus A Communication Enabled	> 2 seconds		
					Battery Voltage	>10.2V		
		DTC Pass					10ms after receiving any message from the supervised source	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Lost Communication with Battery Energy Control Module	U0111	Detects that CAN serial data communication has been lost with the Battery Energy Control Module on Bus A	Messages have not been received from the BECM for a specified time	≥ 500ms	Controller On	=TRUE	Runs in 10ms loop	Two Trips, Type B
					Bus A Communication Enabled	> 2 seconds		
					Battery Voltage	>10.2V		
		DTC Pass					10ms after receiving any message from the supervised source	
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
					Bus A Communication Enabled	> 2 seconds		
					Battery Voltage	>10.2V		
		DTC Pass					10ms after receiving any message from the supervised source	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Lost Communication with Electric A/C Compressor Control Module	U016B	Detects that CAN serial data communication has been lost with the Electric A/C Compressor Control Module on Bus A	Messages have not been received from the EACCM for a specified time	≥ 500ms	Controller On	=TRUE	Runs in 10ms loop	Two Trips, Type B
					Bus A Communication Enabled	> 2 seconds		
					Battery Voltage	>10.2V		
		DTC Pass					10ms after receiving any message from the supervised source	
Lost Communication With Hybrid Powertrain Control Module	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
					Bus A Communication Enabled	> 2 seconds		
					Battery Voltage	>10.2V		
		DTC Pass					10ms after receiving any message from the supervised source	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Lost Communication with Hybrid Powertrain Control Module on Bus B	U1817	Detects that CAN serial data communication has been lost with the Hybrid Powertrain Control Module on Bus B	Messages have not been received from the HCP for a specified time	≥ 500ms	Controller On	=TRUE	Runs in 10ms loop	One Trip, Type A
					Bus B Communication Enabled	> 2 seconds		
					Battery Voltage	>10.2V		
		DTC Pass					10ms after receiving any message from the supervised source	
Lost Communication With ECM on Bus B	U1818	Detects that CAN serial data communication has been lost with the ECM on Bus B	Messages have not been received from the ECM for a specified time	≥ 500ms	Controller On	=TRUE	Runs in 10ms loop	Two Trips, Type B
					Bus B Communication Enabled	> 2 seconds		
					Battery Voltage	>10.2V		
		DTC Pass					10ms after receiving any message from the supervised source	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Lost Communication with Battery Charger Control Module on Bus H	U1838	Detects that CAN serial data communication has been lost with the Battery Charger Control Module on Bus H	Messages have not been received from the Battery Charger Module for a specified time	≥ 500ms	Controller On	=TRUE	Runs in 10ms loop	One Trip, Type A
					Bus H Communication Enabled	> 2 seconds		
					Battery Voltage	>10.2V		
		DTC Pass					10ms after receiving any message from the supervised source	
Lost Communication with Battery Energy Control Module on Bus H	U185A	Detects that CAN serial data communication has been lost with the Battery Energy Control Module on Bus H	Messages have not been received from the Battery Energy Control Module for a specified time	≥ 500ms	Controller On	=TRUE	Runs in 10ms loop	One Trip, Type A
					Bus H Communication Enabled	> 2 seconds		
					Battery Voltage	>10.2V		
		DTC Pass					10ms after receiving any message from the supervised source	
Fuel Door Diagnostics								
Fuel Fill Door Switch Stuck Closed	P04B6	Fuel Door Position Rationality	Fuel door opened	FALSE	Fuel Fill Door Switch Stuck Closed Diagnostic Enable Calibration	=TRUE	50ms	Two Trips, Type B
			AND refuel request	TRUE				

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	80% of total number samples @ 50ms per sample (<5sec)	One Trip, Type A
			OR		The Hardware reported test result, for an open circuit or short to power condition	≠ INDETERMINANT		
			Hardware Reported Test Result for SHORT Circuit to Battery		The door lock driver circuit must be active to assert an Unlock	=ASSERT UNLOCK		
					OR			
					The door lock driver circuit must be active to assert Lock state	=ASSERT LOCK		
			Hardware Reported Test Result for SHORT Circuit to Ground	Fault =TRUE	Fuel Fill Door Lock Control Circuit/Open Diagnostic Enable Calibration	=TRUE	64 out of 80 samples @ 50ms per sample	
					The Hardware reported test result is for short circuit condition	≠ INDETERMINANT		
					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	600ms	Two Trips, Type B
					No active DTCs:	P04BB, P04BD, P04BE, P04BF, P04C1, P04C2, P04C3, P04C5, P04C6,		
					The Fuel Fill Door Lock is comanded to the Lock position	=ASSERTLOCK		
					The Fuel Fill Door is not already in the Lock postion	=TRUE		
Fuel Fill Door Unlock Control Range/Performance	P04C0	Performance for the Fuel Fill Door Unlock Control	Fuel Door Lock state does NOT transition from Locked to Unlock		Fuel Fill Door Unlock Control Range/Performance Diagnostic Enable Calibration	=TRUE	600ms	Two Trips, Type B
					No active DTCs:	P04BB, P04BD, P04BE, P04BF, P04C1, P04C2, P04C3, P04C5, P04C6,		
					The Fuel Fill Door Lock is commanded to the unlock position	=ASSERTUNLOCK		
					The Fuel Fill Door is not already in the Unlock postion	=TRUE		
Fuel Fill Door Lock Position Sensor/Switch Circuit	P04C3	Detects if the circuit resistance is incorrect	Switch sensor reading within invalid range	65.9%> Reported Positon <=81.6%	Fuel Fill Door Lock Position Sensor/Switch Circuit Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B

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	16 out of 20 samples @ 50ms per sample	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
Fuel Fill Door Lock Position Sensor/Switch Circuit High	P04C6	Detects if the circuit is shorted to battery or open	Switch sensor reading greater than threshold	Reported Position > 94.5%	Fuel Fill Door Lock Position Sensor/Switch Circuit High Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Open Request Sensor/Switch Circuit	P04C8	Detects if the circuit resistance is incorrect	Switch sensor reading within invalid range	65.9%< Reported Position <=81.6%	Fuel Fill Door Open Request Sensor/Switch Circuit Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Open Request Sensor/Switch Circuit Low	P04CA	Detects if the circuit is shorted to ground	Fuel Fill Door Lock Request Switch sensor reading less than threshold	Reported Position<22.9%	Fuel Fill Door Open Request Sensor/Switch Circuit Low Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Open Request Sensor/Switch Circuit High	P04CB	Detects if the Circuit is shorted to battery or open	Fuel Fill Door Request Switch sensor reading above threshold	Reported Position > 94.5%	Fuel Fill Door Open Request Sensor/Switch Circuit High Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Evaporative Emission (EVAP) System Pressure Incorrect During Fuel Fill Door Open Request	P1461	Detects incorrect EVAP System pressure during a Fuel Fill Door Open Request	The Fuel Tank Vapor Pressure does NOT fall within a pressure range	Fuel Tank Vapor Pressure >= .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		
Charge Port Door Diagnostics								
Charge Port Door Open Request Switch Circuit	P0CC7	Detects if the circuit resistance is incorrect	Switch sensor reading within INVALID range	65.9%< Reported Position <=81.6%	Charge Port Door Open Request Switch Circuit Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Charge Port Door Open Request Switch Circuit Low	P0CC9	Detects if the circuit is shorted to ground	Switch sensor reading less than threshold	Reported Positon <22.9%	Charge Port Door Open Request Switch Circuit Low Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms 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 @ 500ms 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 @ 500ms 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 @ 500ms per sample	Two Trips, Type B
Charge Port Door Position Sensor Circuit High	P0CCF	Detects if the circuit is shorted to battery	Position sensor reading greater than threshold	Reported Positon > 94.5%	Charge Port Door Position Sensor Circuit High Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms 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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					The hardware reported circuit fault staus is	≠ INDETERMINANT		
			Case 1: Short to Ground	=TRUE	Charge Port Door Unlock Command	=TRUE	7 out of 9 samples @ 50ms per sample	
			Case 2: Short to Battery or Open	=TRUE	Charge Port Door Unlock Command	=FALSE	64 out of 80 samples @ 50ms per sample	
Charge Port Door Unlock Control Circuit Performance	P0CD2	Performance test for the unlock control circuit	Charge Door Position OPEN not Detected in time less than threshold	13 seconds	Charge Port Door Unlock Control Circuit Performance Diagnostic Enable Calibration	=TRUE	13 seconds	Two Trips, Type B
					Temperature enable diagnostic calibration	> -12C		
					No active DTCs:	P0CCC, P0CCE, P0CCF, P0CD1		
		DTC Pass					ONE TRIP MIL OFF	
Charging Diagnostics								
Control Pilot Circuit High	P0CF6	Sets when % control pilot signal (voltage/system) is above a threshold	% Control Pilot Signal	> 0.58	System Voltage Vehicle Speed Charge Cord State	> 9.0V > = 5 mph Not Connected	30 failures out of 50 samples 100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	
Control Pilot Circuit Low	P0CF5	Sets when % control pilot signal (voltage/system) is below a threshold	% Control Pilot Signal	< 0.03	System Voltage Control Pilot Diag Switch Charge Cord State No active DTCs:	> 9.0V On Not Connected P0CD1,P0CCF,P0CCE, P0CCC,P0CCA,P0CC9, P0CC7,P0CC6	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	
Control Pilot Circuit Range/Performance	P0CF4	This diagnostic tests the integrity of the Charge Control Pilot.There are two tests to ensure proper functioning of the pilot. Part A: Sets when Control Pilot Percent Voltage is above a Threshold OR Aux Micro Logic State is in HIGH state OR Main Micro Logic State is in LOW state Part B:	% Control Pilot Signal Aux Micro Logic State Main Micro Logic State	> 0.03 High Low	Part A: CPDIAG Switch State Vehicle Speed System Voltage Charge Cord State	 Not Asserted (see Definitions) > = 5 mph > 9.0V 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
		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 > 10.2V		
		OR Aux Micro Logic State is in LOW state OR Main Micro Logic State is in HIGH state						
		DTC Pass					5 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Proximity Detection Circuit High	P0D59	Sets when Proximity Detection Circuit Voltage is above a threshold	Proximity Detection Circuit Voltage	> 4.8 V.	System Voltage Vehicle Speed Shift Lever Position No Faults on Vehicle Speed	> 9.0V > 12.4 mph Not in Park	30 failures out of 50 samples 100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	
Proximity Detection Circuit Low	P0D58	Sets when Proximity Detection Circuit Voltage is below a threshold	Proximity Detection Circuit Voltage	< 4.2 V.	System Voltage Vehicle Speed Shift Lever Position No Faults on Vehicle Speed	> 9.0V > 12.4 mph Not in Park	30 failures out of 50 samples 100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger System Precharge Time Too Long	P0D26	This diagnostic tests whether precharge has occurred in the appropriate amount of time in a characteristic way. The target voltage is battery pack voltage. A deviation or deadband around pack voltage is calculated in the form of a percentage deviation. To have a successful or passing precharge, the bus voltage must rise and be within the calculated deadband window for a continuous time of at least 0.25 seconds and before 10 seconds has elapsed since the beginning of precharge.	Not Passing (see pass criteria below)	>= 10 seconds	System Voltage AND Multi-Purpose Contactor AND Charger Contactor State Precharge Too Long Time	> 9.0V open Precharge < = 10 sec.	10 sec	One Trip, Type A
		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 Multi-Purpose Contactor Charger Contactor State No Active DTCs on HV output current sensor signal No Active Cooling No Active Heating	> 9.0V Open Precharge P0D53, P0D54, P1EEB, P1EEC, P1ECE, P0D5C, P16C5, P1EFD, P1F16 (See Definitions tab)	4 failures out of 5 samples 100 ms rate	One Trip, Type A
		DTC Pass					0.5 seconds	
Battery Charger Input Current Too High	P0D2A	Sets when Charger AC Input Current is above a threshold If AC Voltage >= 180 V If AC Voltage < 160 V			No Active DTCs on AC Input Voltage No Active DTCs on AC Input Current Signal Control Pilot Charging Switch State	P0D3F, P0D40, P1EE7, P1EE8, P0D3E, P1ECE, P0D5C, P0D5B, P16C4, P1EFD P0D3A, P0D3B, P1EE7, P1EE8, P1ECE, P0D5C, P0D5B, P16C4, P1EFD, P1F14 Closed	240 failures out of 300 samples 100 ms rate	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			AC input current	> 17 A				
			AC input current	> 13 A				
		DTC Pass					5 seconds	
Battery Charger Output Current Performance	P0D22	This DTC can be set in either of two ways (Part A or Part B). Part A monitors for the charger output HV current to be within an acceptable deviation band about the commanded current. If this allowable deviation is exceeded, the DTC will be set. Part B monitors for the special case where the OBCM has been commanded on but the charger has not turned on its HV output. If this	Part A: abs(Charger HV Output Current Deviation)	>=Table F(Commanded Current) See Supporting Tables	Part A & Part B Common: System Voltage Part A: Charge Control Mode Commanded HV Current Charging Contactor Status Charger Turn On Delay Time (A) (has expired)	 > 9.0V Constant Current OR Constant Voltage >0.5A = CLOSED >= 5 Sec	Part A: 255 failures out of 320 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
		condition occurs the DTC will be set. Part A and Part B are mutually exclusive fault detection strategies.	Part B: Charger HV Power Supply Status		AND, EITHER Multipurpose Contactor Status OR RESS Heater Duty Cycle	 = CLOSED > 99%		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				= UNAVAILABLE	Part B: Charger HV Power Supply Enable Command Commanded HV Voltage Charger Turn On Delay Time (B) (has expired)	= TRUE >??V >=6 Sec	Part B: 255 failures out of 320 samples 100 ms rate	
		DTC Pass					32 sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Output Voltage Performance	P0D20	This DTC sets when the percent of voltage deviation while in constant voltage control modeis greater than a threshold.	Charger HV Output Voltage Percent Deviation	>= 15%	System Voltage Charge Control Mode	> 9.0V Constant Voltage	30 failures out of 50 samples 100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	

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

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	> 9.0 V		
					No faults on HV Output Voltage Sensor	P0D4E, P0D4F, P1EEB, P1EEC, P1ECE, P0D5C P16C5, P1EFD		
					Charge System Mode	Heat Only Mode		
Battery Charger AC Voltage Not Present	P1EE6	Sets when Charger AC input Voltage is below a threshold	Charger AC Input Voltage	<= 5 V	System Voltage	> 9.0V	40 failures out of 50 samples	
					AC On Requested	>= 4 Sec.	100 ms rate	
					No Active DTCs on AC Input Voltage Sensor	P0D3F, P0D40, P1EE7, P1EE8, P0D3E, P1ECE, P0D5C, P0D5B, P16C4, P1EFD		
					Control Pilot State	Connected Ready (In/Out)		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Pilot Charging Switch Range/Performance	P0CF9	Sets when Control Pilot % voltage is below a threshold or if it is above a threshold	Control Pilot Normalized Voltage OR Control Pilot Normalized Voltage Note: Control Pilot Normalized Voltage=Charging System Control Pilot Voltage / Battery Voltage	> 28 % < 14 %	System Voltage Control Pilot Charging Switch State CPDIAG Switch State Charge Cord State Control Pilot Circuit and Performance Diagnostics	> 9.0V 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 Note: Control Pilot Normalized Voltage=Charging System Control Pilot Voltage / Battery Voltage	> 10 % < 4 %	System Voltage Charging Ventilation Switch State CPDIAG Switch State Charge Cord State Control Pilot Circuit and Performance Diagnostics Control Pilot Charging Switch Performance	> 9.0V 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
Charge Port Door Unlock Control Circuit Performance	P0CD2	Performance test for the unlock control circuit	Case 2: Short to Battery or Open	=TRUE	Charge Port Door Unlock Command	=FALSE	64 out of 80 samples @ 50ms per sample	Two Trips, Type B
			Charge Door Position OPEN not Detected in time less than threshold	13 seconds	Charge Port Door Unlock Control Circuit Performance Diagnostic Enable Calibration	=TRUE	13 seconds	
					Temperature enable diagnostic calibration	> -12C		
					No active DTCs:	P0CCC, P0CCE, P0CCF, P0CD1		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass					ONE TRIP MIL OFF	
Charging Diagnostics								
Control Pilot Circuit High	P0CF6	Sets when % control pilot signal (voltage/system) is above a threshold	% Control Pilot Signal	> 0.58	System Voltage Vehicle Speed Charge Cord State	> 9.0V > = 5 mph Not Connected	30 failures out of 50 samples 100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	
Control Pilot Circuit Low	P0CF5	Sets when % control pilot signal (voltage/system) is below a threshold	% Control Pilot Signal	< 0.03	System Voltage Control Pilot Diag Switch Charge Cord State No active DTCs:	> 9.0V On Not Connected P0CD1,P0CCF,P0CCE, P0CCC,P0CCA,P0CC9, P0CC7,P0CC6	30 failures out of 50 samples 100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	
Control Pilot Circuit Range/Performance	P0CF4	This diagnostic tests the integrity of the Charge Control Pilot.There are two tests to ensure proper functioning of the pilot. Part A: Sets when Control Pilot Percent Voltage is above a Threshold OR Aux Micro Logic State is in HIGH state OR Main Micro Logic State is in LOW state	% Control Pilot Signal Aux Micro Logic State Main Micro Logic State	> 0.03 High Low	Part A: CPDIAG Switch State Vehicle Speed System Voltage Charge Cord State	Not Asserted (see Definitions) > = 5 mph > 9.0V 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
		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 > 10.2V		
		OR Aux Micro Logic State is in LOW state OR Main Micro Logic State is in HIGH state						
		DTC Pass					5 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Proximity Detection Circuit High	P0D59	Sets when Proximity Detection Circuit Voltage is above a threshold	Proximity Detection Circuit Voltage	> 4.8 V.	System Voltage [Charge Port Door No Active DTCs on Charge Port Door Position OR Vehicle Speed Shift Lever Position No Faults on Vehicle Speed	> 9.0V 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 [Charge Port Door No Active DTCs on Charge Port Door Position OR Vehicle Speed Shift Lever Position No Faults on Vehicle Speed]	> 9.0V Closed P0CCF,P0CCE, P0CCC > 12.4 mph Not in Park	30 failures out of 50 samples 100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger System Precharge Time Too Long	P0D26	This diagnostic tests whether precharge has occurred in the appropriate amount of time in a characteristic way. The target voltage is battery pack voltage. A deviation or deadband around pack voltage is calculated in the form of a percentage deviation. To have a successful or passing precharge, the bus voltage must rise and be within the calculated deadband window for a continuous time of at least 0.25 seconds and before 10 seconds has elapsed since the beginning of precharge.	Not Passing (see pass criteria below)	>= 10 seconds	System Voltage AND Multi-Purpose Contactor AND Charger Contactor State Precharge Too Long Time	> 9.0V open Precharge < = 10 sec.	10 sec	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	abs({[Charger Bus Voltage / Battery Pack Voltage] - 1}x 100) AND Precharge Complete Window Time	< 5% >= 0.25 seconds			0.25 sec	
Battery Charger Output Shorted	P0D23	Sets Charger Bus Current is above a threshold	Bus Current	> .35 A	System Voltage Multi-Purpose Contactor Charger Contactor State No Active DTCs on HV output current sensor signal No Active Cooling No Active Heating	> 9.0V Open Precharge P0D53, P0D54, P1EEB, P1EEC, P1ECE, P0D5C, P16C5, P1EFD, P1F16 (See Definitions tab)	4 failures out of 5 samples 100 ms rate	One Trip, Type A
		DTC Pass					0.5 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Input Current Too High	P0D2A	Sets when Charger AC Input Current is above a threshold If AC Voltage >= 180 V If AC Voltage < 160 V	AC input current AC input current	> 17 A > 13 A	No Active DTCs on AC Input Voltage No Active DTCs on AC Input Current Signal Control Pilot Charging Switch State	P0D3F, P0D40, P1EE7, P1EE8, P0D3E, P1ECE, P0D5C, P0D5B, P16C4, P1EFD P0D3A, P0D3B, P1EE7, P1EE8, P1ECE, P0D5C, P0D5B, P16C4, P1EFD, P1F14 Closed	240 failures out of 300 samples 100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	

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) Note:	>=Table F(Desired Current) See Supporting Tables	Charge Control Mode Desired Current Delay Time after start of constant current control	Constant Current >0.5 A 10 sec	1800 failures out of 2400 samples 100 ms rate	One Trip, Type A
		DTC Pass					240 sec	
Battery Charger Output Voltage Performance	P0D20	This DTC sets when the percent of voltage deviation while in constant voltage control modeis greater than a threshold.	Charger HV Output Voltage Percent Deviation	>= 15%	System Voltage Charge Control Mode	> 9.0V Constant Voltage	30 failures out of 50 samples 100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	

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

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	> 9.0 V		
					No faults on HV Output Voltage Sensor	P0D4E, P0D4F, P1EEB, P1EEC, P1ECE, P0D5C P16C5, P1EFD		
					Charge System Mode	Heat Only Mode		
Battery Charger AC Voltage Not Present	P1EE6	Sets when Charger AC input Voltage is below a threshold	Charger AC Input Voltage	<= 5 V	System Voltage	> 9.0V	40 failures out of 50 samples	
					AC On Requested	>= 4 Sec.	100 ms rate	
					No Active DTCs on AC Input Voltage Sensor	P0D3F, P0D40, P1EE7, P1EE8, P0D3E, P1ECE, P0D5C, P0D5B, P16C4, P1EFD		
					Control Pilot State	Connected Ready (In/Out)		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Pilot Charging Switch Range/Performance	P0CF9	Sets when Control Pilot % voltage is below a threshold or if it is above a threshold	Control Pilot Normalized Voltage OR Control Pilot Normalized Voltage Note: Control Pilot Normalized Voltage=Charging System Control Pilot Voltage / Battery Voltage	> 28 % < 14 %	System Voltage Control Pilot Charging Switch State CPDIAG Switch State Charge Cord State Control Pilot Circuit and Performance Diagnostics	> 9.0V Closed Asserted Not Connected Completed this Key-Cycle	30 failures out of 50 samples 100 ms rate	One Trip, Type A

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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 Note: Control Pilot Normalized Voltage=Charging System Control Pilot Voltage / Battery Voltage	> 10 % < 4 %	System Voltage Charging Ventilation Switch State CPDIAG Switch State Charge Cord State Control Pilot Circuit and Performance Diagnostics Control Pilot Charging Switch Performance	> 9.0V Closed Asserted Not Connected Completed this Key-Cycle Completed this Key-Cycle	30 failures out of 50 samples 100 ms rate	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel Rail Pressure (FRP) Sensor Performance (rationality)	P018B	This DTC detects a fuel pressure sensor response stuck within the normal operating range	Absolute value of fuel pressure change as sensed during intrusive test.	<= 30 kPa	1. FRP Circuit Low DTC (P018C)	Not active	Frequency: Continuous; 12.5 ms loop. 60 seconds between intrusive tests that pass Intrusive test requested if fuel system is clamped for >= 5	DTC Type A 1 trip

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	
					3. FuelPump Circuit Low DTC (P0231)	Not active	Duration of intrusive test is fueling related (5 to 12 seconds).	
					4. FuelPump Circuit High DTC (P0232)	Not active		

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		
					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		
					13. Engine fuel flow	> 0.047 g/s		
					14. ECM fuel control system failure (PPEI $1ED)	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 Fuel Pump Control AND Ignition Run/Crank Voltage	Run or Crank enabled enabled 9V < voltage < 32V	72 test failures in 80 test samples if Fuel Pump Current <100A 1 sample/12.5 ms	DTC Type A 1 trip
Fuel Pump Control Circuit High Voltage	P0232	This DTC detects if the fuel pump control circuit is shorted to high	Voltage measured at fuel pump circuit	> 3.86 V	Commanded fuel pump output Fuel pump control enable Time that above conditions are met	0% duty cycle (off) False >=4.0 seconds	36 test failures in 40 test samples; 1 sample/12.5ms Pass/Fail determination made only once per trip	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel Pump Control Circuit (Open)	P023F	This DTC detects if the fuel pump control circuit is open	Fuel Pump Current AND Fuel Pump Duty Cycle	<=0.5A >20%	Ignition OR HS Comm OR Fuel Pump Control AND Ignition Run/Crank Voltage	Run or Crank enabled enabled 9V < voltage < 32V	72 test failures in 80 test samples; 1 sample/12.5ms	DTC Type A 1 trip
Fuel System Control Module Enable Control Circuit	P025A	This DTC detects if there is a fault in the fuel pump control enable circuit	PPEI (PPEI (Powertrain Platform Electrical Interface) Fuel System Request ($1ED)	≠ Fuel Pump Control Module Enable Control Circuit	Ignition AND PPEI Fuel System Request ($1ED)	Run or Crank valid	72 failures out of 80 samples 1 sample/12.5 ms	DTC Type A 1 trip

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
Control Module Not Programmed	P0602	Indicates that the FSCM needs to be programmed	This DTC is set via calibration, when KeMEMD_b_NoStartCal	= TRUE	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	Runs once at power up	DTC Type A 1 trip
Control Module Long Term Memory Reset	P0603	Non-volatile memory checksum error at controller power-up	Checksum at power-up	≠ checksum at power-down	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	1 failure Frequency: Once at power-up	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Random Access Memory (RAM)	P0604	Indicates that control module is unable to correctly write and read data to and from RAM	Data read	≠ Data written	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	1 failure if it occurs during the first RAM test of the ignition cycle, otherwise 5 failures Frequency: Runs continuously in the background.	DTC Type A 1 trip
Control Module Internal Performance 1. Main Processor Configuration Register Test	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 • RAM latch flag.	0x5A5A 0x5A	1. For all I/O configuration register faults: •KeMEMD_b_ProcFltCfgRegEnbl 2. For Processor Clock Fault: •KeMEMD_b_ProcFltCLKDiagEnbl	TRUE TRUE	Test 3 3 failures out of 15 samples 1 sample/12.5 ms	
3. External watchdog test			3. For External Watchdog Fault: • Software control of fuel pump driver	Control Lost	3. For External Watchdog Fault: •KeFRPD_b_FPExtWDogDiagEnbl 3. For External Watchdog Fault: •Control Module ROM(P0601) 3. For External Watchdog Fault: •Control Module RAM(P0604)	TRUE not active not active		
Control Module Long Term Memory (EEPROM) Performance	P062F	Indicates that the NVM Error flag has not been cleared	Last EEPROM write	Did not complete	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	1 test failure Once on controller power-up	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
5Volt Reference Circuit (Short High/Low/Out of Range)	P0641	Detects continuous short or out of range on the #1 5V sensor reference circuit	Reference voltage AND Output OR Reference voltage AND Output OR Reference voltage AND Output	>= 0.5V inactive >= 5.5V active <=4.5V active	Ignition	Run or Crank	15 failures out of 20 samples 1 sample/12.5 ms	DTC Type A 1 trip
			OR Reference voltage 	> 102.5% nominal (i.e., 5.125V) OR <97.5% nominal (i.e., 4.875V)				
Fuel Pump Control Module - Driver Over-temperature 1	P064A	This DTC detects if an internal fuel pump driver overtemperature condition exists under normal operating conditions	Pump Driver Temp	> 150C	Ignition OR HS Comm OR Fuel Pump Control KeFRPD_b_FPOverTempDiagEnbl	Run or Crank Enabled Enabled TRUE	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 Run/Crank	9V<voltage<32V		
Ignition 1 Switch Circuit Low Voltage	P2534	This DTC detects if the Ignition1 Switch circuit is shorted to low or open	Ignition 1 voltage	<= 6 V	Engine	Running	180 failures out of 200 samples 1 sample/25.0 ms	DTC Type A 1 trip
Fuel Pump Flow Performance (rationality)	P2635	This DTC detects degradation in the performance of the SIDI electronic return-less fuel system	Filtered fuel rail pressure error	<= Low Threshold (function of desired fuel rail pressure and fuel flow rate. 15% of resultant Target Pressure) OR >= High Threshold (function of desired fuel rail pressure and fuel flow rate. 15% of resultant Target Pressure) **(See Supporting**	1. FRP Circuit Low DTC (P018C)	Not active	Filtered fuel rail pressure error Time Constant = 12.5 seconds Frequency: Continuous 12.5 ms loop	DTC Type B 2 trips
					2. FRP Circuit High DTC (P018D)	Not active .		
					3. Fuel Rail Pressure Sensor Performance DTC (P018B)	Not active		
					4. FuelPump Circuit Low DTC (P0231)	Not active		
					5. FuelPump Circuit High DTC (P0232)	Not active		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					6. FuelPump Circuit Open DTC (P023F)	Not active		
					7. Reference Voltage DTC (P0641)	Not active		
					8. Fuel Pump Control Module Driver Over-temperature DTC's (P064A)	Not active		
					9. Control Module Internal Performance DTC (P0606)	Not active		
					10. An ECM fuel control system failure (PPEI $1ED)	Not occurred		
					11. The Barometric pressure (PPEI $4C1) signal	Valid (for absolute fuel pressure sensor)		
					12. Engine run time	>= 30 seconds		
					13. Emissions fuel level (PPEI $3FB)	Not low		
					14. Fuel pump control	Enabled		
					15. Fuel pump control state	Normal		
					16. Battery Voltage	11V<=voltage=<32V		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					17. Fuel flow rate **(See Supporting Tables tab)**	> 0.047 g/s **AND** <= Max allowed fuel flow rate as a function of desired rail pressure & Vbatt (Typical values in the range of 11 to 50 g/s)		
					18. Fuel Pressure Control System	Is not responding to an over-pressurization due to pressure build during DFCO or a decreasing desired pressure command.		

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
Wheel Speed Sensor Diagnostics								
Left Front Wheel Speed Sensor Circuit Low	C1232	The left front wheel speed sensor (WSS) is open.	WSS feedback voltage < Threshold Pass Threshold: > 0.20v	0.20v Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled No Active DTCs	> 9.0 < 19.5 True (Note 1) C1207	> 100ms	two trips
Right Front Wheel Speed Sensor Circuit Low	C1233	The right front wheel speed sensor is open.	WSS feedback voltage < Threshold Pass Threshold: > 0.20v	0.20v Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled No Active DTCs	> 9.0 < 19.5 True (Note 1) C1208	> 100ms	two trips
Left Rear Wheel Speed Sensor Circuit Low	C1234	The left rear wheel speed sensor is open.	WSS feedback voltage < Threshold Pass Threshold: > 0.20v	0.20v Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled No Active DTCs	> 9.0 < 19.5 True (Note 1) C1209	> 100ms	two trips
Right Rear Wheel Speed Sensor Circuit Low	C1235	The right rear wheel speed sensor is open.	WSS feedback voltage < Threshold Pass Threshold: > 0.20v	0.20v Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled No Active DTCs	> 9.0 < 19.5 True (Note 1) C1210	> 100ms	two trips
Left Front Wheel Speed Sensor Circuit High	C1207	The left front wheel speed sensor is shorted.	WSS feedback voltage > Threshold1 OR ORION ASIC detects current > Threshold2 Pass Threshold: < 2.2v	Threshold1 = 2.20v Threshold2 = 35ma Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled	> 9.0 < 19.5 True (Note 1)	> 100ms	two trips
Right Front Wheel Speed Sensor Circuit High	C1208	The right front wheel speed sensor is shorted.	WSS feedback voltage > Threshold1 OR ORION ASIC detects current > Threshold2 Pass Threshold: < 2.2v	Threshold1 = 2.20v Threshold2 = 35ma Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled	> 9.0 < 19.5 True (Note 1)	> 100ms	two trips
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

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

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	C1223	The left rear WSS signal has dropped out. It has stopped producing edges.	Number of detected edges = 0	0 edges Nominal Range: (N/A)	Veh Vel System Voltage Processing_Enabled No Active DTCs	> 8 mph < 19.5 True (Note 1) C1209	70ms	two trips
		Missing signal. The left rear wheel speed sensor is no longer being detected.	For Single Missing, TC Active, and Multiple Missing WSS's: Missing Threshold = Larger of: (0.2 x Max)m/s or 1.8m/s Max is the maximum filtered velocity from the other 3 wheels Pass Threshold: WSS signal is detected	See Malfunction Criteria Nominal Range: (0.6kph < WSS vel range < 240kph)	Accel (on all wheels) Veh Vel (largest from all 4 wheels) Processing_Enabled No Active DTCs	< 17.16m/s/s > 12.8kph True (Note 1) C1209	Single: Time > 5s Single TC Active: Time > 60s Multiple: Time > 2minutes / > 15 ms	
Right Rear Wheel Speed Sensor Circuit	C1224	The right rear WSS signal has dropped out. It has stopped producing edges.	Number of detected edges = 0	0 edges Nominal Range: (N/A)	Veh Vel System Voltage Processing_Enabled No Active DTCs	> 8 mph < 19.5 True (Note 1) C1210	70ms	two trips
		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
Tire Size Mismatch	C122E	This detects that there may be mismatched sized tires on the vehicle	|WSS (one wheel) – WSS(other 3)| / Wheel Vel(other 3) > Threshold	20% Nominal Range: N/A	Vehicle Velocity Cornering Wheel Slip Brake Pedal Apply Detected Processing_Enabled No Active DTCs	>4m/s < 3% (Note 10) Not Detected (Note 10) True (Note 2) True (Note 1) C1207 C1208 C1209 C1210	30ms	two trips
Pedal Travel								
Brake Pedal Position Sensor Power Circuit Low	C120F	The supply to the pedal position sensor is shorted to ground.	Pedal supply voltage < Threshold Pass Threshold > 0.5v	0.5v	Processing_Enabled	True (Note 1)	30ms	Two trips
Brake Pedal Position Sensor Reference Circuit	C12E5	Determines if the voltage supply to the pedal sensor is out of range.	Pedal supply voltage < Threshold Low Pedal supply voltage > Threshold High Pass Threshold 4.75 < Volt <5.25	Low = 4.75v High = 5.25v Nominal Range: (N/A)	Processing_Enabled	True (Note 1)	30ms	Two trips

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

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

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

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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		This diagnostic is set when the boost loss condition described in the “Boost Loss Fault” is a result of certain situations such as the Engine Run Active being low. This diagnostic is used to effect the proper system reaction without indicating a hardware fault.	Boost Press < Threshold1 AND MCP Greater Than Boost Press Time >= Time1 AND Accum Pres Filtered > Threshold2 OR Boost Loss First Apply Time > Time2	Threshold1 = 7000 kPa Time1 = 250msec Threshold2 = 16000 kPa Time2 = 250msec	Boost Pressure Valid Boost Loss Condition Boost Loss Condition Fault	True True False	250 ms	
BB Solenoids								
ABS **Power Switch** Circuit Open	C12E6	When the power switch has been commanded on the voltage level is monitored for proper operation.	Voltage Level (switched battery) < Threshold Pass Threshold > 80% bat volt	80% bat voltage Nominal Range: (N/A)	Power Switch Base Brake Enabled Power Switch Command	True (Note 8) On	50ms	Two trips
ABS **Power Switch** Circuit Shorted	C12E7	The Base Brake Power switch voltage decay is monitored after the power switch is turned off. Voltage too high indicates a shorted switch. Voltage too low indicates a missing filter capacitor.	Power Switch Short Fault: Power switch feedback > Threshold1 Power Switch Short FSM Capacitor Fault: Power switch feedback < Threshold2 Pass Threshold 80% < fdbk <50%	Threshold1 = 80% bat volt Threshold2 = 50% bat volt Nominal Range: (N/A)	Power Switch Command Motor	Off != Running	50ms	Two trips
ABS **Base Brake Open** Solenoid **Circuit Open**	C12D6	Whenever the Power Switch **Base Brake** is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high.**	Solenoid feedback voltage < Threshold Solenoid feedback voltage > Threshold Pass Threshold >80% Pass Threshold <30%	80% battery 30% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	Two trips

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 **high.**	Solenoid feedback voltage < Threshold Pass Threshold >65.23%	65.23% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	21ms (Solenoid in PWM Mode)	
ABS **Base Brake Open** Solenoid **Circuit Shorted**	C12D7	Whenever the Power Switch **Base Brake** is closed and the driver transistor is turned on (solenoid commanded on) the feedback voltage should be **low.**	Solenoid feedback voltage > Threshold Pass Threshold: < Threshold	30% of battey (Solenoid in ON/OFF Mode)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v On	15ms (Solenoid in ON/OFF Mode)	Two trips
		Whenever the Power Switch **Base Brake** is closed and the driver transistor is turned on (solenoid commanded on) the feedback voltage should be **low.**	Solenoid feedback voltage > Threshold Pass Threshold: < 85%	85% of batter (Solenoid in PWM Mode) Nominal Range: (8v > 16v)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v On	21ms (Solenoid in PWM Mode)	
ABS **Base Brake Open** Solenoid **Driver Shorted**	C12D8	Whenever the Power Switch **Base Brake** is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high.**	Solenoid feedback voltage < Threshold Pass Threshold >30%	30% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	Two trips
		Whenever the Power Switch Base Brake is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high**.	Solenoid feedback voltage < Threshold Pass Pass Threshold > 43.49%	43.49% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	21ms (Solenoid in PWM Mode)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS **Base Brake Closed** Solenoid **Circuit Open**	C12D9	Whenever the Power Switch Base Brake is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high**.	Solenoid feedback voltage < Threshold Solenoid feedback voltage > Threshold Pass Threshold >80% Pass Threshold <30%	80% battery 30% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	Two trips
		Whenever the Power Switch Base Brake is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high.**	Solenoid feedback voltage < Threshold Pass Threshold >65.23%	65.23% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	21ms (Solenoid in PWM Mode)	
ABS **Base Brake Closed** Solenoid **Circuit Shorted**	C12DA	Whenever the Power Switch **Base Brake** is closed and the driver transistor is turned on (solenoid commanded on) the feedback voltage should be **low.**	Solenoid feedback voltage > Threshold Pass Threshold: < Threshold	30% of battey (Solenoid in ON/OFF Mode)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v On	15ms (Solenoid in ON/OFF Mode)	Two trips
		Whenever the Power Switch **Base Brake** is closed and the driver transistor is turned on (solenoid commanded on) the feedback voltage should be **low.**	Solenoid feedback voltage > Threshold Pass Threshold: < Threshold	85% of batter (Solenoid in PWM Mode) Nominal Range: (8v > 16v)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v On	21ms (Solenoid in PWM Mode)	
ABS **Base Brake Closed** Solenoid **Driver Shorted**	C12DB	Whenever the Power Switch **Base Brake** is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high.**	Solenoid feedback voltage < Threshold Pass Threshold >30%	30% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Whenever the Power Switch **Slip Control** is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high.**	Solenoid feedback voltage < Threshold Pass Pass Threshold > 43.49%	43.49% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	21ms (Solenoid in PWM Mode)	
ABS Boost Valve Solenoid Circuit **Shorted**	C12DD	This failsafe is for shorted coil detection for HW CLC coils	Current Feedback > Threshold Pass Threshold: < 150% of requested current	150% of requested current Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Commanded Current Commanded Current	True (Note 8) > 8v < 16v > 0.25a < 0.35a	15ms	Two trips
ABS Boost Valve Solenoid **Circuit Performance**	C12A7	The current from the closed loop current controlled valve coil is diagnosed by checking if the difference of the measured current feedback and the commanded current is within a tolerance range.	Coil Feedback Current > Threshold Pass Threshold: < 25% of commanded current	25% of Commanded Current Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Commanded Current Commanded Current	True (Note 8) > 8v < 16v > 0.44a < 1.5a	100ms	Two trips
		Whenever the Power Switch Base Brake is closed and the driver transistor is not turned on (solenoid commanded off) the feedback current should be 0 amps.	Current feedback > Threshold Pass Threshold < 0.10amp	0.10amp Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	
FSM Pump Motor								
ABS Pump Motor Run On	C12E9	This fault occurs if the Motor is continuously on for greater than 60s for 5 consecutive run times during an ignition cycle.	FSM Run-On Fault counter > Threshold Pass Threshold < 5	5 Nominal Range: (10v > 16v)	Motor_Enabled Motor_ON	True (Note 9) > 60s	15 ms	Two trips

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Device Voltage Low	C12E1	System voltage is too low for certain operations. **If the vehicle is not moving or if the vehicle is in park and the park signal is valid, the fault maturation time will be 20 sec. Otherwise the fault maturation time will be 100msec.**	System voltage < Threshold Pass Threshold Volt >9.3v	9v Nominal Range: (N/A)	Ignition **Vehicle Moving** **PRNDL** **OR** **PRNDL_P Signal Valid** **Wheel Speeds Valid**	!= Crank **!= TRUE** **!= Park** **False** **False**	**20s** 100ms	Special C
EBCM Device Voltage High	C12E2	System voltage is too high for certain operations.	System voltage > Threshold Pass Threshold Volt <15.7v	16v Nominal Range: (N/A)	Ignition	!= Crank	100ms	Two trips
Wake Inputs								
Ignition Circuit Low	C1240	Ignition voltage is too Low	Ignition Voltage < Threshold Pass Threshold > 6v	6v	EngRunCrankTerminal Status EngRunCrankTerminal StatusValid	!= False = True	5s	Two trips
Ignition Circuit High	C1241	Ignition voltage is too High	Ignition Voltage > Threshold Pass Threshold < 6v	6v	EngRunCrankTerminal Status EngRunCrankTerminal StatusValid	= False = True	5s	Two trips
ACC Wake Up Circuit Low	C1242	Wakeup voltage is too Low at startup	Vakeup voltage < Threshold Pass Threshold > 6v	6v	Engine run flag active Diagnostic ran this ignition cycle Normal Communiction Enabled	= True for 3s = False = True	5s	Two trips
Controller								
EBCM Self Test Failed	C127C	The Built In Self Test (BIST) is responsible for testing the internal functionality of the core within the main microprocessor	Fail Consecutive Times = Threshold	2 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Processor Performance	C127B	**Normal Operation:** The micro sends a watchdog enable command(WEC) via the SPI to the Orion ASIC every schedule loop. If the ASIC does not receive this message, the external watchdog circuit inhibits the power switches. **Ignition Self-Test:** The external watchdog circuit is tested by not sending the WEC via the SPI to the ASIC so that the external watchdog is off and then commanding the power switch to on.	Power Switch Slip Control Voltage Feedback > Threshold Pass Threshold < 80% bat volt	80% bat volt Nominal Range: (N/A)		Run during Start-up	30ms	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Random Access Memory (RAM)	C1255	The following tests are continuously ran: 1. Read/write of the micro's RAM registers. 2. Address check of the RAM address lines. 3. Verify that the RAM location used to store the persistent address line test address (offset) advances to the next address line address. 4. Perform data check on a RAM address that includes a dependency check against another RAM location that is address adjacent to the RAM location being tested. 5. Verify that the RAM location used to store the persistent data test address advances to the next test address.	If any of the tests fail, the system is forced into a reset by writing an invalid watchdog key to the system registers. If the RAM failure is NOT detected by the bootloader static RAM check algorithm then a fault code is set and the exact type of RAM failure is written to NVRAM.	See Malfunction Criteria Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip
EBCM Read Only Memory (ROM)	C1256	This check is called from the scheduler each loop. Each ROM section is check-summed by byte. Each byte will be added to the current checksum for a section. If the byte being checked is the last byte of a section, then the section is verified for a correct checksum.	ROM Section's Checksum != Threshold	0 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	Immediate	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Stack Overrun	C126E	To detect underflow and overflow of the system stacks, a word of RAM is reserved at the end of each of the system stacks. A word of RAM is also reserved at the upper-most address of the stack section. The contents of these reserved words will be monitored periodically to determine if they have been modified. To detect cases where the application could be pushing a value onto the stack that matches the test value, the test value that is stored at these reserved addresses will be changed each update.	End of Stack != Threshold	Set value changed every software release Nominal Range: (N/A)		Upon Starting Scheduler in the Application	Immediate	one trip
EBCM Processor Overrun	C121D	Processor did not perform a proper shutdown. NVRAM blocks written at shutdown do not match expected values upon startup. Processing interrupt occurred.	The contents of the two NVRAM blocks are compared upon start-up with expected values from shutdown process.	Blocks do not compare	Vehicle moving On Brake	True True Upon Starting Scheduler in the Application	15ms	two trips
EBCM Unimplemented Interrupt	C121E	This fault is set if an interrupt occurs that has no explicit interrupt handler defined.	Interrupt Set = Threshold	Not Defined Interrupt Handler Nominal Range: (N/A)		**Upon Starting Scheduler in the Application**	6 interrupts	Two trips
EBCM Unexpected Exception	C121F	This fault is set if an exception that is not supported in our system has been generated.	Exception Not Supported = Condition	N/A Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	Two trips

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		The periodic Internal Processor Communication (IPC) packet transmission service checks for previous transmission request completion before the new request is made. If the previous transmission was not completed, then the IPC handler declares an IPC packe	Secondary micro-processor communication packet does not re-synchonize with expected start-up sequence and with in set time.	Time Nominal Range: (N/A)	100msec	Upon Starting Scheduler in the Application	15 ms	
EBCM Serial Peripheral Interface Performance	C126F	2 data bytes are sent to the Orion ASIC. The Orion sends back the first byte.	Received Data != Sent Data for Threshold # of attempts	3 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	20 ms	one trip
EBCM Serial Peripheral Interface Inoperative	C123F	Each time data is sent out from the SPI port, a counter is loaded. The counter is decremented each check that the micro polls the SPI status to see if the data transfer is complete. The counter should never reach zero before the data transfer is complete. If the counter reaches zero, it means that the peripheral, NVRAM, appears to be non-functional.	Counter = Threshold	0 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15 ms	one trip

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

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

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

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

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

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

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

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

Note #4 - See Correlation Table below

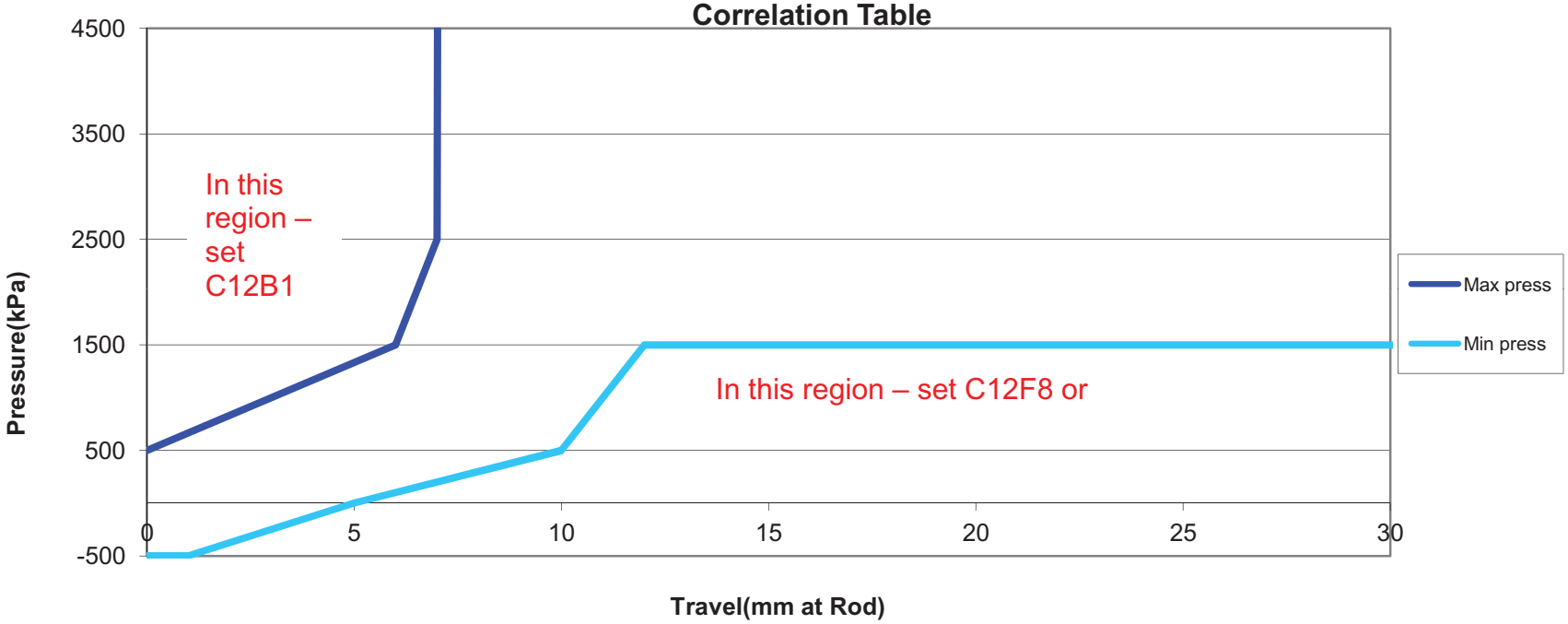
Note #5 - M/C Pressure Sensor stable is a comparision of the raw M/C pressure reading against 2 filtered versions of the reading (0.5 Hz and 5 Hz.) If all 3 values are within a small tolerance (7 kpa) then the driver's input is considered stable.

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

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

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

Note 4:
Correlation Table



Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense A Circuit Low	P0B3D	Sets when cell voltage is detected below threshold	Cell Voltage A	<= 0.2V	Diagnostic Enable	TRUE	1.4second in a 2 second window	One Trip
Hybrid Battery Voltage Sense B Circuit Low	P0B42		Cell Voltage B	<= 0.2V	Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE		
Hybrid Battery Voltage Sense C Circuit Low	P0B47		Cell Voltage C	<= 0.2V	No Active DTCs associated with VTSM Loss of Comm	U2603, U2604, U2605, U2606		
Hybrid Battery Voltage Sense D Circuit Low	P0B4C		Cell Voltage D	<= 0.2V	No Active DTCs associated with VTSM 5V Ref Diagnostic	P1E93, P1E99, P1E9F, P1EA5		
Hybrid Battery Voltage Sense E Circuit Low	P0B51			<= 0.2V	No Active DTCs associated with Open Sense Line	P0B3B, P0B40, P0B45, P0B4A, P0B4F, P0B54, P0B59, P0B5E, P0B63, P0B68, P0B6D, P0B77, P0B7C, P0B81, P0B86, P0B8B, P0B95, P0B9A, P0B9F, P0BA4, P0BA9, P0BAE, P0BB3, P0BB8, P1B28, P1B29, P1B2A, P1B2B, P1B2C, P1B2D, P1E4C, P1E4D, P1E4E, P1E4F, P1E50, P1E51, P1E52, P1E53, P1E54, P1E56, P1E57, P1E58, P1E59, P1E5A, P1E5B, P1E5C, P1E5D, P1E5E, P1E5F, P1E60, P1E61, P1E62, P1E63, P1E64,		
Hybrid Battery Voltage Sense F Circuit Low	P0B56		Cell Voltage F	<= 0.2V				
Hybrid Battery Voltage Sense G Circuit Low	P0B5B		Cell Voltage G	<= 0.2V				
Hybrid Battery Voltage Sense H Circuit Low	P0B60		Cell Voltage H	<= 0.2V				
Hybrid Battery Voltage Sense I Circuit Low	P0B65		Cell Voltage I	<= 0.2V				
Hybrid Battery Voltage Sense J Circuit Low	P0B6A		Cell Voltage J	<= 0.2V				
Hybrid Battery Voltage Sense K Circuit Low	P0B6F		Cell Voltage K	<= 0.2V	2nd Protection Self Test Diagnostic	Not Running		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense L Circuit Low	P0B74		Cell Voltage L	<= 0.2V	2nd Protection Self Test Diagnostic	Not Running		
Hybrid Battery Voltage Sense M Circuit Low	P0B79		Cell Voltage M	<= 0.2V	No Active DTCs associated with VTSM Cell Balancing Fault	P1E92, P1E98, P1E9E, P1EA4		
Hybrid Battery Voltage Sense N Circuit Low	P0B7E		Cell Voltage N	<= 0.2V	No Active DTCs associated with VTSM Internal Performance	P1E8E, P1E94, P1E9A, P1EA0		
Hybrid Battery Voltage Sense O Circuit Low	P0B83		Cell Voltage O	<= 0.2V	No Active DTCs on VITM RESS Bus Off	U2401		
Hybrid Battery Voltage Sense P Circuit Low	P0B88		Cell Voltage P	<= 0.2V				
Hybrid Battery Voltage Sense Q Circuit Low	P0B8D		Cell Voltage Q	<= 0.2V				
Hybrid Battery Voltage Sense R Circuit Low	P0B92		Cell Voltage R	<= 0.2V				
Hybrid Battery Voltage Sense S Circuit Low	P0B97		Cell Voltage S	<= 0.2V				
Hybrid Battery Voltage Sense T Circuit Low	P0B9C		Cell Voltage T	<= 0.2V				
Hybrid Battery Voltage Sense U Circuit Low	P0BA1		Cell Voltage U	<= 0.2V				
Hybrid Battery Voltage Sense V Circuit Low	P0BA6		Cell Voltage V	<= 0.2V				
Hybrid Battery Voltage Sense W Circuit Low	P0BAB		Cell Voltage W	<= 0.2V				
Hybrid Battery Voltage Sense X Circuit Low	P0BB0		Cell Voltage X	<= 0.2V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense Y Circuit Low	P0BB5		Cell Voltage Y	<= 0.2V				
Hybrid Battery Voltage Sense Z Circuit Low	P0BBA		Cell Voltage Z	<= 0.2V				
Hybrid Battery Voltage Sense AA Circuit Low	P1B17		Cell Voltage AA	<= 0.2V				
Hybrid Battery Voltage Sense AB Circuit Low	P1B1A		Cell Voltage AB	<= 0.2V				
Hybrid Battery Voltage Sense AC Circuit Low	P1B1D		Cell Voltage AC	<= 0.2V				
Hybrid Battery Voltage Sense AD Circuit Low	P1B20		Cell Voltage AD	<= 0.2V				
Hybrid Battery Voltage Sense AE Circuit Low	P1B23		Cell Voltage AE	<= 0.2V				
Hybrid Battery Voltage Sense AF Circuit Low	P1B26		Cell Voltage AF	<= 0.2V				
Hybrid Battery Voltage Sense AG Circuit Low	P1B46		Cell Voltage AG	<= 0.2V				
Hybrid Battery Voltage Sense AH Circuit Low	P1B49		Cell Voltage AH	<= 0.2V				
Hybrid Battery Voltage Sense AI Circuit Low	P1B4C		Cell Voltage AI	<= 0.2V				
Hybrid Battery Voltage Sense AJ Circuit Low	P1B4F		Cell Voltage AJ	<= 0.2V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense AK Circuit Low	P1B52		Cell Voltage AK	<= 0.2V				
Hybrid Battery Voltage Sense AL Circuit Low	P1B55		Cell Voltage AL	<= 0.2V				
Hybrid Battery Voltage Sense AM Circuit Low	P1B58		Cell Voltage AM	<= 0.2V				
Hybrid Battery Voltage Sense AN Circuit Low	P1B5B		Cell Voltage AN	<= 0.2V				
Hybrid Battery Voltage Sense AO Circuit Low	P1B5E		Cell Voltage AO	<= 0.2V				
Hybrid Battery Voltage Sense AP Circuit Low	P1B61		Cell Voltage AP	<= 0.2V				
Hybrid Battery Voltage Sense AQ Circuit Low	P1B64		Cell Voltage AQ	<= 0.2V				
Hybrid Battery Voltage Sense AR Circuit Low	P1B67		Cell Voltage AR	<= 0.2V				
Hybrid Battery Voltage Sense AS Circuit Low	P1B6A		Cell Voltage AS	<= 0.2V				
Hybrid Battery Voltage Sense AT Circuit Low	P1B6D		Cell Voltage AT	<= 0.2V				
Hybrid Battery Voltage Sense AU Circuit Low	P1B70		Cell Voltage AU	<= 0.2V				
Hybrid Battery Voltage Sense AV Circuit Low	P1B73		Cell Voltage AV	<= 0.2V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense AW Circuit Low	P1B76		Cell Voltage AW	<= 0.2V				
Hybrid Battery Voltage Sense AX Circuit Low	P1B79		Cell Voltage AX	<= 0.2V				
Hybrid Battery Voltage Sense AY Circuit Low	P1B7C		Cell Voltage AY	<= 0.2V				
Hybrid Battery Voltage Sense AZ Circuit Low	P1B7F		Cell Voltage AZ	<= 0.2V				
Hybrid Battery Voltage Sense BA Circuit Low	P1B82		Cell Voltage BA	<= 0.2V				
Hybrid Battery Voltage Sense BB Circuit Low	P1B85		Cell Voltage BB	<= 0.2V				
Hybrid Battery Voltage Sense BC Circuit Low	P1B88		Cell Voltage BC	<= 0.2V				
Hybrid Battery Voltage Sense BD Circuit Low	P1B8B		Cell Voltage BD	<= 0.2V				
Hybrid Battery Voltage Sense BE Circuit Low	P1B8E		Cell Voltage BE	<= 0.2V				
Hybrid Battery Voltage Sense BF Circuit Low	P1B91		Cell Voltage BF	<= 0.2V				
Hybrid Battery Voltage Sense BG Circuit Low	P1B94		Cell Voltage BG	<= 0.2V				
Hybrid Battery Voltage Sense BH Circuit Low	P1B97		Cell Voltage BH	<= 0.2V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense BI Circuit Low	P1B9A		Cell Voltage BI	<= 0.2V				
Hybrid Battery Voltage Sense BJ Circuit Low	P1B9D		Cell Voltage BJ	<= 0.2V				
Hybrid Battery Voltage Sense BK Circuit Low	P1BA0		Cell Voltage BK	<= 0.2V				
Hybrid Battery Voltage Sense BL Circuit Low	P1BA3		Cell Voltage BL	<= 0.2V				
Hybrid Battery Voltage Sense BM Circuit Low	P1BA6		Cell Voltage BM	<= 0.2V				
Hybrid Battery Voltage Sense BN Circuit Low	P1BA9		Cell Voltage BN	<= 0.2V				
Hybrid Battery Voltage Sense BO Circuit Low	P1BAC		Cell Voltage BO	<= 0.2V				
Hybrid Battery Voltage Sense BP Circuit Low	P1BAF		Cell Voltage BP	<= 0.2V				
Hybrid Battery Voltage Sense BQ Circuit Low	P1BB2		Cell Voltage BQ	<= 0.2V				
Hybrid Battery Voltage Sense BR Circuit Low	P1BB5		Cell Voltage BR	<= 0.2V				
Hybrid Battery Voltage Sense BS Circuit Low	P1BB8		Cell Voltage BS	<= 0.2V				
Hybrid Battery Voltage Sense BT Circuit Low	P1BBB		Cell Voltage BT	<= 0.2V				
Hybrid Battery Voltage Sense BU Circuit Low	P1BBE		Cell Voltage BU	<= 0.2V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense BV Circuit Low	P1BC1		Cell Voltage BV	<= 0.2V				
Hybrid Battery Voltage Sense BW Circuit Low	P1BC4		Cell Voltage BW	<= 0.2V				
Hybrid Battery Voltage Sense BX Circuit Low	P1BC7		Cell Voltage BX	<= 0.2V				
Hybrid Battery Voltage Sense BY Circuit Low	P1BCA		Cell Voltage BY	<= 0.2V				
Hybrid Battery Voltage Sense BZ Circuit Low	P1BCD		Cell Voltage BZ	<= 0.2V				
Hybrid Battery Voltage Sense CA Circuit Low	P1BD0		Cell Voltage CA	<= 0.2V				
Hybrid Battery Voltage Sense CB Circuit Low	P1BD3		Cell Voltage CB	<= 0.2V				
Hybrid Battery Voltage Sense CC Circuit Low	P1BD6		Cell Voltage CC	<= 0.2V				
Hybrid Battery Voltage Sense CD Circuit Low	P1BD9		Cell Voltage CD	<= 0.2V				
Hybrid Battery Voltage Sense CE Circuit Low	P1BDC		Cell Voltage CE	<= 0.2V				
Hybrid Battery Voltage Sense CF Circuit Low	P1BDF		Cell Voltage CF	<= 0.2V				
Hybrid Battery Voltage Sense CG Circuit Low	P1BE2		Cell Voltage CG	<= 0.2V				
Hybrid Battery Voltage Sense CH Circuit Low	P1BE5		Cell Voltage CH	<= 0.2V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense CI Circuit Low	P1BE8		Cell Voltage CI	<= 0.2V				
Hybrid Battery Voltage Sense CJ Circuit Low	P1BEB		Cell Voltage CJ	<= 0.2V				
Hybrid Battery Voltage Sense CK Circuit Low	P1BEE		Cell Voltage CK	<= 0.2V				
Hybrid Battery Voltage Sense CL Circuit Low	P1BF1		Cell Voltage CL	<= 0.2V				
Hybrid Battery Voltage Sense CM Circuit Low	P1BF4		Cell Voltage CM	<= 0.2V				
Hybrid Battery Voltage Sense CN Circuit Low	P1BF7		Cell Voltage CN	<= 0.2V				
Hybrid Battery Voltage Sense CO Circuit Low	P1BFA		Cell Voltage CO	<= 0.2V				
Hybrid Battery Voltage Sense CP Circuit Low	P1BFD		Cell Voltage CP	<= 0.2V				
Hybrid Battery Voltage Sense CQ Circuit Low	P1E02		Cell Voltage CQ	<= 0.2V				
Hybrid Battery Voltage Sense CR Circuit Low	P1E05		Cell Voltage CR	<= 0.2V				
Hybrid Battery Voltage Sense A Circuit High	P0B3E	Sets when cell voltage is detected above threshold	Cell Voltage A	>= 4.8V	Diagnostic Enable	TRUE	1.4second in a 2 second window	One Trip
Hybrid Battery Voltage Sense B Circuit High	P0B43		Cell Voltage B	>= 4.8V	Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE		
Hybrid Battery Voltage Sense C Circuit High	P0B48		Cell Voltage C	>= 4.8V	No Active DTCs associated with VTSM Loss of Comm	U2603, U2604, U2605, U2606		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense D Circuit High	P0B4D		Cell Voltage D	>= 4.8V	No Active DTCs associated with VTSM 5V Ref Diagnostic	P1E93, P1E99, P1E9F, P1EA5		
Hybrid Battery Voltage Sense E Circuit High	P0B52		Cell Voltage E	>= 4.8V	No Active DTCs associated with Open Sense Line	P0B3B, P0B40, P0B45, P0B4A, P0B4F, P0B54, P0B59, P0B5E, P0B63, P0B68, P0B6D, P0B77, P0B7C, P0B81, P0B86, P0B8B, P0B95, P0B9A, P0B9F, P0BA4, P0BA9, P0BAE, P0BB3, P0BB8, P1B28, P1B29, P1B2A, P1B2B, P1B2C, P1B2D, P1E4C, P1E4D, P1E4E, P1E4F, P1E50, P1E51, P1E52, P1E53, P1E54, P1E56, P1E57, P1E58, P1E59, P1E5A, P1E5B, P1E5C, P1E5D, P1E5E, P1E5F, P1E60, P1E61, P1E62, P1E63, P1E64, P1E65, P1E66, P1E67, P1E68,		
Hybrid Battery Voltage Sense F Circuit High	P0B57		Cell Voltage F	>= 4.8V				
Hybrid Battery Voltage Sense G Circuit High	P0B5C		Cell Voltage G	>= 4.8V				
Hybrid Battery Voltage Sense H Circuit High	P0B61		Cell Voltage H	>= 4.8V				
Hybrid Battery Voltage Sense I Circuit High	P0B66		Cell Voltage I	>= 4.8V				
Hybrid Battery Voltage Sense J Circuit High	P0B6B		Cell Voltage J	>= 4.8V				
Hybrid Battery Voltage Sense K Circuit High	P0B70		Cell Voltage K	>= 4.8V		P1E69, P1E6A, P1E6B, P1E6C, P1E6E, P1E6F, P1E70, P1E71, P1E72, P1E73, P1E74, P1E75, P1E76, P1E77, P1E78, P1E79, P1E7A, P1E7B, P1E7C, P1E7D, P1E7E, P1E7F, P1E80, P1E81, P1E82, P1E83, P1E84, P1E86, P1E87, P1E88, P1E89, P1E8A		
Hybrid Battery Voltage Sense L Circuit High	P0B75		Cell Voltage L	>= 4.8V				
Hybrid Battery Voltage Sense M Circuit High	P0B7A		Cell Voltage M	>= 4.8V				
Hybrid Battery Voltage Sense N Circuit High	P0B7F		Cell Voltage N	>= 4.8V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense O Circuit High	P0B84		Cell Voltage O	>= 4.8V	2nd Protection Self Test Diagnostic	Not Running		
Hybrid Battery Voltage Sense P Circuit High	P0B89		Cell Voltage P	>= 4.8V	No Active DTCs associated with VTSM Cell Balancing Fault	P1E92, P1E98, P1E9E, P1EA4		
Hybrid Battery Voltage Sense Q Circuit High	P0B8E		Cell Voltage Q	>= 4.8V	No Active DTCs associated with VTSM Internal Performance	P1E8E, P1E94, P1E9A, P1EA0		
Hybrid Battery Voltage Sense R Circuit High	P0B93		Cell Voltage R	>= 4.8V	No Active DTCs on VITM RESS Bus Off	U2401		
Hybrid Battery Voltage Sense S Circuit High	P0B98		Cell Voltage S	>= 4.8V				
Hybrid Battery Voltage Sense T Circuit High	P0B9D		Cell Voltage T	>= 4.8V				
Hybrid Battery Voltage Sense U Circuit High	P0BA2		Cell Voltage U	>= 4.8V				
Hybrid Battery Voltage Sense V Circuit High	P0BA7		Cell Voltage V	>= 4.8V				
Hybrid Battery Voltage Sense W Circuit High	P0BAC		Cell Voltage W	>= 4.8V				
Hybrid Battery Voltage Sense X Circuit High	P0BB1		Cell Voltage X	>= 4.8V				
Hybrid Battery Voltage Sense Y Circuit High	P0BB6		Cell Voltage Y	>= 4.8V				
Hybrid Battery Voltage Sense Z Circuit High	P0BBB		Cell Voltage Z	>= 4.8V				
Hybrid Battery Voltage Sense AA Circuit High	P1B18		Cell Voltage AA	>= 4.8V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense AB Circuit High	P1B1B		Cell Voltage AB	>= 4.8V				
Hybrid Battery Voltage Sense AC Circuit High	P1B1E		Cell Voltage AC	>= 4.8V				
Hybrid Battery Voltage Sense AD Circuit High	P1B21		Cell Voltage AD	>= 4.8V				
Hybrid Battery Voltage Sense AE Circuit High	P1B24		Cell Voltage AE	>= 4.8V				
Hybrid Battery Voltage Sense AF Circuit High	P1B27		Cell Voltage AF	>= 4.8V				
Hybrid Battery Voltage Sense AG Circuit High	P1B47		Cell Voltage AG	>= 4.8V				
Hybrid Battery Voltage Sense AH Circuit High	P1B4A		Cell Voltage AH	>= 4.8V				
Hybrid Battery Voltage Sense AI Circuit High	P1B4D		Cell Voltage AI	>= 4.8V				
Hybrid Battery Voltage Sense AJ Circuit High	P1B50		Cell Voltage AJ	>= 4.8V				
Hybrid Battery Voltage Sense AK Circuit High	P1B53		Cell Voltage AK	>= 4.8V				
Hybrid Battery Voltage Sense AL Circuit High	P1B56		Cell Voltage AL	>= 4.8V				
Hybrid Battery Voltage Sense AM Circuit High	P1B59		Cell Voltage AM	>= 4.8V				
Hybrid Battery Voltage Sense AN Circuit High	P1B5C		Cell Voltage AN	>= 4.8V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense AO Circuit High	P1B5F		Cell Voltage AO	>= 4.8V				
Hybrid Battery Voltage Sense AP Circuit High	P1B62		Cell Voltage AP	>= 4.8V				
Hybrid Battery Voltage Sense AQ Circuit High	P1B65		Cell Voltage AQ	>= 4.8V				
Hybrid Battery Voltage Sense AR Circuit High	P1B68		Cell Voltage AR	>= 4.8V				
Hybrid Battery Voltage Sense AS Circuit High	P1B6B		Cell Voltage AS	>= 4.8V				
Hybrid Battery Voltage Sense AT Circuit High	P1B6E		Cell Voltage AT	>= 4.8V				
Hybrid Battery Voltage Sense AU Circuit High	P1B71		Cell Voltage AU	>= 4.8V				
Hybrid Battery Voltage Sense AV Circuit High	P1B74		Cell Voltage AV	>= 4.8V				
Hybrid Battery Voltage Sense AW Circuit High	P1B77		Cell Voltage AW	>= 4.8V				
Hybrid Battery Voltage Sense AX Circuit High	P1B7A		Cell Voltage AX	>= 4.8V				
Hybrid Battery Voltage Sense AY Circuit High	P1B7D		Cell Voltage AY	>= 4.8V				
Hybrid Battery Voltage Sense AZ Circuit High	P1B80		Cell Voltage AZ	>= 4.8V				
Hybrid Battery Voltage Sense BA Circuit High	P1B83		Cell Voltage BA	>= 4.8V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense BB Circuit High	P1B86		Cell Voltage BB	>= 4.8V				
Hybrid Battery Voltage Sense BC Circuit High	P1B89		Cell Voltage BC	>= 4.8V				
Hybrid Battery Voltage Sense BD Circuit High	P1B8C		Cell Voltage BD	>= 4.8V				
Hybrid Battery Voltage Sense BE Circuit High	P1B8F		Cell Voltage BE	>= 4.8V				
Hybrid Battery Voltage Sense BF Circuit High	P1B92		Cell Voltage BF	>= 4.8V				
Hybrid Battery Voltage Sense BG Circuit High	P1B95		Cell Voltage BG	>= 4.8V				
Hybrid Battery Voltage Sense BH Circuit High	P1B98		Cell Voltage BH	>= 4.8V				
Hybrid Battery Voltage Sense BI Circuit High	P1B9B		Cell Voltage BI	>= 4.8V				
Hybrid Battery Voltage Sense BJ Circuit High	P1B9E		Cell Voltage BJ	>= 4.8V				
Hybrid Battery Voltage Sense BK Circuit High	P1BA1		Cell Voltage BK	>= 4.8V				
Hybrid Battery Voltage Sense BL Circuit High	P1BA4		Cell Voltage BL	>= 4.8V				
Hybrid Battery Voltage Sense BM Circuit High	P1BA7		Cell Voltage BM	>= 4.8V				
Hybrid Battery Voltage Sense BN Circuit High	P1BAA		Cell Voltage BN	>= 4.8V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense BO Circuit High	P1BAD		Cell Voltage BO	>= 4.8V				
Hybrid Battery Voltage Sense BP Circuit High	P1BB0		Cell Voltage BP	>= 4.8V				
Hybrid Battery Voltage Sense BQ Circuit High	P1BB3		Cell Voltage BQ	>= 4.8V				
Hybrid Battery Voltage Sense BR Circuit High	P1BB6		Cell Voltage BR	>= 4.8V				
Hybrid Battery Voltage Sense BS Circuit High	P1BB9		Cell Voltage BS	>= 4.8V				
Hybrid Battery Voltage Sense BT Circuit High	P1BBC		Cell Voltage BT	>= 4.8V				
Hybrid Battery Voltage Sense BU Circuit High	P1BBF		Cell Voltage BU	>= 4.8V				
Hybrid Battery Voltage Sense BV Circuit High	P1BC2		Cell Voltage BV	>= 4.8V				
Hybrid Battery Voltage Sense BW Circuit High	P1BC5		Cell Voltage BW	>= 4.8V				
Hybrid Battery Voltage Sense BX Circuit High	P1BC8		Cell Voltage BX	>= 4.8V				
Hybrid Battery Voltage Sense BY Circuit High	P1BCB		Cell Voltage BY	>= 4.8V				
Hybrid Battery Voltage Sense BZ Circuit High	P1BCE		Cell Voltage BZ	>= 4.8V				
Hybrid Battery Voltage Sense CA Circuit High	P1BD1		Cell Voltage CA	>= 4.8V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense CB Circuit High	P1BD4		Cell Voltage CB	>= 4.8V				
Hybrid Battery Voltage Sense CC Circuit High	P1BD7		Cell Voltage CC	>= 4.8V				
Hybrid Battery Voltage Sense CD Circuit High	P1BDA		Cell Voltage CD	>= 4.8V				
Hybrid Battery Voltage Sense CE Circuit High	P1BDD		Cell Voltage CE	>= 4.8V				
Hybrid Battery Voltage Sense CF Circuit High	P1BE0		Cell Voltage CF	>= 4.8V				
Hybrid Battery Voltage Sense CG Circuit High	P1BE3		Cell Voltage CG	>= 4.8V				
Hybrid Battery Voltage Sense CH Circuit High	P1BE6		Cell Voltage CH	>= 4.8V				
Hybrid Battery Voltage Sense CI Circuit High	P1BE9		Cell Voltage CI	>= 4.8V				
Hybrid Battery Voltage Sense CJ Circuit High	P1BEC		Cell Voltage CJ	>= 4.8V				
Hybrid Battery Voltage Sense CK Circuit High	P1BEF		Cell Voltage CK	>= 4.8V				
Hybrid Battery Voltage Sense CL Circuit High	P1BF2		Cell Voltage CL	>= 4.8V				
Hybrid Battery Voltage Sense CM Circuit High	P1BF5		Cell Voltage CM	>= 4.8V				
Hybrid Battery Voltage Sense CN Circuit High	P1BF8		Cell Voltage CN	>= 4.8V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense CO Circuit High	P1BFB		Cell Voltage CO	>= 4.8V				
Hybrid Battery Voltage Sense CP Circuit High	P1BFE		Cell Voltage CP	>= 4.8V				
Hybrid Battery Voltage Sense CQ Circuit High	P1E03		Cell Voltage CQ	>= 4.8V				
Hybrid Battery Voltage Sense CR Circuit High	P1E06		Cell Voltage CR	>= 4.8V				
Hybrid Battery Voltage Sense A Circuit	P0B3B	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V|	Case 2 : |1st Cell V – 2nd Cell V| > 1V	Diagnostic Enable	TRUE	600 ms out of a 600 ms window	One Trip
Hybrid Battery Voltage Sense B Circuit	P0B40		**Case 2: General Cell Voltage Sensing Line** Affected Cell Voltage- Adjacent Cell		Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE	Frequency- 200 ms	
Hybrid Battery Voltage Sense C Circuit	P0B45		**Case 3: Bus Bar (+) Side Sensing Line** Affected Cell Voltage- One Cell	Case 3 : Busbar Cap Voltage > 0.7V **&** Busbar + Side Cell Voltage < 2.5V	No Active DTCs associated with VTSM Loss of Comm	U2603, U2604, U2605, U2606		
Hybrid Battery Voltage Sense D Circuit	P0B4A		**Case 4: Bus Bar (-) Side Sensing Line** Affected Cell Voltage- One Cell		No Active DTCs associated with VTSM 5V Ref Diagnostic	P1E93, P1E99, P1E9F, P1EA5		
			Case 5: Common Power Line Affected Cell Voltage- Adjacent Cells (No Power Off)					
			*Note- **Case 1: Single Power Line** Case 1 causes the slave ASIC to not be powered resulting in all affected cell voltages = 0V					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense E Circuit	P0B4F			Case 4 : Busbar Cap Voltage > 0.7V **&** Busbar + Side Cell Voltage > 2.5V Case 5 : |1st Cell V – 2nd Cell V| > 0.5V				
Hybrid Battery Voltage Sense F Circuit	P0B54							
Hybrid Battery Voltage Sense G Circuit	P0B59							
Hybrid Battery Voltage Sense H Circuit	P0B5E							
Hybrid Battery Voltage Sense I Circuit	P0B63							
Hybrid Battery Voltage Sense J Circuit	P0B68							
Hybrid Battery Voltage Sense K Circuit	P0B6D							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense M Circuit	P0B77							
Hybrid Battery Voltage Sense N Circuit	P0B7C							
Hybrid Battery Voltage Sense O Circuit	P0B81					Not Running		
Hybrid Battery Voltage Sense P Circuit	P0B86				2nd Protection Self Test Diagnostic No Active DTCs associated with VTSM Cell Balancing Fault	P1E92, P1E98, P1E9E, P1EA4		
Hybrid Battery Voltage Sense Q Circuit	P0B8B				No Active DTCs associated with VTSM Internal Performance	P1E8E, P1E94, P1E9A, P1EA0		
Hybrid Battery Voltage Sense S Circuit	P0B95				No Active DTCs on VITM RESS Bus Off	U2401		
Hybrid Battery Voltage Sense T Circuit	P0B9A							
Hybrid Battery Voltage Sense U Circuit	P0B9F							
Hybrid Battery Voltage Sense V Circuit	P0BA4							
Hybrid Battery Voltage Sense W Circuit	P0BA9							
Hybrid Battery Voltage Sense X Circuit	P0BAE							
Hybrid Battery Voltage Sense Y Circuit	P0BB3							
Hybrid Battery Voltage Sense Z Circuit	P0BB8							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense AA Circuit	P1B28							
Hybrid Battery Voltage Sense AB Circuit	P1B29							
Hybrid Battery Voltage Sense AC Circuit	P1B2A							
Hybrid Battery Voltage Sense AD Circuit	P1B2B							
Hybrid Battery Voltage Sense AE Circuit	P1B2C							
Hybrid Battery Voltage Sense AF Circuit	P1B2D							
Hybrid Battery Voltage Sense AG Circuit	P1E4C							
Hybrid Battery Voltage Sense AH Circuit	P1E4D							
Hybrid Battery Voltage Sense AI Circuit	P1E4E							
Hybrid Battery Voltage Sense AJ Circuit	P1E4F							
Hybrid Battery Voltage Sense AK Circuit	P1E50							
Hybrid Battery Voltage Sense AL Circuit	P1E51							
Hybrid Battery Voltage Sense AM Circuit	P1E52							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense AN Circuit	P1E53							
Hybrid Battery Voltage Sense AO Circuit	P1E54							
Hybrid Battery Voltage Sense AQ Circuit	P1E56							
Hybrid Battery Voltage Sense AR Circuit	P1E57							
Hybrid Battery Voltage Sense AS Circuit	P1E58							
Hybrid Battery Voltage Sense AT Circuit	P1E59							
Hybrid Battery Voltage Sense AU Circuit	P1E5A							
Hybrid Battery Voltage Sense AV Circuit	P1E5B							
Hybrid Battery Voltage Sense AW Circuit	P1E5C							
Hybrid Battery Voltage Sense AX Circuit	P1E5D							
Hybrid Battery Voltage Sense AY Circuit	P1E5E							
Hybrid Battery Voltage Sense AZ Circuit	P1E5F							
Hybrid Battery Voltage Sense BA Circuit	P1E60							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense BB Circuit	P1E61							
Hybrid Battery Voltage Sense BC Circuit	P1E62							
Hybrid Battery Voltage Sense BD Circuit	P1E63							
Hybrid Battery Voltage Sense BE Circuit	P1E64							
Hybrid Battery Voltage Sense BF Circuit	P1E65							
Hybrid Battery Voltage Sense BG Circuit	P1E66							
Hybrid Battery Voltage Sense BH Circuit	P1E67							
Hybrid Battery Voltage Sense BI Circuit	P1E68							
Hybrid Battery Voltage Sense BJ Circuit	P1E69							
Hybrid Battery Voltage Sense BK Circuit	P1E6A							
Hybrid Battery Voltage Sense BL Circuit	P1E6B							
Hybrid Battery Voltage Sense BM Circuit	P1E6C							
Hybrid Battery Voltage Sense BO Circuit	P1E6E							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense BP Circuit	P1E6F							
Hybrid Battery Voltage Sense BQ Circuit	P1E70							
Hybrid Battery Voltage Sense BR Circuit	P1E71							
Hybrid Battery Voltage Sense BS Circuit	P1E72							
Hybrid Battery Voltage Sense BT Circuit	P1E73							
Hybrid Battery Voltage Sense BU Circuit	P1E74							
Hybrid Battery Voltage Sense BV Circuit	P1E75							
Hybrid Battery Voltage Sense BW Circuit	P1E76							
Hybrid Battery Voltage Sense BX Circuit	P1E77							
Hybrid Battery Voltage Sense BY Circuit	P1E78							
Hybrid Battery Voltage Sense BZ Circuit	P1E79							
Hybrid Battery Voltage Sense CA Circuit	P1E7A							
Hybrid Battery Voltage Sense CB Circuit	P1E7B							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense CC Circuit	P1E7C	DTC Pass		Case 2 : |1st Cell V – 2nd Cell V| <= 1V			600 ms	
Hybrid Battery Voltage Sense CD Circuit	P1E7D							
Hybrid Battery Voltage Sense CE Circuit	P1E7E			Case 3 : Busbar Cap Volt <= 0.7V				
Hybrid Battery Voltage Sense CF Circuit	P1E7F							
Hybrid Battery Voltage Sense CG Circuit	P1E80			Case 4 : Busbar Cap Volt > 0.7V				
Hybrid Battery Voltage Sense CH Circuit	P1E81							
Hybrid Battery Voltage Sense CI Circuit	P1E82			Case 5: |1st Cell V - 2nd Cell V| <= 0.5V				
Hybrid Battery Voltage Sense CJ Circuit	P1E83							
Hybrid Battery Voltage Sense CK Circuit	P1E84							
Hybrid Battery Voltage Sense CM Circuit	P1E86							
Hybrid Battery Voltage Sense CN Circuit	P1E87							
Hybrid Battery Voltage Sense CO Circuit	P1E88							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense CP Circuit	P1E89							
Hybrid Battery Voltage Sense CQ Circuit	P1E8A							
Hybrid Battery Temperature Sensor Circuit Low	P0A9D	Sets when Temperature Sensor X falls below a Threshold	Temperature Sensor X	Temperature Sensor X > 87.5C (ADC Count < 680)	Diagnostic Enable	TRUE	1.4 seconds in a 2 second window Frequency- 200 ms	Two Trips
Hybrid Battery 2 Temperature Sensor Circuit Low Voltage	P0AC7				Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE		
Hybrid Battery 3 Temperature Sensor Circuit Low Voltage	P0ACC				No Active DTCs associated with VTSM Loss of Comm	U2603, U2604, U2605, U2606		
Hybrid Battery 4 Temperature Sensor Circuit Low Voltage	P0AEA				No Active DTCs associated with VTSM 5V Ref Diagnostic	P1E93, P1E99, P1E9F, P1EA5		
Hybrid Battery Temperature Sensor E Circuit Low	P0BC4							
Hybrid Battery Temperature Sensor F Circuit Low	P0C35							
Hybrid Battery Temperature Sensor G Circuit Low	P0C7E				2nd Protection Self Test Diagnostic	Not Running		
Hybrid Battery Temperature Sensor H Circuit Low	P0C83							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Temperature Sensor I Circuit Low	P0C8A				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 >= 680)			2 Seconds	
Hybrid Battery Temperature Sensor Circuit High	P0A9E	Sets when Temperature Sensor X falls above a Threshold	Temperature Sensor X	Temperature Sensor X < -40C (ADC Count > 3992)	Diagnostic Enable	TRUE	1.4 seconds in a 2 second window Frequency-200 ms	Two Trips
Hybrid Battery 2 Temperature Sensor Circuit High Voltage	P0AC8				Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE		
Hybrid Battery 3 Temperature Sensor Circuit High Voltage	P0ACD				No Active DTCs associated with VTSM Loss of Comm	U2603, U2604, U2605, U2606		
Hybrid Battery 4 Temperature Sensor Circuit High Voltage	P0AEB				No Active DTCs associated with VTSM 5V Ref Diagnostic	P1E93, P1E99, P1E9F, P1EA5		
Hybrid Battery Temperature Sensor E Circuit High	P0BC5							
Hybrid Battery Temperature Sensor F Circuit High	P0C36							
Hybrid Battery Temperature Sensor G Circuit High	P0C7F				2nd Protection Self Test Diagnostic	Not Running		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Temperature Sensor H Circuit High Hybrid Battery Temperature Sensor I Circuit High	P0C84 P0C8B				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 >= -40C (ADC Count <= **3992**)			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 No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H High Voltage Contactor Status	TRUE TRUE TRUE > 11V U185B Open	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
		DTC Pass		If there is return signal for isolation test signal (sine-wave)			2 Seconds	
Hybrid Battery Pack Coolant Temperature Sensor Circuit Low	P0C44	Sets when Inlet Coolant Temp Sensor falls below a Threshold	Inlet Temp	Inlet Temp >= 87.9C (ADC Count <= 130)	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit VITM System Voltage	TRUE TRUE P1A07 >= 9V	1.75 seconds in a 2.5 seconds window Frequency-250 ms	Two Trips
		DTC Pass		Inlet Temp < 87.9C (ADC Count > 130)			2.5 Seconds	
Hybrid Battery 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 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 >= -40C (ADC Count <= 3823)			2.5 Seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Battery Pack Coolant Temperature Sensor B Circuit Low	P0CD7	Sets when Outlet Coolant Temp Sensor falls below a Threshold	Outlet Temp	Inlet Temp >= 87.9C (ADC Count <= 130)	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit VITM System Voltage	TRUE TRUE P1A07 >= 9V	1.75 seconds in a 2.5 seconds window Frequency- 250 ms	Two Trips
		DTC Pass		Inlet Temp < 87.9C (ADC Count > 130)			2.5 Seconds	
Hybrid/EV Battery Pack Coolant Temperature Sensor B Circuit High	P0CD8	Sets when Outlet Coolant Temp Sensor goes above a Threshold	Outlet Temp	Outlet Temp < -40C (ADC Count > 3823)	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit VITM System Voltage	TRUE TRUE P1A07 >= 9V	1.75 seconds in a 2.5 seconds window Frequency- 250 ms	Two Trips
		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 VITM System Voltage	TRUE TRUE P1A07 >= 9V	175 ms in a 250 ms window Frequency-25 ms	One Trip
		DTC Pass		Pack Voltage <= 456V			250 ms	
Hybrid Battery Pack Current Sensor B Circuit Low	P0B10	If Fine Current is below Threshold	Fine Current	< -23A	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable 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	

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 Sensor Circuit Low	P0AC1	If Coarse Current is below Threshold	Coarse Current	< -470A	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		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	P1A07		
					VITM System Voltage	>= 9V		
		DTC Pass		Coarse Current <= 280A			250 ms	
Hybrid/EV Battery Pack Current Sensor A Exceeded Learning Limit	P1EBA	If Pack Current Coarse Offset is out of range	|Pack Current Coarse Offset|	> 8A	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	At power up - 185 ms	One Trip
					High Voltage Contactor Status	Open		
					Charger Contactor Status	Open		
					5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	2.8V to 3.2V *Please note that this is not the 5v Ref. diagnostic, but a reading taken at the point when the Offset diagnostic is about to start		
					VITM System Voltage	>= 9V		
					VITM Initalization Status Extended	Initializing		
					No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H	U185B		
		DTC Pass		|Pack Current Coarse Offset| <= 8A			At power up - 185 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid/EV Battery Pack Current Sensor B Exceeded Learning Limit	P1EBB	If Pack Current Fine Offset is out of range	Pack Current Fine Offset	|Pack Current Fine Offset| > 2.5A	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	At power up - 185 ms	One Trip
					High Voltage Contactor Status	Open		
					Charger Contactor Status	Open		
					5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	2.8V to 3.2V *Please note that this is not the 5v Ref. diagnostic, but a reading taken at the point when the Offset diagnostic is about to start		
					VITM System Voltage	>= 9V		
					VITM Initalization Status Extended	Initializing		
					No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H	U185B		
		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	
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	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							Frequency- 200 ms	
		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
		DTC Pass		1			1 Second	
Battery Energy Control Module Lost Communication With Hybrid	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	TRUE TRUE	1.75 seconds in a 2 second window Frequency-	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Powertrain Control Module					No Active DTC for Battery Energy Control Module Communication Bus A Off VITM System Voltage Flashing Programming Session (Other Modules or itself) Mode $28 Executed on HS Bus	U180B >= 9V Completed TRUE	250 ms	
		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	
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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass		1			At power up - 5 ms up to 400	
Battery Energy Control Module Internal Performance	P0A1F	VITM Software Watchdog	If Watchdog resets controller	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	N/A Immediate	One Trip
		DTC Pass		1				
Battery Energy Control Module Ignition Switch Run/Start Position Circuit Low	P1A5E	If RunCrank input state is below Threshold and RunCrank Received Serial Data State = Active	RunCrank Hardwire Input and Serial Data signal	RunCrank Input < 5V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module Communication Bus H Bus Off VITM System Voltage No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit	TRUE TRUE U1806 >= 9V P1A07	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 Lost Communication with Hybrid Processor Control Module B on Bus H	U185B		
		DTC Pass		RunCrank Input >= 5V			6 seconds	
Battery Energy Control Module Ignition Switch Run/Start Position Circuit High	P1A5F	If RunCrank input state is above Threshold and RunCrank Received Serial Data State = Inactive	RunCrank Hardwire Input and Serial Data signal	RunCrank Input >= 5V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable 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	TRUE TRUE U1806 >= 9V P1A07	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 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 Accessory Position Circuit Low	P1A60	If Acessory input state is below Threshold and received serial data Propulsion System Active state = True	Accessory Hardwire Input and Serial Data signal	RunCrank Input < 5V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	100 ms in a 125 ms window	Two Trips
					No Active DTC for Battery Energy Control Module Communication Bus A Off	U180B		
					No Active DTC for Battery Energy Control Module Lost Communication With with HCP (TPIM) on Bus A (HS GMLAN Bus)	U1885		
					VITM System Voltage	>= 9V		
					No Active DTC for Battery Energy Control Module 5 Volt Reference Circuit	P1A07		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Run/Crank Propulsion System Active Accessory Diagnostic Delay	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 Batterry Interface Control Module X	U2603 U2604 U2605 U2606	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 2nd Protection Self Test Diagnostic VITM System Voltage	TRUE TRUE Not Running >= 9V	2.8 seconds in a 4 second window Frequency-400 ms	One Trip
		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 No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus A (HS)	P1A0C P1A07 U2602		
		DTC Pass		HVEM Input >= 5V			10 Seconds	
Battery Energy Control Module Dedicated Bus 1 Off	U2401	If Bus Off is Detected	Transmit Error Counter (TEC)	TEC > 255	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	1.4 seconds in a 2 second window Frequency- 200 ms	One Trip
		DTC Pass		TEC < 255			2 Seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on HS	U2602	If message $236 is not Received by VITM	Loss of Supervision with VICM module on HS GMLAN bus	# of consecutive $236 message not received > 3	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTC for Battery Energy Control Module Communication Bus A Off VITM System Voltage Flashing Programming Session (Other Modules or itself) Mode $28 Executed on HS Bus	TRUE TRUE U180B >= 9V Completed TRUE	2.8 seconds in a 4 second window Frequency-100 ms	Two Trips
		DTC Pass		1			4 Seconds	
Hybrid Battery Interface Control Module x Cell Balancing Circuit	P1E92 P1E98 P1E9E P1EA4	Cell Balance switch output	Cell Balance switch is below threshold	4.0V < Cell Voltage < 5.0V Threshold = 66mV 3.5V < Cell Voltage < 4.0V Threshold = 41mV 3.0V < Cell Voltage < 3.5V Threshold = 22mV	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 No Active DTCs associated with VTSM Internal Performance No Active DTCs on VITM RESS Bus Off	TRUE TRUE U2603, U2604, U2605, U2606 Not Running P1E8E, P1E94, P1E9A, P1EA0 U2401	14 seconds in a 20 seconds window Frequency-200 ms	One Trip
		DTC Pass		Threshold is above values specified for Cell Voltage			20 Seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				specified				
Hybrid Battery Interface Control Module x ROM	P1E90 P1E96 P1E9C P1EA2	ROM Checksum method	ROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTCs associated with VTSM Loss of Comm	TRUE Transitions: TRUE to FALSE (During VTSMx Power down) U2603, U2604, U2605, U2606	At power down-Total of 824 ms for all slaves	One Trip
		DTC Pass		1			At power down-Total of 824 ms for all slaves	
Hybrid Battery Interface Control Module x RAM	P1E8F P1E95 P1E9B P1EA1	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
		DTC Pass		1			At power up-Total of 58 ms for all slaves	
Hybrid Battery Interface Control Module x KAM	P1E91 P1E97 P1E9D	Using Checksum method	EEPROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTCs associated with VTSM Loss of Comm	TRUE Transitions: TRUE to FALSE (During VTSMx Power down) U2603, U2604, U2605, U2606	At power down-Total of 26 ms for all Slaves	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
	P1EA3							
		DTC Pass		1			At power down- Total of 26 ms for all Slaves	
Hybrid Battery Interface Control Module x Performance	P1E8E P1E94 P1E9A P1EA0	VTSMx Software Watchdog OR SPI Bus Malfunction (Read Value from Register Not Equal to Written Value)	If Watchdog resets controller OR Wrong value Read	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	N/A instantaneous - Watchdog Reset 500us - SPI Bus	One Trip
		DTC Pass		Both should pass			500 us in 200ms window	
Hybrid Battery Interface Control Module x 5V Ref	P1E93 P1E99 P1E9F P1EA5	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 > 3.5V	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 TRUE U2603, U2604, U2605, U2606 Not Running	1.4 seconds in a 2.0 seconds window Frequency- 200ms	One Trip
		DTC Pass		2.8V <= 5V Reference Value <= 3.5V			2.0 seconds	
Hybrid/EV Battery	P1EB1	VITM Software version	If any software version	1	Diagnostic Enable	TRUE	At power up-	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Interface Control Module Software IncompatibleBattery Energy Control Module Lost Communication with Hybrid Processor Control Module B on HS		and Software version of ALL Slave modules are compatible	incompatibility is detected		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 >= 9V U2603, U2604, U2605, U2606 U2401	200 ms	
		DTC Pass		1			At power up-200 ms	
Hybrid/EV Battery Interface Control Module x Not Programmed	P1EB2 P1EB3 P1EB4 P1EB5	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 TRUE >= 9V	As soon as Programming session ends	One Trip
		DTC Pass		1			As soon as Programming session ends	

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 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	Two Trips, Type B
	P1F07				Seed and Key Algorithm Calibration	TRUE		
	P1F08				Run/Crank, Accessory or HVEM EB Comm Enable	TRUE		
	P1F09				No Active DTCs associated with VTSM Loss of Comm	U2603, U2604, U2605, U2606		
					No Active DTCs on VITM RESS Bus Off	U2401		
					2nd Protection Self Test Diagnostic	Not Running		
		DTC Pass		5			1.4 seconds	

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" Phase W Current Sensor Circuit Low	P0BEF	Circuit Low monitor to detect the failure of W-phase current sensor circuit below valid range	W Phase current sensor output at highside	< -800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "A" Phase W Current Sensor Circuit High	P0BF0	Circuit High monitor to detect the failure of W-phase current sensor circuit above valid range	W Phase current sensor output at highside	> 800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "A" Phase W Current Sensor Offset Out-of Range	P0BEE	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	W Phase offset current output at highside	>30 A	Wakeup Signal Power Stage No Active DTCs:	On OPEN P0BEF/P0BF0	X: 8 cts Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
MCP A IGBT Diagnostics								
Drive Motor "A" Inverter Performance	P0A78	Detects IGBT Desaturation Faults	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
MCP A High Voltage (HV) Diagnostics								
Drive Motor "A" Hybrid Battery System Voltage High	P1AEE	To detect over voltage and to protect TPIM HV Circuit	HV Sensor Voltage OR Hardware Over Voltage Flag	> 463V = TRUE	Controller Initialization	Complete	X: 3 cts Y: N/A R: 0.1 - 0.5 ms T: 0.3 - 1.50 ms	One Trip, Type A
Drive Motor "A" Control Module Hybrid Battery Voltage Sense Circuit Low Voltage	P1AE8	Circuit Low monitor of HV output voltage sensor	HV Sensor Voltage	<30V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A
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)	>= 40 V >= 50 V	No Active DTCs: Controller Initialization Contactors	P1AE8, P1AE9 Closed	X: 18 cts Y: 30 cts R: 10.4ms T: 187ms	Two Trips, Type B
Drive Motor "A" Control Module Hybrid Battery Voltage System Isolation Fault	P1AF0	Isolation Lost between mid-pack voltage and chassis	Isolation Ratio (Neg mid-pack voltage / Pos mid-pack voltage)	>4.53	No Active DTCs: Controller Initialization	P1AE8, P1AE9, P1AEC Complete	X: 240 cts Y: 480 cts R: 10.4 ms T: 2496 ms	Two Trips, Type B
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 1 Circuit Low	P1AF4	Circuit 1 Low monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage	<20V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 1 Circuit High	P1AF5	Circuit 1 High monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage - HV	>40 V	No Active DTCs: Controller Initialization Run/Crank	P1AE8, P1AE9 Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit Low	P1B0B	Circuit 2 Low monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage	<20V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit High	P1B0C	Circuit 2 High monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage - HV	>40 V	No Active DTCs: Controller Initialization Run/Crank	P1AE8, P1AE9 Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B

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) and ABS(Pos mid-pack - Neg mid-pack - HV)	>= 40 V >= 50 V	No Active DTCs: Controller Initialization Run/Crank	P1AE8, P1AE9, P1B0B, P1B0C Complete Active	X: 100 cts Y: 150 cts R: 10.4ms T: 1040ms	Two Trips, Type B
Motor Control Processor Voltage Diagnostics								
Sensor Power Supply "A" Circuit Low	P06B1	Detects Sensor Power Supply (15V) below an acceptable threshold.	Scaled 15V Supply Voltage	< 12.0V	Wakeup Signal	On	X: 40 cts Y: 50 cts R: 10.4ms T: 416 ms OR continuous fail time > 300 ms	One Trip, Type A
Sensor Power Supply "A" Circuit High	P06B2	Detects Sensor Power Supply (15V) above an acceptable threshold.	Scaled 15V Supply Voltage	> 18.0V	Wakeup Signal	On	X: 40 cts Y: 50 cts R: 10.4ms T: 416 ms OR continuous fail time > 300 ms	One Trip, Type A
System Voltage Low	P1ADE	*This is the 12V system voltage low diagnostic*						Special Type C
		DTC Fail case 1: Sets when the ignition voltage is below a threshold	Ignition Voltage	<= 10 Volts	Enable Cal RunCrankActive Engine Speed	= true = true >= 0 RPM	5 fail counts out of 6 sample counts Executes in a 1000ms loop Detects in 6 sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass:		Ignition Voltage > 10 Volts			1 second	
System Voltage Hi	P1ADF	*This is the 12V system voltage Hi diagnostic*						Special Type C
		DTC Fail case 1: Sets when the ignition voltage is above a threshold	Ignition Voltage	>= 18 Volts	Enable Cal RunCrankActive	= true = true	5 fail counts out of 6 sample counts Executes in a 1000ms loop Detects in 6 sec	
		DTC Pass:		Ignition Voltage < 18 Volts			1 second	
Motor A Inverter Temp Sensor Diagnostics								
Drive Motor Inverter Temperature Sensor A Circuit Range/Performance	P0AEE	Inverter A Temperature Sensor #1 In-Range Rationality Check	ABS (Inverter Temp A - Average of (Power Electronics Coolant Temp and Transmission Fluid Temp)) "ColdStartAvg"	>20 deg C	Wake Up Signal Propulsion System Inactive Time Thermal Conditioning Off Time Charge Off Time Cold Start Average Temperature Power Electronics Coolant Temperature Available Power Electronics Coolant Temperature Fault Active	On >=21600s >=7200s >=7200s > -20C TRUE FALSE	700 cts Start Delay PLUS X: 200 cts Y: 300 cts R: 10.4ms T: 2080ms =9.36 sec total	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Tranmission Fluid Temperature Valid Propulsion System Inactive Timer Fault Active Propulsion System Inactive Timer Mask Off Board Charging Inactive Timer Fault Active 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:	TRUE FALSE Use Data FALSE Use Data FALSE Use Data TRUE P0AF0 and P0AEF		
Drive Motor Inverter Temperature Sensor A Circuit High	P0AF0	To detect Inverter A Temperature Sensor #1 voltage Out of Range high	PIM Temp A	< -58 deg C (near 5V)	Wakeup Signal When malfunction present at start of trip: Cumulative Inverter Warmup Time	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
					at or above Inverter Warmup Torque Threshold	>=ABS(20 Nm)		
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 Thermal Conditioning Off Time Charge Off Time Cold Start Average Temperature Power Electronics Coolant Temperature Available Power Electronics Coolant Temperature Fault Active Tranmission Fluid Temperature Valid Propulsion System Inactive Timer Fault Active	On >=21600s >=7200s >=7200s > -20C TRUE FALSE TRUE FALSE	300 cts Start Delay PLUS X: 550 cts Y: 700 cts R: 10.4ms T: 2080ms =8.84 sec total	One Trip, Type A

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		(voltage)					T: 2600ms	
Drive Motor Inverter Temperature Sensor E Circuit Range/Performance	P0BDC	Inverter A Temperature Sensor #3 In-Range Rationality Check	ABS(PIM Temp E - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	>20 deg C	Wake Up Signal	On	300 cts Start Delay	One Trip, Type A
					Propulsion System Inactive Time	>=21600s		
					Thermal Conditioning Off Time	>=7200s	PLUS	
					Charge Off Time	>=7200s	X: 550 cts Y: 700 cts	
					Cold Start Average Temperature	> -20C	R: 10.4ms T: 2080ms =8.84 sec total	
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Tranmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" Inverter Phase V Over Temperature	P0C12	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp C Temperature	> 98 deg C	PIM Temperature No Perf Fault; P0BDC	IN RANGE NOT ACTIVE	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
Drive Motor "A" Inverter Phase W Over Temperature	P0C13	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp E Temperature	> 98 deg C	PIM Temperature No Active DTCs:	IN RANGE P0BD2	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
Motor A Resolver Sensors - Discrete Diagnostics								
Drive Motor "A" Position Sensor Circuit	P0A3F	To detect Loss of Signal or converter error (line open, short) in the Motor Resolver circuit	Sin or Cos Signal	<2.3V	Wakeup Signal Resolver Initialization Delay	On 2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	One Trip, Type A
Drive Motor "A" Position Sensor Circuit Range/Performance	P0A40	To detect a Degradation of Signal fault in the angle data read by the Motor Resolver circuit.	Sin or Cos Signal	>4.0V	Wakeup Signal Resolver Initialization Delay	On 2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms	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 "A" Position Sensor Circuit Loss of Tracking	P1B03	To detect a Loss of Tracking fault in the Motor Resolver circuit.	Internal Tracking Error	> 5 deg	Wakeup Signal Resolver Initialization Delay	On 2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	One Trip, Type A
Drive Motor "A" Position Sensor Circuit Overspeed	P1B0D	To detect when Motor A has exceeded operational maximum speed	ABS(Motor speed)	>6300 rpm	Wakeup Signal	On	X: 10 cts Y: 12 cts R: 10.4ms T: 104ms	One Trip, Type A
Drive Motor "A" Position Sensor Not Learned	P0C17	To detect an unvalidated Resolver Offset Learn Value AND No Stored Previously Valid Value	Offset Learn DIDN'T complete because: ABS(Motor Speed) OR Filtered DC OR ALL Phase Current OR TimeOut	 >50 rpm < 192 V <15 A > 1.4 second for 1 Timeout	Key Off Wakeup Signal ABS(Motor Speed) High Voltage Valid Stored Offset	TRUE ON < 20 rpm > 192 V FALSE	300 ms learn time	One Trip, Type A
Drive Motor "A" Position Exceeded Learning Limit	P0C4E	**Fail Case 1:**To detect an OOR Offset Learn Value	Offset Learn Completes AND ABS(Offset Correction Angle)	> 30 degrees	ABS(Motor Speed) High Voltage	< 20 rpm > 192V	300 ms learn time	One Trip, Type A
		Fail Case 2: To detect a sudden jump from previously stored offset learn value	Offset Learn Completes AND ABS(Offset Correction Angle - prevoiusly stored value)	> 10 degrees				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" Position Sensor Learn Incorrect	P1B0F	To detect an unvalidated Resolver Offset Learn Value AND a Stored Previously Valid Value	Offset Learn DIDN'T complete because: ABS(Motor Speed)	> 50 rpm	Key Off	TRUE	300 ms learn time	Two Trips, Type B
			OR Filtered DC Voltage	< 192V	Wakeup Signal	TRUE		
			OR ALL Phase Current Max-Min Delta	< 15A	ABS(Motor Speed)	< 20 rpm	X: 30 ct Y: N/A R: 2.08ms T: 62.4ms	
			OR TimeOut waiting for entry conditions	> 1.4 second for 1 Timeouts	Valid Stored Offset	TRUE		
					High Voltage	> 192 V		
Motor A Resolver Sensors - Circuit Diagnostics								
Drive Motor "A" Position Sensor Circuit "A" Low	P0C52	To detect Resolver Circuit S1/3 Out of Range Low	Resolver S13 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms T: 520ms	One Trip, Type A
Drive Motor "A" Position Sensor Circuit "A" High	P0C53	To detect Resolver Circuit S1/3 Out of Range High	Resolver S13 Circuit Reference Voltage	> 4.5 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	One Trip, Type A
Drive Motor "A" Position Sensor Circuit "B" Low	P0C5C	To detect Resolver Circuit S2/4 Out of Range Low	Resolver S24 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms T: 520ms	One Trip, Type A
Drive Motor "A" Position Sensor Circuit "B" High	P0C5D	To detect Resolver Circuit S2/4 Out of Range High	Resolver S24 Circuit Reference Voltage	> 4.5 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	One Trip, Type A

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

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	P1EB6	*This Diagnostic tests for BINVDM errors*						One Trip, Type A
		DTC Fail case 1: Non-volatile memory (**Static**) checksum error at controller power-up	Checksum at power-up does not match checksum at power-down		Ignition Status	= Run or Crank	1 failure Frequency: Once at powerup	
		DTC Fail case 2: Non-volatile memory (**Preserved**) checksum error at controller power-up						
		DTC Fail case 3: Non-volatile memory (**BINVDM**) checksum error at controller power-up						
		DTC Fail case 4: Non-volatile memory (**ShutdownFinished**) checksum error at controller power-up						
		DTC Pass:		No ROM memory faults				
Control Module Random Access Memory (RAM) Failure	P1A50	*This Diagnostic tests the checksum on RAM memory*						One Trip, Type A
		DTC Fail case 1: Indicates that HCP is unable to correctly write and read data to and from **Dual Store** RAM	Data read	does not match data written	Ignition Status	= Run or Crank	Should finish within 30 seconds at all operating conditions	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 5: Indicates that HCP is unable to correctly write and read data to and from **System** RAM						
		DTC Fail case 6: Indicates that HCP is unable to correctly write and read data to and from **Cache** RAM						
		DTC Fail case 7: Indicates that HCP is unable to correctly write and read data to and from **eTPU** RAM						
		DTC Pass:		No errors in 1000ms MainSOH RAM faults = false CommFlts = false System RAM faults = false CacheRam faults = false eTPU RAM faults = false				
Control Module	P0A1B	*This Diagnostic tests all the internal processor integrity subsystems*						One Trip,

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

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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 13: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_FlashECC_CktTest	HWIO detects Fault	= 3 /10 5/10	1. Flash ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	
		DTC Fail case 14: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RAM_ECC_CktTest	HWIO detects Fault	= 3 /10 5/10	1. RAM ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	
		DTC Fail case 15: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_DMA_Xfer Test	HWIO detects Fault or Memory Copy Error	= True or =True	Diagnostic Test Enabled	= TRUE		
MCPA Torque Security Diagnostics								
Control Module Long	P1ADC	*This Diagnostic tests for unuseable BINVDM (flash) memory only*						One Trip,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Term Memory Performance		**DTC Fail case 1:** Indicates that the NVM Error flag **HWIO Bat Write will not succeed** set	Last EEPROM write did not complete		Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up	Type A
		DTC Fail case 2: Indicates that the NVM Error flag **HWIO Assembly Cal** set						
		DTC Pass:		NV write will not succeed = fail Assembly cal fail = false				
Drive Motor A Torque Delivered Performance	P0C19	*This Diagnostic tests that the difference between the motor A torque command slew and the motor torque achieved is greater than a threshold.*						One Trip, Type A
		DTC Fail case 1: The slewed MCP torque command is different by the MCP torque achieved	the commanded torque - the achieved torque	< 138	Ignition switch	in crank or run		
Drive Motor A Control Module Not Programmed	P1A4F	*This diagnostic prevents flashing different MCP software into MCP A that does not match its ID*						One Trip, Type A
		DTC Fail case 1: The MCP ID hardware does not match the calibration for the specific MCP	MCP ID Hardware	≠ *Calibration*				
Drive Motor A Control Module Internal Control Module Torque Calculation Performance	P1E0A	*This diagnostic detects the torque command path calculation errors*						One Trip, Type A
		DTC Fail case 1: If the difference between the Torque achieved primary path signal and the redundant path signal is greater than a threshold (MTQR)	Difference between Primary and Redundant signals	> 164Nm	Fault Active TPTKO Torque Mon Fail	= True = False = True	30 fail counts out of 32 sample counts Executes in a 6.25 ms Loop Detects in 200ms	

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 8: Compares the Duty ABC primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (SVMR)	**For OverMod:** Mod Index Square or PerfSqr **For Linear:** Mod Index Square or PerfSqr	> .2Nm > 1Nm > .1Nm > .15Nm				
		DTC Fail case 9: Compares the Power Input Watts primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (HVTR)	Difference between Primary and Redundant signals	>4000				
		DTC Fail case 10: Compares the VDC Adapt primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (HVTR)	Difference between Primary and Redundant signals	> .03V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 11: Compares the Qest primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (HVTR)	Difference between Primary and Redundant signals	> 0Nm				
		DTC Fail case 12: Compares the Motor Speed primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MSPR)	Difference between Primary and Redundant signals	>116 RadPerSec				
Communication Diagnostics								
Lost Comm'n With ECM/PCM on Bus A	U1876	*This diagnostic indicates a lost communication between the MCPA and the ECM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the ECM on Bus A	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Controller B on Bus B	U182E	*This diagnostic indicates a lost communication between the MCPA and the VICM on Bus B*						Two Trips, Type B
		DTC Fail case 1: Lost Communication with Hybrid Powertrain Control Module B on Bus B (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Controller B	U2613	*This diagnostic indicates a lost communication between the MCPA and the VICM*						Two Trips, Type B
		DTC Fail case 1: Lost Communication with Hybrid Powertrain Control Module B on Bus A (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					PowerMode	=RUN		

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "B" Phase U Current Sensor Circuit Low	P0BF3	Circuit Low monitor to detect the failure of U-phase current sensor circuit below valid range	U Phase current sensor output at highside	< -800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "B" Phase U Current Sensor Circuit High	P0BF4	Circuit High monitor to detect the failure of U-phase current sensor circuit above valid range	U Phase current sensor output at highside	> 800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "B" Phase U Current Sensor Offset Out-of Range	P0BF2	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	U Phase offset current output at highside	>30 A	Wakeup Signal Power Stage No Active DTCs:	On OPEN P0BE7/P0BE8	X: 8 cts Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Drive Motor "B" Phase V Current Sensor Circuit Low	P0BF7	Circuit Low monitor to detect the failure of V-phase current sensor circuit below valid range	V Phase current sensor output at highside	< -800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "B" Phase V Current Sensor Circuit High	P0BF8	Circuit High monitor to detect the failure of V-phase current sensor circuit above valid range	V Phase current sensor output current at highside	> 800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "B" Phase V Current Sensor Offset Out-of Range	P0BF6	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	V Phase offset current output at highside	>30 A	Wakeup Signal Power Stage No Active DTCs:	On OPEN P0BEB/P0BEC	X: 8 cts Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Drive Motor "B" Phase W Current Sensor Circuit Low	P0BFB	Circuit Low monitor to detect the failure of W-phase current sensor circuit below valid range	W Phase current sensor output at highside	< -800 A	Wakeup Signal	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 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
MCP B IGBT Diagnostics								
Drive Motor "B" Inverter Performance	P0A79	Detects IGBT Desaturation Faults Monitors hw status line to detect internal overcurrent faults, shoot through, or loss of switching control events	Phase A, B, or C High or Low Side Devices	OVERDRIVEN (Status Fault Bit)	Wakeup Signal High Voltage	On > 100V	X: 1 ct Y: N/A R: 2.08ms T: 2.08ms	One Trip, Type A
Drive Motor "B" Inverter Power Supply Circuit/Open	P0C0E	Detects IGBT Bias Faults Monitors hw status line to detect loss of power supply to gate drive board	Phase A, B, or C Power Supply	FAILED (Status Fault Bit)	Inverter State High Voltage	Initialization Complete > 100V	X: 1 ct Y: N/A R: 2.08ms T: 2.08ms	One Trip, Type A
MCP B High Voltage (HV) Diagnostics								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "B" Hybrid Battery System Voltage High	P1AEF	To detect over voltage and to protect TPIM HV Circuit	HV Sensor Voltage OR Hardware Over Voltage Flag	> 463V = TRUE	Controller Initialization	Complete	X: 3 cts Y: N/A R: 0.1 - 0.5 ms T: 0.3 - 1.50 ms	One Trip, Type A
Drive Motor "B" Control Module Hybrid Battery Voltage Sense Circuit Low Voltage	P1AEA	Circuit Low monitor of HV output voltage sensor	HV Sensor Voltage	<30V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A
Drive Motor "B" Control Module Hybrid Battery Voltage Sense Circuit High Voltage	P1AEB	Circuit High monitor of HV output voltage sensor	HV Sensor Voltage	>500 V	Controller Initialization Run/Crank	Complete Active	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A
Drive Motor "B" Control Module Hybrid Battery System Voltage	P1AED	To check correlation of HV with sum of mid-pack voltages and HV_Battery.	ABS(HV - HV_Battery) AND ABS(HV - sum of mid-pack voltages)	>= 40 V >= 50 V	No Active DTCs: Controller Initialization Contactors	P1AEA, P1AEB Complete Closed	X: 18 cts Y: 30 cts R: 10.4ms T: 187ms	Two Trips, Type B
Drive Motor "B" Control Module Hybrid Battery Voltage System Isolation Fault	P1AF2	Isolation Lost between mid-pack voltage and chassis	Isolation Ratio (Neg mid-pack voltage / Pos mid-pack voltage)	>4.53	No Active DTCs: Controller Initialization	P1AEA, P1AEB, P1AED Complete	X: 250 cts Y: 300 cts R: 10.4ms T: 2600ms	Two Trips, Type B
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensor Circuit Low	P1AF6	Circuit 1 Low monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage	<20V	Controller Initialization Run/Crank	Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Contactors	Closed		
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensor Circuit High	P1AF7	Circuit 1 High monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage - HV	>40 V	No Active DTCs: Controller Initialization Run/Crank	P1AEA, P1AEB Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 728ms	Two Trips, Type B
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit Low	P1B43	Circuit 2 Low monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage	<20V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit High	P1B44	Circuit 2 High monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage - HV	>40 V	No Active DTCs: Controller Initialization Run/Crank	P1AEA, P1AEB Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 728ms	Two Trips, Type B
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensing Performance	P1B42	To check correlation of sum of mid-pack voltages against HV and HV_Battery	ABS(Pos mid-pack - Neg mid-pack - HV_Battery) and ABS(Pos mid-pack - Neg mid-pack - HV)	>= 40 V >= 50 V	No Active DTCs: Run/Crank Controller Initialization	P1AEA, P1AEB, P1B43, P1B44 Active Complete	X: 100 cts Y: 150 cts R: 10.4ms T: 1040ms	Two Trips, Type B
Motor B Temp Sensor Diagnostics								
Drive Motor "B" Control Module	P0A31	Motor B Temperature Sensor In-Range	ABS(Motor Thermistor Temperature - the average	> 20 deg C	Wake Up Signal	On	300 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
Temperature Sensor Performance		Rationality Check	of (Power Electronic Coolant Temperature and Transmission Fluid Temperature)) "ColdStartAvg"			>=21600s		
					Propulsion System Inactive Time			
					Thermal Conditioning Off Time	>=7200s	PLUS	
					Charge Off Time	>=7200s	X: 550 cts Y: 700 cts R: 10.4ms T: 2080ms =8.84 sec total	
					Cold Start Average Temperature	> -20C		
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Tranmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		
					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 P0A32 and P0A33		
Drive Motor "B" Control Module Temperature Sensor Circuit Out of Range High	P0A33	To detect temperature sensor voltage Out of Range high.	Motor Temp	< -41 deg C (near 5V)	Warmup Time Warmup Torque	Init Complete >=90s >=ABS(20 Nm)	X: 900 cts Y:1800cts R: 10.4ms T: 9378ms	One Trip, Type A
Drive Motor "B" Control Module Temperature Sensor Circuit Out of Range Low	P0A32	To detect temperature sensor voltage Out of Range low.	Motor Temp	> 184 degC (near 0V)		Init Complete	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor "B" Over Temperature	P0A35	To detect a sustained motor overtemperature condition	Motor Temperature exceeds inital fault threshold AND Does not decrease below reset threshold	> 149 deg C	Motor Temperature No Active Temp Performance Fault	IN RANGE P0A31	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Motor Control Processor Voltage Diagnostics								
Sensor Power Supply "B" Circuit Low	P06B4	Detects Sensor Power Supply (15V) below an acceptable threshold.	Scaled 15V Supply Voltage	< 12.0V	Wakeup Signal	On	X: 40 cts Y: 50 cts R: 10.4ms T: 416 ms OR continuous fail time > 300 ms	One Trip, Type A
Sensor Power Supply "B" Circuit High	P06B5	Detects Sensor Power Supply (15V) above an acceptable threshold.	Scaled 15V Supply Voltage	> 18.0V	Wakeup Signal	On	X: 40 cts Y: 50 cts R: 10.4ms T: 416 ms OR continuous fail time > 300 ms	One Trip, Type A
System Voltage Low	P1AE0	*This is the 12V system voltage low diagnostic*						Special Type C
		DTC Fail case 1: Sets when the ignition voltage is below a threshold	Ignition Voltage	<= 10 Volts	Enable Cal RunCrankActive Engine Speed	= true = true >= 0 RPM	5 fail counts out of 6 sample counts Executes in a 1000ms loop Detects in 6 sec	
		DTC Pass:		Ignition Voltage > 10 Volts			1 second	
System Voltage Hi	P1AE1	*This is the 12V system voltage Hi diagnostic*						Special Type C

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Off Board Charging Inactive Timer Fault Active 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:	FALSE Use Data FALSE Use Data TRUE 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 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 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	P0BD7	Inverter B Temperature Sensor #2 In-Range	ABS(PIM Temp D - AVG(PwrElecCoolantTem	>20 deg C	Wake Up Signal	On	300 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
Temperature Sensor D Circuit Range/Performance		Rationality Check	p and TransTemp)) "ColdStartAvg"		Propulsion System Inactive Time	>=21600s		
					Thermal Conditioning Off Time	>=7200s	PLUS	
					Charge Off Time	>=7200s	X: 550 cts Y: 700 cts	
					Cold Start Average Temperature	> -20C	R: 10.4ms T: 2080ms =8.84 sec total	
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Tranmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		
					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 Circuit Low	P0BD8	To detect Inverter B Temperature Sensor #2 Out of Range low (voltage)	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
Drive Motor Inverter Temperature Sensor F Circuit Range/Performance	P0BE1	Inverter B Temperature Sensor #3 In-Range Rationality Check	ABS(PIM Temp F - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	>20 deg C	Wake Up Signal Propulsion System Inactive Time Thermal Conditioning Off Time Charge Off Time Cold Start Average Temperature Power Electronics Coolant Temperature Available	On >=21600s >=7200s >=7200s > -20C TRUE	700 cts Start Delay PLUS X: 200 cts Y: 300 cts R: 10.4ms T: 2080ms =9.36 sec total	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Tranmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		
					Battery Thermal Conditioning Inactive Fault Active	FALSE		
					Battery Thermal Conditioning Inactive Mask	Use Data		
					Plug In Charging Present	TRUE		
					No Active Power Inverter Temp Out Of Range Faults:	P0BE2 and P0BE3		
Drive Motor Inverter Temperature Sensor F Circuit High	P0BE3	To detect Inverter B Temperature Sensor #3 Out of Range high (voltage).	PIM Temp F Temperature	< -58 deg C (near 5V)	Wakeup Signal When malfunction present at start of trip: Cumulative Inverter Warmup Time	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
					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
Drive Motor "B" Inverter Phase W Over Temperature	P0C16	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp F Temperature	> 98 deg C initial fault	PIM Temperature No Active DTCs:	IN RANGE P0BE1	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
Motor B Resolver Sensors - Discrete Diagnostics								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "B" Position Sensor Circuit	P0A45	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 "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 OR ALL Phase Current Max-Min Delta OR TimeOut waiting for entry conditions	 >50 rpm < 192 V <100 A > 1.4 second for 1 timeout	Key Off Wakeup Signal ABS(Motor Speed) High Voltage Valid Stored Offset	TRUE ON < 20 rpm > 192 V FALSE	300 ms learn time	One Trip, Type A
Drive Motor B Position Exceeded Learning Limit	P0C4F	**Fail Case 1:** To detect an Oor Offset Learn Value	Offset Learn Completes AND ABS(Offset Correction Angle)	> 30 degrees	ABS(Motor Speed) High Voltage	< 20 rpm > 192V	300 ms learn time	One Trip, Type A
		Fail Case 2: To detect a sudden jump from previously stored offset learn value	Offset Learn Completes AND ABS(Offset Correction Angle - prevoiusly stored value)	> 10 degrees				

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	P1B10	To detect an unvalidated Resolver Offset Learn Value AND a Stored Previously Valid Value	Offset Learn DIDN'T complete because: ABS(Motor Speed)	> 50 rpm	Key Off	TRUE	300 ms learn time	Two Trips, Type B
			OR Filtered DC Voltage	< 192V	Wakeup Signal	TRUE		
			OR ALL Phase Current Max-Min Delta	< 15A	ABS(Motor Speed)	< 20 rpm	X: 30 ct Y: N/A R: 2.08ms T: 62.4ms	
			OR TimeOut waiting for entry conditions	> 1.4 second for 1 timeout	Valid Stored Offset	TRUE		
					High Voltage	> 192 V		
Motor B Resolver Sensors - Circuit Diagnostics								
Drive Motor "B" Position Sensor Circuit "A" Low	P0C57	To detect Resolver Circuit S1/3 Out of Range Low	Resolver S13 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms T: 520ms	One Trip, Type A
Drive Motor "B" Position Sensor Circuit "A" High	P0C58	To detect Resolver Circuit S1/3 Out of Range High	Resolver S13 Circuit Reference Voltage	> 4.5 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	One Trip, Type A
Drive Motor "B" Position Sensor Circuit "B" Low	P0C61	To detect Resolver Circuit S2/4 Out of Range Low	Resolver S24 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms T: 520ms	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 "B" High	P0C62	To detect Resolver Circuit S2/4 Out of Range High	Resolver S24 Circuit Reference Voltage	> 4.5 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	One Trip, Type A
MCP B Controller Fault Diagnostics								
Control Module Read Only Memory (ROM)	P1A54	*This Diagnostic tests the checksum on ROM (flash) memory*						One Trip, Type A
		DTC Fail case 1: This DTC will be stored if any check sum in the **boot** is incorrect	Calculated Checksum does not match stored checksum		Ignition Status	= Run or Crank	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5 failures Frequency: Runs continuously in the background	
		DTC Fail case 2: This DTC will be stored if any check sum in the **calibration** is incorrect						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 3: This DTC will be stored if any check sum in the **software** is incorrect						
		DTC Pass:		ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false				
Control Module Long Term Memory Reset	P1EB7	*This Diagnostic tests for BINVDM errors*						One Trip, Type A
		DTC Fail case 1: Non-volatile memory (**Static**) checksum error at controller power-up	Checksum at power-up does not match checksum at power-down		Ignition Status	= Run or Crank	1 failure Frequency: Once at powerup	
		DTC Fail case 2: Non-volatile memory (**Preserved**) checksum error at controller power-up						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 3: Non-volatile memory (**BINVDM**) checksum error at controller power-up						
		DTC Fail case 4: Non-volatile memory (**ShutdownFinished**) checksum error at controller power-up						
		DTC Pass:		No ROM memory faults				
s	P1A53	*This Diagnostic tests the checksum on RAM memory*						One Trip, Type A
		s	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
		DTC Fail case 2: Indicates that HCP is unable to correctly write and read data to and from **Write Protect** RAM						
		DTC Fail case 3: Indicates that HCP is unable to correctly write and read data to and from **2nd SOH** RAM						
		DTC Fail case 4: Indicates that HCP is unable to correctly write and read data to and from **Main SOH** RAM						

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

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 Internal Performance	P0A1C	*This Diagnostic tests all the internal processor integrity subsystems*						One Trip, Type A
		DTC Fail case 1: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctd SPI_Flt	HWIO detects Fault	= true (in SPI Hardware)	Run/Crank Voltage OR Powertrain Relay Voltage Diagnostic System Enable Powermoding	> 9.5 Volts = true = Accesory or Off	28 fail counts out of 32 sample counts Executes in a 6.25ms loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 2: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndNotRunningSeedKyTst	Key Value	= Calibration Value	SRAR shutdowns SPI Fault RunCrank Active Ram or ROM fault 12V battery Seed received in wrong order fault Vehicle Speed Seed/Key Timeout Powermode	= False =False = False = false >11V = false <= 0 MPH = False = off for less than 5 seconds	Detects in 150ms	
		DTC Fail case 3: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndFailsToTakeRmdlActn	IPT Detects faulty harware in Inhibit path IPT feedback	≠ calibration Value	HV Bat contactor Staus Available MMDR HPMR HV Battery Contactors Motor Faults Motor Speed SRAR shutdowns	= True = Powerdown Wait State = Eval BP Open State >= 80 V = Closed = False <= 10 RPM = False	Up down counter = 3	

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

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

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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 15: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_DMA_Xfer Test	HWIO detects Fault or Memory Copy Error	= True or =True	Diagnostic Test Enabled	= TRUE		
MCPB Torque Security Diagnostics								
Control Module Long Term Memory Performance	P1ADD	*This Diagnostic tests for unuseable BINVDM (flash) memory only*						One Trip, Type A
		DTC Fail case 1: Indicates that the NVM Error flag **HWIO Bat Write will not succeed** set	Last EEPROM write did not complete		Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up	
		DTC Fail case 2: Indicates that the NVM Error flag **HWIO Assembly Cal** set						
		DTC Pass:		NV writewillnotsucceed = fail Assemblycalfail = false				
Drive Motor B Torque Delivered Performance	P0C1A	*This Diagnostic tests that the difference between the motor B torque command slew and the motor torque achieved is greater than a threshold.*						One Trip, Type A
		DTC Fail case 1: The slewed MCP torque command is different by the MCP torque achieved	the commanded torque - the achieved torque	< 138	Ignition switch	in crank or run		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor B Control Module Not Programmed	P1A52	*This diagnostic prevents flashing different MCP software into MCP B that does not match its ID*						One Trip, Type A
		DTC Fail case 1: The MCP ID hardware does not match the calibration for the specific MCP	MCP ID Hardware	*≠ Calibration*				
Drive Motor B Control Module Internal Control Module Torque Calculation Performance	P1E0B	*This diagnostic detects the torque command path calculation errors*						One Trip, Type A
		DTC Fail case 1: If the difference between the Torque achieved primary path signal and the redundant path signal is greater than a threshold (MTQR)	Difference between Primary and Redundant signals	> 164Nm	Fault Active TPTKO Torque Mon Fail	= True = False = True	30 fail counts out of 32 sample counts Executes in a 6.25 ms Loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 2: If the difference between the Torque Commanded primary path signal and the redundant path signal is greater than a threshold (MTDR)	Difference between Primary and Redundant signals	> 164Nm				
		DTC Fail case 3: Compares the ISSD primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCUR)	Difference between Primary and Redundant signals	> 50A				
		DTC Fail case 4: Compares the ISSQ primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCUR)	Difference between Primary and Redundant signals	> 50A				
		DTC Fail case 5: Compares the ISSCmd primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCDR)	Difference between Primary and Redundant signals	> 50A				

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 10: Compares the VDC Adapt primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (HVTR)	Difference between Primary and Redundant signals	> .03V				
		DTC Fail case 11: Compares the Qest primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (HVTR)	Difference between Primary and Redundant signals	> 0Nm				
		DTC Fail case 12: Compares the Motor Speed primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MSPR)	Difference between Primary and Redundant signals	>116 RadPerSec				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Communication Diagnostics								
Lost Comm'n With ECM/PCM on Bus A	U1879	*This diagnostic indicates a lost communication between the MCPB and the ECM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the ECM on Bus A	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Communication With TCM	U1850	*This diagnostic indicates a lost communication between the MCPB and the TCM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the TCM on Bus A	Missed TCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Controller B on Bus B		**DTC Fail case 1:** Lost Communication with Hybrid Powertrain Control Module B on Bus B (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	Type B
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Controller B	U2614	*This diagnostic indicates a lost communication between the MCPB and the VICM*						Two Trips, Type B
		DTC Fail case 1: Lost Communication with Hybrid Powertrain Control Module B on Bus A (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		

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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Rotor Position	-30 deg < Phase Axis < +30 deg		
					Current Command	>= 3A		
Auxiliary Transmission Fluid Pump Motor Current High	P0C28	**Fail Case 1**: To detect fast, repeated 3 Phase over currents and to protect IGBT.	U, V, or W Phase current sensor	> 35 A	Wakeup Signal	On	X: 2 cts Y: 30 cts R: 2.08 ms T: 4.2 ms	One Trip, Type A
		Fail Case 2: To detect slow, intermittent 3 Phase over currents and to protect IGBT.					X: 5 cts Y: 50 cts R: 2.08 ms T: 10.4 ms	
Auxiliary Transmission Fluid Pump Motor Phase U Current Sensor Circuit Low	P1E2A	Circuit Low monitor to detect the failure of U-phase current sensor circuit below valid range	U Phase current sensor output at highside	< -30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 8 ct Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase U Current Sensor Circuit High	P1E2B	Circuit High monitor to detect the failure of U-phase current sensor circuit above valid range	U Phase current sensor output at highside	> 30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 4 ct Y: 6 ct R: 10.4 ms T: 42 ms	One Trip, Type A
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
Auxiliary Transmission Fluid Pump Motor Phase W Current Sensor Circuit Range/Performance	P1E32	Offset Circuit monitor to detect the failure of W-phase offset current above valid range	W Phase offset current output at highside	> 2A	Wakeup Signal PowerStage No Active DTCs:	ON OPEN P1E30/P1E31	X: 8 ct Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase U-V-W Current Sensor Correlation	P1E33	To detect electrical failure of phase current sensor.	Sum of 3 phase currents	> 5A	Wakeup Signal	ON	X: 160 ct Y: 190 ct R: 0.11 ms T: 17.6 ms	One Trip, Type A
ATPC IGBT Diagnostics								
Auxiliary Transmission Fluid Pump Motor Inverter Power Supply Circuit/Open	P1E38	Detects IGBT Bias Faults	Phase A, B, or C Power Supply	FAILED (Status Fault Bit)	Wakeup Signal	ON	X: 67 ct Y: 100 cnt R: 2 ms T: 134 ms	One Trip, Type A
		Monitors hw line to detect loss of power supply to gate drive board.			High Voltage	> 100V		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Auxiliary Transmission Fluid Pump Motor Inverter Performance	P1E39	Detects IGBT Desaturation Faults. Monitors hw status line to detect internal overcurrent faults, shoot through or loss of switching control events	Phase A, B, or C High or Low Side Devices	OVERDRIVEN (Status Fault Bit)	Inverter State High Voltage	Initialization Complete > 100V	66 ms (4 retries at 4ms with a 10ms wait time between each retry)	One Trip, Type A
ATPC Sensorless Controls Diagnostics								
Auxiliary Transmission Fluid Pump Torque Performance	P1E3A	Detects Sensorless Stall of Aux Fluid Pump	Commanded speed - Actual speed	> 200 rpm	Torque command	> 6.8 Nm	X: 400 ct Y:2500 R: 2.08 ms T: 832 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Overspeed	P179A	To detect when Motor A has exceeded operational maximum speed	ABS(Motor speed) initially	>6500 rpm	Wake up signal	On	X: 10 cts Y: 12 cts R: 10.4ms T: 104ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Control Module Calculated Motor Position Performance	P1E29	Loss of Sensorless Control OR Polarity Detection Fault	Motor Speed Speed Command OR Rotor Speed ERS	< -500 r/min > 0 > 62.8 rad/s	Wake up signal	On	X: 3 cts Y: 5 cts R: 2ms T: 6ms X:100 cts Y:N/A R:2ms Retries: 5 T:1s	One Trip, Type A
ATPC High Voltage (HV) Diagnostics								
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery System Voltage High	P1E27	To detect over voltage and to protect TPIM HV Circuit	HV Sensor Voltage OR Hardware Over Voltage Flag	> 463V = TRUE	Controller Initialization	Complete	X: 3 cts Y: N/A R: 0.0002ms T: 600us	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 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
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Sense Circuit High Voltage	P1E21	Circuit High monitor of HV output voltage sensor	HV Sensor Voltage	>500 V	Controller Initialization Run/Crank	Complete Active	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery System Voltage	P1E28	To check correlation of HV with sum of mid-pack voltages and HV_Battery.	ABS(HV - HV_Battery) AND ABS(HV - sum of mid-pack voltages)	>= 40 V >= 50 V	No Active DTCs: Contactors	P1E20, P1E21 Closed	X: 18 cts Y: 30 cts R: 10.4ms T: 187ms	Two Trips, Type B
ATPC Isolation Diagnostics								
	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	P1E20, P1E21, P1E28 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
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
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 Run/Crank	P1E20, P1E21 Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensor Circuit 2 Low	P1E1E	Circuit 2 Low monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage	<20V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensor Circuit 2 High	P1E1F	Circuit 2 High monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage - HV	>40 V	No Active DTCs: Controller Run/Crank	P1E20, P1E21 Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensing Performance	P1E1B	To check correlation of sum of mid-pack voltages against HV and HV_Battery	ABS(Pos mid-pack - Neg mid-pack - HV_Battery) and ABS(Pos mid-pack - Neg mid-pack - HV)	>= 40 V >= 50 V	No Active DTCs: Controller Run/Crank	P1E20, P1E21, P1E1E, P1E1F Complete Active	X: 100 cts Y: 150 cts R: 10.4ms T: 1040 ms	Two Trips, Type B
ATPC Temp Sensor Diagnostics								
Auxiliary Transmission Fluid Pump Motor Inverter Temperature Sensor Circuit High	P1E34	To detect Inverter A Temperature Sensor #1 voltage out of range high	PIM Temp A Temperature	< -58 deg C (near 5V)	Wakeup Signal When malfunction present at start of trip: Cumulative Inverter Warmup Time at or above Inverter Warmup Torque Threshold	ON >=600s >=ABS(1 Nm)	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	Two Trips, Type B
Auxiliary Transmission Fluid Pump Motor Inverter Temperature Sensor Circuit Low	P1E35	To detect Inverter A Temperature Sensor #1 Out of Range low (voltage)	PIM Temp B Temperature	> 130 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	Two Trips, Type B
Auxiliary Transmission Fluid Pump Motor Inverter Temperature Sensor Circuit Range/Performance	P1E36	Inverter A Temperature Sensor #1 In-Range Rationality Check	ABS(PIMTemp - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	> 20 deg C	Wake Up Signal Propulsion System Inactive Time Thermal Conditioning Off Time Charge Off Time Cold Start Average Temperature	On >=21600s >=7200s >=7200s > -20C	300 cts Start Delay PLUS X: 550 cts Y: 700 cts R: 10.4ms T: 2080ms =8.84 sec total	Two Trips, Type B

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Auxiliary Transmission Fluid Pump Motor Inverter Over Temperature	P1E37	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp A Temperature	> 98 deg C initial fault	PIM Temperature No Active DTCs:	IN RANGE P1E36	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	Two Trips, Type B
ATPC Controller Diagnostics								
Auxiliary Transmission Fluid Pump Control Module Read Only Memory (ROM)	P1E25	*This Diagnostic tests the checksum on ROM (flash) memory*						One Trip, Type A
		DTC Fail case 1: This DTC will be stored if any check sum in the **boot** is incorrect	Calculated Checksum does not match stored checksum		Ignition Status	= Run or Crank	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5 failures Frequency: Runs continuously in the background	
		DTC Fail case 2: This DTC will be stored if any check sum in the **calibration** is incorrect						
		DTC Fail case 3: This DTC will be stored if any check sum in the **software** is incorrect						
		DTC Pass:		ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false				
Auxiliary Transmission Fluid Pump Control Module Long Term Memory Performance	P1E24	*This Diagnostic tests for BINVDM errors*						One Trip, Type A
		DTC Fail case 1: Non-volatile memory (**Static**) checksum error at controller power-up			Ignition Status	= Run or Crank	1 failure Frequency: Once at powerup	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 2: Non-volatile memory (**Preserved**) checksum error at controller power-up	Checksum at power-up does not match checksum at power-down					
		DTC Fail case 3: Non-volatile memory (**BINVDM**) checksum error at controller power-up						
		DTC Fail case 4: Non-volatile memory (**ShutdownFinished**) checksum error at controller power-up						
		DTC Pass:		No ROM memory faults				
Auxiliary Transmission Fluid Pump Control Module Random Access Memory (RAM)	P1E23	*This Diagnostic tests the checksum on RAM memory*						One Trip, Type A
		DTC Fail case 1: Indicates that HCP is unable to correctly write and read data to and from **Dual Store** RAM			Ignition Status	= Run or Crank	Should finish within 30 seconds at all operating conditions	
		DTC Fail case 2: Indicates that HCP is unable to correctly write and read data to and from **Write Protect** RAM						
		DTC Fail case 3: Indicates that HCP is unable to correctly write and read data to and from **2nd SOH** RAM						
		DTC Fail case 4: Indicates that HCP is unable to correctly write and read data to and from **Main SOH** RAM	Data read	does not match data written				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 5: Indicates that HCP is unable to correctly write and read data to and from **System** RAM						
		DTC Fail case 6: Indicates that HCP is unable to correctly write and read data to and from **Cache** RAM						
		DTC Fail case 7: Indicates that HCP is unable to correctly write and read data to and from **eTPU** RAM						
		DTC Pass:		No errors in 1000ms MainSOH RAM faults = false CommFlts = false System RAM faults = false CacheRam faults = false eTPU RAM faults = false				
Auxiliary Transmission Fluid Pump Motor Control Module	P0B0D	*This Diagnostic tests all the internal processor integrity subsystems*						One Trip, Type A
		DTC Fail case 1: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctd SPI_Flt	HWIO detects Fault	= true (in SPI Hardware)	Run/Crank Voltage OR Powertrain Relay Voltage Diagnostic System Enable Powermoding	> 9.5 Volts = true = Accesory or Off	28 fail counts out of 32 sample counts Executes in a 6.25ms loop Detects in 200ms	

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

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

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 13: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_FlashECC_CktTest	HWIO detects Fault	= 3 /10 5/10	1. Flash ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	
		DTC Fail case 14: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RAM_ECC_CktTest	HWIO detects Fault	= 3 /10 5/10	1. RAM ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	
		DTC Fail case 15: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_DMA_Xfer Test	HWIO detects Fault or Memory Copy Error	= True or =True	Diagnostic Test Enabled	= TRUE		
Auxiliary Transmission Fluid Pump Control Module Long Term Memory Reset	P1EB8	*This Diagnostic tests for unuseable BINVDM (flash) memory only*						One Trip, Type A
		DTC Fail case 1: Indicates that the NVM Error flag **HWIO Bat Write will not succeed** set	Last EEPROM write did not complete		Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 2: Indicates that the NVM Error flag **HWIO Assembly Cal** set			Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up	
		DTC Pass:		NV writewillnotsucceed = fail Assemblycalfail = false				
Auxiliary Transmission Fluid Pump Motor Control Module Not Programmed	P1BFF	*This diagnostic prevents flashing different MCP software into MCP C that does not match its ID*						One Trip, Type A
		DTC Fail case 1: The MCP ID hardware does not match the calibration for the specific MCP	MCP ID Hardware	≠ *Calibration*				
Control Module Long Term Memory Reset	P1EB8	*This Diagnostic tests for BINVDM errors*						One Trip, Type A
		DTC Fail case 1: Non-volatile memory (**Static**) checksum error at controller power-up	Checksum at power-up does not match checksum at power-down		Ignition Status	= Run or Crank	1 failure Frequency: Once at powerup	
		DTC Fail case 2: Non-volatile memory (**Preserved**) checksum error at controller power-up						
		DTC Fail case 3: Non-volatile memory (**BINVDM**) checksum error at controller power-up						
		DTC Fail case 4: Non-volatile memory (**ShutdownFinished**) checksum error at controller power-up						
		DTC Pass:		No ROM memory faults				
ATPC Comm'n								
Lost Comm'n With	U1839	*This diagnostic indicates a lost communication between the ATPC and the ECM on Bus A*						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		**DTC Fail case 1:** Detects that CAN serial data communication has been lost with the ECM on Bus A	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	Type B
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With TCM	U183B	*This diagnostic indicates a lost communication between the ATPC and the TCM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the TCM on Bus A	Missed TCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		

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	*This diagnostic indicates a lost communication between the ATPC and the HCP*						Two Trips, Type B
		Detects that CAN serial data communication has been lost with the HCP	Missed HCP Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Detects within 500 msec at 6.25 msec loop rate	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Controller B	U183C	*This diagnostic indicates a lost communication between the ATPC and the VICM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Lost Communication with Hybrid Powertrain Control Module B on Bus B (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					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	U2615	*This diagnostic indicates a lost communication between the ATPC and the VICM*						Two Trips, Type B
		DTC Fail case 1: Lost Communication with Hybrid Powertrain Control Module B on Bus A (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
A/C Compressor Control Module Ignition Switch Run/Start Position Circuit High	P15BA	Run/Crank circuit is stuck on	Run/Crank input	ON	System Voltage	12V System Status > 10.25 V	5 fails out of 10 samples. Continuous sampling at 50 msec/sample	One Trip, Type A
			AND		Comm with VICM	Message $236 recd.		
			GMLAN Signal "VICM Run Crank Terminal Status"	INACTIVE				
		Status Pass	Run/Crank input	ON	System Voltage	12V System Status > 10.25 V	5 passes out of 10 samples. Continuous sampling at 50 msec/sample	
			AND		HW Inputs	Accessory		
			GMLAN Signal "VICM Run Crank Terminal Status"	ACTIVE	Comm with VICM	Message $236 recd.		
			OR					
			Run/Crank input	OFF				
			AND					
			GMLAN Signal "VICM Run Crank Terminal Status"	INACTIVE				
			OR					
			Run/Crank input	OFF				
			AND					
			GMLAN Signal "VICM Run Crank Terminal Status"	INACTIVE				
A/C Compressor Control Module Ignition Switch Run/Start Position Circuit Low	P15B9	Run/Crank circuit is stuck off	Run/Crank input =OFF & GMLAN Signal "VICM Run Crank Terminal Status"=ACTIVE"		System Voltage	12V System Status > 10.25 V	5 fails out of 10 samples. Continuous sampling at 50 msec/sample	One Trip, Type A
					HW Inputs	Accessory		
					Comm with VICM	Message $236 recd.		
		Status Pass	Run/Crank input =ON & GMLAN Signal "VICM Run Crank Terminal Status"=ACTIVE" OR Run/Crank input =OFF & GMLAN Signal "VICM Run Crank Terminal Status"=INACTIVE" OR Run/Crank input =ON & GMLAN Signal "VICM Run Crank Terminal Status"=INACTIVE"		System Voltage	12V System Status > 10.25 V	5 passes out of 10 samples. Continuous sampling at 50 msec/sample	
					HW Inputs	Accessory		
					Comm with VICM	Message $236 recd.		
A/C Compressor Motor Voltage	P0D6A	Monitor High Voltage input to ACCM	Sets when HV >= Threshold	450V	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples.	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Sensor Circuit High					HW Inputs	Accessory OR Run/Crank	Continuous 50 msec sampling rate	
					HV Battery Normal Operation	Battery Cell Voltage Fault Active is FALSE		
						Compressor Input Voltage reading within 15 V of Battery Cell Voltage reading		
		Status Pass	HV <= Threshold	440V	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.		
A/C Compressor Motor Voltage Sensor Circuit Low	P0D6B	Monitor High Voltage input to ACCM	Sets when HV <= Threshold	190V	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Contactors Closed with no faults	High Voltage Battery Contactor is CLOSED for > 1 sec AND High Voltage Battery Contactor Fault Active is FALSE		
					HV Battery Normal Operation	Battery Cell Voltage Fault Active is FALSE		
						Compressor Input Voltage reading within 15 V of Battery Cell Voltage reading		
		Status Pass	HV >= Threshold	200V	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
A/C Compressor Motor Instantaneous Voltage High	P1ECA	Monitor High Voltage input to ACCM	Sets when HV >= Threshold	480V	System Voltage	12V System Status > 10.25 V	1 fail out of 1 sample Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	HV <= Threshold	440V	System Voltage	12V System Status > 10.25 V	1 pass out of 1 sample Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.		
A/C Compressor Motor Phase U Current Low	P0D7A	Monitor U-phase motor current	U-phase Input >= Threshold	68 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		
		Status Pass	U-phase Input < Threshold	68 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Motor Phase U Current High	P0D7B	Monitor U-phase motor current	U-phase Input <= Threshold	-68 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		
		Status Pass	U-phase Input > Threshold	-68 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Motor Phase V	P0D7C	Monitor V-phase motor current	V-phase Input >= Threshold	68 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples.	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Current Low					HW Inputs	Accessory OR Run/Crank	Continuous 50 msec sampling rate	
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		
		Status Pass	V-phase Input < Threshold	68 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Motor Phase V Current High	P0D7D	Monitor V-phase motor current	V-phase Input <= Threshold	-68 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		
		Status Pass	V-phase Input > Threshold	-68 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Motor Phase W Current Low	P0D7E	Monitor W-phase motor current	W-phase Input >= Threshold	68 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		
		Status Pass	W-phase Input < Threshold	68 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Motor Phase W Current High	P0D7F	Monitor W-phase motor current	W-phase Input <= Threshold	-68 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling	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
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM	rate	
		Status Pass	W-phase Input > Threshold	-68 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Motor Instantaneous Current High	P1EC9	Monitor DC Link current	Sets when DC Link > Threshold	60A	System Voltage	12V System Status > 10.25 V	1 fail out of 1 sample Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	DC Link <= Threshold	60A	System Voltage	12V System Status > 10.25 V	1 pass out of 1 sample Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Motor Running	Motor Spinning and reaching Speed Request (Thermal Refrigerant Compressor Speed Request > 0 RPM)		
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.		
					Clear Codes	After 10 fails, need clear code from VICM		
A/C Compressor Motor Current High	P0D6F	Monitor DC Link current	Sets when DC Link > Threshold	27A	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM		
		Status Pass	Input <= Threshold	27A	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling	
					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
					Motor Running	Motor Spinning and reaching Speed Request (Thermal Refrigerant Compressor Speed Request > 0 RPM)	rate	
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.		
A/C Compressor Control Module Random Access Memory (RAM) Error	P16B8	RAM memory read/write check	Sets on read/write fault to RAM		System Voltage	12V System Status > 10.25 V	< 250 msec after boot	One Trip, Type A
					HW Inputs	Accessory OR Run/Crank		
					Start up	Upon CPU boot (Run/Crank or ACC transition high)		
		Status Pass			System Voltage	12V System Status > 10.25 V		
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Control Module Read Only Memory (ROM) Error	P16B9	ROM memory check sum	Sets on check sum error with ROM		System Voltage	12V System Status > 10.25 V	< 250 msec after boot	One Trip, Type A
					HW Inputs	Accessory OR Run/Crank		
					Start up	Upon CPU boot (Run/Crank or ACC transition high)		
		Status Pass			System Voltage	12V System Status > 10.25 V		
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Control Module Keep Alive Memory (KAM) Error	P16BA	EEPROM memory check sum	Sets on check sum error with EEPROM		System Voltage	12V System Status > 10.25 V	< 250 msec after boot	One Trip, Type A
					HW Inputs	Accessory OR Run/Crank		
					Start up	Upon CPU boot (Run/Crank or ACC transition high)		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Status Pass			System Voltage	12V System Status > 10.25 V		
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
Electric A/C Compressor Control Module Lost Communication with Hybrid Powertrain Control Module B	U1860	Loss of communication with VICM ECU	Message $236 missed	30 times	System Voltage	12V System Status > 10.25 V	3 sec	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	Message $236 detected	1 time	System Voltage	12V System Status > 10.25 V	< 110 msec. 10 msec scan rate	
					HW Inputs	Accessory OR Run/Crank		
Electric A/C Compressor Control Module Lost Communication with Hybrid Powertrain Control Module 1	U2608	Loss of communication with HCP ECU	Message $1DF missed	30 times	System Voltage	12V System Status > 10.25 V	3 sec	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	Message $1DF detected	1 time	System Voltage	12V System Status > 10.25 V	< 110 msec. 10 msec scan rate	
					HW Inputs	Accessory OR Run/Crank		
Electric A/C Compressor Control Module Internal Temperature Sensor Circuit High	P0D72	Monitor ACCM CPU temperature	Tcpu input < Threshold	-40 deg C	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Outside Air Temperature	OAT > -7 deg C		
		Status Pass	Tcpu input >= Threshold	-40 deg C	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Outside Air Temperature	OAT > -7 deg C		
Electric A/C Compressor Control Module Internal Temperature Sensor Circuit Low	P0D73	Monitor ACCM CPU temperature	Tcpu input > Threshold	274 deg C	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	Tcpu input <= Threshold	274 deg C	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
Electric A/C Compressor Control Module Output Driver Temperature Sensor Circuit High	P0D77	Monitor ACCM IGBT temperature	Tigbt input = Threshold	-40 deg C	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Speed Request	Compressor speed request > 0 rpm		
					Outside Air Temperature	OAT > -7 deg C		
		Status Pass	Tigbt input >= Threshold	-40 deg C	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
					Outside Air Temperature	OAT > -7 deg C		
Electric A/C Compressor Control Module Output Driver Temperature Sensor Circuit Low	P0D78	Monitor ACCM IGBT temperature	Tigbt input > Threshold	274 deg C	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	Tigbt input <= Threshold	274 deg C	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Control Module	P16B7	ACC circuit is stuck off	Accessory	OFF	System Voltage	12V System Status > 10.25 V	500 msec	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Wake-up Circuit Performance					HW Inputs	Run/Crank		
					Prop Sys Active	Propulsion System Active = True		
					Timer	500 msec		
		Status Pass	Accessory	ON	System Voltage	12V System Status > 10.25 V	500 msec	
					HW Inputs	Run/Crank		
					Prop Sys Active	Propulsion System Active = True		
					Timer	500msec		
A/C Compressor Motor Start-Up Current Performance	P1F0B	Monitor Inverter Phase Currents	During driver circuit check for all U/V/W Phases, if any current < Threshold	1 A	System Voltage	12V System Status > 10.25 V	< 50 msec	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Startup			
					Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM		
		Status Pass	During driver circuit check for all U/V/W Phases, all currents >= Threshold	1 A	System Voltage	12V System Status > 10.25 V	1 pass out of 1 sample Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
					Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM		
Electric A/C Compressor Control Module A/C Compressor Motor Current Feedback Circuit High	P1F0D	Monitor ACCM DC Link Current	Current input >= Threshold	36.7 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		
		Status Pass	Current input < Threshold	36.7 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling	
					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
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM	rate	
Electric A/C Compressor Control Module A/C Compressor Motor Current Feedback Circuit Low	P1F0C	Monitor ACCM DC Link Current	Current input <= Threshold	-2.5 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM		
					Peak Motor Current	Exceeds threshold specified in Appendix A for 50 ms		
		Status Pass	Current input > Threshold	-2.5 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Motor Running	$236 Speed Request > 0		
A/C Compressor Motor Speed Performance	P1F0A	Monitor ACCM Motor Speed	Motor Speed < Threshold	1800 rpm	System Voltage	12V System Status > 10.25 V	20 sec	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Startup	Motor Spinning but not reaching 1800 RPM		
					IGBT Temp	Tigbt < 85 degC		
					Timer	> 20 sec after motor starts spinning		
					OR			
					System Voltage	12V System Status > 10.25 V	1 min	
					HW Inputs	Accessory OR Run/Crank		
					Motor Startup	Motor Spinning but not reaching 1800 RPM		
					IGBT Temp	Tigbt > 85 degC		
					Increase in IGBT Temp	ΔTigbt >= 10 degC		
					Timer	> 1 min after motor starts spinning and IGBT Temp increases 10 deg		
		Status Pass	Motor Speed >= Threshold	1800 rpm	System Voltage	12V System Status > 10.25 V	15min	
					HW Inputs	Accessory OR Run/Crank		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM		
					ECU Reset	after a FAIL a 12V reset and 15 minutes is required to re-try the compressor.		

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

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 High (LVS)	P0D45	DTC Fail Sets when the LV Voltage raw data, (LVS _AD_READ), is greater than or equal to a threshold	Low Voltage DC Voltage (sensor reading)	>= 16.88 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	Two Trips, Type B
		DTC Pass	Low Voltage DC Voltage (sensor reading)	< 16.88 Volts			500 ms	
Battery Charger Cold Plate Temperature Sensor Circuit Low (THCP)	P1ED6	DTC Fail Sets when the Cold Plate Temperature raw data, (THCP _AD_READ), is less than or equal to a threshold	Cold Plate Temperature (sensor reading)	<= -49.5 ℃	Low Voltage DC (Secondary) micro status	is AWAKE*	1000 ms in a 1275 ms window	One Trip, Type A
		DTC Pass	Cold Plate Temperature (sensor reading)	> -49.5 ℃			1275 ms	
Battery Charger Cold Plate Temperature Sensor Circuit High (THCP)	P1ED7	DTC Fail Sets when the Cold Plate Temperature raw data, (THCP _AD_READ), is greater than or equal to a threshold	Cold Plate Temperature (sensor reading)	>= 135 ℃	Low Voltage DC (Secondary) micro status	is AWAKE*	1000 ms in a 1275 ms window	One Trip, Type A
		DTC Pass	Cold Plate Temperature (sensor reading)	< 135 ℃			1275 ms	

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 "B" Circuit Low (Sec Reference Voltage)	P1EE9	DTC Fail Sets when the SEC Reference Voltage raw data,(SecVref _AD_READ), is less than or equal to a threshold	Low Voltage DC (Secondary) Micro Reference Voltage	<= 0.782 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Low Voltage DC (Secondary) Micro Reference Voltage	> 0.782 Volts			500 ms	
Battery Charger Control Module Reference Voltage "B" Circuit High (Sec Reference Voltage)	P1EEA	DTC Fail Sets when the Sec Reference Voltage raw data,(SecVref _AD_READ), is greater than or equal to a threshold	Low Voltage DC (Secondary) Micro Reference Voltage	>= 1.407 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Low Voltage DC (Secondary) Micro Reference Voltage	< 1.407 Volts			500 ms	
Battery Charger Hybrid/EV Battery Output Voltage Sensor Circuit Low (HVS)	P0D4E	DTC Fail Sets when the HV Voltage raw data,(HVS _AD_READ), is less than or equal to a threshold	High Voltage DC Voltage (sensor reading)	<= 2.62 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
					High Voltage DC (HV) micro status	is AWAKE*		
		DTC Pass	High Voltage DC Voltage (sensor reading)	> 2.62 Volts			500 ms	
Battery Charger Hybrid/EV Battery Output Voltage Sensor Circuit High (HVS)	P0D4F	DTC Fail Sets when the HV Voltage raw data,(HVS _AD_READ), is greater than or equal to a threshold	High Voltage DC Voltage (sensor reading)	>= 482 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
					High Voltage DC (HV) micro status	is AWAKE*		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	High Voltage DC Voltage (sensor reading)	< 482 Volts			500 ms	
Battery Charger Hybrid/EV Battery Output Current Sensor Circuit Low (HVC)	P0D53	DTC Fail Sets when the HV Current raw data,(HVC_AD_READ) , is less than or equal to a threshold	High Voltage DC Current (sensor reading)	<= 0.098 Amps	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
					High Voltage DC (HV) micro status	is AWAKE*		
		DTC Pass	High Voltage DC Current (sensor reading)	> 0.098 Amps			500 ms	
Battery Charger Hybrid/EV Battery Output Current Sensor Circuit High (HVC)	P0D54	DTC Fail Sets when the HV Current raw data,(HVC_AD_READ) , is greater than or equal to a threshold	High Voltage DC Current (sensor reading)	>= 17.7 Amps	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
					High Voltage DC (HV) micro status	is AWAKE*		
		DTC Pass	High Voltage DC Current (sensor reading)	< 17.7 Amps			500 ms	

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	<= 0.782 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
					High Voltage DC (HV) micro status	is AWAKE*		
		DTC Pass	High Voltage DC (HV) Micro Reference Voltage	> 0.782 Volts			500 ms	
Battery Charger Control Module Reference Voltage "C" Circuit High (HV Reference Voltage)	P1EEC	DTC Fail Sets when the HV Reference Voltage raw data,(HVVref_AD_READ), is greater than or equal to a threshold	High Voltage DC (HV) Micro Reference Voltage	>= 1.407 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
					High Voltage DC (HV) micro status	is AWAKE*		
		DTC Pass	High Voltage DC (HV) Micro Reference Voltage	< 1.407 Volts			500 ms	
Battery Charger Control Module Ignition Switch Run/Start Position Circuit Low(PROG)	P1EF6	DTC Fail Sets if Run/Crank hardwire input state is low when Run/Crank Terminal Status serial data signal indicates hardwire state should be high	Run/Crank hardwire input state VICM Run/Crank Terminal Status signal (CC)	<= 2.0 Volts = HIGH	Low Voltage DC (Secondary) micro status Loss of Comm on HVEM	is AWAKE* U185C not set	1200 ms in a 1500 ms window	One Trip, Type A
		DTC Pass	Run/Crank hardwire input state VICM Run/Crank Terminal Status signal (CC)	>= 5.5 Volts = HIGH/LOW			1500 ms	

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Supervised signal received within timeout window				< 250 ms	
On Board Charger Control Module Communications Bus H Off	U1807	DTC Fail Sets if HVEM Expansion Bus off error is detected	HVEM Expansion Bus off error	= TRUE	Low Voltage DC (Secondary) micro status	is AWAKE*	40 ms in a 40 ms window	One Trip, Type A
		DTC Pass	HVEM Expansion Bus off error	= FALSE			40ms	
Battery Charger Control Module System Voltage Low (LV System Voltage exceeds operating Range)	P1EFC	Subtest 1 of 2: LV Voltage System Check DTC Fail Sets if Low Voltage Output voltage is less tha a voltage threshold	Low Voltage voltage	< 10 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	5 sec in a 5 sec window	Special Type C
		DTC Pass	Low Voltage voltage	is not < 10 Volts			5 sec in a 5 sec window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Subtest 2 of 2: LV Voltage System Check DTC Fail Sets if Low Voltage Output voltage is less than a voltage threshold - two test cases: 1) LV output is OFF, but is requested to turn ON 2) LV output is ON	Case 1: Low Voltage voltage Case 2: Low Voltage voltage	< 9 Volts < 8 Volts	LV Output Command= LV Request= LV Output Command= Low Voltage DC (Secondary) micro status	 OFF ON ON is AWAKE*	400 ms in a 500 ms window 2 sec in a 2 sec window	
		DTC Pass	Case 1: Low Voltage voltage Case 2: Low Voltage voltage	>= 9 Volts is not < 8 Volts			500 ms 2 sec in a 2 sec window	
Battery Charger Control Module Random Access Memory (RAM) Error	P16C2	DTC Fail Each RAM location is written with a predefined value and verified. Sets when verfication on any RAM location fails.	Secondary RAM test result HV or Primary micor SPI Verify Command	= FAIL OR Negative Acknowledgement	Low Voltage DC (Secondary) micro status High Voltage DC (HV) micro status High Voltage AC (Primary) micro status	is AWAKE* is AWAKE* is AWAKE*	10 ms in a 10 ms window, only execute after power up reset	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Secondary RAM test result HV or Primary micor SPI Verify Command	= PASS AND Positive Acknowledgment			10ms	
Battery Charger Control Module Read Only Memory (ROM) Error	P16C1	DTC Fail Sets When checksum verification on application/calibration area fails	Secondary ROM test result HV or Primary micor SPI Verify Command	= FAIL OR Negative Acknowledgement	Low Voltage DC (Secondary) micro status	is AWAKE*	20 ms in a 20 ms window, only execute after power up reset	One Trip, Type A
		DTC Pass	Secondary ROM test result HV or Primary micor SPI Verify Command	= PASS AND Positive Acknowledgment			20ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Control Module SPI Bus 1 (SPI Communication Fault - Primary)	P16C4	Sub-Test 1 of 5 SPI Primary Mico Message Checksum Error DTC Fail Sets when any Primary SPI checksum error count for a SPI Message is greater than or equal to the counter threshold	MessageChkSumErrCntr[AC Meas Msg], OR MessageChkSumErrCntr[OBD Msg], OR MessageChkSumErrCntr[Primary Status], OR MessageChkSumErrCntr[Temperature Msg]	>= 2 >= 2 >= 2 >= 2	Low Voltage DC (Secondary) micro status SPI mode	is AWAKE* = NORMAL	44 ms in a 44 ms window	One Trip, Type A
		DTC Pass	MessageChkSumErrCntr[AC Meas Msg], AND MessageChkSumErrCntr[OBD Msg], AND MessageChkSumErrCntr[Primary Status], AND MessageChkSumErrCntr[Temperature Msg]	< 2 < 2 < 2 < 2			22 ms (message trans rate)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 2 of 5 SPI Primary Micro Message Timeout Error DTC Fail Sets when any Primary SPI Message is not received within an expected time window	MessageTimer[AC Meas Msg], OR MessageTimer[OBD Msg], OR MessageTimer[Primary Status], OR MessageTimer[Temperature Msg]	>= 65 ms >= 65 ms >= 65 ms >= 65 ms	Low Voltage DC (Secondary) micro status SPI mode	is AWAKE* = NORMAL	65 ms	
		DTC Pass	MessageTimer[AC Meas Msg], AND MessageTimer[OBD Msg], AND MessageTimer[Primary Status], AND MessageTimer[Temperature Msg]	< 65 ms < 65 ms < 65 ms < 65 ms			< 65 ms	
		Sub-Test 3 of 5 SPI Primary Micro Node Timeout Error DTC Fail Sets when Primary SPI Resynch Error Counter is greater than or equal to the counter threshold	SpiResynchErrorCounter[PRI]	>= 1	Low Voltage DC (Secondary) micro status SPI mode	is AWAKE* = NORMAL OR SYNCH	3 - 5 ms	
		DTC Pass	SpiResynchErrorCounter[PRI]	< 1			< 3 - 5 ms (depends on message received)	

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 Primary Micro Channel Rationality Error DTC Fail Sets when Primary Channel SPI Mode takes longer than a timer threshold to reach Normal Mode	SpiChannelRationalityTimerInst[PRI]	>= 1000 ms	Low Voltage DC (Secondary) micro status SPI mode HV channel SPI mode Primary channel	is AWAKE* = NORMAL = SYNCH OR VERIFY	1000 ms	
		DTC Pass	SpiChannelRationalityTimerInst[PRI]	< 1000 ms			< 1000 ms	
		Sub-Test 5 of 5 SPI Primary Micro Driver Hardware Error DTC Fail Sets when Primary SPI hardware driver errors received	spi_ResultStatus	Failed	Low Voltage DC (Secondary) micro status	is AWAKE*	1 ms	
		DTC Pass	spi_ResultStatus	Passed			1 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Control Module SPI Bus 1 (SPI Communication Fault - HV DC)	P16C5	Sub-Test 1 of 5 SPI HV DC Micro Message Checksum Error DTC Fail Sets when any HV DC SPI checksum error count for a SPI Message is greater than or equal to the counter threshold	MessageChkSumErrCntr[HV DC Meas Msg]	>= 2	Low Voltage DC (Secondary) micro status	is AWAKE*	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
					SPI mode	= NORMAL		
		DTC Pass	MessageChkSumErrCntr[HV DC Meas Msg]	< 2			22 ms (message trans rate)	
		Sub-Test 2 of 5 SPI HV DC Micro Message Timeout Error DTC Fail Sets when any HV DC SPI Message is not received within an expected time window	MessageTimer[HV DC Meas]	>= 65 ms	Low Voltage DC (Secondary) micro status SPI mode	is AWAKE* = NORMAL	65 ms	
		DTC Pass	MessageTimer[HV DC Meas]	< 65 ms			< 65 ms	
		Sub-Test 3 of 5 SPI HV DC Micro Node Timeout Error DTC Fail Sets when HV DC SPI Resynch Error Counter is greater than or equal to the counter threshold	SpiResynchErrorCounter[PRI]	>= 1	Low Voltage DC (Secondary) micro status SPI mode	is AWAKE* = NORMAL OR SYNCH	3 - 5 ms	

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

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 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 1.9995) + 120 Watts	HV Current Sensor faults HV Voltage Sensor faults High Voltage DC (HV) Micro Ref Voltage faults AC Input Power Status	P0D53 or P0D54 not set P0D4E or P0D4F not set P1EEB or P1EEC not set not FAILED	1.6 seconds in a 2 seconds window	One Trip, Type A
		DTC Pass	High Voltage Power (HV Voltage x HV Current)	<= (AC Power x 1.9995) + 120 Watts			2 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger 14 Volt Output Power Performance (LV Output Power Rationality)	P0D5B	DTC Fail Sets when the measured Low Voltage output power exceeds the theoretical power available (calculated as charger real AC input power X charger efficiency + offset)	Low Voltage Power (LV Voltage x LV Current)	> (AC Power x 1.9995) + 125 Watts	LV Current Sensor faults LV Voltage Sensor faults Low Voltage DC (Secondary) Micro Ref Voltage faults AC Input Power Status	P0D49 or P0D4A not set P0D44 or P0D45 not set P1EE9 or P1EEA not set not FAILED	1.6 seconds in a 2 seconds window	One Trip, Type A
		DTC Pass	Low Voltage Power (LV Voltage x LV Current)	<= (AC Power x 1.9995) + 125 Watts			2 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Total Output Power Performance(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 1.9995) + 130 Watts	HV Current Sensor faults	P0D53 or P0D54 not set	1.6 seconds in a 2 seconds window	One Trip, Type A
					HV Voltage Sensor faults	P0D4E or P0D4F not set		
					LV Current Sensor faults	P0D49 or P0D4A not set		
					LV Voltage Sensor faults	P0D44 or P0D45 not set		
					High Voltage DC (HV) Micro Ref Voltage faults	P1EEB or P1EEC not set		
					Low Voltage DC (Secondary) Micro Ref Voltage faults	P1EE9 or P1EEA not set		
					AC Input Power Status	not FAILED		
		DTC Pass	High Voltage Power (HV Voltage x HV Current) + Low Voltage Power (LV Voltage x LV Current)	<= (AC Power x 1.9995) + 130 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	= TRUE > 1.0 Amps	Low Voltage DC (Secondary) micro status LV Current Sensor faults LV ON Command from Primary LV Hardware Shutdown (12V Alarm)	is AWAKE* P0D49 or P0D4A not set = ON = Shutdown	1.6sec in a 2sec window	One Trip, Type A
		DTC Pass	12V Alarm hardware detection (triggered) OR Low Voltage Current	= FALSE <= 1.0 Amps			2 seconds	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 2 of 2 Zero Offset Check DTC Fail Charger contains multiple temperature sensors. After a sufficient charger off time to allow sensor normalization, temperature sensor values are compared at start up to detect sensor reading offset errors. All sensors should report within a deadband.	Pfc_Failures==3 ||(Pfc_Failures==2&&(Min_failures=2&&Max_failures=2)||Min_failures<=1) the variables are calculate in following way: Temperature ABS(PFC - HV1), Pfc_Failures++,Hv1_Failures++; Temperature ABS(PFC - HV2), Pfc_Failures++,Hv2_Failures++; Temperature ABS(PFC - Case), Pfc_Failures++,Case_Failures++; Temperature ABS(HV1 - HV2), Hv1_Failures++,Hv2_Failures++; Temperature ABS(HV1 - Case), Hv1_Failures++++,Case_Failures++; Temperature ABS(HV2 - Case), Hv2_Failures++++,Case_Failures++; Min_failures=MIN(PFC,HV1,HV2,Case); Max_failures=MAX(PFC,HV1,HV2,Case);	>=20℃ >=20℃ >=20℃ >=20℃ >=20℃ >=20℃	Low Voltage DC (Secondary) micro status	is AWAKE*	640ms in a 800ms window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Diagnostic fails if any one or more of below test conditions is true. 1 Sensor has 3 failures 2 All sensors have 2 failures 3 Sensor has 2 failures and at least one other sensor has only one failure one other sensor has only one failure. Sensor failure means the absolute difference of sensors is great or equal the threshold			PFC Temperature Sensor faults	P1EDF or P1EE0 not set		
					HV 1kW Temperature Sensor faults	P1ECB or P1ECC not set		
					HV 2kW Temperature Sensor faults	P1ED0 or P1ED1 not set		
					Cold Plate Temperature Sensor faults	P1ED6 or P1ED7 not set		
					Charger Off Time	>20 minutes		
					Charger Off Time V	==use Data		
					Charger Off Time M	==Valid		
					Charger Off Time	==Valid		
					Charger Off Time V	is true		
					Charger Off Time M	is true		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					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		
		DTC Pass	Compliment of fail conditions					
Battery Charger High Voltage Converter "A" Temparature Sensor Performance(1kW HV Converter Temperature Sensor-Rationality)	P1ECD	Sub-Test 1 of 2 Exessively Large Rate of Change (Noisy Sensor) DTC Fail Sets when the absolute rate of change of measured temperature is greater than or equal to a temperature change rate threshold - temperature changes are normally relatively	ABS(HV 1kW temperature current cycle - HV 1kW temperature previous cycle)	>= 2℃	Low Voltage DC (Secondary) micro status HV 1kW Temperature Sensor faults Primary MCU normal mode run time	is AWAKE* P1ECB or P1ECC not set > 1 second	640ms in a 800ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	ABS(HV 1kW temperature current cycle - HV 1kW temperature previous cycle)	< 2℃			800ms	
		Sub-Test 2 of 2 Zero Offset Check DTC Fail Charger contains multiple temperature sensors. After a sufficient charger off time to allow sensor normalization, temperature sensor values are compared at start up to detect sensor reading offset errors. All sensors should report within a deadband. Diagnostic fails	HV1_Failures==3 ||(HV1_Failures==2&&(Min_failures=2&&Max_failures=2)||Min_failures<=1) the variables are calculate in following way: Temperature ABS(PFC - HV1), Pfc_Failures++,Hv1_Failures++; Temperature ABS(PFC - HV2), Pfc_Failures++,Hv2_Failures++; Temperature ABS(PFC - Case), Pfc_Failures++,Case_Failures++; Temperature ABS(HV1 - HV2), Hv1_Failures++,Hv2_Failures++; Temperature ABS(HV1 - Case), Hv1_Failures++++,Case_Failures++; Temperature ABS(HV2 - Case), Hv2_Failures++++,Case_Failures++; Min_failures=MIN(PFC,HV1,HV2,Case); Max_failures=MAX(PFC,HV1,HV2,Case);	>=20℃ >=20℃ >=20℃ >=20℃ >=20℃ >=20℃	Low Voltage DC (Secondary) micro status	is AWAKE*	640ms in a 800ms window	

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 2 of 2 Zero Offset Check DTC Fail Charger contains multiple temperature sensors. After a sufficient charger off time to allow sensor normalization, temperature sensor values are compared at start up to detect sensor reading offset errors. All sensors should report within a deadband. Diagnostic fails	HV1_Failures==3 ||(HV1_Failures==2&&(Min_failures=2&&Max_failures=2)||Min_failures<=1) the variables are calculate in following way: Temperature ABS(PFC - HV1), Pfc_Failures++,Hv1_Failures++; Temperature ABS(PFC - HV2), Pfc_Failures++,Hv2_Failures++; Temperature ABS(PFC - Case), Pfc_Failures++,Case_Failures++; Temperature ABS(HV1 - HV2), Hv1_Failures++,Hv2_Failures++; Temperature ABS(HV1 - Case), Hv1_Failures++++,Case_Failures++; Temperature ABS(HV2 - Case), Hv2_Failures++++,Case_Failures++; Min_failures=MIN(PFC,HV1,HV2,Case); Max_failures=MAX(PFC,HV1,HV2,Case);	>=20℃ >=20℃ >=20℃ >=20℃ >=20℃ >=20℃	Low Voltage DC (Secondary) micro status	is AWAKE*	640ms in a 800ms window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		if any one or more of below test conditions is true. 1 Sensor has 3 failures 2 All sensors have 2 failures 3 Sensor has 2 failures and at least one other sensor has only one failure one other sensor has only one failure. Sensor failure means the absolute difference of sensors is great or equal the threshold			PFC Temperature Sensor faults	P1EDF or P1EE0 not set		
					HV 1kW Temperature Sensor faults	P1ECB or P1ECC not set		
					HV 2kW Temperature Sensor faults	P1ED0 or P1ED1 not set		
					Cold Plate Temperature Sensor faults	P1ED6 or P1ED7 not set		
					Charger Off Time	>20 minutes		
					Charger Off Time V	==use Data		
					Charger Off Time M	==Valid		
					Charger Off Time	==Valid		
					Charger Off Time V	is true		
					Charger Off Time M	is true		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					The test only run as long as the module has not yet charged or precharged. After (pre)charge has been started the algorithm is allowed to run a a delay time.	10 seconds		
					Secondary micro has to run	1 second		
		DTC Pass	Compliment of fail conditions					

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 Performance (Cold Plate Temperature Sensor-Rationality)	P1ED8	Sub-Test 1 of 2 Exessively Large Rate of Change (Noisy Sensor) DTC Fail Sets when the absolute rate of change of measured temperature is greater than or equal to a temperature change rate threshold - temperature changes are normally relatively slow	ABS(Cold Plate temperature current cycle - Cold Plate temperature previous cycle)	>= 2℃	Low Voltage DC (Secondary) micro status Cold Plate Temperature Sensor faults Primary MCU normal mode run time	is AWAKE* P1ED6 or P1ED7 not set > 1 second	640ms in a 800ms window	One Trip, Type A
		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
		Sub-Test 2 of 2 Case Thermal Offset Rationality DTC Fail sets when one of below conditons is true. 1 Sensor has 3 failures 2 All sensors have 2 failures 3 Sensor has 2 failures and at least one other sensor has only one failure Sensor failure means the absolute difference of sensors is great or equal the threshold	Case_Failures==3 ||(Case_Failures==2&&(Min_failures=2&&Max_failures=2)||Min_failures<=1) the variables are calculate in following way: Temperature ABS(PFC - HV1), Pfc_Failures++,Hv1_Failures++; Temperature ABS(PFC - HV2), Pfc_Failures++,Hv2_Failures++; Temperature ABS(PFC - Case), Pfc_Failures++,Case_Failures++; Temperature ABS(HV1 - HV2), Hv1_Failures++,Hv2_Failures++; Temperature ABS(HV1 - Case), Hv1_Failures++++,Case_Failures++; Temperature ABS(HV2 - Case), Hv2_Failures++++,Case_Failures++; Min_failures=MIN(PFC,HV1,HV2,Case); Max_failures=MAX(PFC,HV1,HV2,Case);	>=20℃ >=20℃ >=20℃ >=20℃ >=20℃ >=20℃	Low Voltage DC (Secondary) micro status PFC Temperature Sensor faults HV 1kW Temperature Sensor faults HV 2kW Temperature Sensor faults 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	is AWAKE* 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	640ms in a 800ms window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					The test only run as long as the module has not yet charged or precharged. After (pre)charge has been started the algorithm is allowed to run a a delay time.	10 seconds		
					Secondary micro has to run	1 second		
		DTC Pass	Compliment of fail conditions					
Battery Charger 14 Volt Output Voltage Sensor Circuit Range/Performance (LV Output Voltage Sensor Rationality)	P0D43	DTC Fail The Low Voltage Output Voltage Sensor is rationalized against other analog measurements of vehicle system voltage. The diagnostic fails if a deviation limit is exceeded:	Case 1: Run/Crank = High ABS(LV Voltage-RunCrank Voltage) AND ABS(LV Voltage-HVEMB Enable Voltage) Case 2: Run/Crank = Low ABS(LV Voltage-HVEMB Enable Voltage)	>= 6 Volts >= 6 Volts >= 6 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	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
					Low Voltage DC (Secondary) Micro Ref Voltage faults LV Voltage Sensor faults	P1EE9 or P1EEA not set P0D44 or P0D45 not set		
		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	Low Voltage DC (Secondary) micro status	is AWAKE*	1.6sec in a 2sec window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		command is above voltage Threshold and the absolute difference of HV Current and the Current command is above Current Threshold 2 The difference of the HV Voltage and HV Voltage Command is above the overshoot Threshold and the HV Current is above the Current diff Threshold.			HV DC HV ON Command	=ON		
					HighlineTap mode	=Inactive		
					HV Voltage Sensor faults	P0D4E or P0D4F not set		
					HV Current Sensor faults	P0D53 or P0D54 not set		
					High Voltage DC (HV) Micro Ref Voltage faults	P1EEB or P1EEC not set		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	One of followings condition is true. 1. HV Voltage - HV Voltage Command AND (ABS(HV Voltage-HV Voltage Command) OR ABS(HV Current-HV Current Command)) 2. HV Voltage - HV Voltage Command AND HV Current	 <=25V <=25V <=1A >25V <=2A			2sec	

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		above Current Threshold 2 The difference of the HV Voltage and HV Voltage Command is above the overshoot Threshold and the HV Current is above the Current diff Threshold.			High Voltage DC (HV) Micro Ref Voltage faults	P1EEB or P1EEC not set		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	One of followings condition is true: 1.HV Voltage - HV Voltage Command AND (ABS(HV Voltage-HV Voltage Command) OR ABS(HV Current-HV Current Command)) 2.HV Voltage - HV Voltage Command AND HV Current	 <=25V <=25V <=1A >25V <=2A			2sec	

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 2KW Current PWM Regulation Functional DTC Fail Sets when the difference of the HV Current and HV Current Command is above a threshold.	HV Current - HV Current Command	>1A	Low Voltage DC (Secondary) micro status	is AWAKE*	1.6sec in a 2sec window	
					HV Voltage - HV Command from HV DC	<= 25V		
					HV DC HV ON Command	=ON		
					HighlineTap mode	=Active		
					HV Voltage Sensor faults	P0D4E or P0D4F not set		
					HV Current Sensor faults	P0D53 or P0D54 not set		
					High Voltage DC (HV) Micro Ref Voltage faults	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 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	ABS(LV Voltage - LV Voltage Command) AND ABS(LV Current-LV Current Command) OR 2.LV Current	 >2V >3A > 1A	Low Voltage DC (Secondary) micro status	is AWAKE*	50.4 sec in a 63 sec 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 Output LV Output (SPI Signal) (LV Voltage - LV Voltage Command)	=ON = UPDATED <= 1.5 Volts		
					LV Voltage Sensor faults	P0D44 or P0D45 not set		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					LV Current Sensor faults Low Voltage DC (Secondary) Micro Ref Voltage faults	P0D49 or P0D4A not set P1EE9 or P1EEA not set		
		DTC Pass	ABS(LV Voltage - LV Voltage Command) OR ABS(LV Current-LV Current Command) OR 2.LV Current	<=2V <=3A <=1A			63 sec	
		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 Command	> 3A	Low Voltage DC (Secondary) micro status HV DC LV ON Command	is AWAKE* = ON	50.4 sec in a 63 sec window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					LV Voltage Sensor faults	P0D44 or P0D45 not set		
					LV Current Sensor faults	P0D49 or P0D4A not set		
					Low Voltage DC (Secondary) Micro Ref Voltage faults	P1EE9 or P1EEA not set		
					LV Voltage - LV Voltage Command	<= 1.5V		
		DTC Pass	LV Current - LV Current Command	<= 3A			63 sec	
Battery Charger Power Efficiency (Power Efficiency Functional)	P1EFD	DTC Fail Sets when the absolute difference of the AC Input power and the sum of the HV Output Power and the LV Output Power is above or equal to a threshold. Indicative of a sensor rationality error.	ABS(AC Power - (HV Voltage*HV Current + LV Voltage*LV Current))	>= 3300 Watts	Low Voltage DC (Secondary) micro status	is AWAKE*	1.6sec in a 2sec window	Two Trips, Type B
					LV Current Sensor faults	P0D49 or P0D4A not set		
					LV Voltage Sensor faults	P0D44 or P0D45 not set		
					HV Current Sensor faults	P0D53 or P0D54 not set		
					HV Voltage Sensor faults	P0D4E or P0D4F not set		

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	P1EEB or P1EEC not set		
					Low Voltage DC (Secondary) Micro Ref Voltage faults	P1EE9 or P1EEA not set		
					AC Input Power Status	not FAILED		
		DTC Pass	ABS(AC Power - (HV Voltage*HV Current + LV Voltage*LV Current))	< 3300 Watts			2 seconds	
Battery Charger Hybrid/EV System Discharge Time Too Long (Discharger Time Functional)	P0D5E	DTC Fail Sets if the High Voltage Output voltage is greater than or equal to a voltage threshold after an allowed discharge time period - discharge was unsuccessful.	High Voltage Output voltage Case 1: 1.5 seconds after receiving the High Voltage Charger Active Discharge Command OR Case 2: 1.5 seconds after a 5.25 second shut down delay timer has elapsed following confirmation of OBCM Loss of Comm With VICM (DTC U185C confirmed) - total elapsed time 6.75 seconds	>= 60 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	1.5 sec in a 1.5 sec window	One Trip, Type A
					HV Voltage Validity	= VALID		

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	Low Voltage DC (Secondary) micro status	is AWAKE*	1.6sec in a 2sec window	Two Trips, Type B
		DTC Pass	Low Voltage Switch Enable	= Low Voltage Switch Enable Check			2sec	
Battery Charger Control Module Long Term Memory (KAM) Error (EEPROM Integrity)	P16C3	DTC Fail Sets when the presence of predefined values at predefined locations in EEPROM cannot be confirmed	eepromPage00DiagDataByte OR eepromPage0ADiagDataByte	≠A5 (hex) ≠A5 (hex)	Low Voltage DC (Secondary) micro status	is AWAKE*	40 ms in a 40 ms window	One Trip, Type A
		DTC Pass	eepromPage00DiagDataByte AND eepromPage0ADiagDataByte	= A5 (hex) = A5 (hex)			40 ms	

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

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	Low Voltage DC (Secondary) micro status	is AWAKE*	640ms in a 800ms window	One Trip, Type A
		DTC Pass	Low Voltage Current Sensor Cal Complete Flag (LV_Current_Cal_Hist_Status)	≠ 0			800 ms	
Battery Charger Control Module Wake-Up Circuit Performance (ACC)	P16C6	DTC Fail Sets when the Accessory Wake Up is detected as low when expected to be high.	Accessory Wake Up High State Timer (accOnTimer)	<= 100ms	Low Voltage DC (Secondary) micro status Prop System Active Status HSGMLAN bus State	is AWAKE* is Active is ACTIVE	<= 100ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HSGMLAN Comm Faults HCP_HS_LossOfComm	U2609 not set is False		
		DTC Pass	Accessory Wake Up High State Timer (accOnTimer)	> 100ms			> 100ms	
Battery Charger Control Module Supply Voltage Sensor Circuit Range/Performance (PBIAS Voltage-Functional)	P1F03	DTC Fail The test uses two (2) sets of calibration values, one for determining if the PBIAS voltage is in range to turn the charger outputs on, and the other when the charger outputs are on to determine if the PBIAS voltage is sufficient to keep the outputs on.	PBIAS Voltage (BIASRAW) If the charger outputs (HV & LV) are off, PBIAS voltage must be: Else If the charger outputs are on (either HV or LV), PBIAS must be:	< 10.5 Volts OR > 13.5 Volts < 10.0 Volts OR > 15.0 Volts	High Voltage AC (Primary) micro status	is AWAKE* (AC connected or Bulk residual power)	Low voltage fail time = 253ms High voltage fail time = 10.25sec (250ms fault maturity time after initial fault detection at 3ms or 10sec)	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	PBIAS Voltage (BIASRAW) If the charger outputs (HV & LV) are off, PBIAS voltage must be: Else If the charger outputs are on (either HV or LV), PBIAS must be:	 >= 10.5 Volts OR <= 13.5 Volts >= 10.0 Volts OR <= 15.0 Volts			250 ms	
Battery Charger Input Voltage Conditioner Temperature Too High (PFC Thermal System Fault)	P1EF5	DTC Fail Diagnostic uses a hysteresis pair. FAIL sets when the PFC Thermister reported equivalent temperature is greater than or equal to an upper temperature threshold value	PFC Temperature	>= 100C	High Voltage AC (Primary) micro status	is AWAKE* (AC connected or Bulk residual power)	1ms in a 1ms window	One Trip, Type A
		DTC Pass Diagnostic uses a hysteresis pair. PASS sets when the PFC Thermister reported equivalent temperature is less than or equal to a lower temperature threshold value	PFC Temperature	<= 90C			1 ms	

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

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

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Converter Input Voltage Sensor "B" Circuit Low (BLKS2)	P1EDC	DTC Fail Sets when the reported Bulk Voltage2 is less than a voltage threshold	Bulk Voltage2	< 25 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Bulk Voltage2	>= 25 Volts			500 ms	
Battery Charger Control Module Supply Voltage Sensor Circuit High (PBIAS)	P1F02	DTC Fail Sets when the reported PBIAS Voltage is greater than a voltage threshold	PBIAS Voltage	> 16 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	PBIAS Voltage	<= 16 Volts			500 ms	
Battery Charger Control Module Supply Voltage Sensor Circuit Low (PBIAS)	P1F01	DTC Fail Sets when the reported PBIAS Voltage is less than a voltage threshold	PBIAS Voltage	< 6 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	PBIAS Voltage	>= 6 Volts			500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Input Current Sensor Circuit High (IACS)	P0D3B	DTC Fail Sets when the reported AC Current is greater than a current threshold	AC Current	> 24.78 Amps	AC Voltage	> 80 Volts	160 ms in a 200 ms window	One Trip, Type A
		DTC Pass	AC Current	<= 24.78 Amps			200 ms	
Battery Charger Input Current Sensor Circuit Low (IACS)	P0D3A	DTC Fail Sets when the reported AC Current is less than a current threshold	AC Current	< 1.65 Amps	AC Voltage	> 80 Volts	160 ms in a 200 ms window	One Trip, Type A
		DTC Pass	AC Current	>= 1.65 Amps			200 ms	
Battery Charger High Voltage Converter "A" Temparature Sensor Circuit High (THMOD)	P1ECC	DTC Fail Sets when the 1kW HV Converter Temperature sensor voltage (THMOD) is greater than a voltage threshold	1kW HV Converter Temperature Sensor Voltage (THMOD)	> 3.28 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	1kW HV Converter Temperature Sensor Voltage (THMOD)	<= 3.28 Volts			500 ms	

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

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	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	High Voltage AC (HV DC) Micro Reference Voltage	<= 1.25 Volts			500 ms	
Battery Charger Control Module Reference Voltage "A" Circuit Low (HV DC Ref Voltage)	P1EE7	DTC Fail Sets when the High Voltage AC (HV DC) Micro reference voltage is less than a voltage threshold	High Voltage AC (HV DC) Micro Reference Voltage	< 1.00 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	High Voltage AC (HV DC) Micro Reference Voltage	>= 1.00 Volts			500 ms	
Battery Charger Input Voltage Sensor Circuit High (VACS)	P0D40	DTC Fail Sets when the reported AC Voltage is greater than a voltage threshold	AC Peak Voltage	> 422 Volts	AC Present	is TRUE	160 ms in a 200 ms window	One Trip, Type A
		DTC Pass	AC Peak Voltage	<= 422 Volts			200 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Input Voltage Sensor Circuit Low (VACS)	P0D3F	DTC Fail Sets when the reported AC Voltage is less than a voltage threshold	AC Peak Voltage	< 90 Volts	AC Present	is TRUE	5500 ms in a 6875 ms window	One Trip, Type A
		DTC Pass	AC Peak Voltage	>= 90 Volts			6875 ms	
Battery Charger High Voltage Converter "B" Temparature Sensor Circuit High (THMOD2)	P1ED1	DTC Fail Sets when the 2kW HV Converter Temperature sensor voltage (THMOD2) is greater than a voltage threshold	2kW HV Converter Temperature Sensor Voltage (THMOD2)	> 3.28 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	2kW HV Converter Temperature Sensor Voltage (THMOD2)	<= 3.28 Volts			500 ms	
Battery Charger High Voltage Converter "B" Temparature Sensor Circuit Low (THMOD2)	P1ED0	DTC Fail Sets when the 2kW HV Converter Temperature sensor voltage (THMOD2) is less than a voltage threshold	2kW HV Converter Temperature Sensor Voltage (THMOD2)	< 0.03 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	2kW HV Converter Temperature Sensor Voltage (THMOD2)	>= 0.03 Volts			500 ms	
Battery Charger High Voltage Converter "A" Input Current Sensor Circuit High (CSEN1)	P1EE3	DTC Fail CSEN1 Input is greater than a voltage threshold, (the micro performs this test internally)	CSEN1 Input Voltage	> 1.5 Volts	AC Voltage HV Output	> 80 Volts is OFF	950 ms in a 1000 ms window	One Trip, Type A
		DTC Pass	CSEN1 Input Voltage	<= 1.5 Volts			1000 ms	
Battery Charger High Voltage Converter "B" Input Current Sensor Circuit High (CSEN2)	P1EE5	DTC Fail CSEN2 Input is greater than a voltage threshold, (the micro performs this test internally)	CSEN2 Input Voltage	> 1.5 Volts	AC Voltage HV Output	> 80 Volts is OFF	950 ms in a 1000 ms window	One Trip, Type A
		DTC Pass	CSEN2 Input Voltage	<= 1.5 Volts			1000 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Input Voltage Sensor Circuit Range/Performance (AC Input Voltage Sensor-Rationality)	P0D3E	DTC Fail AC Peak Voltage is compared to two equivalent voltage measurements (Bulk1 and Bulk2). Fail is set if the deviation betweeen AC Peak Voltage and each of the two equivalent measurements is greater than voltage deviation thresholds.	ABS(AC Peak Voltage - Bulk1 Voltage) AND ABS(AC Peak Voltage - Bulk2 Voltage)	> 59 Volts > 59 Volts	AC Present PFC Discharged delay Bulk1 Voltage Sensor faults Bulk2 Voltage Sensor faults AC Voltage Sensor faults	is TRUE is TRUE (delay expired) P1ED9 or P1EDA not set P1EDC or P1EDD not set P0D3F or P0D40 not set	1760ms in a 1920ms window	One Trip, Type A

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)	<= 59 Volts <= 59 Volts			1920ms	
Battery Charger Input Current Sensor Circuit Range/Performance (AC Input Current Sensor-Rationality)	P0D39	DTC Fail Sets when the AC Current zero offset value is greater than or equal to a current threshold.	AC Current	>= 1.4 Amps	AC Voltage AC Voltage Sensor faults PFC Discharged delay	> 80 Volts P0D3F or P0D40 not set is TRUE (delay expired)	512ms in a 640ms window	One Trip, Type A
		DTC Pass	AC Current	< 1.4 Amps			640ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Converter Input Voltage Sensor "A" Performance (Converter Input Bulk Voltage Sensor 1- Rationality)	P1EDB	DTC Fail Bulk1 Voltage is compared to two equivalent voltage measurements (AC Peak Voltage and Bulk2). Fail is set if the deviation betweeen Bulk1 Voltage and each of the two equivalent measurements is greater than voltage deviation thresholds.	ABS(Bulk1 Voltage - AC Peak Voltage) AND ABS(Bulk1 Voltage - Bulk2 Voltage)	> 59 Volts > 10 Volts	AC Voltage	> 80 Volts	512ms in a 640ms window	One Trip, Type A
					PFC Discharged delay	is TRUE (delay expired)		
					Bulk1 Voltage Sensor faults	P1ED9 or P1EDA not set		
					Bulk2 Voltage Sensor faults	P1EDC or P1EDD not set		
					AC Voltage Sensor faults	P0D3F or P0D40 not set		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	ABS(Bulk1 Voltage - AC Peak Voltage) AND ABS(Bulk1 Voltage - Bulk2 Voltage)	<= 59 Volts <= 10 Volts			640ms	
Battery Charger Converter Input Voltage Sensor "B" Performance (Converter Input Bulk Voltage Sensor 2-Rationality)	P1EDE	DTC Fail Bulk2 Voltage is compared to two equivalent voltage measurements (AC Peak Voltage and Bulk1). Fail is set if the deviation betweeen Bulk2 Voltage and each of the two equivalent measurements is greater than voltage deviation thresholds.	ABS(Bulk2 Voltage - AC Peak Voltage) AND ABS(Bulk2 Voltage - Bulk1 Voltage)	> 59 Volts > 10 Volts	AC Voltage	> 80 Volts	512ms in a 640ms window	One Trip, Type A
					PFC Discharged delay	is TRUE (delay expired)		
					Bulk1 Voltage Sensor faults	P1ED9 or P1EDA not set		
					Bulk2 Voltage Sensor faults	P1EDC or P1EDD not set		
					AC Voltage Sensor faults	P0D3F or P0D40 not set		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	ABS(Bulk2 Voltage - AC Peak Voltage) AND ABS(Bulk2 Voltage - Bulk1 Voltage)	<= 59 Volts <= 10 Volts			640ms	
Battery Charger Input Power Up Protection Circuit Peformance (AC Inrush RelayFunctionality)	P1EFF	DTC Fail Sets when the AC Relay Check input and the AC relay output are equal.(The AC Relay Check input should be opposite polarity of the AC Relay Output)	AC Relay Output	= AC Relay Check input	AC Voltage	> 80 Volts	2400ms in a 3000ms window	Two Trips, Type B
		DTC Pass	AC Relay Output	≠ AC Relay Check input			3000ms	

*** Microprossessor State Determination Table**

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

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

KtBSED_R_SOH_ResistanceThresh	Temperature(°C, average battery temp) / SOC (%)	10	20	30	40	50	60	70	80	90
	-30	9.600	9.600	9.600	9.300	9.000	9.000	9.000	9.000	9.000
	-20	9.000	9.000	8.630	7.940	7.650	7.570	7.550	7.550	7.520
	-10	2.183	2.085	1.921	1.811	1.665	1.715	1.715	1.715	1.740
	0	1.033	0.935	0.895	0.830	0.826	0.819	0.819	0.827	0.827
	10	0.729	0.795	0.741	0.715	0.684	0.680	0.682	0.694	0.694
	20	0.508	0.410	0.393	0.377	0.377	0.377	0.388	0.388	0.388
	30	0.429	0.331	0.318	0.311	0.311	0.304	0.320	0.320	0.320
	40	0.368	0.270	0.264	0.264	0.264	0.258	0.269	0.277	0.262
	50	0.368	0.270	0.264	0.264	0.264	0.258	0.269	0.277	0.262

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

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

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

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
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

448	468	488	508	528	548	568	588	608	628	648	668	688	708	728	748	768
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

Cert Doc Bundle	NOTE: If any one of these codes were set for N sensors, these FA get set to TRUE for said N sensor								
Battery Current Sensor									
P0AC1	P0AC2	P1EBA	P1A07	P0B13	P0B10	P0B11	P1EBB	(U0111 and U185A)	
Battery Voltage Sensor									
P0ABC	P0ABD	P1A07	P0AF8	P0ABB	(U0111 and U185A)				
Bus Voltage Sensor									
P1AE8	P1AE9	P1AEA	P1AEB	P1AEC	P1AED	P1E20	P1E21	P1E28	U0293
Charger Current Sensor									
P0D53	P0D54	U1838							
CellVoltageRationalityFA									
P0B3D	P1B79	P0B48	P1B80	U2401	P1B2A	P1E7B	P1B4B	P1BDE	
P0B42	P1B7C	P0B4D	P1B83	P1E90	P1B2B	P1E7C	P1B4E	P1BE1	
P0B47	P1B7F	P0B52	P1B86	P1E8F	P1B2C	P1E7D	P1B51	P1BE4	
P0B4C	P1B82	P0B57	P1B89	P1E91	P1B2D	P1E7E	P1B54	P1BE7	
P0B51	P1B85	P0B5C	P1B8C	P1E8E	P1E4C	P1E7F	P1B57	P1BEA	
P0B56	P1B88	P0B61	P1B8F	P1E93	P1E4D	P1E80	P1B5A	P1BED	
P0B5B	P1B8B	P0B66	P1B92	P1E96	P1E4E	P1E81	P1B5D	P1BF0	
P0B60	P1B8E	P0B6B	P1B95	P1E95	P1E4F	P1E82	P1B60	P1BF3	
P0B65	P1B91	P0B70	P1B98	P1E97	P1E50	P1E83	P1B63	P1BF6	
P0B6A	P1B94	P0B75	P1B9B	P1E94	P1E51	P1E84	P1B66	P1BF9	
P0B6F	P1B97	P0B7A	P1B9E	P1E99	P1E52	P1E86	P1B69	P1BFC	
P0B74	P1B9A	P0B7F	P1BA1	P1E9C	P1E53	P1E87	P1B6C	P1E01	
P0B79	P1B9D	P0B84	P1BA4	P1E9B	P1E54	P1E88	P1B6F	P1E04	
P0B7E	P1BA0	P0B89	P1BA7	P1E9D	P1E56	P1E89	P1B72	P1B76	
P0B83	P1BA3	P0B8E	P1BAA	P1E9A	P1E57	P1E8A	P1B75	P0B43	
P0B88	P1BA6	P0B93	P1BAD	P1E9F	P1E58	P0B3C	P1B78	P1B7D	
P0B8D	P1BA9	P0B98	P1BB0	P1EA2	P1E59	P0B41	P1B7B	U2606	
P0B92	P1BAC	P0B9D	P1BB3	P1EA1	P1E5A	P0B46	P1B7E	P1B29	
P0B97	P1BAF	P0BA2	P1BB6	P1EA3	P1E5B	P0B4B	P1B81	P1E7A	
P0B9C	P1BB2	P0BA7	P1BB9	P1EA0	P1E5C	P0B50	P1B84	P1B48	
P0BA1	P1BB5	P0BAC	P1BBC	P1EA5	P1E5D	P0B55	P1B87	P1BDB	
P0BA6	P1BB8	P0BB1	P1BBF	P1EB1	P1E5E	P0B5A	P1B8A	P1B73	
P0BAB	P1BBB	P0BB6	P1BC2	P1EB5	P1E5F	P0B5F	P1B8D	P0B3E	
P0BB0	P1BBE	P0BBB	P1BC5	P0B3B	P1E60	P0B64	P1B90	P1B7A	
P0BB5	P1BC1	P1B18	P1BC8	P0B40	P1E61	P0B69	P1B93	U2605	
P0BBA	P1BC4	P1B1B	P1BCB	P0B45	P1E62	P0B6E	P1B96	P1B28	

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

VICMVoltageFA

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

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