| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Camshaft Actuator Solenoid Circuit Open – Bank 1 | P0010 | Diagnoses the VVT system high side driver circuit for circuit faults. | The ECM detects that voltage is high during driver off state (indicates short to power or open circuit) | Short to power: ≤ 0.5 Ω impedance between signal and controller power Open Circuit: ≥ 200 K Ω impedance between signal and controller ground | System supply voltage is within limits Output driver is commanded on, Ignition switch is in crank or run position | > 11.00 Volts | 20 failures out of 25 samples250 ms / sample, continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Camshaft System Performance – Bank 1 | P0011 | Detects a VVT system error by comparing the desired and actual cam positions when VVT is activated | Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive | (Intake cam Bank 1) Cam Position Error > 6.00 deg. (**CamPosErrorLimIc1**) | DTC's are NOT active: P0010, IntakeCamSensorTFTKO CrankSensorTFTKO CrankIntakeCamCorrelati onFA. | System Voltage > 11.00 Volts, Engine is running VVT is enabled Desired cam position > 0 Power Take Off (PTO) not active<br><br>Both Desired & Measured cam positions cannot be < 6.00 (**CamPosErrorLimIc1**) or have both > 29.00 deg. (**PerfMaxIc1**).<br><br>Desired cam position cannot vary more than 3.00 Cam Deg for at least 3.00 sec. (**StablePositionTimeIc1**) | 135.00 failures out of 150.00 samples100 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Exhaust Camshaft Actuator Solenoid Circuit Open – Bank 1 | P0013 | Diagnoses the VVT system high side driver circuit for circuit faults. | The ECM detects that voltage is high during driver off state (indicates short to power or open circuit) | Short to power: ≤ 0.5 Ω impedance between signal and controller power Open Circuit: ≥ 200 K Ω impedance between signal and controller ground | System supply voltage is within limitsOutput driver is commanded on, Ignition switch is in crank or run position | > 11.00 Volts | 20 failures out of 25 samples250 ms / sample, continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Exhaust Camshaft System Performance – Bank 1 | P0014 | Detects a VVT system error by comparing the desired and actual cam positions when VVT is activated | Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive | (Exhaust cam Bank 1) Cam Position Error > 5.00 deg. (**CamPosErrorLimEc1**) | DTC's are NOT active: P0013, ExhaustCamSensorTFTKO CrankSensorTFTKO CrankExhaustCamCorrelationFA | System Voltage > 11.00 Volts, Engine is running VVT is enabled Desired cam position > 0 Power Take Off (PTO) not active Both Desired & Measured cam positions cannot be < 5.00 deg. (**CamPosErrorLimEc1**) or have both > ( 27.50 ) (**PerfMaxEc1**). Desired cam position cannot vary more than 3.00 Cam Deg for at least 3.00 sec. (**StablePositionTimeEc1**) | 135.00 failures out of 150.00 samples100 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 1 Sensor A | P0016 | Detects cam to crank misalignment by monitoring if cam sensor pulse for bank 1 sensor A occurs during the incorrect crank position | 4 cam sensor pulses more than -7.9 crank degrees before or 12.1 crank degrees after nominal position in one cam revolution. | | Crankshaft and camshaft position signals are synchronized<br><br>Engine is Spinning<br><br>Cam phaser is in "parked" position<br><br>No Active DTCs:<br><br><br><br>Time since last execution of diagnostic | P0335, P0336 P0340,P0341 5VoltReferenceA_FA 5VoltReferenceB_FA<br><br>< 1.0 seconds | 2 failures out of 3 tests.<br><br>A failed test is 4 failures out of 5 samples.<br><br>There is a delay after the first failed test to allow the camshaft position to return to the park position.<br><br>This time is defined by the table "Cam Correlation Oil Temperature Threshold".<br><br>One sample per cam rotation | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 1 Sensor B | P0017 | Detects cam to crank misalignment by monitoring if cam sensor pulse for bank 1 sensor B occurs during the incorrect crank position | 4 cam sensor pulses more than -7.9 crank degrees before or 12.1 crank degrees after nominal position in one cam revolution. | | Crankshaft and camshaft position signals are synchronized<br><br>Engine is Spinning<br><br>Cam phaser is in "parked" position<br><br>No Active DTCs:<br><br><br><br>Time since last execution of diagnostic | P0335, P0336 P0365,P0366 5VoltReferenceA_FA 5VoltReferenceB_FA<br><br>< 1.0 seconds | 2 failures out of 3 tests.<br><br>A failed test is 4 failures out of 5 samples.<br><br>There is a delay after the first failed test to allow the camshaft position to return to the park position.<br><br>This time is defined by the table "Cam Correlation Oil Temperature Threshold".<br><br>One sample per cam rotation | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2S Heater Control Circuit Bank 1 Sensor 1 | P0030 | Diagnoses the Heater Output low side driver circuit for circuit faults. | Voltage low during driver off state (indicates open circuit) | Open Circuit: ≥ 200 K Ω impedance between signal and controller ground. | Ignition Voltage Engine Speed | = Crank or Run > 11.0 volts > 400 RPM | 20 failures out of 25 samples  250 ms / sample  Continuous | Type B, 2 Trips Note: In certain controllers P0031 may also set |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2S Heater Control Circuit Bank1 Sensor1 | P0031 | Diagnoses the Heater Output low side driver circuit for circuit faults. | Voltage low during driver off state (indicates short-to-ground). | Short to ground: ≤ 0.5 Ω impedance between signal and controller ground. | Ignition Voltage Engine Speed | = Crank or Run > 11.0 volts > 400 RPM | 20 failures out of 25 samples <br><br> 250 ms / sample <br><br> Continuous | Type B, 2 Trips Note: In certain controllers P0030 may also set |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2S Heater Control Circuit Bank1 Sensor1 | P0032 | Diagnoses the Heater Output low side driver circuit for circuit faults. | Voltage high during driver on state (indicates short to power). | Short to power: ≤ 0.5 Ω impedance between signal and controller power. | Ignition Voltage Engine Speed | = Crank or Run > 11.0 volts > 400 RPM | 20 failures out of 25 samples<br><br>250 ms / sample<br><br>Continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2S Heater Control Circuit Bank 1 Sensor 2 | P0036 | Diagnoses the Heater Output low side driver circuit for circuit faults. | Voltage low during driver off state (indicates open circuit). | Open Circuit: ≥ 200 K Ω impedance between signal and controller ground. | Ignition Voltage Engine Speed | = Crank or Run > 11.0 volts > 400 RPM | 20 failures out of 25 samples  250 ms / sample  Continuous | Type B, 2 Trips Note: In certain controlle rs P0037 may also set |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2S Heater Control Circuit Bank1 Sensor2 | P0037 | Diagnoses the Heater Output low side driver circuit for circuit faults. | Voltage low during driver off state (indicates short-to-ground). | Short to ground: ≤ 0.5 Ω impedance between signal and controller ground. | Ignition Voltage Engine Speed | = Crank or Run > 11.0 volts > 400 RPM | 20 failures out of 25 samples  250 ms / sample  Continuous | Type B, 2 Trips Note: In certain controllers P0036 may also set |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2S Heater Control Circuit Bank1 Sensor2 | P0038 | Diagnoses the Heater Output low side driver circuit for circuit faults. | Voltage high during driver on state (indicates short to power). | Short to power: ≤ 0.5 Ω impedance between signal and controller power. | Ignition Voltage Engine Speed | = Crank or Run > 11.0 volts > 400 RPM | 20 failures out of 25 samples  250 ms / sample  Continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| HO2S Heater Resistance Bank 1 Sensor 1 | P0053 | Detects an oxygen sensor heater having an incorrect or out of range resistance value. | Heater Resistance outside of the expected range of | 3.6 < Ω < 10.3 | No Active DTC's<br><br>Coolant – IAT Engine Soak Time<br>Coolant Temp<br>Ignition Voltage<br>Engine Run time | ECT_Sensor_FA<br>P2610<br>IAT_SensorFA<br>< 8.0 ºC<br>> 28,800 seconds<br>-30.0 < ºC < 45.0<br>< 32.0 volts<br>< 0.20 seconds | Once per valid cold start | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| HO2S Heater Resistance Bank 1 Sensor 2) (For Single Bank Exhaust Only | P0054 | Detects an oxygen sensor heater having an incorrect or out of range resistance value. | Heater Resistance outside of the expected range of | 4.0 < Ω < 10.7 | No Active DTC's<br><br>Coolant – IAT<br>Engine Soak Time<br>Coolant Temp<br>Ignition Voltage<br>Engine Run time | ECT_Sensor_FA P2610 IAT_SensorFA < 8.0 ºC > 28,800 seconds -30.0 < ºC < 45.0 < 32.0 volts < 0.30 seconds | Once per valid cold start | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| MAP / MAF / Throttle Position Correlation | P0068 | Detect when MAP and MAF do not match estimated engine airflow as established by the TPS | Difference between MAP and estimated MAP exceeds threshold (kPa), or P0651 (5 Volt Ref), or P0107 (MAP circuit low), or P0108 (MAP circuit high) have failed this key cycle, then MAP portion of diagnostic fails | Table, f(TPS). See supporting tables: **Delta MAP Threshold f(TPS)** | Engine Speed | > 800 RPM<br><br>Run/Crank voltage > 6.41 | Continuously fail MAP and MAF portions of diagnostic for 0.1875 s<br><br>Continuous in MAIN processor | Type A, 1 Trips |
| | | | Absolute difference between MAF and estimated MAF exceed threshold (grams/sec), or P0102 (MAF circuit low), or P0103 (MAF circuit hi) have failed this key cycle, or maximum MAF versus RPM (Table) is greater than or equal to maximum MAF versus battery voltage, then MAF portion of diagnostic fails | Table, f(TPS). See supporting tables: **Delta MAF Threshold f(TPS)**<br><br>Table, f(RPM). See supporting tables: **Maximum MAF f (RPM)**<br><br>Table, f(Volts). See supporting tables: **Maximum MAF f (Volts)** | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Internal Control Module SIDI High Pressure Pump min/ max authority | P0089 | This DTC Diagnoses pump control windup to its max or min authority | High Pressure Fuel Pump Delivery Angle<br><br>High Pressure Fuel Pump Delivery Angle | >= 100 °<br><br>Or <= 0 ° | Battery Voltage<br><br>Low Side Fuel Pressure<br><br>Engine Run Time<br><br><br><br><br><br>Barometric Pressure<br>Inlet Air Temp<br><br><br>Fuel Temp<br><br><br>Additional Enable Conditions:<br>All must be true<br>(High Pressure Pump is enabled and<br>High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and<br>High Pressure fuel pump ckt is Not (FA,FP or TFTKO) andCam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and<br>Green Engine (In assembly plant) is not enabled and<br>Not if low fuel condition | >= 11 Volts<br><br>> 0.250 MPa<br><br>>= KtFHPD_t_PumpCntrlEng RunThrsh (see supporting tables) Enabled when a code clear is not active or not exiting device control Engine is not cranking<br><br>>= 70.0 KPA<br>>= -20.0 degC<br><br><br>-20 <= Temp degC <= 90 | Windup High -<br><br>750 failures out of 938 samples<br><br><br>Windup Low -<br><br>750 failures out of 938 Samples | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | and<br>Low side Fuel Pump is on and<br>Injector Flow Test is not active and<br>Device control commanded pressure is false and<br>Device control pump ckt enabled on is false and<br>Engine movement detected is true andManufacturers enable counter is 0)<br>Flex Fuel Sensor Not FA<br>Ignition voltage out of correlation  error(P1682) not active | | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| High Pressure Pump Control Solenoid Enable Low Side Open Circuit | P0090 | The DTC Diagnoses the High Pressure Pump Control Solenoid Enable Low Side Circuit for circuit faults. | Voltage low during driver off state indicates open circuit | Open Circuit: ≥ 200 K Ω impedance between signal and controller ground | Engine Speed<br><br>Battery Voltage | >= 50 RPM<br><br>>= 11 Volts<br><br><br>Not in pump device control<br>Enabled when a code clear is not active or not exiting device control | 20 failures out of 40 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| High Pressure Pump Control Solenoid Enable Low Side Short to Ground | P0091 | The DTC Diagnoses the High Pressure Pump Control Solenoid Enable Low Side Circuit for circuit faults. | Voltage low during driver off state indicates short-to-ground | Short to ground: ≤ 0.1 Amps between signal and controller ground | Engine Speed<br><br>Battery Voltage | >= 50 RPM<br><br>>= 11 Volts<br><br><br>Not in pump device control<br>Enabled when a code clear is not active or not exiting device control | 20 failures out of 40 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| High Pressure Pump Cntrl Solenoid Enable Low Side Short to Power | P0092 | The DTC Diagnoses the High Pressure Pump Control Solenoid Enable Low Side Circuit for circuit faults. | Voltage high during driver on state indicates short to power | Short to power: ≤ 1.1 or 15 Amps selectable thershold based on High pressure Pump  . | Engine Speed<br><br>Battery Voltage | >= 50 RPM<br>>= 11 Volts<br><br>Not in pump device control<br>Enabled when a code clear is not active or not exiting device control | 20 failures out of 40 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Air Temperature Sensor 2 Circuit Performance (applications with humidity sensor, but no manifold temperature sensor) | P0096 | Detects an IAT2 sensor that has stuck in range by comparing to IAT and engine coolant temperature at startup | ABS(Power Up IAT - Power Up IAT2)<br><br>AND<br><br>ABS(Power Up ECT – Power Up IAT2)<br>>=<br>ABS(Power Up ECT – Power Up IAT) | > 30 deg C | Time between current ignition cycle and the last time the engine was running<br><br>Powertrain Relay Voltage for a time<br><br>No Active DTCs: | > 28,800 seconds<br><br>>= 11.00 Volts<br>>= 0.9 seconds<br><br>PowertrainRelayFault<br>ECT_Sensor_Ckt_FA<br>IAT_SensorCircuitFA<br>MnfdTempSensorCktFA<br>HumTempSnsrCktFA | Executes once at the beginning of each ignition cycle if enable conditions are met | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Air Temperature Sensor Circuit 2 Low (applications with humidity) | P0097 | Detects a continuous short to ground or open in the IAT 2 signal circuit | Raw IAT 2 Input | < 13 Hertz (~-60 deg C) | Powertrain Relay Voltage for a time<br><br>No Active DTCs: | >= 11.00 Volts<br>>= 0.9 seconds<br><br>PowertrainRelayFault | 40 failures out of 50 samples<br><br>1 sample every 100 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Air Temperature Sensor Circuit 2 High (applications with humidity) | P0098 | Detects a continuous high frequency in the IAT 2 signal circuit | Raw IAT 2 Input | > 390 Hertz (~150 deg C) | Powertrain Relay Voltage for a time<br><br>No Active DTCs: | >= 11.00 Volts<br>>= 0.9 seconds<br><br>PowertrainRelayFault | 40 failures out of 50 samples<br><br>1 sample every 100 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Air Temperature Sensor 2 Intermittent In-Range | P0099 | Detects a noisy or erratic IAT 2 signal circuit or IAT 2 sensor | String Length<br><br>Where:<br>"String Length" = sum of "Diff" calculated over<br><br>And where:<br>"Diff" = ABS(current IAT 2 reading - IAT 2 reading from 100 milliseconds previous) | > 125.00 DegC<br><br><br>10 consecutive IAT 2 samples | Powertrain Relay Voltage for a time<br><br>No Active DTCs: | >= 11.00 Volts<br>>= 0.9 seconds<br><br>PowertrainRelayFault | 4 failures out of 5 samples<br><br>Each sample takes 1.0 seconds | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Radiator Coolant Temp Sensor Circuit Low Voltage | P00B3 | This DTC detects a short to ground in the RCT signal circuit or the RCT sensor. | RCT Resistance (@ 150ºC) | < 42 Ohms | Engine run time OR IAT min | > 10.0 seconds ≤ 70.3 °C | 5 failures out of 10 samples 1 sec/ sample Continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Radiator Coolant Temp Sensor Circuit High Voltage | P00B4 | Circuit Continuity This DTC detects a short to high or open in the RCT signal circuit or the RCT sensor. | RCT Resistance (@ -60ºC) | > 320,000 Ohms | Engine run time OR IAT min | > 60.0 seconds ≥ -7.0 °C | 5 failures out of 10 samples 1 sec/ sample Continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Engine Coolant Flow Insufficient | P00B7 | This DTC detects a Insufficient Flow Condition (i.e.. Stuck Closed Thermostat) | Engine Coolant Temp (ECT) is greater than 117 Deg C and Difference between ECT and RCT is greater than 30 Deg C. When above is present for more than 5 seconds, fail counts start. | | No Active DTC's<br><br><br>Engine run time<br>OR<br>Engine Coolant Temp | THMR_RCT_Sensor_Ckt _FA<br>THMR_ECT_Sensor_Ckt _FA<br>> 300 seconds<br><br>> 99.5 Deg C | 30 failures out of 600 samples<br><br>1 sec/ sample<br>Continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| High Pressure Start Diagnostic | P00C6 | The DTC Diagnoses the high side fuel pressure during engine cranking. | The ECM detects that the fuel pressure is not rising or has fallen beyond acceptable limits during engine cranking | Pressure Fall Test: High Side Fuel Rail Pressure <= Supporting Table KtFHPD_p_HPS_PresSFallLoThrsh<br><br>Pressure Rise Test: High Side Fuel Pressure < Supporting Table KtFHPC_p_HighPressStart | Low side feed fuel pressure<br><br>Engine Run Time Run/Crank Voltage Engine Coolant<br><br>For each engine start, only 1 diagnostic is performed. The pressure rise test will run if HIgh side fuel pressure is less than KtFHPC_p_HighPressStart, otherwise, the pressure fall diagnostic will run The pressure fall runs when the engine is cranking. | >= 0 KPA<br><br>< = 0 sec<br>> 8 Volts<br>-100 <= °C <= 80<br><br>All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IAT, IAT2 and ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true and Manufacturers enable | Pressure Fall Test: Injected cylinder events >= Supporting Table KtFHPD_Cnt_HPS_PressFallLoThrsh<br><br>Pressure Rise Test: Time >= Supporting Table KtFHPC_t_HighPressStartTmout | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Barometric Pressure Inlet Air Temp | counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation  error(P1682) not active >= 70.0  KPA >= -20.0  DegC | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Press Regulator Solenoid Supply Voltage Control Circuit Open | P00C8 | The DTC Diagnoses the Fuel Press Regulator Solenoid Supply Voltage Control Circuit for circuit faults. | Voltage High during driver off state indicates open circuit | Open circuit: ≥ 200 K Ω impedance between signal and controller ground | Engine Speed Battery Voltage | >= 50 RPM >= 11 Volts<br><br>Not in pump device control Enabled when a code clear is not active or not exiting device control | 20 failures out of 40 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Press Regulator Solenoid Supply Voltage Control Circuit Low | P00C9 | The DTC Diagnoses the Fuel Press Regulator Solenoid Supply Voltage Control Circuit for circuit faults. | Voltage low during driver on state indicates short to ground | Short to ground: ≤ 1.1 or 15 Amps selectable thershold based on High pressure Pump. | Engine Speed Battery Voltage | >= 50 RPM >= 11 Volts<br><br>Not in pump device control Enabled when a code clear is not active or not exiting device control | 20 failures out of 40 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Press Regulator Solenoid Supply Voltage Control Circuit High | P00CA | The DTC Diagnoses the Fuel Press Regulator Solenoid Supply Voltage Control Circuit for circuit faults. | Voltage high during driver on state indicates short to power | Short to Power: ≤ 0.1 Amps between signal and controller power | Engine Speed Battery Voltage | >= 50 RPM >= 11 Volts<br><br>Not in pump device control Enabled when a code clear is not active or not exiting device control | 20 failures out of 40 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Mass Air Flow System Performance (naturally aspirated) | P0101 | Determines if the MAF sensor is stuck within the normal operating range | Filtered Throttle Model Error AND ABS(Measured Flow – Modeled Air Flow) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered | <= 300 kPa*(g/s)<br><br>> 17 grams/sec<br><br>> 25.0 kPa | Engine Speed<br>Engine Speed<br>Coolant Temp<br>Coolant Temp<br>Intake Air Temp<br>Intake Air Temp<br>Minimum total weight factor (all factors multiplied together)<br><br><br><br><br><br><br><br><br><br><br><br><br><br>No Active DTCs:<br><br><br><br><br>No Pending DTCs: | >= 575 RPM<br><= 6,600 RPM<br>>= -7 Deg C<br><= 125 Deg C<br>>= -20 Deg C<br><= 125 Deg C<br><br><br>>= 0.50<br><br>Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM<br><br>Modeled Air Flow Error multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor based on MAF Est<br><br>MAP Model 2 Error multiplied by MAP2 Residual Weight Factor based on RPM<br><br>See "Residual Weight Factor" tables.<br><br>MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA<br><br>EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP | Continuous<br><br>Calculation are performed every 12.5 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Mass Air Flow Sensor Circuit Low Frequency | P0102 | Detects a continuous short to low or a open in either the signal circuit or the MAF sensor | MAF Output | <= 500 Hertz (~ 0.25 gm/sec) | Engine Run Time Engine Speed Ignition Voltage Above criteria present for a period of time | > 1.0 seconds >= 300 RPM >= 11.0 Volts >= 1.0 seconds | 200 failures out of 250 samples 1 sample every cylinder firing event | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Mass Air Flow Sensor Circuit High Frequency | P0103 | Detects a high frequency output from the MAF sensor | MAF Output | >= 11,000 Hertz (~ 328.0 gm/sec) | Engine Run Time Engine Speed Ignition Voltage Above criteria present for a period of time | > 1.0 seconds >= 300 RPM >= 11.0 Volts <br><br> >= 1.0 seconds | 200 failures out of 250 samples <br><br> 1 sample every cylinder firing event | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Manifold Absolute Pressure Sensor Performance (naturally aspirated) | P0106 | Determines if the MAP sensor is stuck within the normal operating range | Filtered Throttle Model Error AND ABS(Measured MAP – MAP Model 1) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered | <= 300 kPa*(g/s) > 25.0 kPa > 25.0 kPa | Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) No Active DTCs: No Pending DTCs: | >= 575 RPM <= 6,600 RPM >= -7 Deg C <= 125 Deg C >= -20 Deg C <= 125 Deg C >= 0.50 Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM MAP Model 1 Error multiplied by MAP1 Residual Weight Factor based on RPM MAP Model 2 Error multiplied by MAP2 Residual Weight Factor based on RPM See "Residual Weight Factor" tables. MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP | Continuous Calculations are performed every 12.5 msec | Type B, 2 Trips |
| | | | Manifold Pressure OR | < 50.0 kPa | Time between current ignition cycle and the last | | 999 failures out of 5 samples | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Manifold Pressure | > 115.0 kPa | time the engine was running<br><br>Engine is not rotating<br><br>No Active DTCs:<br><br><br><br>No Pending DTCs: | > 409.6 seconds<br><br><br><br>EngineModeNotRunTimer Error<br>MAP_SensorFA<br>AAP_SnsrFA<br><br>MAP_SensorCircuitFP<br>AAP_SnsrCktFP | 1 sample every 12.5 msec | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Manifold Absolute Pressure Sensor Circuit Low | P0107 | Detects a continuous short to low or open in either the signal circuit or the MAP sensor. | MAP Voltage | < 3.0 % of 5 Volt Range (This is equal to 0.15 Volts or 3.5 kPa) | Continuous | | 320 failures out of 400 samples<br><br>1 sample every 12.5 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Manifold Absolute Pressure Sensor Circuit High | P0108 | Detects an open sensor ground or continuous short to high in either the signal circuit or the MAP sensor. | MAP Voltage | > 90.0 % of 5 Volt Range (This is equal to 4.50 Volts, or 115.0 kPa) | Continuous | | 320 failures out of 400 samples<br><br>1 sample every 12.5 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Air Temperature Sensor Circuit Performance (applications with humidity sensor, but no manifold temperature sensor) | P0111 | Detects an IAT sensor that has stuck in range by comparing to IAT2 and engine coolant temperature at startup | ABS(Power Up IAT - Power Up IAT2)<br><br>AND<br><br>ABS(Power Up ECT – Power Up IAT) > ABS(Power Up ECT – Power Up IAT2) | > 30 deg C | Time between current ignition cycle and the last time the engine was running<br><br>Powertrain Relay Voltage for a time<br><br>No Active DTCs: | > 28,800 seconds<br><br>>= 11.00 Volts<br>>= 0.9 seconds<br><br>PowertrainRelayFault<br> ECT_Sensor_Ckt_FA<br>IAT_SensorCircuitFA<br>MnfdTempSensorCktFA<br>HumTempSnsrCktFA | Executes once at the beginning of each ignition cycle if enable conditions are met | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Air Temperature Sensor Circuit Low | P0112 | Detects a continuous short to ground in the IAT signal circuit or the IAT sensor | Raw IAT Input | < 58 Ohms (~150 deg C) | Engine Run Time | > 0.00 seconds | 40 failures out of 50 samples<br><br>1 sample every 100 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Air Temperature Sensor Circuit High | P0113 | Detects a continuous open circuit in the IAT signal circuit or the IAT sensor | Raw IAT Input | > 142,438 Ohms (~-60 deg C) | Engine Run Time | > 0.00 seconds | 40 failures out of 50 samples<br><br>1 sample every 100 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Air Temperature Sensor Intermittent In-Range | P0114 | Detects a noisy or erratic IAT signal circuit or IAT sensor | String Length<br><br>Where:<br>"String Length" = sum of "Diff" calculated over<br><br>And where:<br>"Diff" = ABS(current IAT reading - IAT reading from 100 milliseconds previous) | > 125.00 DegC<br><br>10 consecutive IAT samples | Continuous | | 4 failures out of 5 samples<br><br>Each sample takes 1.0 seconds | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Engine Coolant Temp Sensor Circuit Low | P0117 | Circuit Continuity This DTC detects a short to ground in the ECT signal circuit or the ECT sensor. | ECT Resistance (@ 150ºC) | < 42 Ohms | | | 5 failures out of 6 samples<br><br>1 sec/ sample<br><br>Continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Engine Coolant Temp Sensor Circuit High | P0118 | Circuit Continuity This DTC detects a short to high or open in the ECT signal circuit or the ECT sensor. | ECT Resistance (@ -60ºC) | > 320,000 Ohms | Engine run time OR IAT min | > 10.0 seconds ≥ -7.0 °C | 5 failures out of 6 samples 1 sec/ sample Continuous | Type B, 2 Trips |

| Component/System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Engine Coolant Temperature (ECT) Sensor Circuit Intermittent | P0119 | Circuit Continuity This DTC detects large step changes in the ECT signal circuit or the ECT sensor. Allowable high and low limits are calculated for the next sample based on the previous sample. | ECT temperature step change:<br><br>1) postive step change is greater than calculated high limit<br><br>OR<br><br>2) negitive step change is lower than calculated low limit.<br><br>The calculated high and low limits use the following calibrations:<br>  1) Sensor time constant<br>  2) Sensor low limit<br>  3) Sensor high limit<br><br><br>*****Generic Example*****<br><br>If the last ECT reading was 90 Deg C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 Deg C and the high limit was calibrated to 200 Deg C the caluculated limits are 101 Deg C and 73 Deg C.<br><br>The next reading (after the 90 Deg C reading) must be between 73 Deg C and 101 Deg C to be valid.<br><br>***************************** | 10.0 seconds<br>-80.0 Deg C<br>200.0 Deg C | No Active DTC's | P0117<br>P0118 | 3 failures out of 4 samples<br><br>1 sec/ sample<br><br>Continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Throttle Position Sensor Performance (naturally aspirated) | P0121 | Determines if the Throttle Position Sensor input is stuck within the normal operating range | Filtered Throttle Model Error AND ABS(Measured Flow – Modeled Air Flow) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered | > 300 kPa*(g/s)  > 17 grams/sec  <= 25.0 kPa | Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)    No Active DTCs:        No Pending DTCs: | >= 575 RPM <= 6,600 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C   >= 0.50  Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM  Modeled Air Flow Error multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor based on MAF Est  See "Residual Weight Factor" tables.  MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA  EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP | Continuous  Calculation are performed every 12.5 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| TPS1 Circuit Low | P0122 | Detects a continuous or intermittent short or open in TPS1 circuit | TPS1 Voltage < | 0.3250 | | Run/Crank voltage > 6.41<br><br><br>No 5V reference error or fault for # 4 5V reference circuit (P06A3) | 79 / 159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| TPS1 Circuit High | P0123 | Detects a continuous or intermittent short or open in TPS1 circuit | TPS1 Voltage > | 4.750 | | Run/Crank voltage > 6.41 <br><br><br><br> No 5V reference error or fault for # 4 5V reference circuit (P06A3) | 79 / 159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Engine Coolant Temperature Below Stat Regulating Temperature ) (energy based "Deluxe" method | P0128 | This DTC detects if the engine coolant temperature rises too slowly due to an ECT or Cooling system fault | Energy is accumulated after the first conbustion event using Range #1 or #2 below:<br><br>Thermostat type is divided into normal (non-heated) and electrically heated.<br><br>For this application the "type" cal (KeTHMG_b_TMS_ElecThstEquipped) = 1 If the type cal is equal to one, the application has an electrically heated t-stat, if equal to zero the the application has an non heated t-stat. See appropiate section below.<br><br>****************************<br>Type cal above = 1 (Electrically heated t-stat)<br>== == == ==<br>Range #1 (Primary) ECT reaches Commanded temperature minus 19 °C when Ambient min is ≤ 52 °C and > 10 °C.<br>Note: Warm up target for range #1 will be at least 79 °C<br>== == == ==<br>Range #2 (Alternate) ECT reaches Commanded temperature minus 50 °C when Ambient min is ≤ 10 °C and > -7 °C.<br>Note: Warm up target for range #2 will be at least | See the two tables named:<br>**P0128_Maximum Accumulated Energy for Start-up ECT conditions - Primary** and<br>**P0128_Maximum Accumulated Energy for Start-up ECT conditions - Alternate** in the Supporting tables section.<br><br>This diagnostic models the net energy into and out of the cooling | No Active DTC's<br><br><br><br><br><br>Engine not run time (soaking time before current trip)<br><br><br>Engine run time<br><br>Fuel Condition<br><br>Distance traveled<br><br><br>****************************<br>If Engine RPM is continuously greater than for this time period<br><br>The diagnostic test for this key cycle will abort<br>****************************<br><br>****************************<br>If T-Stat Heater commanded duty cycle for this time period<br><br>The diagnostic test for this key cycle will abort<br><br>**************************** | ECT_Sensor_Ckt_FA VehicleSpeedSensor_FA OAT_PtEstFiltFA IAT_SensorCircuitFA MAF_SensorFA THMR_AWP_AuxPumpFA THMR_AHV_FA THMR_SWP_Control_FA ECT_Sensor_Perf_FA<br><br><br><br>≥ 1,800 seconds<br><br>30 ≤ Eng Run Tme ≤ 1,800 seconds<br><br>Ethanol ≤ 87 %<br><br>≥ 0.80 km<br><br><br>****************************<br>9,999 rpm 5.0 seconds<br><br><br>****************************<br><br>****************************<br><br>> 20.0 % duty cycle > 5.0 seconds<br><br><br>**************************** | 1 failure to set DTC<br><br>1 sec/ sample<br><br>Once per ignition key cycle | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | 55 °C<br><br>****************************<br>Type cal above = 0 (non - heated t-stat)<br>== == == ==<br>Range #1 (Primary) ECT reaches  87 °C when Ambient min is ≤  52 °C and > 10 °C.<br> == == == ==<br>Range #2 (Alternate) ECT reaches  55 °C when Ambient min is ≤  10 °C and > -7 °C.<br><br>**************************** | system during the warm-up process.<br><br>The five energy terms are: heat from combustion, heat from after-run, heat loss to enviroment, heat loss to cabin and heat loss to DFCO. | ECT at start run | -40 ≤ ECT ≤ 82 °C | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2S Circuit Low Voltage Bank 1 Sensor 1 | P0131 | This DTC determines if the O2 sensor circuit is shorted to low. | Oxygen Sensor Signal | < 50.0 mVolts | No Active DTC's | TPS_ThrottleAuthorityDefaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit _FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_ FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt _FA FuelInjectorCircuit_FA = Not active | 380 failures out of 475 samples  Frequency: Continuous in 100 milli - second loop | Type B, 2 Trips |
| | | | | | AIR intrusive test Fuel intrusive test Idle intrusive test EGR intrusive test System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Diag Equivalence Ratio Air Per Cylinder Fuel Control State Closed Loop Active All Fuel Injectors for active Cylinders Fuel Condition Fuel State | = Not active = Not active = Not active = Not active 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = False 0.9912 < ratio < 1.0137 50 < mgram < 500 = Closed Loop = TRUE  Enabled (On) Ethanol ≤ 87 % DFCO not active | | |
| | | | | | All of the above met for | > 5.0 seconds | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2S Circuit High Voltage Bank 1 Sensor 1 | P0132 | This DTC determines if the O2 sensor circuit is shorted to high. | Oxygen Sensor Signal | > 1,050 mvolts | == Open Test Criteria == No Active DTC's<br><br><br>System Voltage<br>AFM Status<br>Heater Warm-up delay<br>Engine Run Time<br>Engine Run Accum<br>Fuel Condition<br>==================<br><br>No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br><br>Low Fuel Condition Diag<br>Fuel Condition<br><br>Initial delay after Open Test Criteria met (cold start condition)<br><br>Initial delay after Open Test Criteria met (not cold start condition)<br><br>Equivalence Ratio<br>Air Per Cylinder<br>Fuel Control State | ===================<br>TPS_ThrottleAuthorityDefaulted<br>MAF_SensorFA<br>EthanolCompositionSensor_FA<br>10.0 < Volts < 32.0<br>= All Cylinders active<br>= Complete<br>> 5 seconds<br>> 150 seconds<br>≤ 87 % Ethanol<br>===================<br><br>MAP_SensorFA<br>EvapPurgeSolenoidCircuit_FA<br>EvapFlowDuringNonPurge_FA<br>EvapVentSolenoidCircuit_FA<br>EvapSmallLeak_FA<br>EvapEmissionSystem_FA<br>FuelTankPressureSnsrCkt_FA<br>FuelInjectorCircuit_FA<br>AIR System FA<br>= False<br>≤ 87 % Ethanol<br><br>> 45.0 seconds when engine soak time > 28,800 seconds<br><br>> 45.0 seconds when engine soak time ≤ 28,800 seconds<br><br>0.9912 ≤ ratio ≤ 1.0137<br>50 ≤ mgram ≤ 500<br>not = Power Enrichment | 100 failures out of 125 samples<br><br>Frequency: Continuous in 100 milli - second loop | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | All of the above met for | > 5.0 seconds | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2S Slow Response Bank 1 Sensor 1) (For use with ESPD | P0133 | This DTC determines if the O2 sensor response time is degraded. | Fault condition present when the average response time is caluclated over the test time, and compared to the threshold.<br><br>OR<br><br>Slope Time L/R Switches<br><br>OR<br><br>Slope Time R/L Switches | Refer to **P0133_O2S Slow Response Bank 1 Sensor 1 "Pass/Fail Threshold table"** in the Supporting Tables tab<br><br><br>< 5<br><br><br>< 5 | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br>Bank 1 Sensor 1 DTC's not active<br><br>System Voltage<br>EGR Device Control<br>Idle Device Control<br>Fuel Device Control<br>AIR Device Control<br>Low Fuel Condition Diag<br>Green O2S Condition | TPS_ThrottleAuthorityDefaulted<br>MAP_SensorFA<br>IAT_SensorFA<br>ECT_Sensor_FA<br>AmbientAirDefault<br>MAF_SensorFA<br>EvapPurgeSolenoidCircuit_FA<br>EvapFlowDuringNonPurge_FA<br>EvapVentSolenoidCircuit_FA<br>EvapSmallLeak_FA<br>EvapEmissionSystem_FA<br>FuelTankPressureSnsrCkt_FA<br>FuelInjectorCircuit_FA<br>AIR System FA<br>EthanolCompositionSensor_FA<br>EngineMisfireDetected_FA<br><br>P0131, P0132, P0134<br><br> 10.0 < Volts < 32.0<br>= Not active<br>= Not active<br>= Not active<br>= Not active<br>= False<br>= Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S1, B2S1 (if applicable) | Sample time is 60 seconds<br><br>Frequency: Once per trip | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | in Supporting Tables tab. | | |
| | | | | | O2 Heater on for Learned Htr resistance | ≥ 40 seconds = Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" ) | | |
| | | | | | Engine Coolant IAT Engine run Accum | > 70 °C > -40 °C > 120 seconds | | |
| | | | | | Time since any AFM status change Time since Purge On to Off change Time since Purge Off to On change | > 2.0 seconds > 0.0 seconds > 1.5 seconds | | |
| | | | | | Engine airflow Engine speed Fuel Condition Baro Air Per Cylinder | 10 ≤ grams/second ≤ 40 1,000 <= RPM <= 3,500 < 87 % Ethanol > 70 kpa ≥ 200 mGrams | | |
| | | | | | Fuel Control State Closed Loop Active LTM fuel cell Transient Fuel Mass Baro Fuel Control State Fuel State Commanded Proportional Gain | = Closed Loop = TRUE = Enabled ≤ 100.0 mgrams = Not Defaulted not = Power Enrichment DFCO not active ≥ 0.0 % | | |
| | | | | | ================= All of the above met for | ================= > 3.0 seconds | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2S Circuit Insufficient Activity Bank 1 Sensor 1 | P0134 | This DTC determines if the O2 sensor circuit is open. | Oxygen Sensor Signal | > 1,700 mvolts | No Active DTC's<br><br><br>System Voltage<br>AFM Status<br>Heater Warm-up delay<br>Engine Run Time<br>Engine Run Accum<br>Fuel Condition | TPS_ThrottleAuthorityDefaulted<br>MAF_SensorFA<br>EthanolCompositionSensor_FA<br> 10.0 < Volts < 32.0<br>= All Cylinders active<br>= Complete<br>> 5  seconds<br>> 150  seconds<br>≤ 87  % Ethanol | 200 failures out of 250 samples.<br><br>Frequency: Continuous 100 msec loop | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2S Heater Performance Bank 1 Sensor 1 | P0135 | This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit. | Heater Current outside of the expected range of | 0.3 < Amps < 2.5 | No Active DTC's<br><br>System Voltage<br>Heater Warm-up delay<br>O2S Heater device control<br><br>B1S1 O2S Heater Duty Cycle<br><br>All of the above met for | ECT_Sensor_FA<br><br>10.0 < Volts < 32.0<br>= Complete<br><br>= Not active<br><br>> zero<br><br>> 120 seconds | 8 failures out of 10 samples<br><br>Frequency: 2 tests per trip 30 seconds delay between tests and 1 second execution rate | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2S Circuit Low Voltage Bank 1 Sensor 2) (For Single Bank Exhaust Only | P0137 | This DTC determines if the O2 sensor circuit is shorted to low. | Oxygen Sensor Signal | < 50 mvolts | No Active DTC's | TPS_ThrottleAuthority DefaultedMAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit _FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA = Not active = Not active = Not active = Not active | 430 failures out of 540 samples  Frequency: Continuous in 100 milli - second loop | Type B, 2 Trips |
| | | | | | AIR intrusive test Fuel intrusive test Idle intrusive test EGR intrusive test System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Diag Equivalence Ratio Air Per Cylinder Fuel Control State Closed Loop Active All Fuel Injectors for active Cylinders Fuel Condition Fuel State | = Not active = Not active = Not active = Not active 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = False $0.9912 \le$ ratio $\le 1.0137$ $50 \le$ mgrams $\le 500$ = Closed Loop = TRUE  Enabled (On) Ethanol <= 87 %DFCO not active | | |
| | | | | | All of the above met for | > 5.0 seconds | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2S Circuit High Voltage Bank 1 Sensor 2) (For Single Bank Exhaust Only | P0138 | This DTC determines if the O2 sensor circuit is shorted to high. | Oxygen Sensor Signal | > 1,050 mvolts | == Open Test Criteria ==<br>No Active DTC's<br><br><br><br>System Voltage<br>AFM Status<br>Heater Warm-up delay<br>Engine Run Time<br>Fuel Condition<br>==================<br><br>No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br>Low Fuel Condition Diag<br>Fuel Condition<br><br>Initial delay after Open Test Criteria met (cold start condition)<br><br>Initial delay after Open Test Criteria met (not cold start condition)<br><br>Equivalence Ratio<br>Air Per Cylinder<br>Fuel Control State | ==================<br>TPS_ThrottleAuthorityDefaulted<br>MAF_SensorFA<br>EthanolCompositionSensor_FA<br>10.0 < Volts < 32.0<br>= All Cylinders active<br>= Complete<br>> 5 seconds<br>≤ 87 %Ethanol<br>==================<br><br>MAP_SensorFA<br>EvapPurgeSolenoidCircuit_FA<br>EvapFlowDuringNonPurge_FA<br>EvapVentSolenoidCircuit_FA<br>EvapSmallLeak_FA<br>EvapEmissionSystem_FA<br>FuelTankPressureSnsrCkt_FA<br>FuelInjectorCircuit_FA<br>AIR System FA<br>= False<br>≤ 87 % Ethanol<br><br>> 105.0 seconds when engine soak time > 28,800 seconds<br><br>> 105.0 seconds when engine soak time ≤ 28,800 seconds<br><br>0.9912 ≤ ratio ≤ 1.0137<br>50 ≤ mgrams ≤ 500<br>not = Power Enrichment | 100 failures out of 125 samples<br><br>Frequency: Continuous in 100 milli - second loop | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | All of the above met for | > 5.0  seconds | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2 Sensor Slow Response Rich to Lean Bank 1 Sensor 2 | P013A | This DTC determines if the post catalyst O2 sensor has Slow Response in a predefined Rich to Lean voltages range during Rich to Lean transition. The diagnostic test is an intrusive test which runs in a DFCO mode to achieve the required response. | The EWMA of the Post O2 sensor normalized integral value<br><br>OR<br><br>The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds) | > 8.0 units<br><br><br>> 74.0 grams (upper voltage threshold is 450 mvolts and lower voltage threshold is 150 mvolts) | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br><br>B1S2 DTC's Not Active this key cycle<br><br>System Voltage<br>Learned heater resistance<br><br><br><br><br><br><br>ICAT MAT Burnoff delay<br>Green O2S Condition<br><br><br><br><br><br><br><br><br><br><br>Low Fuel Condition Diag<br>Post fuel cell<br><br>DTC's Passed | TPS_ThrottleAuthorityDefaulted<br>ECT_Sensor_FA<br>IAT_SensorFA<br>MAF_SensorFA<br>MAP_SensorFA<br>AIR System FA<br>FuelInjectorCircuit_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EngineMisfireDetected_FA<br>EthanolCompositionSensor_FA<br>P013B, P013E, P013F, P2270 or P2271<br><br>10.0 < Volts < 32.0<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br>= Not Valid<br>= Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab.<br><br>= False<br>= enabled<br><br>P2270 (and P2272 if applicable) | Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed. | Type A, 1 Trips EWMA |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | ================== After above conditions are met: DFCO mode is continued (wo driver initiated pedal input). | P013E (and P014A if applicable) ================== | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2 Sensor Slow Response Lean to Rich Bank 1 Sensor 2 | P013B | This DTC determines if the post catalyst O2 sensor has Slow Response in a predefined Lean to Rich voltages range during Lean to Rich transition. The diagnostic is an intrusive test which increases the delivered A/F ratio to achieve the required rich threshold. | The EWMA of the Post O2 sensor normalized integral value<br><br>OR<br><br>The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds) | > 11.0 units<br><br><br>> 75 grams (lower voltage threshold is 300 mvolts and upper voltage threshold is 600 mvolts) | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br>B1S2 DTC's Not Active this key cycle<br><br>System Voltage<br>Learned heater resistance<br><br><br><br><br><br><br>ICAT MAT Burnoff delay<br><br>Green O2S Condition<br><br><br><br><br><br><br><br><br><br>Green Cat System Condition | TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013A, P013E, P013F, P2270 or P2271<br><br>10.0 < Volts < 32.0 = Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>= Not Valid<br><br>= Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab.<br><br>= Not Valid, System is not valid until accumulated airflow is greater than | Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed. | Type A, 1 Trips EWMA |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 360,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C. (Note: This feature is only enabled when the vehicle is new and cannot be enabled in service). | | |
| | | | | | Low Fuel Condition Diag Post fuel cell | = False | | |
| | | | | | | = enabled | | |
| | | | | | DTC's Passed | P2270 (and P2272 if applicable) P013E (and P014A if applicable) P013A (and P013C if applicable) P2271 (and P2273 if applicable) P013F (and P014B if applicable) | | |
| | | | | | ================== After above conditions are met: Fuel Enrich mode continued. ================ During this test the following must stay TRUE or the test will abort: 0.96 ≤ Fuel EQR ≤ 1.01 | ================== | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2 Sensor Delayed Response Rich to Lean Bank 1 Sensor 2 | P013E | This DTC determines if the post catalyst O2 sensor has an initial delayed response to an A/F change from Rich to Lean. The diagnostic is an intrusive test which runs in a DFCO mode to achieve the required response. | Post O2 sensor voltage<br><br>AND<br><br>The Accumulated mass air flow monitored during the Delayed Response Test under DFCO<br><br>DFCO begins after:<br>1) Catalyst has been rich for a minimum of AND<br>2) Catalyst Rich Accumulation Air Flow is greater or equal to | > 450 mvolts<br><br><br><br>> 30 grams<br><br><br><br>> 1 secs<br><br><br><br>> 6 grams | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br>B1S2 DTC's Not Active this key cycle<br><br>System Voltage<br>Learned heater resistance<br><br><br><br><br><br><br><br>ICAT MAT Burnoff delay<br><br>Green O2S Condition<br><br><br><br><br><br><br><br><br><br><br><br>Low Fuel Condition Diag<br>Post fuel cell | TPS_ThrottleAuthorityDefaulted<br>ECT_Sensor_FA<br>IAT_SensorFA<br>MAF_SensorFA<br>MAP_SensorFA<br>AIR System FA<br>FuelInjectorCircuit_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EngineMisfireDetected_FA<br>EthanolCompositionSensor_FA<br>P013A, P013B, P013F, P2270 or P2271<br><br><br><br>10.0 < Volts < 32.0<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>= Not Valid<br><br>= Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab.<br><br>= False<br>= enabled | Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed. | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | DTC's Passed<br><br>Number of fueled cylinders<br>==================<br>After above conditions are met: DFCO mode entered (wo driver initiated pedal input). | P2270 (and P2272 if applicable)<br><br>≤ 3 cylinders<br>================== | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2 Sensor Delayed Response Lean to Rich Bank 1 Sensor 2 | P013F | This DTC determines if the post catalyst O2 sensor has an initial delayed response to an A/F change from Lean to Rich. The diagnostic is an intrusive test which increases the delivered A/F ratio to achieve the required rich threshold. | Post O2 sensor voltage<br><br>AND<br><br>The Accumulated mass air flow monitored during the Delayed Response Test | < 300 mvolts<br><br><br>> 110 grams | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br><br>B1S2 DTC's Not Active this key cycle<br><br>System Voltage<br>Learned heater resistance<br><br><br><br><br><br><br><br>ICAT MAT Burnoff delay<br><br>Green O2S Condition<br><br><br><br><br><br><br><br><br><br><br>Green Cat System Condition | TPS_ThrottleAuthorityDefaulted<br>ECT_Sensor_FA<br>IAT_SensorFA<br>MAF_SensorFA<br>MAP_SensorFA<br>AIR System FA<br>FuelInjectorCircuit_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EngineMisfireDetected_FA<br>EthanolCompositionSensor_FA<br>P013A, P013B, P013E, P2270 or P2271<br><br><br><br><br>10.0 < Volts < 32.0<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" )<br><br>= Not Valid<br><br>= Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab.<br><br>= Not Valid, System is not valid until accumulated airflow is greater than | Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 360,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C. (Note: This feature is only enabled when the vehicle is new and cannot be enabled in service). | | |
| | | | | | Low Fuel Condition Diag Post fuel cell | = False = enabled | | |
| | | | | | DTC's Passed | P2270 (and P2272 if applicable) P013E (and P014A if applicable) P013A (and P013C if applicable) P2271 (and P2273 if applicable) | | |
| | | | | | Number of fueled cylinders =================== After above conditions are met: Fuel Enrich mode entered. ================ During this test the following must stay TRUE or the test will abort: 0.96 ≤ Fuel EQR ≤ 1.01 | ≥ 1 cylinders =================== | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2S Circuit Insufficient Activity Bank 1 Sensor 2) (For Single Bank Exhaust Only | P0140 | This DTC determines if the O2 sensor circuit is open. | Oxygen Sensor Signal | > 1,700 mvolts | No Active DTC's<br><br><br>System Voltage<br>AFM Status<br>Heater Warm-up delay<br>Engine Run Time<br>Engine Run Accum<br>Fuel Condition | TPS_ThrottleAuthorityDefaulted<br>MAF_SensorFA<br>EthanolCompositionSensor_FA<br>10.0 < Volts < 32.0<br>= All Cylinders active<br>= Complete<br>> 5 seconds<br>> 150 seconds<br>≤ 87 % Ethanol | 200 failures out of 250 samples.<br><br>Frequency: Continuous 100 msec loop | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2S Heater Performance Bank 1 Sensor 2) (For Single Bank Exhaust Only | P0141 | This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit. | Heater Current outside of the expected range of | 0.3 > amps > 2.5 | No Active DTC's System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty Cycle<br><br>All of the above met for | ECT_Sensor_FA 10.0 < Volts < 32.0 = Complete<br><br>= Not active<br><br>> zero<br><br>> 120 seconds | 8 failures out of 10 samples<br><br>Frequency: 2 tests per trip 30 seconds delay between tests and 1 second execution rate. | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2 Sensor Delayed Response Rich to Lean Bank 1 Sensor 1 | P015A | This DTC determines if the pre catalyst O2 sensor has an initial delayed response to an A/F change from Rich to Lean. The diagnostic is an intrusive test which runs in a DFCO mode to achieve the required response. | The EWMA of the Pre O2 sensor normalized R2L time delay value<br><br>OR<br><br>[The Accumulated time monitored during the R2L Delayed Response Test (Gross failure).<br><br>AND<br><br>Pre O2 sensor voltage is | > 0.5 EWMA (sec)<br><br><br><br>≥ 1.5 Seconds<br><br><br><br>> 550 mvolts | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>System Voltage<br>EGR Device Control<br>Idle Device Control<br>Fuel Device Control<br>AIR Device Control<br>Low Fuel Condition Diag<br><br>Green O2S Condition | TPS_ThrottleAuthorityDefaulted<br>MAP_SensorFA<br>IAT_SensorFA<br>ECT_Sensor_FA<br>AmbientAirDefault<br>MAF_SensorFA<br>EvapPurgeSolenoidCircuit_FA<br>EvapFlowDuringNonPurge_FA<br>EvapVentSolenoidCircuit_FA<br>EvapSmallLeak_FA<br>EvapEmissionSystem_FA<br>FuelTankPressureSnsrCkt_FA<br>FuelInjectorCircuit_FA<br>AIR System FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EthanolCompositionSensor_FA<br>EngineMisfireDetected_FA<br>P0131, P0132, P0134<br><br>10.0 < Volts < 32.0<br>= Not active<br>= Not active<br>= Not active<br>= Not active<br>= False<br><br>= Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for | Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed | Type A, 1 Trips EWMA |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | O2 Heater (pre sensor) on for<br>Learned Htr resistance | the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab.<br><br>≥ 40 seconds<br>= Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" ) | | |
| | | | | | Engine Coolant<br>IAT<br>Engine run Accum | > 70 ºC<br>> -40 ºC<br>> 120 seconds | | |
| | | | | | Engine Speed to initially enable test<br>Engine Speed range to keep test enabled (after initially enabled) | 1,250 ≤ RPM ≤ 2,300<br><br>1,100 ≤ RPM ≤ 2,450 | | |
| | | | | | Engine Airflow<br>Vehicle Speed to initially enable test<br>Vehicle Speed range to keep test enabled (after initially enabled) | 3 ≤ gps ≤ 12<br>34.2 ≤ MPH ≤ 74.6<br><br>31.7 ≤ MPH ≤ 82.0 | | |
| | | | | | Closed loop integral<br>Closed Loop Active<br>Evap<br>Ethanol<br>Post fuel cell | 0.85 ≤ C/L Int ≤ 1.07<br>= TRUE<br>not in control of purge<br>not in estimate mode<br>= enabled | | |
| | | | | | EGR Intrusive diagnostic<br>All post sensor heater delays<br>O2S Heater (post sensor) on Time<br>Predicted Catalyst temp<br>Fuel State | = not active<br><br>= not active<br><br>≥ 175.0 sec<br>600 ≤ ºC ≤ 850<br>= DFCO possible | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | ================== <br> All of the above met for at least 1.0 seconds, and then the Force Cat Rich intrusive stage is requested. <br> ================== <br><br> Pre O2S voltage B1S1 at end of Cat Rich stage <br> Fuel State <br> Number of fueled cylinders <br><br> ================== <br> After above conditions are met: DFCO Mode is entered (wo driver initiated pedal input). | ================== <br><br> ================== <br><br> ≥ 690 mvolts <br> = DFCO active <br><br> ≤ 3 cylinders <br><br> ================== | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2 Sensor Delayed Response Lean to Rich Bank 1 Sensor 1 | P015B | This DTC determines if the pre catalyst O2 sensor has an initial delayed response to an A/F change from Lean to Rich. The diagnostic is an intrusive test which runs in an enriched fuel mode to achieve the required response. | The EWMA of the Pre O2 sensor normalized L2R time delay value<br><br>OR<br><br>[The Accumulated time monitored during the L2R Delayed Response Test (Gross failure).<br><br>AND<br><br>Pre O2 sensor voltage is<br><br>OR<br><br>At end of Cat Rich stage the Pre O2 sensor output is | > 0.5 EWMA (sec)<br><br><br>≥ 1.5 Seconds<br><br><br>< 350 mvolts<br><br><br>< 690 mvolts | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>System Voltage<br>EGR Device Control<br>Idle Device Control<br>Fuel Device Control<br>AIR Device Control<br>Low Fuel Condition Diag<br><br>Green O2S Condition | TPS_ThrottleAuthorityDefaulted<br>MAP_SensorFA<br>IAT_SensorFA<br>ECT_Sensor_FA<br>AmbientAirDefault<br>MAF_SensorFA<br>EvapPurgeSolenoidCircuit_FA<br>EvapFlowDuringNonPurge_FA<br>EvapVentSolenoidCircuit_FA<br>EvapSmallLeak_FA<br>EvapEmissionSystem_FA<br>FuelTankPressureSnsrCkt_FA<br>FuelInjectorCircuit_FA<br>AIR System FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EthanolCompositionSensor_FA<br>EngineMisfireDetected_FA<br>P0131, P0132, P0134<br><br>10.0 < Volts < 32.0<br>= Not active<br>= Not active<br>= Not active<br>= Not active<br>= False<br><br>= Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for | Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed | Type A, 1 Trips EWMA |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | O2 Heater (pre sensor) on for Learned Htr resistance | the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab.<br><br>≥ 40 seconds = Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" ) | | |
| | | | | | Engine Coolant<br>IAT<br>Engine run Accum | > 70 ºC<br>> -40 ºC<br>> 120 seconds | | |
| | | | | | Engine Speed to initially enable test<br>Engine Speed range to keep test enabled (after initially enabled) | 1,250 ≤ RPM ≤ 2,300<br><br>1,100 ≤ RPM ≤ 2,450 | | |
| | | | | | Engine Airflow<br>Vehicle Speed to initially enable test<br>Vehicle Speed range to keep test enabled (after initially enabled) | 3 ≤ gps ≤ 12<br>34.2 ≤ MPH ≤ 74.6<br><br>31.7 ≤ MPH ≤ 82.0 | | |
| | | | | | Closed loop integral<br>Closed Loop Active<br>Evap<br>Ethanol<br>Post fuel cell<br>EGR Intrusive diagnostic<br>All post sensor heater delays<br>O2S Heater (post sensor) on Time<br><br>Predicted Catalyst temp | 0.85 ≤ C/L Int ≤ 1.07<br>= TRUE<br>not in control of purge<br>not in estimate mode<br>= enabled<br>= not active<br><br>= not active<br><br>≥ 175.0 sec<br><br>600 ≤ ºC ≤ 850 | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Fuel State Number of fueled cylinders | = DFCO inhibit<br><br>≥ 1 cylinders | | |
| | | | | | ================<br>When above conditions are met: Fuel Enrich mode is entered. | =================<br><br>================= | | |
| | | | | | ================<br>During this test: Engine Airflow must stay between:<br>and the delta Engine Airflow over 12.5msec must be : | =================<br><br><br><br>4 ≤ gps ≤ 10<br><br><br>≤ 10.0 gps | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel System Too Lean Bank 1 | P0171 | Determines if the fuel control system is in a lean condition, based on the filtered long-term and short-term fuel trim. | The filtered long-term fuel trim metric<br><br>AND<br><br>The filtered short-term fuel trim metric (a value < 0.95 effectively nullifies the short-term fuel trim criteria) | >= 1.385<br><br><br><br>>= 0.100 | Engine speed<br>BARO<br>Coolant Temp<br>MAP<br>Inlet Air Temp<br>MAF<br>Fuel Level<br><br><br>Long Term Fuel Trim data accumulation:<br><br><br><br><br><br><br><br>Sometimes, certain Long-Term Fuel Trim Cells are not utilized for control and/or diagnosis<br><br><br><br>Closed Loop<br>Long Term FT<br><br><br><br><br><br><br>Fuel Consumed<br><br><br><br><br>EGR Diag. | 400 <rpm< 6,600<br>> 70 kPa<br>-20 <°C< 130<br>15 <kPa< 255<br>-20 <°C< 150<br>1.0 <g/s< 512.0<br>> 10 % or if fuel sender is faulty<br><br>> 80.0 seconds of data must accumulate on each trip, with at least 50.0 seconds of data in the current fuel trim cell before a pass or fail decision can be made.<br><br>(Please see "**Long-Term Fuel Trim Cell Usage**" in Supporting Tables for a list of cells utilized for diagnosis)<br><br>Enabled<br>Enabled<br>(Please see "**Closed Loop Enable Criteria**" and "**Long Term FT Enable Criteria**" in Supporting Tables.)<br><br>> 0.0 liters of fuel consumed after a fuel fill event ("Virtual Flex Fuel Sensor applications only)<br><br>Intrusive Test Not Active<br>Intrusive Test Not Active | Frequency: 100 ms Continuous Loop | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Catalyst Diag. Post O2 Diag. Device Control EVAP Diag.  No active DTC: | Intrusive Test Not Active Not Active "tank pull down" Not Active  IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapExcessPrgePsbl_FA Ethanol Comp Snsr FA FuelInjectorCkt_FA EngMisfireDetected_FA EGRValvePerf_FA EGRValveCkt_FA MAP_EngVacuumStatus AmbPresDfltdStatus TC_BoostPresSnsrFA O2Snsr_B1_Snsr_1_FA | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel System Too Rich Bank 1 | P0172 | Determines if the fuel control system is in a rich condition, based on the filtered long-term fuel trim metric.<br><br>There are two methods to determine a Rich fault. They are Passive and Intrusive. A Passive Test decision cannot be made when Purge is enabled. The Intrusive test is described below:<br>Intrusive Test:<br>When the filtered Purge Long Term Fuel Trim metric is <= 0.790 , purge is ramped off to determine if excess purge vapor is the cause of the rich condition. If the filtered Purge Long Term Fuel Trim metric > 0.790 , the test passes without checking the filtered Non-Purge Long Term Fuel Trim metric.<br><br>Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, and the execution frequency of other diagnostics. | Passive Test: The filtered Non-Purge Long Term Fuel Trim metric<br><br>AND<br><br>The filtered Short Term Fuel Trim metric (a value > 1.05 effectively nullifies the short-term fuel trim criteria)<br><br>Intrusive Test: For 2 out of 3 intrusive segments, the filtered Purge Long Term Fuel Trim metric<br><br>AND<br><br>The filtered Non-Purge Long Term Fuel Trim metric<br><br>AND<br><br>The filtered Short Term Fuel Trim metric (a value > 1.05 effectively nullifies the short-term fuel trim criteria)<br><br>Segment Def'n:<br>Segments can last up to 35 seconds and are separated by the lesser of 30 seconds of purge-on time or enough time to purge 18 grams of vapor. | <= 0.780<br><br><br><br><= 2.000<br><br><br><br><br><br><= 0.790<br><br><br><br><br><= 0.780<br><br><br><br><= 2.000 | | Secondary Parameters and Enable Conditions are identical to those for P0171, with the exception that fuel level is not considered. | Frequency: 100 ms Continuous Loop | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | A maximum of 3 completed segments or 30 attempts are allowed for each intrusive test. After an intrusive test report is completed, another intrusive test cannot occur for 300 seconds to allow sufficient time to purge excess vapors from the canister. During this period, fuel trim will pass if the filtered Purge-on Long Term fuel trim > 0.790 for at least 60 seconds, indicating that the canister has been purged. | | | | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pressure Sensor "B" Circuit Range/ Performance | 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 | DTC Type A 1 trip |
| | | | | | 2. FRP Circuit High DTC (P018D) | Not active | | |
| | | | | | 3. FuelPump Circuit Low DTC (P0231) | Not active | | |
| | | | | | 4. FuelPump Circuit High DTC (P0232) | Not active | Intrusive test requested if fuel system is clamped for >= 5 seconds or fuel pressure error variance <= typically (0.3 to 0.6) (calculated over a 2.5sec period); otherwise report pass | |
| | | | | | 5. FuelPump Circuit Open DTC (P023F) | Not active | | |
| | | | | | | Not active | | |
| | | | | | | >=5 seconds | | |
| | | | | | 6. Reference Voltage DTC (P0641) | Not low | | |
| | | | | | 7. Fuel Pump Control Module Driver Over- temperature DTC (P064A) | Enabled | Duration of intrusive test is fueling related (5 to 12 seconds). | |
| | | | | | | Normal or FRP rationality control | | |
| | | | | | 8. Control Module Internal Performance DTC (P0606) | > 0.047 g/s | 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) | |
| | | | | | | Not failed | | |
| | | | | | 9. Engine run time | | | |
| | | | | | 10. Emissions fuel level (PPEI $3FB) | | | |
| | | | | | 11. Fuel pump control | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | 12. Fuel pump control state<br><br>13. Engine fuel flow<br><br>14. ECM fuel control system failure (PPEI $1ED) | | | |
| | | | | | | | | |

| Component/System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pressure Sensor "B" Circuit Low | 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<br><br>1 sample/12.5 ms | DTC Type A<br><br>1 trip |

| Component/System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pressure Sensor "B" Circuit High | 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<br><br>1 sample/12.5 ms | DTC Type A<br><br>1 trip |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| SIDI High Pressure Sensor Performance | P0191 | The DTC Diagnoses a skewed fuel rail sensor via a comparison of measured pressure and commanded/ modeled pressure | Idle test (Low Side Fuel Pressure - High Side Fuel Pressure) | SIDI High Pressure Sensor Performance Idle Test Enabled <= -1.000 MPa OR >= 1.000 MPa | Vehicle Speed Pedal Position = 0 for Battery Voltage Low Pressure Fuel Pump Pressure Engine Run Time Delay counts after pump is turned off | Enabled when a code clear is not active or not exiting device control Engine is not cranking <= 0.62 MPH 200 Counts (12.5ms per count) >= 11 Volts >= 0.250 MPa >= KtFHPD_t_PumpCntrlEngRunThrsh(see supporting tables) Enabled when a code clear is not active or not exiting device control Engine is not cranking >= KtFHPD_Cnt_SnsPrfIdlePumpOffDly(see supporting tables) | Idle Test > = 240 counts (12.5ms per count) | Type A, 1 Trips |
| | | | High Drive Test (Relief Pressure - Measured high Pressure) | SIDI High Pressure Sensor Performance High Drive Test Enabled <= -1.60 MPa | Engine Speed Desired High Side Pressure Vehicle Speed Accelerator Pedal | 1,000 <= RPM <= 3,000 4 <= MPa <= 6 >= 22 MPH >= 10 % | KtFHPD_Cnt_SnsPrfIdlePumpOffDly runs in 12.5 ms loopHigh Drive Test >= 160 counts (12.5ms per count) | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Battery Voltage | >= 11 Volts | | |
| | | | | | Low Pressure Fuel Pump Pressure | >= 0.250 MPa | | |
| | | | | | Engine Run Time | >= KtFHPD_t_PumpCntrlEngRunThrsh(see supporting tables) | | |
| | | | | | | Enabled when a code clear is not active or not exiting device control | | |
| | | | | | | Engine is not cranking | | |
| | | | Low Drive Test (Commanded high Pressure - Measured high Pressure) AND Modeled Injection Pressure | SIDI High Pressure Sensor Performance Low Drive Test Enabled >= 3.000 MPa >= 1.60 MPa | Engine Speed | 1,000 <= RPM <= 3,000 | LoDrive Test >= 240 counts (12.5ms per count) | |
| | | | | | Desired High Side Pressure | 4.00 <= MPa <= 6.00 | | |
| | | | | | Vehicle Speed | >= 22 MPH | | |
| | | | | | Accelerator Pedal | >= 10 % | | |
| | | | | | Battery Voltage | >= 11 Volts | | |
| | | | | | Low Pressure Fuel Pump Pressure | >= 0.250 MPa | | |
| | | | | | Engine Run Time | >= KtFHPD_t_PumpCntrlEngRunThrsh(see supporting tables) | | |
| | | | | | | Enabled when a code clear is not active or not exiting device control | | |
| | | | | | | Engine is not cranking | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | ------------------------------ <br><br> Sensor Stuck Test Measured High Pressure (max - min) | ------------------------------ <br><br> SIDI High Pressure Sensor Performance Stuck Test Enabled <= 0.100 MPa | ------------------------------ <br><br> Engine Speed <br><br> Vehicle Speed | ------------------------------ <br><br> >= 2,000 RPM <br> >= 18.64 MPH <br> Enabled when a code clear is not active or not exiting device control Engine is not cranking Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true and Manufacturers enable counter is 0)Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active Fuel InjCkt Not (FA or TFTKO) EST Driver Not(FA) Misfire detected | -------------------- <br><br> Stuck Test Engine Run Time >= KtFHPD_t_Pump CntrlEngRunThr sh(See Supporting Tables) or Accumulating engine crank time >= KtFHPD_t_SnsP rfStuckCrankTm out(See Supporting Tables) | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Barometric Pressure<br>Inlet Air Temp<br>Fuel Temp | Not(FA) MAFR sensor Not (FA) MAPR sensor Not (FA) APSR Pedal sensor Not(FA) TPSR sensor Not (FA) VSPR speed sensor Not(FA) SystemRPM Not (FA) Manual Clutch not engaged or vehicle has automatic transmission All cylinder are fuel enabled and<br>>= 70.0 KPA<br>>= -20.0 DegC<br>-20 <= Temp degC <= 90 | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| High Pressure Sensor Out of Range Low | P0192 | This DTC Diagnoses High Pressure Sensor Out of Range Low | High Pressure Fuel Sensor | <= 4 % of 5Vref | Battery Voltage | >= 11 Volts<br><br>Engine Running | Both Run Continuously Engine Synchronous Mode 800 failures out of 1,000 samples Time Based Mode 400 failures out of 500 samples 6.25 ms Sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| High Pressure Sensor Out of Range High | P0193 | This DTC Diagnoses High Pressure Sensor Out of Range High | High Pressure Fuel Sensor | >= 96 % of 5Vref | Battery Voltage | >= 11 Volts<br><br>Engine Running | Both Run Continuously Engine Synchronous Mode 800 failures out of 1,000 samples Time Based Mode 400 failures out of 500 samples 6.25 ms Sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 1 Open Circuit - (SIDI) | P0201 | This DTC Diagnoses Injector 1 enable low side driver circuit for circuit faults. | Low current through the low side driver during operation indicates open circuit | Open circuit: ≥ 200 K Ω impedance between signal and controller ground | Battery Voltage Engine Running | >= 11 Volts >= 5 Seconds P062B not FA or TFTK | 10 failures out of 20 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 2 Open Circuit - (SIDI) | P0202 | This DTC Diagnoses Injector 2 enable low side driver circuit for circuit faults. | Low current through the low side driver during operation indicates open circuit | Open circuit: ≥ 200 K Ω impedance between signal and controller ground | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds<br><br>P062B not FA or TFTK | 10 failures out of 20 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 3 Open Circuit - (SIDI) | P0203 | This DTC Diagnoses Injector 3 enable low side driver circuit for circuit faults. | Low current through the low side driver during operation indicates open circuit | Open circuit: ≥ 200 K Ω impedance between signal and controller ground | Battery Voltage Engine Running | >= 11 Volts <br> >= 5 Seconds <br><br> P062B not FA or TFTK | 10 failures out of 20 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 4 Open Circuit - (SIDI) | P0204 | This DTC Diagnoses Injector 4 enable low side driver circuit for circuit faults. | Low current through the low side driver during operation indicates open circuit | Open circuit: ≥ 200 K Ω impedance between signal and controller ground | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds  P062B not FA or TFTK | 10 failures out of 20 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| TPS2 Circuit Low | P0222 | Detects a continuous or intermittent short or open in TPS2 circuit | TPS2 Voltage < | 0.250 | | Run/Crank voltage > 6.41<br><br><br><br>No 5V reference error or fault for # 4 5V reference circuit (P06A3) | 79 / 159 counts;<br><br>57 counts continuous; 3.125 ms /count in the ECM main processor | Type A, 1 Trips |

| Component/System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| TPS2 Circuit High | P0223 | Detects a continuous or intermittent short or open in TPS2 circuit | TPS2 Voltage > | 4.590 | | Run/Crank voltage > 6.41<br><br><br>No 5V reference error or fault for # 4 5V reference circuit (P06A3) | 79 / 159 counts;<br><br>57 counts continuous;<br>3.125 ms /count in the ECM main processor | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Secondary Circuit Low | P0231 | This DTC detects if the fuel pump control circuit is shorted to low | Fuel Pump Current | > 14.48A | Ignition<br><br>OR<br><br>HS Comm<br><br>OR<br><br>Fuel Pump Control<br><br>AND<br><br>Ignition Run/Crank Voltage | Run or Crank<br><br>enabled<br><br>enabled<br><br>9V < voltage < 32V | 72 test failures in 80 test samples if Fuel Pump Current <100A<br><br>1 sample/12.5 ms | DTC Type A<br><br>1 trip |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Secondary Circuit High | P0232 | This DTC detects if the fuel pump control circuit is shorted to high | Voltage measured at fuel pump circuit | > 3.86 V | a] Commanded fuel pump output b] Fuel pump control enable c] Time that above conditions are met | a] 0% duty cycle (off) b] False c] >= 4 sec | Once per trip 36 failures / 40 samples 1 sample / 12.5 millisec | Type A, 1 Trips |

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

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 1 Low side circuit shorted to ground (SIDI) | P0261 | This DTC Diagnoses Injector 1 enable low side driver circuit for circuit faults. | Voltage low across low side drive during off state indicates short-to-ground | Short to ground: ≤ 1 volt between signal and controller ground | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds<br><br>P062B not FA or TFTK | 10 failures out of 20 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 1 Low side circuit shorted to power (SIDI) | P0262 | This DTC Diagnoses Injector 1 enable low side driver circuit for circuit faults. | Voltage High across low side driver during On state indicates short to power | Short to power: 25 amp >= through low side driver | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds<br><br>P062B not FA or TFTK | 10 failures out of 20 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 2 Low side circuit shorted to ground (SIDI) | P0264 | This DTC Diagnoses Injector 2 enable low side driver circuit for circuit faults. | Voltage low across low side drive during off state indicates short-to-ground | Short to ground: ≤ 1 volt between signal and controller ground | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds  P062B not FA or TFTK | 10 failures out of 20 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 2 Low side circuit shorted to power (SIDI) | P0265 | This DTC Diagnoses Injector 2 enable low side driver circuit for circuit faults. | Voltage High across low side driver during On state indicates short to power | Short to power: 25 amp >= through low side driver | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds<br><br>P062B not FA or TFTK | 10 failures out of 20 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 3 Low side circuit shorted to ground (SIDI) | P0267 | This DTC Diagnoses Injector 3 enable low side driver circuit for circuit faults. | Voltage low across low side drive during off state indicates short-to-ground | Short to ground: ≤ 1 volt between signal and controller ground | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds  P062B not FA or TFTK | 10 failures out of 20 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 3 Low side circuit shorted to power (SIDI) | P0268 | This DTC Diagnoses Injector 3 enable low side driver circuit for circuit faults. | Voltage High across low side driver during On state indicates short to power | Short to power: 25 amp >= through low side driver | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds<br><br>P062B not FA or TFTK | 10 failures out of 20 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 4 Low side circuit shorted to ground (SIDI) | P0270 | This DTC Diagnoses Injector 4 enable low side driver circuit for circuit faults. | Voltage low across low side drive during off state indicates short-to-ground | Short to ground: ≤ 1 volt between signal and controller ground | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds<br><br>P062B not FA or TFTK | 10 failures out of 20 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 4 Low side circuit shorted to power (SIDI) | P0271 | This DTC Diagnoses Injector 4 enable low side driver circuit for circuit faults. | Voltage High across low side driver during On state indicates short to power | Short to power: 25 amp >= through low side driver | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds<br><br>P062B not FA or TFTK | 10 failures out of 20 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Random Misfire Detected | P0300 | These DTC's will determine if a random or a cylinder specific misfire is occurring by monitoring various terms derived from crankshaft velocity. The rate of misfire over an interval is compared to both emissions and catalyst damaging thresholds.  The pattern of crankshaft acceleration after the misfire is checked to differentiate between real misfire and other sources of crank shaft noise. | Deceleration Value vs. Engine Speed and Engine load<br><br>The equation used to calculate deceleration value is tailored to specific vehicle operating conditions. The selection of the equation used is based on the 1st tables encountered that are not max of range. If all tables are max of range at a given speed/load, that speed load region is an ***Undetectable region*** see Algorithm Description Document for additional details. | [<br>    (>**IdleSCD_Decel**<br>    AND<br>    > **IdleSCD_Jerk**)<br><br>OR<br>  (>**SCD_Decel**  AND<br>   > **SCD_Jerk**)<br><br>OR<br>  (>**IdleCylModeDecel**<br>   AND<br>   > **IdleCylModeJerk**)<br><br>OR<br>  (>**CylMode_Decel**<br>   AND<br>   > **CylMode_Jerk**)<br><br>OR<br>  (>**RevMode_Decel**)<br><br>OR WHILE in Cylinder Deactivation mode:<br>  (> **AFM_Decel**)<br>]<br>- see details on Supporting Tables Tab (P0300 Section) | Engine Run Time<br><br>Engine Coolant Temp<br>  Or If ECT at startup<br>  Then ECT<br><br>System Voltage<br>+ Throttle delta<br>- Throttle delta<br><br><br><br><br><br>Early Termination option: (used on plug ins that may not have enough engine run time at end of trip for normal interval to complete.) | > 2 crankshaft revolution<br><br>-7 ℃ < ECT <  125 ℃<br>< -7 ℃<br>21 ℃ < ECT <  125 ℃<br><br>9.00  < volts <  32.00<br>< 95.00 % per 25 ms<br>< 95.00 % per 25 ms<br><br><br><br><br><br>Not Enabled | Emission Exceedence = any ( 5 ) failed 200 rev blocks out of ( 16 ) 200 rev block tests<br><br>Failure reported for (1) Exceedence in 1st ( 16 ) 200 rev block tests, or ( 4 ) Exceedences thereafter.<br><br>OR<br>when Early Termination Reporting = Enabled and engine rev > 1,000  revs and < 3,200 revs at end of trip<br><br>any Catalyst Exceedence = ( 1 ) 200 rev block as data supports for catalyst damage.<br><br>Failure reported with (1 or 3) Exceedences in FTP, or (1) Exceedence outside FTP. | Type B, 2 Trips (Mil Flashes with Catalyst damage level of Misfire) |
| Cylinder 1 Misfire Detected | P0301 | | | | | | | |
| Cylinder 2 Misfire Detected | P0302 | | | | | | | |
| Cylinder 3 Misfire Detected | P0303 | | | | | | | |
| Cylinder 4 Misfire Detected | P0304 | | | | | | | |
| | | | Misfire Percent Emission Failure Threshold | ≥  0.63 % P0300 | | | | |
| | | | Misfire Percent Catalyst Damage | > **Catalyst_Damage_ Misfire_Percentage** in Supporting Tables | (at low speed/loads, one cylinder may not cause cat damage) | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | When engine speed and load are less than the FTP cals (3) catalyst damage exceedences are allowed. | whenever secondary conditions are met.<br><br>≤ 0 FTP rpm AND<br>≤ 0 FTP % load | Engine Speed<br>Engine Load<br>Misfire counts | > 1,400 rpm AND<br>> 22 % load AND<br>< 180 counts on one cylinder | Continuous | |
| | | | | disable conditions: | Engine Speed | 450 < rpm < ((Engine Over Speed Limit) - 400<br><br>Engine speed limit is a function of inputs like Gear and temperature<br><br>see **EngineOverSpeedLimit** in supporting tables | 4 cycle delay | |
| | | | | No active DTCs: | | TPS_FA<br>EnginePowerLimited<br>MAF_SensorTFTKO<br>MAP_SensorTFTKO<br>IAT_SensorTFTKO<br>ECT_Sensor_Ckt_TFTKO<br>5VoltReferenceB_FA<br>CrankSensorTFTKO<br>CrankSensorFA<br>CamLctnIntFA<br>CamLctnExhFA<br>CamSensorAnyLctnTFTKO<br>AnyCamPhaser_FA<br>AnyCamPhaser_TFTKO<br>AmbPresDfltdStatus | 4 cycle delay | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | P0315 & engine speed | > 1,000 rpm | 4 cycle delay | |
| | | | | | Fuel Level Low | LowFuelConditionDiagnostic | 500 cycle delay | |
| | | | | | Cam and Crank Sensors | in sync with each other | 4 cycle delay | |
| | | | | | Misfire requests TCC unlock | Not honored because Transmission in hot mode or POPD intrusive diagnostic running | 4 cycle delay | |
| | | | | | Fuel System Status | ≠ Fuel Cut | 4 cycle delay | |
| | | | | | Active FuelManagement | Transition in progress | 0 cycle delay | |
| | | | | | Undetectable engine speed and engine load region | *Undetectable region* from Malfunction Criteria | 4 cycle delay | |
| | | | | | Abusive Engine Over Speed | > 8,192 rpm | 0 cycle delay | |
| | | | | | Below zero torque (except CARB approved 3000 rpm to redline triangle.) | < *ZeroTorqueEngLoad* in Supporting Tables | 4 cycle delay | |
| | | | | | Below zero torque:  TPS  Vehicle Speed | ≤ 1 % > 19 mph | 4 cycle delay | |
| | | | | | EGR Intrusive test | Active | 12 cycle delay | |
| | | | | | Manual Trans | Clutch shift | 4 cycle delay | |
| | | | | | Accel Pedal Position AND Automatic transmission shift | > 100.00 % | 7 cycle delay | |
| | | | | | Driveline Ring Filter active | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early.<br><br>Filter Driveline ring:<br><br><br>Stop filter early:<br><br><br><br><br><br>Abnormal engine speed oscillations:<br>(Rough road etc)<br>Off Idle, number of consecutive decelerating cylinders after "misfire":<br>(Number of decels can vary with misfire detection equation)<br>TPS<br>Engine Speed<br>Veh Speed<br><br>Consecutive decels while in      SCD Mode<br>Cyl Mode<br>Rev Mode<br><br><br><br><br>Misfire Crankshaft Pattern Recognition checks each "misfire" candidate in 100 engine Cycle test to see if it looks like real misfire, or some disturbance like rough road.  The check is | > "**Ring Filter**" # of engine cycles after misfire in Supporting Tables<br><br>> "**Number of Normals**" # of engine cycles after misfire in Supporting Tables tab<br><br><br><br><br><br><br><br><br><br>> 3 %<br>> 1,000 rpm<br>> 3 mph<br><br>> **Abnormal SCD Mode**<br>> **Abnormal Cyl Mode**<br>> **Abnormal Rev Mode**<br>in Supporting Tables | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | based on a multiplier times the ddt_jerk value used to detect misfire at that speed and load. At the end of 100 engine cycle test, the ratio of unrecog/recognized is checked to confirm if real misfire is present. | | | |
| | | | | | Pattern Recog Enabled: | Disabled | | |
| | | | | | Engine Speed | 700 < rpm < 3,000 | | |
| | | | | | Veh Speed | > 0.6 mph | | |
| | | | | | "misfire" unrecognized if: Crankshaft snap after: | | | |
| | | | | | isolated "misfire" | > **Min_PatternMultiplier** | | |
| | | | | | repetative "misfire" | > **Max_PatternMultiplier** in Supporting Tables | | |
| | | | | | Ratio of Unrecog/Recog | > 1.00 | discard test | |
| | | | | | Rough Road: Non-Crankshaft based: | Disabled | | |
| | | | | | Rough Road Source | Wheel Speed in ECM | | |
| | | | | | IF Rough Road Source = WheelSpeedInECM | | | |
| | | | | | ABS/TCS | active | discard test | |
| | | | | | Wheel speed noise | > WSSRoughRoadThres | | |
| | | | | | VSES | active | | |
| | | | | | IF Rough Road Source = "FromABS" | | | |
| | | | | | ABS/TCS | active | discard test | |
| | | | | | RoughRoad | detected | | |
| | | | | | VSES | active | | |
| | | | | | IF Rough Road Source = "TOSS" | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | TOSS dispersion | >**TOSSRoughRoadThres** in supporting tables | discard test | |
| | | | | | AND No Active DTCs | Transmission Output Shaft Angular Velocity Validity TransmissionEngagedStat e_FA (Auto Trans only) Clutch Sensor FA (Manual Trans only) | 4 cycle delay | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Crankshaft Position System Variation Not Learned | P0315 | Monitor for valid crankshaft error compensation factors | Sum of Compensation factors. Each Cylinder pair shares one compensation factor. A perfect factor would be 1.0000. Unlearned factors are defaulted out of range so the sum of factors would be out of range. | ≥ 2.0040 OR ≤ 1.9960 | OBD Manufacturer Enable Counter | MEC = 0 | 0.50 seconds Frequency Continuous100 msec | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Knock Sensor (KS) Performance Per Cylinder | P0324 | This diagnostic checks for knock sensor performance out of the normal expected range on a per cylinder basis due to:<br>1. Excessive knock or<br>2. Abnormal engine noise or<br>3. Flat signal | Common Enable Criteria<br><br>(Applies to all 3 parts of the performance diag)<br><br><br><br><br><br><br><br>Specific Enable Criteria and Thresholds for 3 individual parts of the performance diag:<br>- - - - - - - - - - - - - - - - - -<br>1. Excessive Knock Diag: Filtered Knock Intensity<br><br>VaKNKD_k_PerfCylKnock IntFilt<br>(where 'Knock Intensity' = 0 with no knock; and > 0 & proportional to knock magnitude with knock)<br>- - - - - - - - - - - - - - - - - -<br>2. Abnormal Noise Diag:<br><br>Filtered FFT Intensity<br><br>(where 'FFT Intensity' = Non-knocking, background noise) | <br><br><br><br><br><br><br><br><br><br><br><br><br>- - - - - - - - - - - - - - - - -<br>> 2.10 (no units)<br><br><br><br><br><br><br><br><br>- - - - - - - - - - - - - - - - -<br><br><br><**AbnormalNoise_Thre shold** (see Supporting Tables) | Diagnostic Enabled?<br><br>Engine Run Time<br><br>Engine Speed<br><br>Engine Air Flow<br><br><br><br>ECT<br><br>IAT<br><br><br><br><br><br><br><br>- - - - - - - - - - - - - - - -<br>Engine Speed<br><br>Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle)<br><br><br><br>- - - - - - - - - - - - - - -<br>Individual Cylinders enabled for Abnormal Noise<br><br><br>Engine Speed<br><br>Cumlative Number of Engine Revs Above Min Eng Speed (per key | Yes<br><br>≥ 2.0 seconds<br><br>≤ 8,500 RPM<br><br>≥ 0 mg/cylinder<br>and<br>≤ 2,000 mg/cylinder<br><br>≥ -40 deg's C<br><br>≥ -40 deg's C<br><br><br><br><br><br><br>- - - - - - - - - - - - - - - -<br>≥ 550 RPM<br><br>≥ 300 Revs<br><br><br><br><br><br>- - - - - - - - - - - - - - -<br>See **AbnormalNoise_ CylsEnabled** (Supporting Tables)<br><br><br>≥ 8,500 RPM<br><br>≥ 400 Revs | <br><br><br><br><br><br><br><br><br><br>First Order Lag Filters with Weight Coefficients<br>- - - - - - - - - - - - - -<br>Excessive Knk Weight Coefficient = 0.0100<br><br>Updated each engine event<br><br><br><br><br>- - - - - - - - - - - - - -<br>Abn Noise Weight Coefficient = 0.0150<br><br>Updated each engine event | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | - - - - - - - - - - - - - - - - - - -<br><br>3. Flat Signal Diag: Filtered Signal Delta (Current FFT Intensity - Ave_Intensity_No-Knock)<br><br>VaKNKD_k_PerfCylFlatFil tInt | - - - - - - - - - - - - - - - - -<br><br>< 0.008 (no units) | cycle)<br>- - - - - - - - - - - - - - - - - - -<br><br>Engine Speed<br><br>Cumlative Number of Engine Revs Above Min Eng Speed (per keycycle) | - - - - - - - - - - - - - - - - - - -<br><br>≥ 8,500 RPM<br><br>≥ 400 Revs | - - - - - - - - - - - - - - -<br><br>Flat Signal Weight Coefficient = 0.010<br><br>Updated each engine event | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Knock Sensor (KS) Circuit Bank 1 | P0325 | This diagnostic checks for an open in the knock sensor circuit | Filtered FFT Output | > **OpenCktThrshMin** and < **OpenCktThrshMax** <br><br>**See Supporting Tables** <br><br>Thresholds for OpenMethod = 20 kHz: **OpenCktThrshMin (20 kHz) & OpenCktThrshMax (20 kHz)** <br><br>Thresholds for OpenMethod = NormalNoise: **OpenCktThrshMin (Normal Noise) & OpenCktThrshMax (Normal Noise)** | Diagnostic Enabled? <br><br>Engine Run Time <br><br>Engine Speed <br><br><br><br>Cumulative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) <br><br>Engine Air Flow <br><br><br><br>ECT <br><br>IAT | Yes <br><br>≥ 2.0 seconds <br><br>≥ 550 RPM and ≤ 8,500 RPM <br><br>≥ 200 revs <br><br><br><br>≥ 20 mg/cylinder and ≤ 2,000 mg/cylinder <br><br>≥ -40 deg's C <br><br>≥ -40 deg's C | First Order Lag Filter with Weight Coefficient <br><br>Weight Coefficient = 0.0120 <br><br>Updated each engine event | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Knock Sensor (KS) Performance Bank 1 | P0326 | This diagnostic checks for knock sensor performance out of the normal expected range, on a per sensor basis, due to 1. Excessive knock or 2. Abnormal engine noise or 3. Flat signal | Common Enable Criteria (Applies to all 3 parts of the performance diag) | | Diagnostic Enabled? <br><br> Engine Run Time <br><br> Engine Speed <br><br> Engine Air Flow <br><br><br><br><br> ECT <br><br> IAT | Yes <br><br> ≥ 2.0 seconds <br><br> ≤ 8,500 RPM <br><br> ≥ 20 mg/cylinder and ≤ 2,000 mg/cylinder <br><br> ≥ -40 deg's C <br><br> ≥ -40 deg's C | | Type B, 2 Trips |
| | | | Specific Enable Criteria and Thresholds for 3 individual parts of the performance diag: <br>- - - - - - - - - - - - - - - - - - <br> 1. Excessive Knock Diag: Filtered Knock Intensity <br><br> (where 'Knock Intensity' = 0 with no knock; and > 0 & proportional to knock magnitude with knock) | - - - - - - - - - - - - - - - - <br> > 2.10 (no units) | - - - - - - - - - - - - - - - - - <br> Engine Speed <br><br> Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle) | - - - - - - - - - - - - - - - - <br> ≥ 550 RPM <br><br> ≥ 200 Revs | First Order Lag Filters with Weight Coefficients <br>- - - - - - - - - - - - <br> Excessive Knk Weight Coefficient = <br><br> 0.0100 <br><br> Updated each engine event | |
| | | | - - - - - - - - - - - - - - - - - - <br> 2. Abnormal Noise Diag: <br><br> Filtered FFT Intensity: (where 'FFT Intensity' = Non-knocking, background noise) | - - - - - - - - - - - - - - - - <br> < **AbnormalNoise_ Threshold** (see Supporting Tables) | - - - - - - - - - - - - - - - - - <br> Individual Cylinders enabled for Abnormal Noise <br><br><br> Engine Speed <br><br> Cumlative Number of Engine Revs Above Min Eng Speed (per key | - - - - - - - - - - - - - - - - <br> See **AbnormalNoise_ CylsEnabled** (Supporting Tables) <br><br> ≥ 2,000 RPM <br><br> ≥ 200 Revs | - - - - - - - - - - - - <br> Abnormal Noise Weight Coefficient = <br><br> 0.0050 <br><br> Updated each engine event | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | cycle) | | | |
| | | | 3. Flat Signal Diag: Filtered Signal Delta (Current FFT Intensity - Ave_Intensity_No-Knock) | < 0.008  (no units) | Engine SpeedCumlative Number of Engine Revs Above Min Eng Speed (per keycycle) | ≥ 550  RPM  ≥ 200 Revs | Flat Signal  Weight Coefficient =  0.010  Updated each engine event | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Knock Sensor (KS) Circuit Low Bank 1 | P0327 | This diagnostic checks for an out of range low knock sensor signal | Sensor Input or Return Signal Line | <  8.0  Percent<br><br>(of 5 V reference) | Diagnostic Enabled?<br><br>Engine Speed | Yes<br><br>>  0  RPM<br>        and<br><  8,500  RPM | 50  Failures<br>      out of<br>63  Samples<br><br>100 msec rate | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Knock Sensor (KS) Circuit High Bank 1 | P0328 | This diagnostic checks for an out of range high knock sensor signal | Sensor Input or Return Signal Line | > 39.0 Percent<br><br>(of 5 Volt Reference) | Diagnostic Enabled?<br><br>Engine Speed | Yes<br><br>> 0 RPM<br>and<br>< 8,500 RPM | 50 Failures out of 63 Samples<br><br>100 msec rate | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Knock Sensor (KS) Circuit Bank 2 | P0330 | This diagnostic checks for an open in the knock sensor circuit | Filtered FFT Output | > OpenCktThrshMin and < OpenCktThrshMax<br><br>**See Supporting Tables**<br><br>Thresholds for OpenMethod = 20 kHz:<br><br>**OpenCktThrshMin (20 kHz) & OpenCktThrshMax (20 kHz)**<br><br>Thresholds for OpenMethod = NormalNoise:<br><br>**OpenCktThrshMin (Normal Noise) & OpenCktThrshMax (Normal Noise)** | Diagnostic Enabled?<br><br>Engine Run Time<br><br>Engine Speed<br><br><br><br>Cumlative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above)<br><br>Engine Air Flow<br><br><br><br>ECT<br><br>IAT | Yes<br><br>≥ 2.0 seconds<br><br>≥ 550 RPM and ≤ 8,500 RPM<br><br>200 revs<br><br><br><br>≥ 20 mg/cylinder and ≤ 2,000 mg/cylinder<br><br>≥ -40 deg's C<br><br>≥ -40 deg's C | First Order Lag Filter with Weight Coefficient<br><br>Weight Coefficient = 0.0120<br><br>Updated each engine event | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Knock Sensor (KS) Performance Bank 2 | P0331 | This diagnostic checks for knock sensor performance out of the normal expected range, on a per sensor basis, due to<br>1. Excessive knock or<br>2. Abnormal engine noise on a per bank basis or<br>3. Flat signal | Common Enable Criteria<br><br>(Applies to all 3 parts of the performance diag) | | Diagnostic Enabled?<br><br>Engine Run Time<br><br>Engine Speed<br><br>Engine Air Flow<br><br><br>ECT<br><br>IAT | Yes<br><br>≥ 2.0 seconds<br><br>≤ 8,500 RPM<br><br>≥ 20 mg/cylinder and<br>≤ 2,000 mg/cylinder<br><br>≥ -40 deg's C<br><br>≥ -40 deg's C | | Type B, 2 Trips |
| | | | Specific Enable Criteria and Thresholds for 3 individual parts of the performance diag:<br>- - - - - - - - - - - - - - - - | | - - - - - - - - - - - - - - - - | - - - - - - - - - - - - - - - - | First Order Lag Filters with Weight Coefficients<br>- - - - - - - - - - - - | |
| | | | 1. Excessive Knock Diag: Filtered Knock Intensity<br><br>(where 'Knock Intensity' = 0 with no knock; and > 0 & proportional to knock magnitude with knock) | > 2.10 (no units) | Engine Speed<br><br>Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle) | ≥ 550 RPM<br><br>≥ 200 Revs | Excessive knk Weight Coefficient = 0.0100<br><br>Updated each engine event | |
| | | | - - - - - - - - - - - - - - - - <br>2. Abnormal Noise Diag:<br><br>Filtered FFT Intensity:<br><br>(where 'FFT Intensity' = Non-knocking, background noise) | - - - - - - - - - - - - - - - - <br>< **AbnormalNoise_Thre shold** (see Supporting Tables) | - - - - - - - - - - - - - - - - <br>Individual Cylinders enabled for Abnormal Noise<br><br>Engine Speed<br><br>Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle) | See **AbnormalNoise_ CylsEnabled** (Supporting Tables)<br><br>≥ 2,000 RPM<br><br>≥ 200 Revs | - - - - - - - - - - - - <br>Abnormal Noise Weight Coefficient = 0.0050<br><br>Updated each engine event | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | - - - - - - - - - - - - - - - - - - <br> 3. Flat Signal Diag: Filtered Signal Delta (Current FFT Intensity - Ave_Intensity_No-Knock) | - - - - - - - - - - - - - - - - - - <br> < 0.008 (no units) | - - - - - - - - - - - - - - - - - - <br> Engine SpeedCumlative Number of Engine Revs Above Min Eng Speed (per keycycle) | - - - - - - - - - - - - - - - - - - <br> ≥ 550 RPM≥ 200 Revs | - - - - - - - - - - - <br> Flat Signal Weight Coefficient = 0.010 Updated each engine event | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Knock Sensor (KS) Circuit Low Bank 2 | P0332 | This diagnostic checks for an out of range low knock sensor signal | Sensor Input or Return Signal Line | < 8.0 Percent <br><br> (of 5 Volt Reference) | Diagnostic Enabled? <br><br> Engine Speed | Yes <br><br> > 0 RPM <br> and <br> < 8,500 RPM | 50 Failures out of 63 Samples <br><br> 100 msec rate | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Knock Sensor (KS) Circuit High Bank 2 | P0333 | This diagnostic checks for an out of range high knock sensor signal | Sensor Input or Return Signal Line | > 39.00 Percent<br><br>(of 5 Volt Reference) | Diagnostic Enabled?<br><br>Engine Speed | Yes<br><br>> 0 RPM<br>  and<br>< 8,500 RPM | 50 Failures out of<br>63 Samples<br><br>100 msec rate | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Crankshaft Position (CKP) Sensor A Circuit | P0335 | Determines if a fault exists with the crank position sensor signal | Time since last crankshaft position sensor pulse received | >= 4.0 seconds | Starter engaged AND (cam pulses being received OR ( DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow |  = FALSE  = FALSE  = FALSE  > 3.0 grams/second ) ) | Continuous every 100 msec | Type B, 2 Trips |
|  |  |  | No crankshaft pulses received | >= 1.0 seconds | Engine is Running  Starter is not engaged  No DTC Active: | 5VoltReferenceB_FA | Continuous every 12.5 msec |  |
|  |  |  | No crankshaft pulses received |  | Engine is Running OR Starter is engaged  No DTC Active: | 5VoltReferenceA_FA 5VoltReferenceB_FA P0365 P0366 | 2 failures out of 10 samples  One sample per engine revolution |  |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Crankshaft Position (CKP) Sensor A Performance | P0336 | Determines if a performance fault exists with the crank position sensor signal | Time in which 10 or more crank re-synchronizations occur | < 10.0 seconds | Engine Air Flow<br><br>Cam-based engine speed<br><br>No DTC Active: | >= 3.0 grams/second<br><br>> 450 RPM<br><br>5VoltReferenceB_FA<br>P0335 | Continuous every 250 msec | Type B, 2 Trips |
| | | | No crankshaft synchronization gap found | >= 0.4 seconds | Engine is Running<br><br>Starter is not engaged<br><br>No DTC Active: | <br><br><br><br>5VoltReferenceB_FA | Continuous every 12.5 msec | |
| | | | Time since starter engaged without detecting crankshaft synchronization gap | >= 1.5 seconds | Starter engaged<br>AND<br>(cam pulses being received<br>OR<br>( DTC P0101<br>AND<br>DTC P0102<br>AND<br>DTC P0103<br>AND<br>Engine Air Flow | <br><br><br><br><br><br>= FALSE<br><br>= FALSE<br><br>= FALSE<br><br>> 3.0 grams/second ) ) | Continuous every 100 msec | |
| | | | Crank pulses received in one engine revolution<br>OR<br>Crank pulses received in one engine revolution | < 51<br><br><br>> 65 | Engine is Running<br>OR<br>Starter is engaged<br><br>No DTC Active: | <br><br><br><br>5VoltReferenceA_FA<br>5VoltReferenceB_FA<br>P0365<br>P0366 | 8 failures out of 10 samples<br><br>One sample per engine revolution | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor A | P0340 | Determines if a fault exists with the cam position bank 1 sensor A signal | Time since last camshaft position sensor pulse received<br><br>OR<br><br>Time that starter has been engaged without a camshaft sensor pulse | >= 5.5 seconds<br><br><br><br><br>>= 4.0 seconds | Starter engaged AND (cam pulses being received OR ( DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow | <br><br><br><br>= FALSE<br><br>= FALSE<br><br>= FALSE<br><br>> 3.0 grams/second ) ) | Continuous every 100 msec | Type B, 2 Trips |
| | | | Fewer than 4 camshaft pulses received in a time | > 3.0 seconds | Engine is running<br><br>Starter is not engaged<br><br>No DTC Active: | <br><br><br><br>5VoltReferenceA_FA | Continuous every 100 msec | |
| | | | No camshaft pulses received during first 12 MEDRES events (There are 12 MEDRES events per engine cycle | | Crankshaft is synchronized<br><br>Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged<br><br>No DTC Active: | <br><br><br><br><br><br><br><br>5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA | Continuous every MEDRES event | |
| | | | The number of camshaft pulses received during 100 engine cycles | = 0 | Crankshaft is synchronized<br><br>No DTC Active: | <br><br><br>5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA | 8 failures out of 10 samples<br><br>Continuous every engine cycle | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Camshaft Position (CMP) Sensor Performance Bank 1 Sensor A | P0341 | Determines if a performance fault exists with the cam position bank 1 sensor A signal | The number of camshaft pulses received during first 12 MEDRES events is OR (There are 12 MEDRES events per engine cycle) | < 4 > 10 | Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active: | 5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensorFA | Continuous every MEDRES event | Type B, 2 Trips |
| | | | The number of camshaft pulses received during 100 engine cycles OR | < 398 > 402 | Crankshaft is synchronized No DTC Active: | 5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensorFA | 8 failures out of 10 samples Continuous every engine cycle | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| IGNITION CONTROL #1 CIRCUIT | P0351 | Diagnoses the Ignition Control (EST) low side driver circuit for circuit faults. Monitors EST for Cylinder 1 (Cylinders 1 and 4 for V6 with waste spark). | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.<br><br>Voltage low during driver off state (indicates short-to-ground or open circuit)<br><br><br><br>Voltage high during driver on state (indicates short-to-power) | <br><br><br><br><br>Short to ground:<br>≤ 0.5 Ω impedance between signal and controller ground<br><br>Open Circuit:<br>≥ 200 kΩ impedance between signal and controller ground<br><br>Short to power:<br>≤ 0.5 Ω impedance between signal and controller power | Engine running<br><br>Ignition Voltage | <br><br>> 5.00 Volts | 50 Failures out of 63 Samples<br><br>100 msec rate | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| IGNITION CONTROL #2 CIRCUIT | P0352 | Diagnoses the Ignition Control (EST) low side driver circuit for circuit faults. Monitors EST for Cylinder 2 (Cylinders 2 and 5 for V6 with waste spark). | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.<br><br>Voltage low during driver off state (indicates short-to-ground or open circuit) | Short to ground: $\leq 0.5~\Omega$ impedance between signal and controller ground<br><br>Open Circuit: $\geq 200~k\Omega$ impedance between signal and controller ground | Engine running<br><br>Ignition Voltage | > 5.00 Volts | 50 Failures out of 63 Samples<br><br>100 msec rate | Type B, 2 Trips |
| | | | Voltage high during driver on state (indicates short-to-power) | Short to power: $\leq 0.5~\Omega$ impedance between signal and controller power | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| IGNITION CONTROL #3 CIRCUIT | P0353 | Diagnoses the Ignition Control (EST) low side driver circuit for circuit faults. Monitors EST for Cylinder 3 (Cylinders 3 and 6 for V6 with waste spark). | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.<br><br>Voltage low during driver off state (indicates short-to-ground or open circuit) | Short to ground: $\leq 0.5\ \Omega$ impedance between signal and controller ground<br><br>Open Circuit: $\geq 200\ k\Omega$ impedance between signal and controller ground | Engine running<br><br>Ignition Voltage | > 5.00 Volts | 50 Failures out of 63 Samples<br><br>100 msec rate | Type B, 2 Trips |
| | | | Voltage high during driver on state (indicates short-to-power) | Short to power: $\leq 0.5\ \Omega$ impedance between signal and controller power | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| IGNITION CONTROL #4 CIRCUIT | P0354 | Diagnoses the Ignition Control (EST) low side driver circuit for circuit faults. Monitors EST for Cylinder 4 (if applicable). | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.<br><br>Voltage low during driver off state (indicates short-to-ground or open circuit) | <u>Short to ground</u>: ≤ 0.5 Ω impedance between signal and controller ground<br><br><u>Open Circuit</u>: ≥ 200 kΩ impedance between signal and controller ground | Engine running<br><br>Ignition Voltage | > 5.00 Volts | 50 Failures out of 63 Samples<br><br>100 msec rate | Type B, 2 Trips |
| | | | Voltage high during driver on state (indicates short-to-power) | <u>Short to power</u>: ≤ 0.5 Ω impedance between signal and controller power | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor B | P0365 | Determines if a fault exists with the cam position bank 1 sensor B signal | Time since last camshaft position sensor pulse received<br><br>OR<br><br>Time that starter has been engaged without a camshaft sensor pulse | >= 5.5 seconds<br><br><br><br><br><br><br>>= 4.0 seconds | Starter engaged AND (cam pulses being received OR ( DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow | <br><br><br><br><br><br>= FALSE<br><br>= FALSE<br><br>= FALSE<br><br>> 3.0 grams/second ) ) | Continuous every 100 msec | Type B, 2 Trips |
| | | | Fewer than 4 camshaft pulses received in a time | > 3.0 seconds | Engine is running<br><br>Starter is not engaged<br><br>No DTC Active: | <br><br><br><br>5VoltReferenceA_FA | Continuous every 100 msec | |
| | | | No camshaft pulses received during first 12 MEDRES events (There are 12 MEDRES events per engine cycle | | Crankshaft is synchronized<br><br>Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged<br><br>No DTC Active: | <br><br><br><br><br><br><br><br>5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA | Continuous every MEDRES event | |
| | | | The number of camshaft pulses received during 100 engine cycles | = 0 | Crankshaft is synchronized<br><br>No DTC Active: | <br><br><br>5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA | 8 failures out of 10 samples<br><br>Continuous every engine cycle | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Camshaft Position (CMP) Sensor Performance Bank 1 Sensor B | P0366 | Determines if a performance fault exists with the cam position bank 1 sensor B signal | The number of camshaft pulses received during first 12 MEDRES events is OR (There are 12 MEDRES events per engine cycle) | < 4 > 10 | Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active: | 5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensorFA | Continuous every MEDRES event | Type B, 2 Trips |
| | | | The number of camshaft pulses received during 100 engine cycles OR | < 398 > 402 | Crankshaft is synchronized No DTC Active: | 5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensorFA | 8 failures out of 10 samples Continuous every engine cycle | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Secondary AIR Incorrect Airflow | P0411 | Detects an insufficient flow condition. This test is run during Phase 1 (AIR pump commanded On, Valve commanded Open). Leaks downstream of the valve are detected via an evaluation of average pressure error and average "String Length"(SL) – a term that represents the absolute pressure delta accumulated every 6.25ms, then averaged over the duration of the test. Low SL values are indicative of downstream leaks or blockages. | Average Pressure Error or<br><br>OR the following String Length (SL) Test:<br><br>Average Pressure Error or<br><br>and the Average String Length<br><br><br>NOTE: Average Pressure Error is the average difference between the predicted pressure and the measured pressure | > 4.5 kPa<br>< -7.5 kPa<br><br><br><br><br>> 5.0 kPa<br>< -1.0 kPa<br><br><br>< **SL Threshold Bank 1 Table** | BARO<br>Inlet Air Temp<br>Coolant Temp<br>Engine off time<br>System Voltage<br>MAP not<br>Engine Speed<br>MAF not<br><br>SL Stability time<br>SL RPM range<br><br><br>No active DTCs: | > 60 kPa<br>> -11.0 deg C<br>> -11.0 deg C < 56.0<br>> 1,800.0 seconds<br>> 10.0 Volts < 32.0<br>< 20 kPa for 2.0 sec<br>< 5,000 RPM<br>> 50 gm/s for 3.0 sec<br><br>> 4.0 seconds<br>< 4,700 RPM > 4,900<br><br><br>AIRSystemPressureSensor FA<br>AIRValveControlCircuit FA<br>AIRPumpControlCircuit FA<br>MAF_SensorFA<br>AmbientAirDefault_NA<br>IAT_SensorFA<br>ECT_Sensor_FA<br>EngineMisfireDetected_FA<br>CatalystSysEfficiencyLoB1_FA<br>CatalystSysEfficiencyLoB2_FA<br>ControllerProcessorPerf_FA<br>IgnitionOutputDriver_FA<br>FuelInjectorCircuit_FA | Phase 1 Conditional test weight > 7.0 seconds<br><br>Total 'String Length' accumulation time > 10.0 sec<br><br>Frequency: Once per trip when AIR pump is commanded On<br><br>Conditional test weight is calculated by multiplying the following Factors:<br>**Phase 1 Baro Test Weight Factor, Phase 1 MAF Test Weight Factor, Phase 1 System Volt Test Weight Factor, Phase 1 Ambient Temp Test Weight Factor**<br>(see Supporting Tables) | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Secondary AIR Solenoid Control Circuit | P0412 | This DTC checks the AIR solenoid circuit for electrical integrity | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. | 20 failures out of 25 samples | System Voltage | > 10.0 Volts < 32.0 | 25 samples (250 ms per sample)<br><br>Continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Secondary AIR Pump Control Circuit | P0418 | This DTC checks the AIR Pump circuit for electrical integrity | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. | 20 failures out of 25 samples | System Voltage | > 10.0 Volts < 32.0 | 25 samples (250 ms per sample)<br><br>Continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Catalyst System Low Efficiency Bank 1 | P0420 | NOTE: The information contained below applies to applications that use the Idle Catalyst Monitor Algorithm<br><br>The catalyst washcoat contains Cerium Oxide. Cerium Oxide reacts with NO and O2 during lean A/F excursions to store the excess oxygen (I.e. Cerium Oxidation). During rich A/F excursions, Cerium Oxide reacts with CO and H2 to release this stored oxygen (I.e. Cerium Reduction). This is referred to as the Oxygen Storage Capacity, or OSC. CatMon's strategy is to "measure" the OSC of the catalyst through forced Lean and Rich A/F excursions<br><br>Normalized Ratio OSC Value Calculation Information and Definitions =<br>1. Raw OSC Calculation = (post cat O2 Resp time - pre cat O2 Resp time)<br>2. BestFailing OSC value from a calibration table (based on temp and exhaust gas flow) | Normalized Ratio OSC Value (EWMA filtered) | < 0.35 | There must be a valid idle period. The criteria are:<br><br>Driver must be off the accel pedal. This checks that the final accel pedal position (comprehending deadband and hysteresis) is essentially zero.<br><br>Idle Speed Control System Is Active<br><br>Vehicle Speed<br><br>Engine speed<br><br>Engine run time<br><br>Tests attempted this trip<br><br>The catalyst diagnostic has not yet completed for the current trip.<br><br>Catalyst Idle Conditions Met Criteria is satified which includes the General Enable met and the Valid Idle Period | < 1.24 MPH<br><br>> 1,100 RPM for a minimum of 35 seconds since end of last idle period.<br><br>> **CatmonMinEngineRunTimeToEnable** This is a function of Coolant Temperature, please see "Supporting Tables" for details.<br><br>< 255 | 1 test attempted per valid idle period<br><br>Minimum of 1 test per trip<br><br>Maximum of 8 tests per trip<br><br>Frequency: Fueling Related : 12.5 ms<br><br>OSC Measurements: 100 ms<br><br>Temp Prediction: 12.5ms | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | 3. WorstPassing OSC value (based on temp and exhaust gas flow) | | | Criteria met, as well as: | | | |
| | | | | | Green Converter Delay | Not Active | | |
| | | Normalized Ratio Calculation = (1-2) / (3-2) | | | Induction Air | > -20 ° C < 250 ° C | | |
| | | A Normalized Ratio of 1 essentially represents a good part and a ratio of 0 essentially represents a very bad part.The Catalyst Monitoring Test is done during idle. Several conditions must be meet in order to execute this test. These conditions and their related values are listed in the secondary parameters area of this document. | | | Intrusive test(s): Fueltrim Post O2 EVAP EGROther vehicle functions: | Not Active | | |
| | | | | | Power Take Off RunCrank Voltage Ethanol Estimation | Not Active > 10.90 Volts NOT in Progress | | |
| | | | | | ECT | > 50 ° C < 130 ° C | | |
| | | | | | Barometric Pressure | > 70 KPA | | |
| | | | | | Idle Time before going intrusive is | < 50 Seconds | | |
| | | | | | Idle time is incremented if Vehicle speed | < 1.24 MPH and the drivers foot is off accel pedal and the idle speed control system is active as identified in the Valid Idle Period Criteria section. | | |
| | | | | | Short Term Fuel Trim | > 0.90 < 1.30 | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Predicted catalyst temp<br><br>AND<br><br>Engine Airflow | > 575.00 degC<br><br>><br>**CatmonMinAirflowForWarmCatalystDetermination**<br><br>table (g/s)<br>(refer to "Supporting Tables" tab)<br>(Based on engine coolant at the time the WarmedUpEvents counter resets to 0.) | | |
| | | | | | for at least | 22 seconds | | |
| | | | | | with a closed throttle time | < 120 seconds consecutively (closed throttle consideration involves having the driver off the accel pedal as stated in the Valid Idle Period Criteria Section) . | | |
| | | | | | Also, in order to increment the WarmedUpEvents counter, either the vehicle speed must exceed the vehicle speed cal or the driver must NOT be off the accel pedal as stated in the Valid Idle Period Criteria section above. | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Closed loop fueling (Please see "Closed Loop Enable Criteria" section of the "Supporting Tables" tab for details.) | | | |
| | | | | | PRNDL | Enabled in Drive Range on an Auto Transmission vehicle. | | |
| | | | | | Idle Stable Criteria: | Must hold true from after Catalyst Idle Conditions Met to the end of test | | |
| | | | | | MAF | > 2.50 g/s < 11.00 g/s | | |
| | | | | | Predicted catalyst temperature | < 850 degC | | |
| | | | | | Engine Fueling Criteria at Beginning of Idle Period The following fueling related must also be met from between 4 and 7 seconds after the Catalyst Idle Conditions Met Criteria has been met for at least 4 seconds prior to allowing intrusive control: | | | |
| | | | | | Number of pre-O2 switches | >= 2 | | |
| | | | | | Short Term Fuel Trim Avg | > 0.96 < 1.04 | | |
| | | | | | Rapid Step Response | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | (RSR) feature will initiate multiple tests: | | | |
| | | | | | If the difference between current EWMA value and the current OSC Normalized Ratio value is | > 0.53 | | |
| | | | | | and the current OSC Normalized Ratio value  is | < 0.10 | | |
| | | | | | Maximum RSR tests to detect failure when RSR is enabled. | 24 | | |
| | | | | | Green Converter Delay Criteria This is part of the check for the Catalyst Idle Conditions Met Criteria section | | | |
| | | | | | The diagnostic will not be enabled until the following has been met: | | | |
| | | | | | Predicted catalyst temperature | > 0 ° C | | |
| | | | | | for | 0  seconds non-continuously. | | |
| | | | | | Note:  this feature is only enabled when the vehicle is new and cannot be enabled in service | | | |
| | | | | | PTO | Not Active | | |
| | | | | | General Enable DTC's Not Set | MAF_SensorFA MAF_SensorTFTKO AmbPresDfltdStatus | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | IAT_SensorCircuitFA IAT_SensorCircuitTFTKO ECT_Sensor_FA O2S_Bank_1_Sensor_1_ FA O2S_Bank_1_Sensor_2_ FA O2S_Bank_2_Sensor_1_ FA O2S_Bank_2_Sensor_2_ FA FuelTrimSystemB1_FA FuelTrimSystemB1_TFTK O FuelTrimSystemB2_FA FuelTrimSystemB2_TFTK O EngineMisfireDetected_F A EvapPurgeSolenoidCircuit _FA IAC_SystemRPM_FA EGRValvePerformance_F A EGRValveCircuit_FA CamSensorAnyLocationF A CrankSensorFA TPS_Performance_FA EnginePowerLimited | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Evaporative Emission (EVAP) System Small Leak Detected<br><br>(Not Sealed Fuel System) | P0442 | This DTC will detect a small leak (≥ 0.020") in the EVAP system between the fuel fill cap and the purge solenoid. On some applications a small leak is defined as ≥ 0.025", 0.030", or 0.150". The engine off natural vacuum method (EONV) is used. EONV is an evaporative system leak detection diagnostic that runs when the vehicle is shut off when enable conditions are met. Prior to sealing the system and performing the diagnostic, the fuel volatility is analyzed. In an open system (Canister Vent Solenoid [CVS] open) high volatility fuel creates enough flow to generate a measurable pressure differential relative to atmospheric.After the volatility check, the vent solenoid will close. After the vent is closed, typically a build up of pressure from the hot soak begins (phase-1). The pressure typically will peak and then begin to decrease as the fuel cools. When | The total delta from peak pressure to peak vacuum during the test is normalized against a calibration pressure threshold table that is based upon fuel level and ambient temperature. (Please see **P0442: EONV Pressure Threshold (Pascals) Table** in Supporting Tables). The normalized value is calculated by the following equation: 1 - (peak pressure - peak vacuum) / pressure threshold. The normalized value is entered into EWMA (with 0= perfect pass and 1= perfect fail).<br><br>When EWMA is<br><br>the DTC light is illuminated.<br><br>The DTC light can be turned off if the EWMA is<br><br>and stays below the EWMA fail threshold for 3 additional consecutive trips. | > 0.57 (EWMA Fail Threshold),<br><br><br><br>≤ 0.35 (EWMA Re-Pass Threshold) | Fuel Level<br>Drive Time<br>Drive length<br>ECT<br>Baro<br>Distance since assembly plant<br>Engine not run time before key off must be<br><br><br><br>Time since last complete test<br>if normalized result and EWMA is passing<br><br>OR<br>Time since last complete test<br>if normalized result or EWMA is failing<br><br>Estimated ambient temperature at end of drive<br><br><br>Estimate of Ambient Air Temperature Valid<br>****************************<br>Conditions for Estimate of Ambient Air Temperature to be valid:<br><br>1. Cold Start | 10 % ≤ Percent ≤ 90 %<br>≥ 600 seconds<br>≥ 3.1 miles<br>≥ 63 °C<br>≥ 70 kPa<br>≥ 10.0 miles<br><br>≤ refer to **P0442: Engine Off Time Before Vehicle Off Maximum as a Function of Estimated Ambient Temperature Table** in Supporting Tables.<br><br><br>≥ 17 hours<br><br><br><br><br>≥ 10 hours<br><br><br><br>0 °C≤Temperature≤ 34 °C<br><br><br><br>**************************** | Once per trip, during hot soak (up to 2,400 sec.). No more than 2 unsuccessful attempts between completed tests. | Type A, 1 Trips<br><br>EWMA<br><br>Average run length is 8 to 12 trips under normal conditions<br><br>Run length is 3 to 6 trips after code clear or non-volatile reset |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | the pressure drops ( -62.27 ) Pa from peak pressure, the vent is then opened for 60 seconds to normalize the system pressure. The vent is again closed to begin the vacuum portion of the test (phase-2). As the fuel temperature continues to fall, a vacuum will begin forming. The vacuum will continue until it reaches a vacuum peak. When the pressure rises 62.27 Pa from vacuum peak, the test then completes. If the key is turned on while the diagnostic test is in progress, the test will abort. | | | Startup delta deg C (ECT-IAT)<br><br>OR<br>2. Short Soak and Previous EAT Valid<br><br>Previous time since engine off<br><br>OR<br>3. Less than a short soak and Previous EAT Not Valid<br><br>Previous time since engine off<br>AND<br>Vehicle Speed<br>AND<br>Mass Air Flow<br><br>Must expire Estimate of Ambient Temperature Valid Conditioning Time. **P0442: Estimate of Ambient Temperature Valid Conditioning Time Table** in Supporting Tables.<br><br>OR<br>4. Not a Cold Start and greater than a Short Soak<br><br><br>Previous time since engine off<br>AND<br>Vehicle Speed<br>AND<br>Mass Air Flow | ≤ 8 °C<br><br><br><br><br><br>≤ 7,200 seconds<br><br><br><br><br><br><br><br>≤ 7,200 seconds<br><br>≥ 32 mph<br><br>≥ 6 g/sec<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>> 7,200 seconds<br><br>≥ 32 mph<br><br>≥ 6 g/sec | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Must expire maximum value in Estimate of Ambient Temperature Valid Conditioning Time. Please see **P0442: Estimate of Ambient Temperature Valid Conditioning Time** in Supporting Tables.<br><br>1. High Fuel Volatility<br><br>During the volatility phase, pressure in the fuel tank is integrated vs. time. If the integrated pressure is then test aborts and unsuccessful attempts is incremented.<br><br>OR<br>2. Vacuum Refueling Detected<br><br>See P0454 Fault Code for information on vacuum refueling algorithm.<br><br>OR<br>3. Fuel Level Refueling Detected<br><br>See P0464 Fault Code for information on fuel level refueling.<br><br>OR | < -5 | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | 4.  Vacuum Out of Range and No Refueling<br><br>See P0451 Fault Code for information on vacuum sensor out of range and P0464 Fault Code for information on fuel level refueling.<br><br>OR<br>5.  Vacuum Out of Range and Refueling Detected<br><br>See P0451 Fault Code for information on vacuum sensor out of range and P0464 Fault Code for information on fuel level refueling.<br><br>OR<br>6.  Vent Valve Override Failed<br><br>Device control using an off-board tool to control the vent solenoid, cannot exceed<br>during the EONV test<br><br>OR<br>7.  Key up during EONV test<br><br>No active DTCs: | | 0.50  seconds<br><br><br><br>MAF_SensorFA<br>ECT_Sensor_FA<br>IAT_SensorFA<br>VehicleSpeedSensor_FA<br>IgnitionOffTimeValid<br>AmbientAirDefault | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | P0443 P0446 P0449 P0452 P0453 P0455 P0496 | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Evaporative Emission (EVAP) Canister Purge Solenoid Valve Circuit (ODM) <br><br>(Not Sealed Fuel System and For Single DTC Implementation Only) | P0443 | Diagnoses the canister purge solenoid low side driver circuit for circuit faults | Voltage low during driver off state (indicates open circuit or short-to-ground) <br><br><br>Voltage high during driver on state (indicates short to power) | Open circuit: ≥ 200 K Ω impedence between signal and controller ground <br><br>Short to ground: ≤ 0.5 Ω impedence between signal and controller ground <br><br>Short to power: ≤ 0.5 Ω impedence between signal and controller power | PT Relay Voltage | Voltage ≥ 11.0 volts | 20 failures out of 25 samples <br><br>250 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Evaporative Emission (EVAP) Vent System Performance<br><br>(Not Sealed Fuel System) | P0446 | This DTC will determine if a restriction is present in the vent solenoid, vent filler, vent hose or EVAP canister.<br><br>This test runs with normal purge and vent valve is open. | Vent Restriction Prep Test:<br>Vented Vacuum for<br>OR<br>Vented Vacuum for<br><br><br>Vent Restriction Test:<br>Tank Vacuum for<br>before Purge Volume<br><br>After setting the DTC for the first time, 2 liters of fuel must be consumed before setting the DTC for the second time. | < -623 Pa<br>60 seconds<br><br>> 1,245 Pa<br>60 seconds<br><br><br>> 2,989 Pa<br>5 seconds<br>≥ 10 liters | Fuel Level<br>System Voltage<br><br>Startup IAT<br><br>Startup ECT<br>BARO<br><br><br>No active DTCs: | 10 % ≤ Percent ≤ 90 %<br>11 volts ≤ Voltage ≤ 32 volts<br>4 °C ≤ Temperature ≤ 30 °C<br>≤ 35 °C<br>≥ 70 kPa<br><br><br>MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault EnginePowerLimited<br><br>P0443<br>P0449<br>P0452<br>P0453<br>P0454 | Once per Cold Start<br><br>Time is dependent on driving conditions<br><br>Maximum time before test abort is 1,000 seconds | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Evaporative Emission (EVAP) Vent Solenoid Control Circuit (ODM) (Not Sealed Fuel System and For Single DTC Implementation Only) | P0449 | Diagnoses the vent solenoid low side driver circuit for circuit faults. | Voltage low during driver off state (indicates open circuit or short-to-ground) <br><br> Voltage high during driver on state (indicates short to power) <br><br> If the P0449 is active, an intrusive test is performed with the vent solenoid commanded closed for 15 seconds. | Open circuit: ≥ 200 K Ω impedence between signal and controller ground <br><br> Short to ground: ≤ 0.5 Ω impedence between signal and controller ground <br><br> Short to power: ≤ 0.5 Ω impedence between signal and controller power | | | 20 failures out of 25 samples <br><br> 250 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Tank Pressure (FTP) Sensor Circuit Performance<br><br>(Not Sealed Fuel System) | P0451 | The DTC will be set if the fuel tank vacuum sensor is out of range when it tries to re-zero prior to the phase-1 or phase-2 portions of the engine-off natural vacuum small leak test. | The tank vacuum sensor voltage is compared to a window about the nominal sensor voltage offset (~1.5 volts)<br><br>Upper voltage threshold (voltage addition above the nominal voltage)<br><br>Lower voltage threshold (voltage subtraction below the nominal voltage)<br><br>The difference between tank vacuum sensor voltage and the nominal offset voltage is then normalized against the appropriate threshold listed above to produce a ratio between 0.0 and 1.0. This normalized re-zero ratio is then filtered with a EWMA (with 0= perfect pass and 1=perfect fail).<br><br>When EWMA is<br><br>the DTC light is illuminated.<br><br>The DTC light can be turned off if the EWMA is<br><br>and stays below the EWMA fail threshold for 3 additional consecutive trips. | <br><br><br><br>0.2 volts<br><br><br><br>0.2 volts<br><br><br><br><br><br><br><br><br><br><br><br>> 0.73 (EWMA Fail Threshold),<br><br><br><br>≤ 0.40 (EWMA Re-Pass Threshold) | This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes | | This test is executed during an engine-off natural vacuum small leak test. The number of times that it executes can range from zero to two per engine-off period. The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete. | Type A, 1 Trips<br><br>EWMA<br><br>Average run length: 6<br>Run length is 2 trips after code clear or non-volatile reset |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage<br><br>(Not Sealed Fuel System) | P0452 | This DTC will detect a Fuel Tank Pressure (FTP) sensor signal that is too low out of range. | FTP sensor signal<br><br>The normal operating range of the FTP sensor is 0.5 volts (~1245 Pa) to 4.5 volts (~ -3736 Pa). | < 0.15 volts ( 3.0 % of Vref or ~ 1,681 Pa) | Time delay after sensor power up for sensor warm-up is | 0.10 seconds | 640 failures out of 800 samples<br><br>12.5 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Tank Pressure (FTP) Sensor Circuit High Voltage<br><br>(Not Sealed Fuel System) | P0453 | This DTC will detect a Fuel Tank Pressure (FTP) sensor signal that is too high out of range. | FTP sensor signal<br><br>The normal operating range of the FTP sensor is 0.5 volts (~1245 Pa) to 4.5 volts (~ -3736 Pa). | > 4.85 volts ( 97 % of Vref or ~ -4,172 Pa) | Time delay after sensor power up for sensor warm-up is | 0.10 seconds | 640 failures out of 800 samples<br><br>12.5 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Tank Pressure (FTP) Sensor Circuit Intermittent (Not Sealed Fuel System) | P0454 | This DTC will detect intermittent tank vacuum sensor signals that would have caused the engine-off natural vacuum small leak test to abort due to an apparent re-fueling event. | If an abrupt change in tank vacuum is detected the engine-off natural vacuum test is aborted due to an apparent refueling event. Subsequent to the abort, a refueling rationality test is executed to confirm that a refueling event occurred. If a refueling is confirmed, then the test sample is considered passing. Otherwise, the sample is considered failing indicating an intermittent signal problem. An abrupt change is defined as a change in vacuum: in the span of 1.0 seconds. But in 12.5 msec. A refueling event is confirmed if the fuel level has a persistent change of for 30 seconds. | > 112 Pa < 249 Pa  10 % | This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes and the canister vent solenoid is closed | | This test is executed during an engine-off natural vacuum small leak test. The test can only execute up to once per engine-off period.The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete.The test will report a failure if 2 out of 3 samples are failures.  12.5 ms / sample | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Evaporative Emission (EVAP) System Large Leak Detected (Not Sealed Fuel System) | P0455 | This DTC will detect a weak vacuum condition (large leak or purge blockage) in the EVAP system. Purge valve is controlled (to allow purge flow) and vent valve is commanded closed. | Purge volume while Tank vacuum After setting the DTC for the first time, 2 liters of fuel must be consumed before setting the DTC for the second time. Weak Vacuum Follow-up Test (fuel cap replacement test) Weak Vacuum Test failed. Passes if tank vacuum Note: Weak Vacuum Follow-up Test can only report a pass. | > 20 liters ≤ 1,993 Pa ≥ 2,740 Pa | Fuel Level System Voltage BARO Purge Flow No active DTCs: Cold Start Test If ECT > IAT, Startup temperature delta (ECT-IAT): Cold Test Timer Startup IAT Startup ECT Weak Vacuum Follow-up Test This test can run following a weak vacuum failure or on a hot restart. | 10 % ≤ Percent ≤ 90 % 11 volts ≤ Voltage ≤ 32 volts ≥ 70 kPa ≥ 2.10 % MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault EnginePowerLimited P0443 P0449 P0452 P0453 P0454 ≤ 8 °C ≤ 1,000 seconds 4 °C≤Temperature≤ 30 °C ≤ 35 °C | Once per cold start Time is dependent on driving conditions Maximum time before test abort is 1,000 seconds Weak Vacuum Follow-up Test With large leak detected, the follow-up test is limited to 1,300 seconds. Once the MIL is on, the follow-up test runs indefinitely. | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Level Sensor 1 Performance<br><br>(For use on vehicles with a single fuel tank) | P0461 | This DTC will detect a fuel sender stuck in range in the primary fuel tank. | Delta fuel volume change over an accumulated 155 miles. | < 3 liters | Engine Running<br><br>No active DTCs: | VehicleSpeedSensor_FA | 250 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Level Sensor 1 Circuit Low Voltage | P0462 | This DTC will detect a fuel sender stuck out of range low in the primary fuel tank. | Fuel level Sender % of 5V range | < 10 % | | | 100 failures out of 125 samples<br><br>100 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Level Sensor 1 Circuit High Voltage | P0463 | This DTC will detect a fuel sender stuck out of range high in the primary fuel tank. | Fuel level Sender % of 5V range | > 60 % | | | 100 failures out of 125 samples<br><br>100 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Level Sensor 1 Circuit Intermittent<br><br>(Not Sealed Fuel System) | P0464 | This DTC will detect intermittent fuel level sensor signals that would have caused the engine-off natural vacuum small leak test to abort due to an apparent re-fueling event. | If a change in fuel level is detected, the engine-off natural vacuum test is aborted due to an apparent refueling event. Subsequent to the abort, a refueling rationality test is executed to confirm that an actual refueling event occurred. If a refueling event is confirmed, then the test sample is considered passing. Otherwise, the sample is considered failing indicating an intermittent signal problem.<br><br>An intermittent change in fuel level is defined as:<br><br>The fuel level changes by and does not remain for 30 seconds during a 600 second refueling rationality test. | <br><br>10 %<br>> 10 % | This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes | | This test is executed during an engine-off natural vacuum small leak test. The test can only execute up to once per engine-off period.The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete.The test will report a failure if 2 out of 3 samples are failures.<br><br>100 ms / sample | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cooling Fan 1 Relay Control Circuit Open (ODM) (Not used on EREV) | P0480 | Diagnoses the cooling fan 1 relay control low side driver circuit for circuit faults | Voltage low during driver off state (indicates open circuit) | Open Circuit: ≥ 200 K Ω impedance between signal and controller ground | Powertrain Relay Voltage | Voltage ≥ 11.00 volts | 50 failures out of 63 samples<br><br>100 ms / sample | Type B, 2 Trips<br><br>Note: In certain controllers P0691 may also set (Fan 1 Short to Ground). |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cooling Fan 2 Relay Control Circuit Open (ODM) | P0481 | Diagnoses the cooling fan 2 relay control low side driver circuit for circuit faults | Voltage low during driver off state (indicates open circuit) | Open Circuit: ≥ 200 K Ω impedance between signal and controller ground | Powertrain Relay Voltage | Voltage ≥ 11.00 volts | 50 failures out of 63 samples<br><br>100 ms / sample | Type B, 2 Trips<br><br>Note: In certain controllers P0693 may also set (Fan 2 Short to Ground) |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Evaporative Emission (EVAP) System Flow During Non-Purge<br><br>(Not Sealed Fuel System) | P0496 | This DTC will determine if the purge solenoid is leaking to engine manifold vacuum.<br><br>This test will run with the purge valve closed and the vent valve closed. | Tank Vacuum for<br><br>Test time | > 2,491 Pa<br>5 seconds<br><br>≥ refer to **P0496: Purge Valve Leak Test Engine Vacuum Test Time (Cold Start) as a Function of Fuel Level Table** in Supporting Tables. | Fuel Level<br>System Voltage<br><br>BARO<br>Startup IAT<br><br>Startup ECT<br>Engine Off Time<br><br>No active DTCs: | 10 % ≤ Percent ≤ 90 %<br>11 volts ≤ Voltage ≤ 32 volts<br>≥ 70 kPa<br>4 °C≤Temperature≤ 30 °C<br><br>≤ 35 °C<br>≥ 28,800.0 seconds<br><br>MAP_SensorFA<br>TPS_FA<br>VehicleSpeedSensor_FA<br>IAT_SensorFA<br>ECT_Sensor_FA<br>AmbientAirDefault<br>EnginePowerLimited<br><br>P0443<br>P0449<br>P0452<br>P0453<br>P0454 | Once per cold start<br><br>Cold start: max time is 1,000 seconds | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Low Engine Speed Idle System | P0506 | This DTC will determine if a low idle exists | Filtered Engine Speed Error | > 91.00 rpm | Baro | > 70 kPa | Diagnostic runs in every 12.5 ms loop | Type B, 2 Trips |
| | | | filter coefficient | 0.00300 | Coolant Temp | > KeSPDD_T_EnblECT_Min ( 60 °C) and < KfECTI_T_EngCoolHotHi Thresh ( 125 °C) Must verify KfECTI_T_EngCoolHotLo Thresh ( 120 ) is less than KfECTI_T_EngCoolHotHi Thresh ( 125 ) | Diagnostic reports pass or fail in 10 seconds once all enable conditions are met | |
| | | | | | Engine run time | ≥ 60 sec | | |
| | | | | | Ignition voltage | 32 ≥ volts ≥ 11 | | |
| | | | | | Time since gear change | ≥ 3 sec | | |
| | | | | | Time since a TCC mode change | > 3 sec | | |
| | | | | | IAT | > -20 °C | | |
| | | | | | Vehicle speed | ≤ 1.24 kph | | |
| | | | | | Commanded RPM delta | ≤ 25 rpm | | |
| | | | | | Idle time | > 5 sec | | |
| | | | | | For manual transmissions: Clutch Pedal Position or Clutch Pedal Position | > 12.00 pct < 75.00 pct | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | No active DTCs | PTO not active<br><br>Transfer Case not in 4WD LowState<br><br>Off-vehicle device control (service bay control) must not be active.<br><br>following conditions not TRUE: (VeTESR_e_EngSpdReqIntvType = CeTESR_e_EngSpdMinLimit AND VeTESR_e_EngSpdReqRespType = CeTESR_e_NoSuggestion)<br><br>Clutch is not depressed<br><br>TC_BoostPresSnsrFA<br>ECT_Sensor_FA<br>EnginePowerLimited<br>EGRValveCircuit_FA<br>EGRValvePerformance_FA<br>IAT_SensorCircuitFA<br>EvapFlowDuringNonPurge_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>FuelInjectorCircuit_FA<br>MAF_SensorFA<br>EngineMisfireDetected_FA<br>IgnitionOutputDriver_FA | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA FuelLevelDataFault LowFuelConditionDiagnostic Clutch Sensor FA AmbPresDfltdStatus P2771 | | |
| | | | | | All of the above met for Idle time | > 5 sec | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| High Engine Speed Idle System | P0507 | This DTC will determine if a high idle exists | Filtered Engine Speed Error | < -182.00 rpm | Baro | > 70 kPa | Diagnostic runs in every 12.5 ms loop | Type B, 2 Trips |
| | | | filter coefficient | 0.00300 | Coolant Temp | > KeSPDD_T_EnblECT_Min ( 60 °C) and < KfECTI_T_EngCoolHotHiThresh ( 125 °C) Must verify KfECTI_T_EngCoolHotLoThresh ( 120 ) is less than KfECTI_T_EngCoolHotHiThresh ( 125 ) | Diagnostic reports pass or fail in 10 seconds once all enable conditions are met | |
| | | | | | Engine run time | ≥ 60 sec | | |
| | | | | | Ignition voltage | 32 ≥ volts ≥ 11 | | |
| | | | | | Time since gear change | ≥ 3 sec | | |
| | | | | | Time since a TCC mode change | > 3 sec | | |
| | | | | | IAT | > -20 °C | | |
| | | | | | Vehicle speed | ≤ 1.24 kph | | |
| | | | | | Commanded RPM delta | ≤ 25 rpm | | |
| | | | | | For manual transmissions: Clutch Pedal Position or Clutch Pedal Position | > 12.00 pct < 75.00 pct | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | PTO not active | | |
| | | | | | | Transfer Case not in 4WD LowState | | |
| | | | | | | Off-vehicle device control (service bay control) must not be active. | | |
| | | | | | | following conditions not TRUE: (VeTESR_e_EngSpdReqIntvType = CeTESR_e_EngSpdMinLimit AND VeTESR_e_EngSpdReqRespType = CeTESR_e_NoSuggestion) | | |
| | | | | | | Clutch is not depressed | | |
| | | | | | No active DTCs | TC_BoostPresSnsrFA ECT_Sensor_FA EnginePowerLimited EGRValveCircuit_FA EGRValvePerformance_FA IAT_SensorCircuitFA EvapFlowDuringNonPurge_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA FuelInjectorCircuit_FA MAF_SensorFA EngineMisfireDetected_FA IgnitionOutputDriver_FA TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | FuelLevelDataFaultLow FuelConditionDiagnostic Clutch SensorFA AmbPresDfltdStatus P2771 | | |
| | | | | | All of the above met for Idle time | > 5 sec | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cold Start Rough Idle | P050D | Monitors the combustion performance when the cold start emission reduction strategy is active by accumulating and determining the percentage of engine cycles that have less than complete combustion relative to the total number of engine cycles in which Dual Pulse is active. | Deceleration index vs. Engine Speed Vs Engine load<br><br>Deceleration index calculation is tailored to specific vehicle. Tables used are 1st tables encountered that are not max of range. Undetectable region at a given speed/load point is where all tables are max of range point. see Algorithm Description Document for additional details.<br><br>Incomplete combustion identified by P0300 threshold tables: | (>Idle SCD AND >Idle SCD ddt Tables) OR (>Idle Cyl Mode AND > Idle Cyl Mode ddt Tables) | Misfire Algorithm Enabled (Refer to P0300 for Enablement Requirements)<br><br>OBD Manufacturer Enable Counter<br><br>To enable the diagnostic, the Cold Start Emission Reduction Strategy Must Be Active per the following:<br><br>Catalyst Temperature AND<br>Engine Coolant AND<br>Engine Coolant AND<br>Barometric Pressure<br><br>In addition, Dual Pulse Strategy Is Enabled and Active Per the following:<br><br>Engine Speed<br><br><br>Accel Position<br><br>Engine Run Time<br><br><br>For the engine speeds and loads in which Dual Pulse is active: | <br><br><br>= 0<br><br><br><br><br><br>< 500.00 degC<br><br>> -12.00 degC<br><br><= 56.00 degC<br><br>>= 75.00 KPa<br><br><br><br><br>>= 250.00 RPM<br><= 3,000.00 RPM<br><br><br><= 1.00 Pct<br><br>< 20 seconds | Runs once per trip when the cold start emission reduction strategy is active and Dual Pulse is enabled and active.<br><br>Frequency: 100ms<br><br>Test completes after Dual Pulse is no longer active OR The first 500 engine cycles have been reached | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Dual Pulse Error induced misfires percentage | >= catalyst damaging misfire | | |
| | | | | | Dual Pulse Error induced misfires percentage | < 90% of the maximum achieveable catalyst damaging misfire. | | |
| | | | | | Engine Cycles | >= 50 < 501 | | |
| | | | | | The Cold Start Emission Reduction strategy must not be exiting.  The strategy will exit per the following: | | | |
| | | | | | Catalyst Temperature AND Engine Run Time OR Engine Run Time OR | >= 1,000.00  degC  >= 17.50  seconds  > **CatalystLightOffExtendedEngineRunTimeExit**  This Extended Engine run time exit table is a function of percent ethanol and Catmons NormRatioEWMA.  Refer to "Supporting Tables" for details. | | |
| | | | | | Barometric Pressure | < 75.00  KPa | | |
| | | | | | Dual Pulse Strategy will | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | exit per the following: | | | |
| | | | | | Engine Speed OR | > 3,200.00 RPM | | |
| | | | | | Accel Position | > 2.00 Pct | | |
| | | | | | Engine Run Time | >= 20 seconds | | |
| | | | | | Dual Pulse Strategy will also exit if the any of the "Additional Dual Pulse Enabling Criteria" is not satisfied: | | | |
| | | | | | "Additional Dual Pulse Enabling Criteria": | | | |
| | | | | | Green Engine Enrichment | Not Enabled | | |
| | | | | | Misfire Converter Protection strategy | Not being requested | | |
| | | | | | Engine Metal Overtemp strategy | Not being requested | | |
| | | | | | Fuel control state | Open Loop | | |
| | | | | | Output State Control | Not being requested for fuel | | |
| | | | | | DOD Or DFCO | Not Active | | |
| | | | | | Power Enrichment | Not Active | | |
| | | | | | Piston Protection | Not Active | | |
| | | | | | Hot Coolant Enrichment | Not Active | | |
| | | | | | Injector Flow Test | Not Active | | |
| | | | | | General Enable | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | DTC's Not Set: | AcceleratorPedalFailure ECT_Sensor_FA IAT_SensorCircuitFA MnfdTempSensorCktFA CrankSensorFaultActive FuelInjectorCircuit_FA MAF_SensorFA MAP_SensorFA AnyCamPhaser_TFTKO Clutch Sensor FA IAC_SystemRPM_FA IgnitionOutputDriver_FA TPS_FA VehicleSpeedSensor_FA FuelInjectorCircuit_TFTKO FHPR_b_FRP_SnsrCkt_FA FHPR_b_FRP_SnsrCkt_TFTKO FHPR_b_PumpCkt_FA FHPR_b_PumpCkt_TFTKO TransmissionEngagedState_FA EngineTorqueInaccurate FuelPumpRlyCktFA | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Engine Oil Pressure (EOP) Sensor Performance | P0521 | Determines if the Engine Oil Pressure (EOP) Sensor is stuck or biased in range | If enabled: | | Diagnostic enabled/ disabled | Enabled | Performed every 100 msec | Type B, 2 Trips |
| | | | | | Oil Pressure Sensor In Use | Present | | |
| | | | | | Two Stage Oil Pump is Present = FALSE | TRUE | | |
| | | | To pass a currently failing test:<br><br>The filtered, weighted difference between measured EOP and predicted EOP (a function of engine speed and engine oil temp.): | < -50.0 kPa OR > 50.0 kPa | Quality or weighting factor values less than "1" indicate that we don't have 4sigma/2sigma robustness in that region. The quality of the data is determined via statistical analysis of Variance data. Regions where diagnosis is possible have a quality or weighting factor value that is a function of engine speed, engine oil temperature, predicted oil pressure, and engine load stability. | | | |
| | | | To fail a currently passing test:<br><br>The filtered, weighted difference between measured EOP and predicted EOP (a function of engine speed and engine oil temp.): | > -47.0 kPa AND < 47.0 kPa | (**RPM_Weighting_Factor** * **Oil_Temp_Weighting_Factor** * **Eng_Load_Stability_Weighting_Factor** * **Eng_Oil_Pred_Weighting_Factor**) with a first order filter coefficient of 0.01<br><br>Details on P0521 Supporting Tables Tab: **RPM_Weighting_Factor** **RPM_Weighting_Factor _X_Axis** | >= 0.30 weighting | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | **Oil_Temp_Weighting_Factor** **Oil_Temp_Weighting_Factor_Axis** **Eng_Load_Stability_Weighting_Factor** **Eng_Load_Stability_Weighting_Factor_Axis** **Eng_Oil_Pred_Weighting_Factor** **Eng_Oil_Pred_Weighting_Factor_Axis** <br><br> No active DTC's | Fault bundles: EngOilPressureSensorCkt FA CrankSensorFA ECT_Sensor_FA MAF_SensorFA IAT_SensorFA | | |
| | | | If enabled: | | Engine Running Diagnostic enabled/ disabled | Enabled | ≥ 40 errors out of 50 samples. | |
| | | | To Fail when previously passing with the engine running: <br><br> Filtered Engine Oil Pressure below expected threshold | Filtered Oil Pressure ≤ **LowMinOilPresFail** (Details on Supporting Tables Tab) | Oil Pressure Sensor In Use <br><br> Two Stage Oil Pump is Present = TRUE | Present <br><br> TRUE | Performed every 100 msec | |
| | | | OR | OR | Engine Running | ≥ 20.0 seconds | | |
| | | | Filtered Engine Oil Pressure below expected threshold | Filtered Oil Pressure ≥ **(OP_HiStatePressure** * 1.10 + 16.0 kPa) (Details on Supporting Tables Tab) | Ambient Air Pressure <br><br> Oil Aeration (= TRUE if engine speed > 5,000 RPM for longer than 30.0 seconds) | ≥ 70.0 kPa <br><br> FALSE | | |
| | | | | | Engine Speed within range | 1,000 RPM ≤ Engine Speed ≤ 4,500 RPM | | |
| | | | To pass when previously failing: | | Modelled Oil Temperature within range | 40.0 deg C ≤ Oil Temp ≤ 120.0 deg C | ≥ 10 passes out of 50 | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Filtered Engine Oil Pressure above low threshold plus an offset<br><br>OR<br><br>Filtered Engine Oil Pressure below high threshold minus an offset | Filtered Oil Pressure ≥ 10.0 kPa+ **LowMinOilPresFail** (Details on Supporting Tables Tab)<br><br>OR<br><br>Filtered Oil Pressure ≤ (**OP_HiStatePressure** * 1.10 + 16.0 kPa) - 10.0 kPa (Details on Supporting Tables Tab) | No active DTC's | Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA CrankSensorFA EngOilPressureSensorCkt FA AmbientAirDefault EngOilTempFA | samples.<br><br>Performed every 100 msec | |
| | | | If enabled:<br><br>To Fail when previously passing with the engine off:<br><br>Filtered Engine Oil Pressure greater than threshold | Filtered Oil Pressure ≥ 40.0 kPa | Engine Off Rationality Test Diagnostic enabled/ disabled<br><br>Modelled Oil Temperature<br><br>No Engine Movement<br><br>No active DTC's | Enabled<br><br>≥ 70.0 deg C<br><br>> 4.0 seconds<br><br>EngineModeNotRunTimer _FA EngOilTempFA EngOilPressureSensorCkt FA CamSensorFA | ≥ 20 errors out of 40 samples.<br><br>Run once per trip | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Engine Oil Pressure (EOP) Sensor Circuit Low Voltage | P0522 | Determines if the Engine Oil Pressure (EOP) Sensor circuit voltage is too low | (Engine Oil Pressure Sensor Circuit Voltage) / 5 Volts | <  5.00 percent | Engine Speed Enable Engine Speed Disable<br><br>Sensor Present<br><br>Diagnostic enabled/ disabled | >  400 rpm <  350  rpm<br><br>Present<br><br>Enabled | 800  failures out of  1,600 samples<br><br>Performed every 6.25 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Engine Oil Pressure (EOP) Sensor Circuit High Voltage | P0523 | Determines if the Engine Oil Pressure (EOP) Sensor circuit voltage is too high | (Engine Oil Pressure Sensor Circuit Voltage) / 5 Volts | > 95.00 percent | Sensor Present<br><br>Diagnostic enabled/ disabled | Present<br><br>Enabled | 800 failures out of 1,600 samples Performed every 6.25 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Air Conditioning High Side Pressure Sensor (HSPS) Circuit Low Voltage | P0532 | Determines if the Air Conditioning High Side Pressure Sensor circuit voltage is too low | (AC High Side Pressure Sensor Circuit Voltage) / 5 Volts | < 3 percent | Sensor Present<br><br>Diagnostic enabled/ disabled | Enabled<br><br>Enabled | 80 failures out of 100 samples<br><br>Performed every 25 msec | Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Air Conditioning High Side Pressure Sensor (HSPS) Circuit High Voltage | P0533 | Determines if the Air Conditioning High Side Pressure Sensor circuit voltage is too high | (AC High Side Pressure Sensor Circuit Voltage) / 5 Volts | > 95 percent | Sensor Present<br><br>Diagnostic enabled/ disabled | Enabled<br><br>Enabled | 80 failures out of 100 samples<br><br>Performed every 25 msec | Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| System Voltage Low | P0562 | This DTC determines if the current system voltage is below the minimum required voltage for proper ECM operation. | System voltage | ≤ 9 volts | Ignition is "ON"  Engine Speed | ≥ 400 RPM | 5 failures out of 6 samples  1 second/sample | Type C, No MIL Not "Special Type C" |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| System Voltage High | P0563 | This DTC determines if the current system voltage is above the maximum allowed voltage for proper ECM operation. | System voltage | ≥ 18 volts | Ignition is "ON" | | 5 failures out of 6 samples

1 second/sample | Type C, No MIL

Not "Special Type C" |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cruise Control Mutil-Functon Switch Circuit | P0564 | Detect when cruise control multi-function switch circuit (analog) voltage is in an illegal range | Cruise Control analog circuit voltage must be in an "illegal range" or "between ranges" for greater than a calibratable period of time for cruise switch states that are received over serial data | | CAN cruise switch diagnostic enable in ECM | 1.00 | fail continuously for greater than 0.500 seconds | MIL: Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cruise Control Resume Circuit | P0567 | Detects a failure of the cruise resume switch in a continously applied state | Cruise Control Resume switch remains applied for greater than a calibratable period of time for architecture where cruise switch states are received over serial data | | CAN cruise switch diagnostic enable in ECM | 1.00 | fail continuously for greater than 90.000 seconds | MIL: Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cruise Control Set Circuit | P0568 | Detects a failure of the cruise set switch in a continously applied state | Cruise Control Set switch remains applied for greater than a calibratable period of time for architecture where cruise switch states are received over serial data | | CAN cruise switch diagnostic enable in ECM | 1.00 | fail continuously for greater than 90.000 seconds | MIL: Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cruise Control Input Circuit | P0575 | Detects rolling count or protection value errors in Cruise Control Switch Status serial data signal | If x of y rolling count / protection value faults occur, disable cruise for duration of fault | | Cruise Control Switch Serial Data Error Diagnostic Enable | 1.00 | 10 / 16 counts | MIL: Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Brake Pedal Position Sensor Circuit Range/ Performance | P057B | This diagnostic monitors the Brake Pedal Position Sensor for a stuck in range failure | . | | Brake Pedal Position Sensor Circuit Range / Performance Diagnostic Enable | 1.00  ignition voltage > 10.00 | | MIL: Type A, 1 Trips |
| | | | Calculated EWMA value must be greater than calibratable theshold after calibratable number of tests have completed to report a "test passed" for P057B | EWMA value looked up in supporting table P057B KtBRKI_K_FastTestPoi ntWeight as a function of calculated brake pedal position delta EWMA value is > 0.80 | calculated brake pedal position delta sample counter > 50.00 for fast test  OR  calculated brake pedal position delta sample counter > 1,000.00 for slow test | calculated brake pedal position delta > 8.00  OR (for slow test)  shift lever has been in park once this key cycle  vehicle speed >= 5.00  accelerator pedal position < 5.00 | total number of EWMA tests > 20.00 | |
| | | | Calculated EWMA Value must be less than calibratable threshold after calibratable number of tests have completed to report a "test failed" for P057B. This test runs once per key cycle | EWMA value looked up in supporting table P057B KtBRKI_K_CmpltTestP ointWeight as a function of calculated brake pedal position delta EWMA value is less thatn 0.40 | no DTC's active (P057C, P057D) | shift lever has been in park once this key cycle  vehicle speed >= 5.00  accelerator pedal position < 5.00 | total number of EWMA tests > 2.00 | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Brake Pedal Position Sensor Circuit Low | P057C | detects short to ground for brake pedal position sensor | If x of y samples are observed below failure threshold, default brake pedal position to zero percent. | 5.00 | Brake Pedal Position Sensore Low Voltage Diagnostic Enable | 1.00 | 20 / 32.00 counts | MIL: Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Brake Pedal Position Sensor Circuit High | P057D | detects open circuit for brake pedal position sensor | If x of y samples are observed above failure threshold, default brake pedal position to zero percent and set DTC | 95.00 | Brake Pedal Position Sensore High Voltage Diagnostic Enable | 1.00 | 20.00 / 32.00 counts | MIL: Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Thermostat Heater Control Open Circuit | P0597 | Diagnoses the T-stat Heater low side driver circuit for circuit faults. | Voltage low during driver off state (indicates open circuit) | Open Circuit: ≥ 200 K Ω impedance between signal and controller ground. | Run Crank Ignition in Range<br><br>Engine not cranking Run Crank active<br><br>== Above is true and ==<br><br>Last Open Circuit Test | = True<br><br>= True<br>= True<br><br>==================<br><br>= not Indeterminate | 15 failures out of 30 samples<br><br>1 sec/ sample<br><br>Continuous | Type B, 2 Trips Note: In certian controlle rs P0598 may also set |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Thermostat Heater Control Circuit Low | P0598 | Diagnoses the T-stat Heater low side driver circuit for circuit faults. | Voltage low during driver off state (indicates short-to-ground) | Short to ground: ≤ 0.5 Ω impedance between signal and controller ground | Run Crank Ignition in Range<br><br>Engine not cranking Run Crank active<br><br>== Above is true and ==<br><br>Last Ground Short Circuit Test | = True<br><br>= True<br>= True<br><br>================<br><br>= not Indeterminate | 15 failures out of 30 samples<br><br>1 sec/ sample<br><br>Continuous | Type B, 2 Trips Note: In certian controlle rs P0597 may also set |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Thermostat Heater Control Circuit High | P0599 | Diagnoses the T-stat Heater low side driver circuit for circuit faults. | Voltage high during driver on state (indicates short to power) | Short to power: ≤ 0.5 Ω impedance between signal and controller power. | Run Crank Ignition in Range<br><br>Engine not cranking<br>Run Crank active<br><br>== Above is true and ==<br><br>Last Power Short Circuit Test | = True<br><br>= True<br>= True<br><br>=================<br><br>= not Indeterminate | 15 failures out of 30 samples<br><br>1 sec/ sample<br><br>Continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor 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 the calibration check sum is incorrect or the flash memory detects an uncorrectable error via the Error Correcting Code. | The Primary Processor's calculated checksum does not match the stored checksum value.  Covers all software and calibrations. | 1 failure if the fault is detected during the first pass. 5 failures if the fault occurs after the first pass is complete. | | | Diagnostic runs continuously in the background. | Type A, 1 Trips |
| | | | The Primary Processor's Error Correcting Code hardware in the flash memory detects an error. Covers all software and calibrations. | 254 failures detected via Error Correcting Code | | | Diagnostic runs continuously via the flash hardware. | |
| | | | The Primary Processor's calculated checksum does not match the stored checksum value for a selected subset of the calibrations. | 2 consecutive failures detected or 5 total failures detected. | | | Diagnostic runs continuously. Will report a detected fault within 200 ms. | |
| | | | The Secondary Processor's calculated checksum does not match the stored checksum value.  Covers all software and calibrations. | 1 failure if the fault is detected during the first pass. 5 failures if the fault occurs after the first pass is complete. | | | Diagnostic runs continuously in the background. | |
| | | | | In all cases, the failure count is cleared when controller shuts down | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Control Module Not Programmed | P0602 | This DTC will be stored if the PCM is a service PCM that has not been programmed. | Output state invalid | | PCM State | = crank or run<br><br>PCM is identified through calibration as a Service PCM | Diagnostic runs at powerup and once per second continuously after that | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Control Module Long Term Memory Reset | P0603 | Non-volatile memory checksum error at controller power-up | Checksum at power-up does not match checksum at power-down | | | | Diagnostic runs at powerup<br><br>Diagnostic reports a fault if 1 failure occurs | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| ECM RAM Failure | P0604 | Indicates that the ECM has detected a RAM fault | Indicates that the primary processor is unable to correctly read data from or write data to system RAM. Detects data read does not match data written >= | 254 counts | | | Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop) | Type A, 1 Trips |
| | | | Indicates that the primary processor is unable to correctly read data from or write data to cached RAM. Detects data read does not match data written >= | 254 counts | | | Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop) | |
| | | | Indicates that the primary processor is unable to correctly read data from or write data to TPU RAM. Detects data read does not match data written >= | 5 counts | | | Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop) | |
| | | | Indicates that the primary processor detects a mismatch between the data and dual data is found during RAM updates. Detects a mismatch in data and dual data updates > | 0.45384 s | | | When dual store updates occur. | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Indicates that the primary processor detects an illegal write attempt to protected RAM.  Number of illegal writes are > | 65,534 counts | | | Diagnostic runs continuously (background loop) | |
| | | | Indicates that the secondary processor is unable to correctly read data from or write data to system RAM.  Detects data read does not match data written >= | 5 counts | | | Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop) | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Internal ECM Processor Integrity Fault | P0606 | Indicates that the ECM has detected an internal processor integrity fault | Loss or invalid message of SPI communication from the Secondary Processor at initialization detected by the Primary Processor or loss or invalid message of SPI communication from the Secondary Processor after a valid message was received by the Primary Processor | Loss or invalid message at initialization detected or loss or invalid message after a valid message was recieved | | Run/Crank voltage >= 6.41 or Run/Crank voltage >= 11.00 , else the failure will be reported for all conditions | In the primary processor, 159 / 399 counts intermittent or 39 counts continuous; 39 counts continuous @ initialization. 12.5 ms /count in the ECM main processor | Type A, 1 Trips |
| | | | Loss or invalid message of SPI communication from the Primary Processor at initialization detected by the Secondary Processor or loss or invalid message of SPI communication from the Primary Processor after a valid message was received by the Secondary Processor | Loss or invalid message at initialization detected or loss or invalid message after a valid message was recieved | | | In the secondary processor, 20 / 200 counts intermittent or 0.1875 s continuous; 0.4750 s continuous @ initialization. 12.5 ms /count in the ECM secondary processor | |
| | | | Checks for stack over or underflow in secondary processor by looking for corruption of known pattern at stack boundaries. Checks number of stack over/ under flow since last powerup reset >= | 5 | | KeMEMD_b_StackLimitTestEnbl == 1 Value of KeMEMD_b_StackLimitTestEnbl is: 1 . (If 0, this test is disabled) | variable, depends on length of time to corrupt stack | |
| | | | MAIN processor is verified by responding to a seed sent from the secondary with a key response to secondary. Checks number of incorrect keys | 2 incorrect seeds within 8 messages, 0.2000 seconds | | ignition in Run or Crank | 150 ms for one seed continually failing | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | received > or Secondary processor has not received a new within time limit | | | | | |
| | | | Time new seed not received exceeded | | | always running | 0.450 seconds | |
| | | | MAIN processor receives seed in wrong order | | | always running | 3 / 17 counts intermittent. 50 ms/count in the ECM main processor | |
| | | | 2 fails in a row in the Secondary processor's ALU check | | | KePISD_b_ALU_TestEnbl d == 1 Value of KePISD_b_ALU_TestEnbl d is: 1. (If 0, this test is disabled) | 25 ms | |
| | | | 2 fails in a row in the Secondary processor's configuration register masks versus known good data | | | KePISD_b_ConfigRegTes tEnbld == 1 Value of KePISD_b_ConfigRegTes tEnbld is: 1. (If 0, this test is disabled) | 12.5 to 25 ms | |
| | | | Secondary processor detects an error in the toggling of a hardware discrete line controlled by the MAIN processor: number of discrete changes > = or < = over time window(50ms) | 7 17 | | KePISD_b_MainCPU_SO H_FltEnbld == 1 Value of KePISD_b_ConfigRegTes tEnbld is: 1 . (If 0, this test is disabled) time from initialization >= 0.4875 seconds | 50 ms | |
| | | | memory and complement memory do not agree | | | | 0.19 seconds | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Software background task first pass time to complete exceeds | | | Run/Crank voltage > 6.41 | 360.000 seconds | |
| | | | 2 fails in a row in the MAIN processor's ALU check | | | KePISD_b_ALU_TestEnbl d  == 1 Value of KePISD_b_ALU_TestEnbl d is:  1 . (If 0, this test is disabled) | 25 ms | |
| | | | 2 fails in a row in the MAIN processor's configuration register masks versus known good data | | | KePISD_b_ConfigRegTes tEnbld  == 1 Value of KePISD_b_ConfigRegTes tEnbld is:  1 . (If 0, this test is disabled) | 12.5 to 25 ms | |
| | | | Checks number of stack over/under flow since last powerup reset >= | 5 | | KeMEMD_b_StackLimitTe stEnbl  == 1 Value of KeMEMD_b_StackLimitTe stEnbl is:  1 . .  (If 0, this test is disabled) | variable, depends on length of time to corrupt stack | |
| | | | Voltage deviation > | 0.4950 | | KePISD_b_A2D_CnvrtrTe stEnbld == 1 Value of KePISD_b_A2D_CnvrtrTe stEnbld is:  1 . (If 0, this test is disabled) | 5 / 10 counts or 0.150 seconds continuous; 50 ms/count in the ECM main processor | |
| | | | Checks for ECC (error correcting code) circuit test errors reported by the hardware for flash memory. Increments counter during controller initialization if ECC error occured since last | 3 (results in MIL), 5 (results in MIL and remedial action) | | KeMEMD_b_FlashECC_ CktTestEnbl == 1 Value of KeMEMD_b_FlashECC_ CktTestEnbl is:  1 .  (If 0, this test is disabled) | variable, depends on length of time to access flash with corrupted memory | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | controller initialization. Counter >= | | | | | |
| | | | Checks for ECC (error correcting code) circuit test errors reported by the hardware for RAM memory circuit. Increments counter during controller initialization if ECC error occured since last controller initialization. Counter >= | 3 (results in MIL), 5 (results in MIL and remedial action) | | KeMEMD_b_RAM_ECC_ CktTestEnbl == 1 Value of KeMEMD_b_RAM_ECC_ CktTestEnbl is: 1 . (If 0, this test is disabled) | variable, depends on length of time to write flash to RAMvariable, depends on length of time to write flash to RAM | |
| | | | MAIN processor DMA transfer from Flash to RAM has 1 failure | | | KePISD_b_DMA_XferTest Enbld == 1 Value of KePISD_b_DMA_XferTest Enbld is: 0 . (If 0, this test is disabled) | variable, depends on length of time to write flash to RAM | |
| | | | Safety critical software is not executed in proper order. | >= 1 incorrect sequence. | | Table, f(Loop Time). See supporting tables: **Program Sequence Watch Enable f(Loop Time)** (If 0, this Loop Time test is disabled) | Fail Table, f(Loop Time). See supporting tables: **PSW Sequence Fail f (Loop Time)** / Sample Table, f (Loop Time)See supporting tables: **PSW Sequence Sample f(Loop Time)** counts 50 ms/count in | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | the ECM main processor | |
| | | | MAIN processor determines a seed has not changed within a specified time period within the 50ms task. | Previous seed value equals current seed value. | | KePISD_b_SeedUpdKey StorFltEnbl == 1 Value of KePISD_b_SeedUpdKey StorFltEnbl is: 1 . (If 0, this test is disabled) | Table, f(Loop Time). See supporting tables: **Last Seed Timeout f (Loop Time)** | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Starter Relay Control Circuit Open - For 3 DTC implementation only | P0615 | Diagnoses the starter relay high side driver circuit for circuit faults | Voltage high during driver off states (indicates open circuit) | Open circuit: ≥ 200 K Ω impedance between signal and controller ground | Run/Crank Voltage<br><br>Engine Speed | Voltage ≥ 11 volts<br><br>≥ 0 RPM | 40 failures out of 50 samples<br><br>50 ms / sample | Type C, No MIL<br><br>Not "Special Type C"<br><br>Note: In certain controllers P0617 may also set (Starter Relay Control Short to Power) |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Starter Relay Control Circuit Low Voltage | P0616 | Diagnoses the starter relay high side driver circuit for circuit faults | Voltage low during driver on state (indicates short to ground) | Short to Ground: ≤ 0.5 Ω impedance between signal and controller ground | Run/Crank Voltage

Engine Speed | Voltage ≥ 11 volts

≥ 0 RPM | 8 failures out of 10 samples

50 ms / sample | Type C, No MIL

Not "Special Type C" |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Starter Relay Control Circuit High Voltage | P0617 | Diagnoses the starter relay high side driver circuit for circuit faults | Voltage high during driver off states (indicates short to power) | Short to power: ≤ 0.5 Ω impedance between signal and controller power | Run/Crank Voltage<br><br>Engine Speed | Voltage ≥ 11 volts<br><br>≥ 0 RPM | 40 failures out of 50 samples<br><br>50 ms / sample | Type C, No MIL<br><br>Not "Special Type C"<br><br>Note: In certain controllers P0615 may also set (Starter Relay Control Open Circuit) |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Relay Control Circuit Low Voltage | P0628 | Diagnoses the fuel pump relay control high side driver circuit for circuit faults | Voltage low during driver on state (indicates short to ground) | Short to ground: ≤ 0.5 Ω impedance between signal and controller ground | Run/Crank Voltage<br><br>Engine Speed | Voltage ≥ 11 volts<br><br>≥ 0 RPM | 8 failures out of 10 samples<br><br>250 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Internal Control Module Fuel Injector Control Performance | P062B | This DTC Diagnoses the internal fuel injctor control module circuit for circuit faults. | Internal ECU Boost Voltage<br><br>OR<br><br>Internal ECU Boost Voltage<br><br>OR<br><br>Driver Status<br><br>OR<br><br>Driver Status | >= 90 Volts<br><br><= 40 Volts<br><br>= Not Ready<br><br>= Uninitialized | Battery Voltage | >= 8 or >= 11<br><br>Enabled when a code clear is not active or not exiting device control Engine is not cranking Powertrain Relay Voltage within range | High Voltage - 160 failures out of 200 samples<br><br>Low Voltage - 160 failures out of 200 samples<br><br>Driver Status Not Ready- 160 failures out of 200 samples<br><br>Driver Status Uninitialized - Uninitialized state for >= 100 counts<br><br>All at 12.5ms per sample | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Control Module EEPROM Error | P062F | Indicates that the NVM Error flag has not been cleared | The next write to NVM will not succeed or the assembly calibration integrity check failed. | | Ignition State | = unlock/accessory, run, or crank | 1 test failure<br><br>Diagnostic runs once at powerup | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| VIN Not Programmed or Mismatched - Engine Control Module (ECM) | P0630 | This DTC checks that the VIN is correctly written | At least one of the programmed VIN digits | = 00 or FF | OBD Manufacturer Enable Counter | = 0 | 250 ms / test Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| 5 Volt Reference #1 Circuit | P0641 | Detects a continuous or intermittent short on the 5 volt reference circuit #1 | ECM Vref1 < or ECM Vref1 > or the difference between ECM filtered Vref1 and Vref1 > | 4.875 5.125<br><br>0.0495 | | Run/Crank voltage > 6.41 | 19 / 39 counts or 0.1875 sec continuous; 12.5 ms/count in main   processor | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Malfunction Indicator Lamp (MIL) Control Circuit (ODM) Open - For 3 DTC implementation only | P0650 | Diagnoses the malfunction indicator lamp control low side driver circuit for circuit faults. | Voltage low during driver off state (indicates open circuit) | Open circuit: ≥ 200 K Ω impedance between signal and controller ground | Run/Crank Voltage<br><br>Remote Vehicle Start is not active | Voltage ≥ 11 volts | 20 failures out of 25 samples<br><br>250 ms / sample | Type B, No MIL<br><br>NO MIL<br><br>Note: In certain controllers P263A may also set (MIL Control Short to Ground) |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| 5 Volt Reference #2 Circuit | P0651 | Detects a continuous or intermittent short on the 5 volt reference circuit #2 | ECM Vref2 < or ECM Vref2 > or the difference between ECM filtered Vref2 and Vref2 > | 4.875 5.125 0.0495 | | Run/Crank voltage > 6.41 | 19 / 39 counts or 0.1875 sec continuous; 12.5 ms/count in main processor | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Powertrain Relay Control (ODM) Open - For 3 DTC implementation only | P0685 | Diagnoses the powertrain relay control low side driver circuit for circuit faults | Voltage low during driver off state (indicates open circuit) | Open Circuit: ≥ 200 K Ω ohms impedance between signal and controller ground | Run/Crank Voltage | Voltage ≥ 11 volts | 8 failures out of 10 samples<br><br>250 ms / sample | Type B, 2 Trips<br><br>Note: In certain controllers P0686 may also set (Powertrain Relay Control Short to Ground). |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Powertrain Relay Control (ODM) Low | P0686 | Diagnoses the powertrain relay control low side driver circuit for circuit faults | Voltage low during driver off state (indicates short-to-ground) | Short to ground: ≤ 0.5 Ω impedance between signal and controller ground | Run/Crank Voltage | Voltage ≥ 11 volts | 8 failures out of 10 samples<br><br>250 ms / sample | Type B, 2 Trips<br><br>Note: In certain controllers P0685 may also set (Powertrain Relay Control Open Circuit). |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Powertrain Relay Control (ODM) High | P0687 | Diagnoses the powertrain relay control low side driver circuit for circuit faults | Voltage high during driver on state (indicates short to power) | Short to power: ≤ 0.5 Ω impedance between signal and controller power | Run/Crank Voltage | Voltage ≥ 11 volts | 8 failures out of 10 samples<br><br>250 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Powertrain Relay Feedback Circuit Low | P0689 | This DTC is a check to determine if the Powertrain relay is functioning properly. | PT Relay feedback voltage is | ≤ 5 volts | Run/Crank Voltage<br><br>Powertrain relay commanded "ON"<br><br><br>No active DTCs: | ≥ 11 volts<br><br><br><br>PowertrainRelayStateOn_ FA | 5 failures out of 6 samples<br><br>1 second/sample | Type C, No MIL<br><br>Not "Special Type C" |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Powertrain Relay Feedback Circuit High | P0690 | This DTC is a check to determine if the Powertrain relay is functioning properly. | Powertrain Relay Voltage | >= 4.00 volts will increment the fail counter | Powertrain relay commanded "OFF"<br><br>No active DTCs: | >= 2.00 seconds<br><br>PowertrainRelayStateOn_FA | 50 failures out of 63 samples<br><br>100ms / Sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cooling Fan 1 Relay Control Circuit Low Voltage (ODM) | P0691 | Diagnoses the cooling fan 1 relay control low side driver circuit for circuit faults | Voltage low during driver off state (indicates short-to-ground) | Short to ground: ≤ 0.5 Ω impedance between signal and controller ground | Powertrain Relay Voltage | Voltage ≥ 11.00 volts | 50 failures out of 63 samples<br><br>100 ms / sample | Type B, 2 Trips<br><br>Note: In certain controllers P0480 may also set (Fan 1 Open Circuit). |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cooling Fan 1 Relay Control Circuit High Voltage (ODM) | P0692 | Diagnoses the cooling fan 1 relay control low side driver circuit for circuit faults | Voltage high during driver on state (indicates short to power) | Short to power: ≤ 0.5 Ω impedance between signal and controller power | Powertrain Relay Voltage | Voltage ≥ 11.00 volts | 50 failures out of 63 samples<br><br>100 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cooling Fan 2 Relay Control Circuit Low Voltage (ODM) | P0693 | Diagnoses cooling fan 2 relay control low side driver circuit for circuit faults | Voltage low during driver off state (indicates short-to-ground) | Short to ground: ≤ 0.5 Ω impedance between signal and controller ground | Powertrain Relay Voltage | Voltage ≥ 11.00 volts | 50 failures out of 63 samples<br><br>100 ms / sample | Type B, 2 Trips<br><br>Note: In certain controllers P0481 may also set (Fan 2 Open Circuit). |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cooling Fan 2 Relay Control Circuit High Voltage (ODM) | P0694 | Diagnoses the cooling fan 2 relay control low side driver circuit for circuit faults | Voltage high during driver on state (indicates short to power) | Short to power: ≤ 0.5 Ω impedance between signal and controller power | Powertrain Relay Voltage | Voltage ≥ 11.00 volts | 50 failures out of 63 samples<br><br>100 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| 5 Volt Reference #3 Circuit | P0697 | Detects a continuous or intermittent short on the 5 volt reference circuit #3 | ECM Vref3 < or ECM Vref3 > or the difference between ECM filtered Vref3 and Vref3 > | 4.875 5.125 <br><br> 0.0495 | | Run/Crank voltage > 6.41 | 19 / 39 counts or 0.1875 sec continuous; 12.5 ms/count in main processor | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Control Module (FPCM) Requested MIL Illumination | P069E | Monitors the FPCM MIL request line to determine when the FPCM has detected a MIL illuminating fault. | Fuel Pump Control Module Emissions- Related DTC set | | | Time since power-up > 3 seconds | Continuous | Type A, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| 5 Volt Reference #4 Circuit | P06A3 | Detects a continuous or intermittent short on the 5 volt reference circuit #4 | ECM Vref4 < or ECM Vref4 > or the difference between ECM filtered Vref4 and Vref4 > | 4.875 5.125  0.0495 | | Run/Crank voltage > 6.41 | 19 / 39 counts or 0.1875 sec continuous; 12.5 ms/count in main processor | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Internal Control Module Knock Sensor Processor 1 Performance | P06B6 | This diagnostic checks for a fault with the internal test circuit used only for the '20 kHz' method of the Open Circuit Diagnostic | FFT Diagnostic Output | > OpenTestCktThrshMin<br><br>and<br><br>< OpenTestCktThrshMax<br><br>**See Supporting Tables** | Diagnostic Enabled?<br><br>Engine Run Time<br><br>Engine Speed<br><br><br>Cumlative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above)<br><br>Engine Air Flow | Yes<br><br>≥ 2.0 seconds<br><br>> 500 RPM<br>    and<br>< 8,000 RPM<br><br>≥ 200 Revs<br><br><br><br>≥ 0 mg/cylinder<br>    and<br>≤ 2,000 mg/cylinder | First Order Lag Filter with Weight Coefficient<br><br>Weight Coefficient = 0.0120<br><br>Updated each engine event | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Internal Control Module Knock Sensor Processor 2 Performance | P06B7 | This diagnostic checks for a fault with the internal test circuit used only for the '20 kHz' method of the Open Circuit Diagnostic | FFT Diagnostic Output | > OpenTestCktThrshMin<br><br>and<br><br>< OpenTestCktThrshMax<br><br>**See Supporting Tables** | Diagnostic Enabled?<br><br>Engine Run Time<br><br>Engine Speed<br><br><br>Cumlative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above)<br><br>Engine Air Flow | Yes<br><br>≥ 2.0 seconds<br><br>> 500 RPM<br>    and<br>< 8,000 RPM<br><br>≥ 200 Revs<br><br><br><br>≥ 0 mg/cylinder<br>    and<br>≤ 2,000 mg/cylinder | First Order Lag Filter with Weight Coefficient<br><br>Weight Coefficient =<br><br> 0.0120<br><br><br>Updated each engine event | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Two Stage Oil Pump Control Circuit Open | P06DA | Diagnoses the two stage oil pump low side driver for open circuit fault | Voltage low during driver off state (indicates an open circuit) | Open Circuit ≥ 200 k Ω impedance between signal and controller ground | Diagnostic enabled/ disabled

Powertrain Relay Voltage

Run/Crank Active

Cranking State | Enabled

≥ 11.00

= True

= False | >= 40 errors out of 50 samples.

Performed every 100 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Two Stage Oil Pump Control Circuit Short To Ground | P06DB | Diagnoses the two stage oil pump low side driver for Short to Ground circuit fault | Voltage low during driver off state (indicates an short circuit to Ground) | Short to Ground Circuit ≤ 0.5 Ω impedance between signal and controller ground | Diagnostic enabled/ disabled<br><br>Powertrain Relay Voltage<br><br>Run/Crank Active<br><br>Cranking State | Enabled<br><br>≥ 11.00<br><br>= True<br><br>= False | >= 40 errors out of 50 samples.<br><br>Performed every 100 msec | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Two Stage Oil Pump Control Circuit Short To Power | P06DC | Diagnoses the two stage oil pump low side driver for Short to Power circuit fault | Voltage low during driver on state (indicates an short to power) | Short to Ground Circuit ≤ 0.5 Ω impedance between signal and controller power | Diagnostic enabled/ disabled | Enabled | >= 40 errors out of 50 samples. | Type B, 2 Trips |
| | | | | | Powertrain Relay Voltage | ≥ 11.00 | | |
| | | | | | Run/Crank Active | = True | Performed every 100 msec | |
| | | | | | Cranking State | = False | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Two Stage Oil Pump Control Circuit Performance | P06DD | Diagnoses the two stage oil pump is stuck in the high pressure state | Oil Pressure delta is less than a minimum delta pressure on a state change and the measured filtered oil pressure is above a threshold | Oil Pressure delta = ABS [ Filtered Oil Pressure at beginning of state change - filtered oil pressure after 1.5 seconds]<br><br>Oil Pressure delta ≤ **OP_StateChangeMin** (P06DD Performance Test Details on Supporting Tables Tab)<br><br>AND<br><br>Filtered Oil Pressure ≥ (**OP_HiStatePressure** - **OP_LoStatePressure**) / 2 | Common Criteria:<br><br>Two Stage Oil Pump is Present<br><br>Engine Running<br><br>Ambient Air Pressure<br><br>Oil Aeration (= TRUE if engine speed > 5,000 RPM for longer than 30.0 seconds)<br><br>No active DTC's for diagnsotic enable:<br><br><br><br><br><br>No active DTC's for control enable if set to **Enabled**:<br><br><br><br>Active Criteria:<br><br>Oil Pump in Low State<br><br>Modelled Oil Temperature within range | <br><br>TRUE<br><br><br>≥ 20.0 seconds<br><br>≥ 70.0 kPa<br><br>FALSE<br><br><br><br>Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA CrankSensorFA EngOilPressureSensorCkt FA AmbientAirDefault EngOilTempFA OilPmpTFTKO<br><br>Enabled Fault bundles for control disable : OilPmpTFTKO EngineTorqueEstInaccura te EngOilPressureSensorFA PowertrainRelayFault CrankSensorFaultActive<br><br><br><br>> 1.5 seconds<br><br>70.0 deg C ≤ Oil Temp ≤ 115.0 deg C | ≥ 4 errors out of 5 samples.<br><br>Run once per trip or activiated by the Passive Test | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Engine Speed within range | 1,500 RPM ≤ Engine Speed ≤ 2,500 RPM | | |
| | | | | | Engine Torque within range | **MinEnableTorque_OP** ≤ Indicated Requested Engine Torque ≤ **MaxEnableTorque_OP** (P06DD Performance Test Details on Supporting Tables Tab) | | |
| | | | | | Delta Engine Speed within a range | ABS [RPM at beginning of State change - RPM after 1.5 seconds ] ≤ 150 RPM | | |
| | | | | | Passive Criteria: | | | |
| | | | | | Active Test Passed | TRUE | | |
| | | | | | Engine Speed within range | 1,000 RPM ≤ Engine Speed ≤ 4,500 RPM | | |
| | | | | | Modelled Oil Temperature within range | 40.0 deg C ≤ Oil Temp ≤ 120.0 deg C | | |
| | | | | | Delta Engine Speed within a range | ABS [RPM at beginning of State change - RPM after 1.5 seconds ] ≤ 450 RPM | | |
| | | | | | Oil Pressure Delta < **OP_StateChangeMin** (P06DD Performance Test Details on Supporting Tables Tab) | TRUE | | |

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

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Two Stage Oil Pump Control Circuit StuckOn | P06DE | Diagnoses the two stage oil pump is stuck in the low pressure state | Oil Pressure delta is less than a minimum delta pressure on a state change and the measured filtered oil pressure is below a threshold | Oil Pressure delta = ABS [ Filtered Oil Pressure at beginning of state change - filtered oil pressure after 1.5 seconds]<br><br>Oil Pressure delta ≤ **OP_StateChangeMin** (P06DD Performance Test Details on Supporting Tables Tab)<br><br>Filtered Oil Pressure ≤ (**OP_HiStatePressure** - **OP_LoStatePressure**) / 2 (P06DD Performance Test Details on Supporting Tables Tab) | Common Criteria:<br><br>Two Stage Oil Pump is Present<br><br>Engine Running<br><br>Ambient Air Pressure<br><br>Oil Aeration (= TRUE if engine speed > 5,000 RPM for longer than 30.0 seconds)<br><br>No active DTC's for diagnsotic enable:<br><br><br><br><br>No active DTC's for control enable if set to Enabled:<br><br><br><br><br><br>Active Criteria:<br><br>Oil Pump in Low State | <br><br><br>TRUE<br><br>≥ 20.0 seconds<br><br>≥ 70.0 kPa<br><br><br>FALSE<br><br><br><br>Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA CrankSensorFA EngOilPressureSensorCkt FA AmbientAirDefault EngOilTempFA<br><br> Enabled Fault bundles for control disable : OilPmpTFTKO EngineTorqueEstInaccurate EngOilPressureSensorFA PowertrainRelayFault CrankSensorFaultActive<br><br><br><br>> 1.5 seconds | ≥ 4 errors out of 5 samples.<br><br>Run once per trip or activiated by the Passive Test | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Modelled Oil Temperature within range | 70.0 deg C ≤ Oil Temp ≤ 115.0 deg C | | |
| | | | | | Engine Speed within range | 1,500 RPM ≤ Engine Speed ≤ 2,500 RPM | | |
| | | | | | Engine Torque within range | **MinEnableTorque_OP** ≤ Indicated Requested Engine Torque ≤ **MaxEnableTorque_OP** (P06DD Performance Test Details on Supporting Tables Tab) | | |
| | | | | | Delta Engine Speed within a range | ABS [RPM at beginning of State change - RPM after 1.5 seconds ] ≤ 150 RPM | | |
| | | | | | Passive Criteria: | | | |
| | | | | | Active Test Passed | TRUE | | |
| | | | | | Engine Speed within range | 1,000 RPM ≤ Engine Speed ≤ 4,500 RPM | | |
| | | | | | Modelled Oil Temperature within range | 40.0 deg C ≤ Oil Temp ≤ 120.0 deg C | | |
| | | | | | Delta Engine Speed within a range | ABS [RPM at beginning of State change - RPM after 1.5 seconds ] ≤ 450 RPM | | |
| | | | | | Oil Pressure Delta | TRUE | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | < **OP_StateChangeMin** (P06DD Performance Test Details on Supporting Tables Tab) | | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Transmission Control Module (TCM) Requested MIL Illumination | P0700 | Monitors the TCM MIL request line to determine when the TCM has detected a MIL illuminating fault. | Transmission Emissions-Related DTC set | | | Time since power-up > 3 seconds | Continuous | Type A, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Traction Control Torque Request Circuit | P0856 | Determines if torque request from the EBTCM is valid | Serial Communication 2's complement message - ($140 for PPEI2 or $1C9 for PPEI3, $1CA/$1C6 for Hybrid)) | Message <> 2's complement of message | Serial communication to EBTCM (U0108)  Power Mode Engine Running  Status of traction in GMLAN message ($4E9) | No loss of communication  = Run = True  = Traction Present | Count of 2's complement values not equal >= 20  Performed on every received message | Type C, No MIL |
| | | | OR Serial Communication message ($140 for PPEI2 or $1C9 for PPEI3, $1CA/ $1C6 for Hybrid)) rolling count value | Message rolling count value <> previous message rolling count value plus one | | | 10 rolling count failures out of 10 samples  Performed on every received message | |
| | | | OR Too many minimum limit torque request transitions occur from TRUE to FALSE to TRUE within a time period | Requested torque intervention type toggles from not increasing request to increasing request | | | >= 5 multi-transitions out of 5 samples.  Performed every 200 ms | |
| | | | Torque request greater than torque request diagnostic maximum threshold | > 250 Nm for engine based traction torque system, OR > 4,000 Nm for axle based traction torque system | | | >= 4 out of 10 samples  Performed on every received message | |

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

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Inlet Airflow System Performance (naturally aspirated) | P1101 | Determines if there are multiple air induction problems affecting airflow and/or manifold pressure. | Filtered Throttle Model Error<br><br>AND<br><br>( ABS(Measured Flow – Modeled Air Flow) Filtered OR ABS(Measured MAP – MAP Model 1) Filtered<br><br>AND<br><br>ABS(Measured MAP – MAP Model 2) Filtered | <= 300 kPa*(g/s)<br><br><br><br>> 17 grams/sec<br><br><br>> 25.0 kPa )<br><br><br><br>> 25.0 kPa | Engine Speed<br>Engine Speed<br>Coolant Temp<br>Coolant Temp<br>Intake Air Temp<br>Intake Air Temp<br>Minimum total weight factor (all factors multiplied together)<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>No Active DTCs: | >= 575 RPM<br><= 6,600 RPM<br>> -7 Deg C<br>< 125 Deg C<br>> -20 Deg C<br>< 125 Deg C<br><br><br>>= 0.50<br><br>Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM<br><br>Modeled Air Flow Error multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Est<br><br>MAP Model 1 Error multiplied by MAP1 Residual Weight Factor based on RPM<br><br>MAP Model 2 Error multiplied by MAP2 Residual Weight Factor based on RPM<br><br>See "Residual Weight Factor" tables.<br><br>MAP_SensorCircuitFA<br>EGRValvePerformance_FA<br>MAF_SensorCircuitFA<br>CrankSensor_FA<br>ECT_Sensor_FA | Continuous<br><br>Calculation are performed every 12.5 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | No Pending DTCs: | IAT_SensorFA<br><br>EGRValve_FP<br>ECT_Sensor_Ckt_FP<br>IAT_SensorCircuitFP | | |
| | | | | | | | | |

| Component/System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Engine Coolant Temperature Sensor Not Plausible) (TSRD | P111E | This DTC detects a difference between ECT and two other temp sensors after a soak condition. | **Sensor usage definitions:**<br><br>**Sensor1 =** CeECTD_e_ECT_Snsr (Sensor1 is the temp sensor most impacted by the block heater (if equipped))<br><br>**Sensor2 =** CeECTD_e_RCT_Snsr<br><br>**Sensor3 =** CeECTD_e_IAT_Snsr<br><br>===================<br><br>A failure will be reported if any of the following occur:<br><br>1) Sensor1 power up absolute temp difference to Sensor2 and Sensor3 is (Sensor1 fast fail) .<br><br>2) Sensor1 power up temp is greater than Sensor2 and Sensor3 in this range: (and a block heater has not been detected)<br><br>3) Sensor1 power up temp is lower than Sensor2 and Sensor3 by this amount:<br><br>4) Sensor1 power up temp is ≥ Sensor2 and | <br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>≥ 50.0 °C<br><br><br><br><br><br><br>≥ 15.8 and < 50.0 °C<br><br><br><br><br><br><br>≤ 15.8 Deg °C | No Active DTC's<br><br><br><br><br><br><br><br><br><br>Engine Off Soak Time Propulsion Off Soak Time Non-volatile memory initization<br><br><br><br>Test complete this trip Test aborted this trip Test disabled this trip Ambient LowFuelCondition Diag<br><br>==================<br>Block Heater detection is **enabled** when either of the following occurs:<br><br>1) Sensor1 power up temp is greater than Sensor2 and Sensor3 in this range:<br><br>2) Cranking time<br><br>==================<br>Block Heater is **detected** and diagnostic is aborted when 1) or 2) occurs.<br><br>1a) Vehicle drive time | VehicleSpeedSensor_FA IAT_SensorCircuitFA RCT_Sensor_Ckt_FA ECT_Sensor_Ckt_FA EngModeNotRunTmErr EngineModeNotRunTimer_FA OAT_PtEstFiltFA DRER_DiagSystemDsbl OAT_PtEstRawFA<br><br>> 25,200 seconds<br>> 0 seconds<br><br>= Not occurred<br><br><br><br>= False<br>= False<br>= False<br>≥ -7 °C<br>= False<br><br>==================<br><br><br><br><br><br>≥ 15.8 °C and < 50.0 °C<br><br><br>< 10.0 Seconds<br><br>==================<br><br><br><br><br><br>> 400 Seconds with | 1 failure to set DTC<br><br>1 sec/ sample<br><br>Once per valid cold start | Type X, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Sensor3 by 15.8 ℃ and the time spent cranking the engine without starting is ≥ 10.0 seconds with the LowFuelConditionDiag | = False | 1b) Vehicle speed<br><br>1c) Additional Vehicle drive time is provided to 1a when Vehicle speed is below 1b as follows:<br><br>1d) IAT drops from power up IAT<br><br>2a) Sensor1 temp derivative during the test is:<br><br>2b) Consective samples of 2a) being true are:<br><br>==================<br>Diagnostic is **aborted** when 3) or 4) occurs:<br><br>3) Engine run time with vehicle speed below 1b<br><br>4) Engine off time (i.e. auto stop) during Block heater detection | > 14.9 MPH and<br><br>0.50 times the seconds with vehicle speed below 1b<br><br>≥ 5.0 ℃<br><br>< -0.10 ℃/sec<br><br>≥ 4 samples<br><br>===================<br><br>≥ 1,800 Seconds<br><br>≥ 180.0 Seconds | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Radiator Coolant Temperature Sensor Not Plausible) (TSRD | P112F | This DTC detects a difference between RCT and two other temp sensors after a soak condition. | **Sensor usage definitions:**<br><br>**Sensor1 =** CeECTD_e_ECT_Snsr (Sensor1 is the temp sensor most impacted by the block heater (if equipped))<br><br>**Sensor2 =** CeECTD_e_RCT_Snsr<br><br>**Sensor3 =** CeECTD_e_IAT_Snsr<br><br>===================<br><br>A failure will be reported if (based on the above calibrations):<br><br>1) Sensor2 (if RCT is Sensor2 )power up absolute temp difference to Sensor1 and Sensor3 is:<br><br>OR (based on usage)<br><br>2) Sensor3 (if RCT is Sensor3) power up absolute temp difference to Sensor1 and Sensor2 is: | $\geq$ 15.8 °C<br><br><br>$\geq$ 15.8 °C | No Active DTC's<br><br><br><br><br><br><br><br>Engine Off Soak Time Propulsion Off Soak Time Non-volatile memory initization<br><br><br>Test complete this trip Test aborted this trip Test disabled this trip Ambient LowFuelCondition Diag | VehicleSpeedSensor_FA IAT_SensorCircuitFA RCT_Sensor_Ckt_FA ECT_Sensor_Ckt_FA EngModeNotRunTmErr EngineModeNotRunTimer _FA OAT_PtEstFiltFA DRER_DiagSystemDsbl OAT_PtEstRawFA<br><br>> 25,200 seconds > 0 seconds<br><br>= Not occurred<br><br><br>= False = False = False $\geq$ -7 °C = False | 1 failure to set DTC<br><br>1 sec/ sample<br><br>Once per valid cold start | Type X, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Humidity Sensor Circuit Low | P11C2 | Detects a continuous short to power in the Humidity Sensor circuit | Humidity Duty Cycle | <= 5.0 % | Powertrain Relay Voltage for a time<br><br>No Active DTCs: | >= 11.00 Volts<br><br>>= 0.9 seconds PowertrainRelayFault | 40 failures out of 50 samples<br><br>1 sample every 100 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Humidity Sensor Circuit High | P11C3 | Detects a continuous open or short to low in the Humidity Sensor circuit | Humidity Duty Cycle | >= 95.0 % | Powertrain Relay Voltage for a time<br><br>No Active DTCs: | >= 11.00 Volts<br><br>>= 0.9 seconds PowertrainRelayFault | 40 failures out of 50 samples<br><br>1 sample every 100 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Humidity Sensor Circuit Intermittent | P11C4 | Detects a noisy or erratic humidity sensor input | String Length<br><br>Where:<br>"String Length" = sum of "Diff" calculated over<br><br>And where:<br>"Diff" = ABS(current Humidity reading - Humidity reading from 100 milliseconds previous) | > 40 %<br> 10 consecutive<br><br>Humidity samples | Powertrain Relay Voltage for a time<br><br>No Active DTCs: | >= 11.00 Volts<br><br>>= 0.9 seconds<br>PowertrainRelayFault | 4 failures out of 5 samples<br><br>Each sample takes 1.00 seconds | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 1 low side circuit shorted to high side circuit | P1248 | This DTC Diagnoses Injector 1 enable low side driver shorted to high side driver circuit faults. | Voltage high across low side and High side drivers during on state indicates low side shorted to high side | Low side shorted to High Side: 25 amp >= through low side driver | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds  P062B not FA or TFTK | 10 failures out of 20 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 2 low side circuit shorted to high side circuit | P1249 | This DTC Diagnoses Injector 2 enable low side driver shorted to high side driver circuit faults. | Voltage high across low side and High side drivers during on state indicates low side shorted to high side | Low side shorted to High Side: 25 amp >= through low side driver | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds<br><br>P062B not FA or TFTK | 10 failures out of 20 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 3 low side circuit shorted to high side circuit | P124A | This DTC Diagnoses Injector 3 enable low side driver shorted to high side driver circuit faults. | Voltage high across low side and High side drivers during on state indicates low side shorted to high side | Low side shorted to High Side: 25 amp >= through low side driver | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds<br><br>P062B not FA or TFTK | 10 failures out of 20 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 4 low side circuit shorted to high side circuit | P124B | This DTC Diagnoses Injector 4 enable low side driver shorted to high side driver circuit faults. | Voltage high across low side and High side drivers during on state indicates low side shorted to high side | Low side shorted to High Side: 25 amp >= through low side driver | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds P062B not FA or TFTK | 10 failures out of 20 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Driver Over Temperature | P1255 | To detect if an internal fuel pump driver over-temperature condition exists under normal operating conditions | Fuel Pump Driver Temp | > 150C | a1) Ignition status<br>a2) HS Comm<br>a3) Fuel Pump Control<br>b) Diagnostic KeFRPD_b_FPOverTemp DiagEnbl<br>c) System Voltage | a1) Run or Crank<br>a2) == Enabled<br>a3) == Enabled<br>b) == True<br>c) 9v < System V > 32v | 3 failures / 15 samples<br><br>1 sample / 12.5 millisec | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Driver Module- System Voltage Low | P129B | To detect if the system voltage is below a certain threshold | Battery Voltage | < 9.0 V | a) FPPM configuration KeFRPR_e_ChassisFuelPresSysType<br>b) Diagnostic KeFRPR_b_FPPM_BatVoltLoDiagEnbld<br>c) Engine status<br>d) FPPM Power Consumption Alive Rolling Count result<br>e) Diagnostic feedback received<br>f) System Voltage | a) == CeFRPR_e_ECM_FPPM_Sys<br>b) == TRUE<br>c) == Running<br>d) == VALID<br>e) == TRUE<br>f) 9v < System V > 32v | 64 failures / 80 samples<br><br>1 sample / 12.5 millisec | Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Driver Module- System Voltage High | P129C | To detect if the system voltage is above a certain threshold | Battery Voltage | > 32 V | a) FPPM configuration KeFRPR_e_ChassisFuel PresSysType<br>b) Diagnostic KeFRPR_b_FPPM_RunC rnkRatlEnbld<br>c) FPPM Control Status Alive Rolling Count result<br>d) Diagnostic feedback received<br>e) System Voltage | a) == CeFRPR_e_ECM_FPPM _Sys<br>b) == TRUE<br>c) == VALID<br>d) == TRUE<br>e) 9v < System V > 32v | 64 failures / 80 samples<br><br>1 sample / 12.5 millisec | Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Driver Module- Ignition Switch Run/ Start Position Circuit Low | P129D | To detect if the Run/ Start position circuit voltage is short to low / open | FPPM Run_Crank Active status | <> ECM Run_Crank Active status | a) FPPM configuration KeFRPR_e_ChassisFuel PresSysType b) Diagnostic KeFRPR_b_FPPM_RunC rnkRatlEnbld c) FPPM Control Status Alive Rolling Count result d) Diagnostic feedback received e) System Voltage | a) == CeFRPR_e_ECM_FPPM _Sys b) == TRUE c) == Valid d) == TRUE e) >= 9.0 v | 64 failures / 80 samples 1 sample / 12.5 millisec | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Driver Control Module Signal Message Counter Incorrect | P129E | To detect if the command message received as serial data from the engine control module is valid | FPPM Received Duty Cycle Rolling Count | == enumeration faulted | a) FPPM configuration KeFRPR_e_ChassisFuel PresSysType<br>b) Fault state determination enabled<br>c) FPPM Received Duty Cycle Count result<br>d) FPPM Diagnostic feedback received<br>e) CAN communication<br>f) System Voltage | a) == CeFRPR_e_ECM_FPPM _Sys)<br>b) == TRUE<br>c) == Valid<br>d) == TRUE<br>e) == Valid<br>f) 9v < Sys Voltage > 32v | 64 failures / 80 samples<br><br>1 sample / 12.5 millisec | Type A, 1 Trips |
| | | | FPPM Received Duty Cycle Protection Value | == enumeration faulted | a) FPPM configuration KeFRPR_e_ChassisFuel PresSysType<br>b) Fault state determination enabled<br>c) FPPM Received Duty Cycle Protection Value result<br>d) FPPM Diagnostic feedback received<br>e) CAN communication<br>f) System Voltage | a) == CeFRPR_e_ECM_FPPM _Sys)<br>b) == TRUE<br>c) == Valid<br>d) == TRUE<br>e) == Valid<br>f) 9v < Sys Voltage > 32v | 64 failures / 80 samples<br><br>1 sample / 12.5 millisec | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Driver Control Module Enable Circuit Performance | P12A6 | To detect a driver control circuit signal stuck in normal operating range | FPPM Fuel Control Enable Active boolean | <> Fuel Control Enable variable (ECM) | a) FPPM configuration KeFRPR_e_ChassisFuel PresSysType<br>b) Diagnostic KeFRPR_b_FPPM_FuelC ntrlEnblEnbld<br>c) FPPM Control Data Rolling Count result<br>d) Diagnostic feedback received<br>e) System Voltage | a) == CeFRPR_e_ECM_FPPM _Sys<br>b) == TRUE<br>c) == Valid<br>d) == TRUE<br>e) >= 9.0 v | 40 failures / 80 samples<br><br>1 sample / 12.5 millisec | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Control Status Signal Message Counter Incorrect | P12A8 | To detect if the control status message transmitted as serial data from the driver control module is valid | FPPM Control Status Alive Rolling Count | == enumeration faulted | a) FPPM configuration KeFRPR_e_ChassisFuel PresSysType<br>b) Fault state determination enabled<br>c) FPPM Diagnostic feedback received | a) == CeFRPR_e_ECM_FPPM _Sys)<br>b) == TRUE<br>c) == TRUE | 64 failures / 80 samples 1 sample / 12.5 millisec | Type A, 1 Trips |
| | | | FPPM Power Consumption Alive Rolling Count | == enumeration faulted | a) FPPM configuration KeFRPR_e_ChassisFuel PresSysType<br>b) Fault state determination enabled<br>c) FPPM Diagnostic feedback received | a) == CeFRPR_e_ECM_FPPM _Sys)<br>b) == TRUE<br>c) == TRUE | 64 failures / 80 samples 1 sample / 12.5 millisec | |
| | | | FPPM Driver Status Alive Rolling Count | == enumeration faulted | a) FPPM configuration KeFRPR_e_ChassisFuel PresSysType<br>b) Fault state determination enabled<br>c) FPPM Diagnostic feedback received | a) == CeFRPR_e_ECM_FPPM _Sys)<br>b) == TRUE<br>c) == TRUE | 64 failures / 80 samples 1 sample / 12.5 millisec | |
| | | | FPPM Hardware Status Alive Rolling | == enumeration faulted | a) FPPM configuration KeFRPR_e_ChassisFuel PresSysType<br>b) Fault state determination enabled<br>c) FPPM Diagnostic feedback received | a) == CeFRPR_e_ECM_FPPM _Sys)<br>b) == TRUE<br>c) == TRUE | 64 failures / 80 samples 1 sample / 12.5 millisec | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Ignition Coil Positive Voltage Circuit Group 1  * * SIDI ONLY * * | P135A | This diagnostic checks for voltage supply to the Ignition Coils (applicable only for SIDI applications) | Common Enable Criteria<br><br>Ignition Module Supply Voltage.<br><br><br>Three possible power supply sources for Ignition Coils:<br>Case 1: Battery<br>Case 2: Ignition Run/ Crank<br>Case 3: PT Relay<br><br><br>Case Specific Enable Criteria | < 2.5 Volts<br><br><br>Ignition Coil Power Source =<br>(see corresponding case specific enable criteria below)<br><br><br><br>Case 1: Battery<br><br><br><br>Case 2:  Ignition Run/ Crank<br><br><br><br>Case 3: PT Relay | Diagnostic Enabled?<br><br><br><br> PT Relay<br><br><br><br><br>Delay starting at Key-On<br><br><br><br>Ignition Run/Crank Voltage<br><br><br><br>PT Relay Voltage | Yes<br><br><br><br><br><br><br><br><br>5  Engine Revs<br><br><br><br>> 11.0  volts<br><br><br><br>> 11.0  volts | 50  Failures out of 63  Samples<br><br>6.25 msec rate | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cold Start Emissions Reduction System Fault | P1400 | Model based test computes power from exhaust flow and thermal energy resulting from elevated idle speed and retarded spark advance. Detects if the cold start emission reduction system has failed resulting in the delivered power being out of range. | Average desired accumulated exhaust power - Average actual accumulated exhaust power (too much energy delivered to catalyst)  Average desired accumulated exhaust power - Average actual accumulated exhaust power (too little energy delivered to catalyst)  (EWMA filtered) | < -32.00 KJ/s (high RPM failure mode)   > 5.00 KJ/s (low RPM failure mode) | To enable the diagnostic, the Cold Start Emission Reduction Strategy must be Active per the following:  Catalyst Temperature AND Engine Coolant AND Engine Coolant AND Barometric Pressure  The Cold Start Emission Reduction strategy must not be exiting.  The strategy will exit per the following:  Catalyst Temperature AND Engine Run Time OR Engine Run Time OR                     Barometric Pressure   Other Enable Criteria: |          < 500.00 degC  > -12.00 degC  <= 56.00 degC  >= 75.00 KPa             >= 1,000.00 degC  >= 17.50 seconds  > **CatalystLightOffExtendedEngineRunTimeExit**  This Extended Engine run time exit is a function of percent ethanol and Catmons NormRatioEWMA. Refer to "Supporting Tables" for details.  < 75.00 KPa | Runs once per trip when the cold start emission reduction strategy is active  Frequency: 100ms Loop  Test completes after 8 seconds of accumulated qualified data. | EWMA Based - Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | OBD Manufacturer Enable Counter | 0 | | |
| | | | | | Vehicle Speed | < 1.86 MPH | | |
| | | | | | Allow diagnostic to calculate residual in an off-idle state.  If the value of the OffIdleEnable is equal to 1 then the "DriverOffAccelPedal" will not be checked. However, if the value of OffIdleEnable is 0 then driver must be off the accel pedal | 0<br><br>(A value of 1 allows diagnostic to run and calculate the residual while off idle.  A value of 0 requires calculation of the residual at idle) | | |
| | | | | | A change in throttle position (tip-in/tip-out) will initiate a delay in the calculation of the average qualified residual value. Therefore:<br>When the Pedal Close Delay Timer is :<br>the diagnostic will continue the calculation. | > 2.00 seconds | | |
| | | | | | For Manual Transmission vehicles: | Clutch Pedal Top of Travel Achieved and Clutch Pedal Bottom of Travel Achieved.  Refer to the "Clutch Pedal Top of Travel Achieved criteria" and "Clutch Pedal Bottom of Travel Achieved criteria" section of the "Supporting Tables" tab criteria | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | The diagnostic will delay calculation of the residual value and potentially weight the residual calculation differently based on engine run time. This is to ensure the diagnostic is operating in idle speed control as well as during the peak catalyst light off period. The time weighting factor must be :<br><br><br>General Enable:<br><br>DTC's Not Set: | > 0<br>These are scalar values that are a function of engine run time. Refer to **ColdStartDiagnosticDelayBasedOnEngineRunTime** and the cal axis, **ColdStartDiagnosticDelayBasedOnEngineRunTimeCalAxis** in the "Supporting Tables" for details.<br><br><br><br>AcceleratorPedalFailure<br>ECT_Sensor_FA<br>IAT_SensorCircuitFA<br>MnfdTempSensorCktFP<br>CrankSensorFaultActive<br>FuelInjectorCircuit_FA<br>MAF_SensorFA<br>MAP_SensorFA<br>EngineMisfireDetected_FA<br>Clutch Sensor FA<br>IAC_SystemRPM_FA<br>IgnitionOutputDriver_FA<br>TPS_FA<br>VehicleSpeedSensor_FA<br>5VoltReferenceMAP_OOR_Flt<br>TransmissionEngagedState_FA | | |

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

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Transmission Engine Speed Request Circuit | P150C | Determines if engine speed request from the TCM is valid | Serial Communication rolling count value | + 1 from previous $19D message (PTEI3) | Diagnostic enable bit | 1 | Diagnostic runs in 12.5 ms loop | Type B, 2 Trips |
| | | | Transmission engine speed protection | not equal to 2's complement of transmission engine speed request + Transmission alive rolling count | Engine run time | 0.50  sec | | |
| | | | | | # of Protect Errors | 10  protect errors out of 10 samples | | |
| | | | | | # of Alive Rolling Errors | 6  rolling count errors out of 10 samples | | |
| | | | | | No idle diagnostic 506/507 code | IAC_SystemRPM_FA | | |
| | | | | | No Serial communication loss to TCM | (U0101) | | |
| | | | | | Engine Running | = TRUE | | |
| | | | | | Power mode | Run Crank Active | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Steady State Actuation Fault | P1516 | Detect an inablity to maintain a steady state throttle position | The absolute difference between desired and indicated throttle position is > | 2.00 percent | | Run/Crank voltage > 6.41<br><br>Ignition voltage failure is false (P1682)<br><br>TPS minimum learn is not active and Throttle is being Controlled Throttle is considered in a steadystate condition when the desired throttle position over a 12.5 ms period is < 0.25 percent for a settling time period > 4.00 s | 0.49 ms | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cruise Control Switch State Undertermined | P155A | Detects when cruise switch state cannot be determined, such as low voltage conditions | cruise switch state remains undetermined for greater than a calibratable time | | | | fail continuously for greater than 15.5 seconds | MIL: Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Internal Control Module SIDI High Pressure Pump current monitor | P163A | This DTC Diagnoses the current from the control area and compares it with calibrated thresholds to set current high and low flags | SIDI fuel pump High Current Test<br><br>Current<br><br>SIDI fuel pump Low Current Test<br><br>Current | >= 11.00 Amps<br><br><= 0.10 Amps | Battery Voltage<br><br>Low Side Fuel Pressure<br><br>Engine Run Time<br><br><br>Additional Enable Conditions:<br>All must be true<br>(High Pressure Pump is enabled and<br>High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and<br>High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and<br>Cam or Crank Sensor Not FA and<br>IAT,IAT2,ECT Not FA and<br>Low side Fuel Pump Relay ckt Not FA and<br>Estimate fuel rail pressure is valid and<br>Green Engine (In assembly plant) is not enabled and<br>Not if low fuel condition and<br>Low side Fuel Pump is on and<br>Injector Flow Test is not active and<br>Device control commanded pressure is false and<br>Device control pump ckt enabled on is false andEngine movement | >= 11 Volts<br><br>> 0.250 MPa<br><br>>= KtFHPD_t_PumpCntrlEng RunThrsh (see supporting tables)<br>Enabled when a code clear is not active or not exiting device control<br>Engine is not cranking | Current High -<br><br>750 failures out of 938 samples<br><br>Current Low -<br><br>750 failures out of 938 Samples | Type B, 2 Trips |

| Component/System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | detected is true and Manufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active and Barometric Pressure Inlet Air Temp Fuel Temp | >= 70.0 KPA >= -20.0 degC -20 <= Temp degC <= 90 | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Ignition Voltage Correlation | P1682 | Detect a continuous or intermittent out of correlation between the Run/Crank Ignition Voltage & the Powertrain Relay Ignition Voltage | \|Run/Crank – PT Relay Ignition\| > | 3.00  Volts | | Powertrain commanded on<br><br>AND<br><br>(Run/Crank voltage > Table, f(IAT).  See supporting tables:  **PT Relay Pull-in Run/Crank Voltage f(IAT)**<br><br>OR PT Relay Ignition voltage >  5.50  )<br><br>AND<br><br>Run/Crank voltage >  5.50 . | 240 / 480 counts or 0.1750 sec continuous; 12.5 ms/count in main processor | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| TPS SENT Comm Circuit Low | P16A0 | Detects a Low Circuit Fault in the TPS SENT Communication Circuit | Voltage for wave pulse is below state threshold as defined by SAE J2716 SENT Protocol | 0.5 V | | Run/Crank voltage > 6.41 | 79 / 159 counts;<br><br>57 counts continuous; 3.125 ms /count in the ECM main processor | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| TPS SENT Comm Circuit High | P16A1 | Detects a High Circuit Fault in the TPS SENT Communication Circuit | Voltage for wave pulse is above state threshold as defined by SAE J2716 SENT Protocol | 4.1 V | | Run/Crank voltage > 6.41 | 79 / 159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| TPS SENT Comm Circuit Performance | P16A2 | Detects a Message Fault in the TPS SENT Communication Circuit | Message Pulse < Message Pulse > or Message Age Limit >= or Signal CRC fails | 0.125977 ms 0.209991 ms 3.125 ms | | Run/Crank voltage > 6.41 | 79 / 159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Internal Control Module Redundant Memory Performance | P16F3 | Detect Processor Calculation faults due to RAM corruptions, ALU failures and ROM failures<br><br>For all of the following cases: If the individual diagnostic threshold is equal to 2048 ms, this indivudual case is not applicable. If any of the following cases are X out of Y diagnostics and the fail (x) is greater than the sample (Y), this individual case is also not applicable. | Desired Throttle Area calculated does not equal its redundant calculation | N/A | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multiplier | Type A, 1 Trips |
| | | | Equivance Ratio torque compensation exceeds threshold | -70.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multiplier | |
| | | | Absolute difference between Equivance Ratio torque compensation and its dual store out of bounds given by threshold | 70.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multiplier | |
| | | | Absolute difference of Accessory torque and its redundant calculation is out of bounds given by threshold range | 70.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multiplier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | Absolute difference of Filtered Air-per-cylinder and its redundant calculation is out of bounds given by threshold range | 73.68 mg | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Absolute difference between the previous Final Advance and the current Final Advance not Adjusted for Equivalence Ratio is out of bounds given by threshold range | 8.02 degrees | | Engine speed >0rpm | Up/down timer 141 ms continuous, 0.5 down time multipier | |
| | | | Torque Learn offset is out of bounds given by threshold range | High Threshold 0.00 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | multipier | |
| | | | | Low Threshold 0.00 Nm | | | | |
| | | | One step ahead calculation of air-per-cylinder and two step ahead is greater than threshold | 80.00 mg | | Engine speed > 650 rpm | Up/down timer 441 ms continuous, 0.5 down time multipier | |
| | | | Difference between Unmanaged Spark and PACS Spark is greater than threshold | 8.01 degrees | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Commanded Predicted Engine Torque and its dual store do not match | N/A | Ignition State | Accessory, run or crank | Up/down timer 2,048 ms continuous, 0.5 down time | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | multipier | |
| | | | Zero pedal axle torque is out of bounds given by threshold range | High Threshold<br><br>927.59 Nm<br>Low Threshold<br><br>-65,535.00 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Creep Coast Axle Torque is out of bounds given by threshold range | High Threshold<br><br>927.59 Nm<br>Low Threshold<br><br>-65,535.00 Nm | Ignition State | Accessory, run or crank | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |
| | | | Absolute difference of Friction torque and its redundant calculation is out of bounds given by threshold range | 70.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | multipier | |
| | | | Arbitrated Air-Per-Cylinder filter coefficient is out of bounds given by threshold range | High Threshold  1.000  Low Threshold  0.074 | Ignition State | Accessory, run or crank | Up/down timer 475  ms continuous, 0.5 down time multipier | |
| | | | Launch spark is active but the launch spark redundant path indicates it should not be active | N/A | | Engine speed < 7,000.00 or 7,200.00  rpm (hysteresis pair) | Up/down timer 141  ms continuous, 0.5 down time multipier | |
| | | | Rate limited vehicle speed and its dual store do not equal | N/A | | Time since first CAN message with vehicle speed >= 0.500 sec | 10 / 20 counts; 25.0msec/count | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | Preload Throttle Area and its dual store do not equal | N/A | Ignition State | Accessory, run or crank AFM apps only | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |
| | | | Commanded engine torque due to fast actuators and its dual store do not equal | N/A | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Commanded engine torque due to slow actuators and its dual store do not equal | N/A | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | TOS to wheel speed conversion factor is out of bounds given by threshold | High Threshold: 1.10 | Ignition State | Accessory, run or crank | 255 / 6 counts; 25.0msec/count | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | range | T/C Range Hi<br><br>0.10<br>T/C Range Lo<br><br><br>Low Threshold:<br><br>1.10<br>T/C Range Hi<br><br>0.10<br>T/C Range Lo | | | | |
| | | | TOS to wheel speed conversion factor and its dual store do not equal | N/A | Ignition State | Accessory, run or crank | 255 / 6 counts; 25.0msec/count | |
| | | | Cylinders active greater than commanded | 2 cylinders | | Engine run flag = TRUE ><br>2.00<br>s<br>Number of cylinder events since engine run ><br>24<br><br>No fuel injector faults | Up/down timer 141<br>ms continuous, 0.5<br>down time multipier | |

| Component/System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | active | | |
| | | | Transfer case neutral request from four wheel drive logic does not match with operating conditions | N/A | Ignition State | Accessory, run or crank

Transfer case range valid and not over-ridden

FWD Apps only | 32 / 0 counts; 25.0msec/count | |
| | | | Transfer case neutral and its dual store do not equal | N/A | Ignition State | Accessory, run or crank | 255 / 6 counts; 25.0msec/count | |
| | | | Driver progression mode and its dual store do not equal | N/A | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Predicted torque for uncorrected zero pedal determination is greater than calculated limit. | Table, f(Engine, Oil Temp). See supporting tables + 70.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Engine Predicted Request Without Motor is greater than its redundant calculation plus threshold | 69.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Engine Immediate Request Without Motor is greater than its redundant calculation plus threshold | 69.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | Positive Torque Offset is greater than its redundant calculation plus threshold<br><br>OR<br><br>Positive Torque Offset is less than its redundant calculation minus threshold | 70.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Commanded Predicted Engine Request is greater than its redundant calculation plus threshold | 70.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | Commanded Hybrid Predicted Crankshaft Request is greater than its redundant calculation plus threshold | 4,096.00 Nm | Ignition State | Accessory, run or crank | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |
| | | | Commanded Hybrid Immediate Crankshaft Request is less than its redundant calculation minus threshold | 4,096.00 Nm | Ignition State | Accessory, run or crank | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |
| | | | Regeneration Brake Assist is not within a specified range | Brake Regen Assist < 0 Nm  or Brake Regen Assist > | Ignition State | Accessory, run or crank | Up/down timer 2,048 ms continuous, | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | 0.00 Nm | | | 0.5 down time multipier | |
| | | | Cylinder Spark Delta Correction exceeds the absolute difference as compared to Unadjusted Cylinder Spark Delta | 8.01 degrees | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | 1.  Cylinder Torque Offset exceeds step size threshold<br><br>OR<br><br>2.  Sum of Cylinder Torque Offset exceeds sum threshold | 1. 70.08 Nm<br><br><br><br>2. 70.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | Engine Capacity Minimum Immediate  Without Motor is greater than its dual store plus threshold | 100.00 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Engine Capacity Minimum Engine Off is greater than threshold | 0 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Engine Capacity Minimum Engine Immediate Without Motor is greater than  threshold | 0 Nm | Ignition State | Accessory, run or crank | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Commanded Immediate Engine Request is greater than its redundant calculation plus threshold | 70.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |
| | | | PTO Torque Request exceeds allowed rate limited PTO Torque Request | 8.76 Nm/25ms | Ignition State | Accessory, run or crank | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |
| | | | Engine Speed Lores Intake Firing (event based) calculation does not equal its redundant | N/A | | Engine speed greater than 0rpm | Up/down timer 141 ms continuous, 0.5 | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | calculation | | | | down time multipier | |
| | | | Engine Speed Lores Intake Firing timing (event based) calculation does not equal its redundant calculation | N/A | | Engine speed greater than 0rpm | Up/down timer 141 ms continuous, 0.5 down time multipier | |
| | | | Idle speed control calculated predicted minimum torque request exceeds calculated torque limit | Table, f(Oil Temp, RPM). See supporting tables: **Speed Control External Load f(Oil Temp, RPM)** + 70.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Idle speed control calculated predicted minimum torque without reserves exceeds calculated torque limit | Table, f(Oil Temp, RPM). See supporting tables: **Speed Control External Load f(Oil Temp, RPM)** + 70.08 | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | Nm | | | | |
| | | | Difference between Driver Requested Immediate Torque primary path and its secondary exceeds threshold | 927.59 Nm | Ignition State | Accessory, run or crank | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |
| | | | Driver Immediate Request is less than its redundant calculation minus threshold | 927.59 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Commanded Immediate Request is greater than its redundant calculation plus threshold | 927.59 Nm | Ignition State | Accessory, run or crank | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | OR<br><br>Commanded Immediate Request is less than its redundant calculation minus threshold | | | | | |
| | | | Commanded Immediate Response Type is set to Inactive | N/A | Ignition State | Accessory, run or crank | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |
| | | | Difference between Cruise Axle Torque Arbitrated Request and Cruise Axle Torque Request exceeds threshold | 115.95 Nm | | Cruise has been engaged for more than 4.00 seconds | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Desired engine torque request greater than redundant calculation plus threshold | 69.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Engine min capacity above threshold | 70.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 126 ms continuous, 0.5 down time multipier | |
| | | | No fast unmanaged retarded spark above the applied spark plus the threshold | Table, f(RPM,APC). See supporting tables: **Delta Spark Threshold f (RPM,APC)** | | Engine speed greater than 0rpm | Up/down timer 141 ms continuous, 0.5 down time multipier | |
| | | | Absolute difference of adjustment factor based on temperature and its dual store above threshold | 2.76 m/s | Ignition State | Accessory, run or crank | Up/down timer 172 ms continuous, 0.5 down time multipier | |

| Component/System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | 1. Absolute difference of redundant calculated engine speed above threshold | 500 RPM | | Engine speed greater than 0 RPM | Up/down timer 141 ms continuous, 0.5 down time multipier | |
| | | | After throttle blade pressure and its dual store do not match | N/A | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Speed Control's Preditcted Torque Request and its dual store do not match | N/A | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Engine oil temperature and its dual store do not match | N/A | Ignition State | Accessory, run or crank | Up/down timer 403 ms continuous, 0.5 down time multipier | |
| | | | Desired throttle position greater than redundant calculation plus threshold | 7.91 percent | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Absolute difference of the rate limited pre-throttle pressure and its redundant calculation greater than threshold | 0.06 kpa | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Throttle desired torque above desired torque plus threshold | 70.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Desired filtered throttle torque exceeds the threshold plus the higher of desired throttle torque or modeled throttle torque | 70.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Torque feedback proportional term is out of allowable range or its dual store copy does not match | High Threshold  35.04 Nm  Low Threshold  -35.04 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Torque feedback integral term magnitude or rate of change is out of allowable range or its dual store | High Threshold  65.70 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | copy do not match | Low Threshold<br><br>-70.08 Nm<br><br>Rate of change threshold<br><br>4.38 Nm/loop | | | down time multipier | |
| | | | Difference of Final Torque feedback proportional plus integral term and its redundant calculation is out of bounds given by threshold range | High Threshold<br><br>70.08 Nm<br><br>Low Threshold<br><br>- 70.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Difference of torque desired throttle area and | High Threshold | Ignition State | Accessory, run or crank | Up/down timer 475 | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | its redundant calculation is out of bounds given by threshold range | 0.50 %<br><br>Low Threshold<br>- 0.50 % | | | ms continuous, 0.5 down time multipier | |
| | | | Difference of torque model coefficients and its redundant calculation is out of bounds given by threshold range | High Threshold 0.0001300 Low Threshold - 0.0001300 | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Difference of base friction torque and its redundant calculation is out of bounds given by threshold range | High Threshold<br><br> 70.08 Nm<br><br><br>Low Threshold<br><br>- 70.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | Accessory drive friction torque is out of bounds given by threshold range | High Threshold<br><br>70.08 Nm<br><br><br>Low Threshold<br><br>0.00 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | AC friction torque is greater than commanded by AC control software or less than threshold limit | High Threshold<br><br>40.00 Nm<br><br><br>Low Threshold<br><br>0.00 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Difference of Oil temperature delta friction torque and its redundant calculation is out of bounds given by threshold range | High Threshold<br><br>70.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | Low Threshold<br><br>- 70.08<br> Nm | | | | |
| | | | Generator friction torque is out of bounds given by threshold range | High Threshold<br><br>70.08<br>Nm<br><br>Low Threshold<br><br>0.00<br>Nm | Ignition State | Accessory, run or crank | Up/down timer 475<br> ms continuous, 0.5<br>down time multipier | |
| | | | Supercharger friction torque is out of bounds given by threshold range | High Threshold<br><br>70.08<br>Nm<br><br>Low Threshold<br><br>0.00<br> Nm | Ignition State | Accessory, run or crank | Up/down timer 475<br> ms continuous, 0.5<br>down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Filtered Torque error magnitude or its increase rate of change is out of allowable range or its dual store copy do not match | High Threshold<br><br>70.08 Nm<br><br>Low Threshold<br><br>-70.08 Nm<br><br>Rate of change threshold<br><br>4.38 Nm/loop | | Engine speed >0rpm MAF, MAP and Baro DTCs are false | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Torque error compensation is out of bounds given by threshold range | High Threshold<br><br>70.08 Nm<br><br>Low Threshold<br><br>0.00 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Delta Torque Baro compensation is out of bounds given by threshold range | High Threshold 6.45 Nm  Low Threshold -6.12 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | 1. Difference of reserve torque value and its redundant calculation exceed threshold<br><br>OR<br><br>2. Reserve request does not agree with operating conditions or Difference of final predicted torque and its redundant calculation exeed threshold<br><br>OR<br><br>3. Rate of change of reserve torque exceeds threshold, increasing direction only<br><br>OR<br><br>4. Reserve engine torque above allowable capacity threshold | 1. 69.08 Nm<br><br>2. N/A<br><br>3. 69.08 Nm<br><br>4. 69.08 Nm | 3. & 4.: Ignition State | 1. & 2.: Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 70.08 Nm<br><br>3. & 4.: Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Engine Vacuum and its dual store do not match | N/A | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Absolute difference of the calculated Intake Manifold Pressure during engine event versus during time | Table, f(Desired Engine Torque). See supporting tables: **Delta MAP Threshold** | | Engine speed >0rpm | Up/down timer 141 ms continuous, 0.5 | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | event is greater than threshold | **f(Desired Engine Torque)** | | | down time multipier | |
| | | | Min. Axle Torque Capacity is greater than threshold | 0.00 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Driver Predicted Request is greater than its redundant calculation plus threshold<br><br>OR<br><br>Driver Predicted Request is less than its redundant calculation minus threshold | 927.59 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | Cold Delta Friction Torque and its dual store do not match | N/A | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Predicted torque for zero pedal determination is greater than calculated limit. | Table, f(Oil Temp, RPM). See supporting tables: **Speed Control External Load f(Oil Temp, RPM)** + 70.08 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Commanded Predicted Axle Torque and its dual store do not match | 1 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Steady State Estimated Engine Torque and its dual store are not equal | N/A | | AFM not changing from Active to Inactive and preload torque not changing and one loop | Up/down timer 1,988 ms continuous, 0.5 | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | after React command<br><br>Engine speed >0rpm | down time multipier | |
| | | | Difference of Weighting factor for number of cylinders fueled and its redundant calculation is above threshold | 0.26 | | Engine run flag = TRUE > 10.00 s | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Difference of minimum spark advance limit and its redundant calculation is out of bounds given by threshold range | 8.02 degrees | Ignition State | Accessory, run or crank | Up/down timer 141 ms continuous, 0.5 down time multipier | |
| | | | Difference of commanded spark advance and adjusted delivered is out of bounds given by threshold range | 8.02 degrees | | Engine speed >0rpm | Up/down timer 141 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | Absolute difference between Estimated Engine Torque and its dual store are above a threshold | 70.08 Nm | | Engine speed >0rpm | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Absolute difference between Estimated Engine Torque without reductions due to torque control and its dual store are above a threshold | 70.08 Nm | | Engine speed >0rpm | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Difference of desired spark advance for managed torque and its redundant calculation is out of bounds given by threshold range | 8.02 degrees | | Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 70.08 Nm | Up/down timer 441 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Absolute difference of Engine Capacity Minimum Running Immediate Brake Torque Excluding Cylinder Sensitivity and its redundant calculation is out of bounds given by threshold range | 70.08 Nm | | Engine speed >0rpm | Up/down timer 175 ms continuous, 0.5 down time multiplier | |
| | | | One step ahead calculation of air-per-cylinder greater than two step ahead calculation by threshold for time | Threshold: Dynamically calculated based on current engine conditions Fault Pending Threshold: 100 ms | | Engine speed > 650 rpm | Up/down timer 441 ms continuous, 0.5 down time multiplier | |
| | | | Rate limited cruise axle torque request and its dual store do not match within a threshold | 115.95 Nm | Ignition State | Accessory, run or crank | Up/down timer 163 ms continuous, 0.5 down time multiplier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | 1. Absolute difference of Calculated accelerator pedal position compensated for carpet learn and error conditions and its redundant calculation is out of bounds given by threshold range<br><br>OR<br><br>2. Absolute difference of Calculated accelerator pedal position compensated for carpet learn and error conditions and its dual store do not equal<br><br>OR<br><br>3. Absolute difference of Calculated accelerator pedal position and its dual store do not equal | 1.<br>5.00<br>%<br><br>2.<br>N/A<br><br>3.<br>N/A | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Commanded axle torque is greater than its | 927.59 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | redundant calculation by threshold | | | | ms continuous, 0.5 down time multipier | |
| | | | Commanded axle torque is less than its redundant calculation by threshold | -65,535.00 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Preload timer and its redundant calculation do not equal | N/A | Ignition State | Accessory, run or crank<br><br>AFM apps only | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |
| | | | AC friction torque is greater than commanded by AC control software | 40.00 Nm | Ignition State | Accessory, run or crank | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |
| | | | Engine Speed Lores | N/A | | Engine speed >0rpm | Up/down timer | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Intake Firing (time based) calculation does not equal its redundant calculation | | | | 175 ms continuous, 0.5 down time multipier | |
| | | | Absolute difference of the calculated spark offset for equivalence ratio and its redundant cacluation is greater than a threshold | 8.02 degrees | | Engine speed >0rpm | Up/down timer 141 ms continuous, 0.5 down time multiplier | |
| | | | Transmission Torque Request cacluations do not equal their dual stores | N/A | | Run or Crank = TRUE > 0.50 s | 16 / 32 counts; 25.0msec/count | |
| | | | Absolute difference of the predicted motor torque ACS and its redundant cacluation is greater than a threshold | 0.01 Nm | | | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |
| | | | Absolute difference of maximum throttle area and its redundant | 15 mm2 | | | Up/down timer 172 ms continuous, | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | cacluation is greater than a threshold | | | | 0.5 down time multipier | |
| | | | Absolute difference of Desired TIAP and its redundant cacluation is greater than a threshold | 5.00 kPa | | | Up/down timer 475 ms continuous, 0.5 down time multipier | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Camshaft Actuator Solenoid Circuit Low– Bank 1 | P2088 | Diagnoses the VVT system high side driver circuit for circuit faults. | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. | Short to ground: ≤ 0.5 Ω to a voltage source within the Vehicle Ground Voltage Range relative to PWRGND | System supply voltage is within limits. Output driver is commanded on, Ignition switch is in crank or run position | > 11.00 Volts | 20 failures out of 25 samples250 ms / sample, continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Camshaft Actuator Solenoid Circuit High – Bank 1 | P2089 | Diagnoses the VVT system high side driver circuit for circuit faults. | The ECM detects that voltage is high during driver off state (indicates short to power or open circuit) | Short to power: ≤ 0.5 Ω impedance between signal and controller power Open Circuit: ≥ 200 K Ω impedance between signal and controller ground | System supply voltage is within limits. Output driver is commanded on, Ignition switch is in crank or run position | > 11.00 Volts | 20 failures out of 25 samples250 ms / sample, continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Exhaust Camshaft Actuator Solenoid Circuit Low – Bank 1 | P2090 | Diagnoses the VVT system high side driver circuit for circuit faults. | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. | Short to ground: ≤ 0.5 Ω to a voltage source within the Vehicle Ground Voltage Range relative to PWRGND | System supply voltage is within limits. Output driver is commanded on, Ignition switch is in crank or run position | > 11.00 Volts | 20 failures out of 25 samples250 ms / sample, continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Exhaust Camshaft Actuator Solenoid Circuit High – Bank 1 | P2091 | Diagnoses the VVT system high side driver circuit for circuit faults. | The ECM detects that voltage is high during driver off state (indicates short to power or open circuit) | Short to power: ≤ 0.5 Ω impedance between signal and controller power Open Circuit: ≥ 200 K Ω impedance between signal and controller ground | System supply voltage is within limits. Output driver is commanded on, Ignition switch is in crank or run position | > 11.00 Volts | 20 failures out of 25 samples250 ms / sample, continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Post Catalyst Fuel Trim System Low Limit Bank 1 (Too Rich) | P2096 | Determines if the post catalyst O2 sensor based fuel control system has reached it's low limit authority, indicating a rich emissions/exhaust gas condition. Note: If the post catalyst O2 voltage is too rich, the post catalyst O2 integral offset control is decreased. This results in lean bias fuel control in an attempt to correct the rich post O2 voltage. | Rich Fail counter<br><br>High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 18 % for >= 5.0 seconds. Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 14 % for >= 5.0 seconds. | >= 80 counts per 100 sample counts<br><br>Note: Counters increment at a rate of 10 per second when enable conditions are met. If the fail count threshold is reached, a fail is reported and the diagnostic will not report again until the next trip. If the sample count threshold is reached before a fail is reported, a pass is reported, the counters are reset to 0, and evaluation starts again. | The diagnostic is enabled during: Deceleration Idle Cruise Light Acceleration Heavy Acceleration<br><br>The following conditions must be true for > 0.0 seconds:<br><br>Ambient Air Pressure Engine AirFlow Intake Manifold Pressure Induction Air Temperature Start-up Coolant Temp. PTO Intrusive diag. fuel control<br><br>Long Term Secondary Fuel Trim Enabled (see "**Long Term Secondary Fuel Trim Enable Criteria**" in Supporting Tables)<br><br>High Vapor Conditions<br><br>No Fault Active for: | No No Yes Yes Yes<br><br><br><br>>= 70 kPa >= 0.0 g/s <= 10,000.0 >= 0 kPa <= 200 >= -20 deg. C <= 200 >= -20 deg. C Not Active Not Active<br><br><br><br><br><br><br>Not Present<br><br>AmbientAirDefault AIR System FA Ethanol Composition Sensor FA ECT_Sensor_FA EGRValveCircuit_FA EGRValvePerformance_FA IAT_SensorFA CamSensorAnyLocationFA EvapEmissionSystem_FA | Frequency: Continuous Monitoring in 100ms loop. Counters increment when enable conditions are met. When sample count threshold is reached or fail threshold is reached, counters are reset to 0 and start over. | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | EvapFlowDuringNonPurge_FA<br>FuelTankPressureSnsrCkt_FA<br>EvapPurgeSolenoidCircuit_FA<br>EvapSmallLeak_FA<br>EvapVentSolenoidCircuit_FA<br>FuelInjectorCircuit_FA<br>MAF_SensorFA<br>MAF_SensorTFTKO<br>MAP_SensorFA<br>MAP_EngineVacuumStatus<br>EngineMisfireDetected_FA<br>A/F Imbalance Bank1<br>O2S_Bank_1_Sensor_1_FA<br>O2S_Bank_1_Sensor_2_FA | | |
| | | | | | The above general enable conditions must be true for:<br><br>Minimum accumulated counts in each cell required before counters will increment:<br>Deceleration<br>Idle<br>Cruise<br>Light Acceleration<br>Heavy Acceleration<br><br>Fail counter will increment if sample counter increments<br>AND<br>Post oxygen sensor control integral offset (in | > 0.0 seconds<br><br><br><br><br>0<br>0<br>0<br>0<br>0 | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | mV) is<br>Deceleration<br>Idle<br>Cruise<br>Light Acceleration<br>Heavy Acceleration<br>AND<br>Post O2 Voltage is<br>Deceleration<br>Idle<br>Cruise<br>Light Acceleration<br>Heavy Acceleration | <=<br>N/A (control min.= 0 )<br>N/A (control min.= 0 )<br>-500 (control min.= -500 )<br>-500 (control min.= -500 )<br>-500 (control min.= -500 )<br><br>><br>790 mV<br>790 mV<br>790 mV<br>790 mV<br>790 mV | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Post Catalyst Fuel Trim System High Limit Bank 1 (Too Lean) | P2097 | Determines if the post catalyst O2 sensor based fuel control system has reached it's high limit authority, indicating a lean emissions/exhaust gas condition. Note:  If the post catalyst O2 voltage is too lean, the post catalyst O2 integral offset control is increased.  This results in rich bias fuel control in an attempt to correct the lean post O2 voltage. | Lean Fail counter<br><br>High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 18 % for >= 5.0 seconds. Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 14 % for >= 5.0 seconds. | >= 80  counts per  100 sample counts<br><br>Note: Counters increment at a rate of 10 per second when enable conditions are met. If the fail count threshold is reached, a fail is reported and the diagnostic will not report again until the next trip. If the sample count threshold is reached before a fail is reported, a pass is reported, the counters are  reset to 0, and evaluation starts again. | Same as P2096 except for the following:<br><br>Fail counter will increment if sample counter increments AND Post oxygen sensor control integral offset (in mV) is Deceleration Idle Cruise Light Acceleration Heavy Acceleration AND Post O2 Voltage is Deceleration Idle Cruise Light Acceleration Heavy Acceleration | >=<br>N/A (control max.= 0 ) N/A (control max.= 0 ) 700 (control max.= 700 ) 700 (control max.= 700 ) 700 (control max.= 700 )<br><br><<br>690  mV 690  mV 690  mV 690  mV 690  mV | Frequency: Continuous Monitoring in 100ms loop. Counters increment when enable conditions are met.  When sample count threshold is reached or fail threshold is reached, counters are reset to 0 and start over. | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Control Module Throttle Actuator Position Performance | P2101 | 1) Detect a throttle positioning error2) Throttle control is driving the throttle in the incorrect direction3) Throttle control exceeds the reduced power limit | Difference between measured throttle position and modeled throttle position >  OR  Difference between modeled throttle position and measured throttle position > | 7.91 percent   7.91 percent | TPS minimum learn is not active and Throttle is being Controlled and (Engine Running or Ignition Voltage >     or Ignition Voltage >      )     Ignition voltage failure is false (P1682) | Run/Crank voltage > 6.41  Ignition voltage failure is false (P1682)  TPS minimum learn is not active and Throttle is being Controlled  AND  ((Engine Running AND Ignition Voltage > 5.50 ) OR Ignition Voltage > 11.00 ) | 15 counts; 12.5 ms/count in the primary processor | Type A, 1 Trips |
|  |  |  | Throttle Position > | 36.00 percent |  | Powertrain Relay voltage > 6.41  TPS minimum learn is active | 11 counts; 12.5 ms/count in the primary processor |  |
|  |  |  | Throttle Position > | 35.00 percent |  | Powertrain Relay voltage > 6.41  Reduced Power is True | 11 counts; 12.5 ms/count in the primary processor |  |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Throttle return to default | P2119 | Throttle unable to return to default throttle position after de-energizing ETC motor. | (Normalized TPS1 Voltage > AND Normailzed TPS2 Voltage > On the main processor)  OR  (Normalized TPS1 Voltage < AND Normailzed TPS2 Voltage < On the main processor) | 1.7560   1.7590     1.4340   1.4310 | | Throttle de-energized for Actuator, Controller, or Ignition Faults (P21104, P2100, P2101, P2102, P2103, P1682, P0068, P16F3) No TPS circuit faults PT Relay Voltage > 5.500  No 5V reference error or fault for # 4 5V reference circuit (P06A3) | 0.4969 s | Type C, No MIL |
| | | | (Normalized TPS1 Voltage > AND Normailzed TPS2 Voltage > On the main processor)  OR  (Normalized TPS1 Voltage < AND Normailzed TPS2 Voltage < On the main processor) | 1.7560   1.7590     1.4340   1.4310 | | Throttle de-energized for Battery Saver Mode  Engine not running No TPS circuit faults PT Relay Voltage > 5.500  No 5V reference error or fault for # 4 5V reference circuit (P06A3) | 1.5000 s | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Accelerator Pedal Position (APP) Sensor 1 Lo | P2122 | Detect a continuous or intermittent short or open in the APP sensor #1 on Main processor | APP1 Voltage < | 0.4625 | | Run/Crank voltage > 6.41<br><br><br>No 5V reference error or fault for # 4 5V reference circuit (P06A3) | 19 / 39 counts or 14 counts continuous; 12.5 ms/count in the main processor | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Accelerator Pedal Position (APP) Sensor 1 Hi | P2123 | Detect a continuous or intermittent short or open in the APP sensor #1 on Main processor | APP1 Voltage > | 4.7500 | | Run/Crank voltage > 6.41<br><br><br>No 5V reference error or fault for # 4 5V reference circuit (P06A3) | 19 / 39 counts or 14 counts continuous; 12.5 ms/count in the main processor | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Accelerator Pedal Position (APP) Sensor 2 Lo | P2127 | Detect a continuous or intermittent short or open in the APP sensor #2 on Main processor | APP2 Voltage < | 0.3250 | | Run/Crank voltage > 6.41<br><br><br>No 5V reference error or fault for # 4 5V reference circuit (P0697) | 19 / 39 counts or 14 counts continuous; 12.5 ms/count in the main processor | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Accelerator Pedal Position (APP) Sensor 2 Hi | P2128 | Detect a continuous or intermittent short or open in the APP sensor #2 on Main processor | APP2 Voltage > | 2.6000 | | Run/Crank voltage > 6.41<br><br><br><br>No 5V reference error or fault for # 4 5V reference circuit (P0697) | 19 / 39 counts or 14 counts continuous; 12.5 ms/count in the main processor | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Throttle Position (TP) Sensor 1-2 Correlation | P2135 | Detects a continuous or intermittent correlation fault between TPS sensors #1 and #2 on Main processor | Difference between TPS1 displaced and TPS2 displaced > | 6.797 % offset at min. throttle position with a linear threshold to 9.720 % at max. throttle position | | Run/Crank voltage > 6.41<br><br>No TPS sensor faults (P0122, P0123, P0222, P0223)<br><br>No 5V reference error or fault for # 4 5V reference circuit (P06A3) | 79 / 159 counts or 58 counts continuous; 3.125 ms/count in the main processor | Type A, 1 Trips |
| | | | Difference between (normalized min TPS1 ) and (normalized min TPS2) > | 5.000 % Vref | | Run/Crank voltage > 6.41<br><br>No TPS sensor faults (P0122, P0123, P0222, P0223)<br><br>No 5V reference error or fault for # 4 5V reference circuit (P06A3) | 79 / 159 counts or 58 counts continuous; 3.125 ms/count in the main processor | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Accelerator Pedal Position (APP) Sensor 1-2 Correlation | P2138 | Detects a continuous or intermittent correlation fault between APP sensors #1 and #2 on Main processor | Difference between APP1 displaced and APP2 displaced > | 5.000 % offset at min. pedal position with a linear threshold to 10.001 % at max. pedal position | | Run/Crank voltage > 6.41  No APP sensor faults (P2122, P2123,P2127, P2128)  No 5V reference errors or faulst for # 3 &  # 4 5V reference circuits (P06A3, P0697) | 19 / 39 counts intermittent or 15 counts continuous, 12.5 ms/count in the main processor | Type A, 1 Trips |
| | | | Difference between (normalized min  APP1 ) and (normalized min APP2)  > | 5.000 % Vref | | Run/Crank voltage > 6.41  No APP sensor faults (P2122, P2123,P2127, P2128)  No 5V reference errors or faulst for # 3 &  # 4 5V reference circuits (P06A3, P0697) | 19 / 39 counts intermittent or 15 counts continuous, 12.5 ms/count in the main processor | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 1 high side circuit shorted to ground | P2147 | This DTC Diagnoses Injector 1 high side driver circuit for circuit faults. | Voltage high across High Side Driver during On state indicates short to ground | Short to Ground: 25 amp >= through High Side Driver | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds<br><br>P062B not FA or TFTK | 10 failures out of 20 samples<br><br>100 ms /sample Continuous | Type A, 1 Trips |

| Component/System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 1 high side circuit shorted to power | P2148 | This DTC Diagnoses Injector 1 high side driver circuit for circuit faults. | Voltage low across High side drive during off state indicates short to power. | Short to Power: ≤ 1 volt between signal and controller power | Battery Voltage Engine Run Time | >= 11 Volts<br>>= 5 Seconds<br><br>P062B not FA or TFTK | 10 failures out of 20 samples<br><br>100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 2 high side circuit shorted to ground | P2150 | This DTC Diagnoses Injector 2 high side driver circuit for circuit faults. | Voltage high across High Side Driver during On state indicates short to ground | Short to Ground: 25 amp >= through High Side Driver | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds<br><br>P062B not FA or TFTK | 10 failures out of 20 samples<br><br>100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 2 high side circuit shorted to power | P2151 | This DTC Diagnoses Injector 2 high side driver circuit for circuit faults. | Voltage low across High side drive during off state indicates short to power. | Short to Power: ≤ 1 volt between signal and controller power | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds  P062B not FA or TFTK | 10 failures out of 20 samples  100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 3 high side circuit shorted to ground | P2153 | This DTC Diagnoses Injector 3 high side driver circuit for circuit faults. | Voltage high across High Side Driver during On state indicates short to ground | Short to Ground: 25 amp >= through High Side Driver | Battery Voltage Engine Run Time | >= 11 Volts<br>>= 5 Seconds<br><br>P062B not FA or TFTK | 10 failures out of 20 samples<br><br>100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 3 high side circuit shorted to power | P2154 | This DTC Diagnoses Injector 3 high side driver circuit for circuit faults. | Voltage low across High side drive during off state indicates short to power. | Short to Power: ≤ 1 volt between signal and controller power | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds P062B not FA or TFTK | 10 failures out of 20 samples 100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 4 high side circuit shorted to ground | P2156 | This DTC Diagnoses Injector 4 high side driver circuit for circuit faults. | Voltage high across High Side Driver during On state indicates short to ground | Short to Ground: 25 amp >= through High Side Driver | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds<br><br>P062B not FA or TFTK | 10 failures out of 20 samples<br><br>100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Injector 4 high side circuit shorted to power | P2157 | This DTC Diagnoses Injector 4 high side driver circuit for circuit faults. | Voltage low across High side drive during off state indicates short to power. | Short to Power: ≤ 1 volt between signal and controller power | Battery Voltage Engine Run Time | >= 11 Volts >= 5 Seconds<br><br>P062B not FA or TFTK | 10 failures out of 20 samples<br><br>100 ms /sample Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Minimum Throttle Position Not Learned | P2176 | TP sensors were not in the minmum learn window after multiple attempts to learn the minimum. | During TPS min learn on the Main processor, TPS Voltage > <br><br> AND <br><br> Number of learn attempts > | 0.5740 <br><br><br><br> 10 counts | | Run/Crank voltage > 6.41 <br><br> TPS minimum learn is active | 2.0 secs | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cooling System Performance | P2181 | This DTC detects thermostat malfunction (i.e. stuck open) | Engine Coolant Temp (ECT) is ≤ commanded temperature minus 18 Deg C and normalized ratio is ≤ than 0.00 . When above is present for more than 5 seconds, fail counts start. Engine total airgrams is accumulated when 8 ≤ AirFlow ≤ 30 grams per second.<br><br>== Ratio Definition:=== Current temp difference between ECT and RCT minus PwrUp difference divided by total airgrams. Note: Minimum total airgrams is 100.0 grams. | | No Active DTC's<br><br><br><br>Engine not run time<br><br><br>Engine run time<br><br>Fuel Condition<br>ECT at Power Up<br>IAT min<br>T-Stat Heater duty cycle commanded<br><br>Airflow | MAF_SensorFA IAT_SensorFA THMR_RCT_Sensor_Ckt _FA THMR_ECT_Sensor_Ckt _FA<br><br>≥ 1,800 seconds<br><br>50 ≤ Time ≤ 1,800 seconds<br><br>Ethanol ≤ 87 %<br>-10.0 ≤ ECT ≤ 75.0 °C<br>-7 °C ≤ IAT ≤ 52 °C.<br><br>≤ 20 %<br><br>8.0 ≤ Airflow ≤ 30.0 gps | 60 failures out of 400 samples<br><br>1 sec/ sample<br><br>Once per ignition key cycle | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Air Temperature Sensor 1 / 2 Correlation | P2199 | Detects a difference between the IAT and IAT2 sensors | ABS (IAT - IAT2) | > 55.0 deg C | Powertrain Relay Voltage for a time<br><br>No Active DTCs: | >= 11.00 Volts<br>>= 0.9 seconds<br><br>PowertrainRelayFault | 40 failures out of 50 samples<br><br>1 sample every 100 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Bank 1 Air-Fuel Ratio Imbalance | P219A | This monitor determines if a cylinder-to-cylinder air-fuel ratio imbalance is present on bank 1. | Filtered Ratio >  Note: The input to this metric is the pre catalyst oxygen sensor voltage. This voltage is used to generate a Variance metric that represents the statistical variation of the O2 sensor voltage over a given engine cycle. This metric is proportional to the air-fuel ratio imbalance (variance is higher with an imbalance than without). Multiple samples are collected in making a decision.  The observed Variance is dependant on engine speed and load and so each result is normalized for speed and load by comparing it to a known "good system" result for that speed and load, and generating a Ratio metric.  The Ratio metric is calculated by selecting the appropriate threshold calibration from a 17x17 table (Supporting Table "**Variance Threshold Bank1**") and subtracting it from the measured Variance. The result is then divided by a normalizer calibration from another 17 x 17 table | 0.70  If the diagnostic has reported a failure on the prior trip, the Filtered Ratio must fall below 0.49 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing when the Filtered Ratio remains near the initial failure threshold of 0.70 . | System Voltage   Fuel Level   Engine Coolant Temperature   Cumulative engine run time   Diagnostic enabled at Idle (regardless of other operating conditions)   Engine speed range   Engine speed delta during a short term sample period   Mass Airflow (MAF) range   Cumulative delta MAF during a short term sample period   Filtered MAF delta between samples Note: first order lag filter coefficient applied to MAF = 0.050   Air Per Cylinder (APC)   APC delta during short term sample period   Filtered APC delta between samples | no lower than 11.0 Volts for more than 0.2 seconds   > 10.0 percent AND no fuel level sensor fault   > -20 degrees C   > 30.0 seconds     No   1,250 to 4,000 RPM   < 150 RPM   0 to 100 g/s   < 2 g/s   < 0.40 g/s   60 to 600 mg/cylinder   < 40 mg/cylinder   < 3.00 percent | Minimum of 1 test per trip, up to 4 tests per trip during RSR or FIR.  The front O2 sensor voltage is sampled once per cylinder event. Therefore, the time required to complete a single test (when all enable conditions are met) decreases as engine speed increases. For example, 4.50 seconds of data is required at 1000 rpm while double this time is required at 500 rpm and half this time is required at 2000 rpm. This data is collected only when enable conditions are met, and as such significantly more operating time is required than is indicated above. Generally, a report will be | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | (Supporting Table "**Normalizer Bank1**"). This quotient is then multiplied by a quality factor calibration from a 17 x 17 table (Supporting Table "**Quality Factor Bank1**"). This result is referred to as the Ratio. Note that the quality factor ranges between 0 and 1 and represents robustness to false diagnosis in the current operating region. Regions with low quality factors are not used.<br><br>Finally, a EWMA filter is applied to the Ratio metric to generate the Filtered Ratio malfunction criteria metric. Generally, a normal system will result in a negative Filtered Ratio while a failing system will result in a positive Filtered Ratio.<br><br>The range of the Filtered Ratio metric is application specific since both the emissions sensitivity and relationship between imbalance and the Variance metric are application specific.<br><br>Some applications may need to command a unique cam phaser value before performing the | | Note: first order lag filter coefficient applied to APC = 0.100<br><br>Spark Advance<br><br>Throttle Area (percent of max)<br><br>Intake Cam Phaser Angle<br><br>Exhaust Cam Phaser Angle<br><br>Quality Factor (QF) QF calibrations are located in a 17x17 lookup table versus engine speed and load (Supporting Table "**Quality Factor Bank1**"). QF values less than "1" indicate that we don't have 4sigma/2sigma robustness in that region. The quality of the data is determined via statistical analysis of Variance data.<br><br>Fuel Control Status Closed Loop and Long Term FT Enabled for:<br><br><br>AIR pump not on CASE learn not active EGR - no device control, no intrusive diagnostics EVAP - no device control, no intrusive diagnostics Engine OverSpeed | <br><br><br>5 to 55 degrees<br><br>7 to 200 percent<br><br>0 to 35 degrees<br><br>0 to 35 degrees<br><br><br>>= 0.99<br><br><br><br><br><br><br><br>>= 1.2 seconds (Please see "**Closed Loop Enable Criteria**" and "**Long Term FT Enable Criteria**" in Supporting Tables) | made within 5 minutes of operation.<br><br>For RSR or FIR, 8 tests must complete before the diagnostic can report. | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | above calculations since cam phasing has been shown to have an impact on overall signal quality. This application Does Not Use this feature. | | Protection Not Active Idle speed control normal PTO Not Active Injector base pulse width above min limit Rapid Step Response (RSR): RSR will trigger if the Ratio result from the last test is AND it exceeds the last Filtered ratio by<br><br>Once triggered, the filtered ratio is reset to:<br><br><br>Fast Initial Response (FIR): FIR will trigger when an NVM reset or code clear occurs. Once triggered, the filtered ratio is reset to:<br><br><br>No Fault Active for: | >= 0.65<br><br>>= 0.63<br><br><br>0.00<br><br><br><br><br><br>0.00<br><br><br>EngineMisfireDetected_FA MAP_SensorFA MAF_SensorFA ECT_Sensor_FA TPS_ThrottleAuthorityDefaulted FuelInjectorCircuit_FA AIR System FA EvapExcessPurgePsbl_FA CamSensorAnyLocationFA | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Barometric Pressure (BARO) Sensor Performance (naturally aspirated) | P2227 | Compares baro sensor to the calculated baro estimate (part throttle calculation or unthrottled MAP) | Difference between baro sensor reading and estimated baro when distance since last estimated baro update<br><br>OR<br><br>Difference between baro sensor reading and estimated baro when distance since last estimated baro update | > 15.0 kPa<br><br><= 1.24 miles<br><br><br><br>> 20.0 kPa<br><br>> 1.24 miles | Engine Run Time<br><br>No Active DTCs: | > 30.00 seconds<br><br>AmbPresSnsrCktFA ECT_Sensor_Ckt_FA IAT_SensorFA MAF_SensorFA AfterThrottlePressureFA TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA | 320 failures out of 400 samples<br><br>1 sample every 12.5 msec | Type B, 2 Trips |
| | | | Barometric Pressure OR Barometric Pressure | < 50.0 kPa<br><br>> 115.0 kPa | Time between current ignition cycle and the last time the engine was running<br><br>Engine is not rotating<br><br>No Active DTCs:<br><br><br><br><br><br>No Pending DTCs: | > 409.6 seconds<br><br><br><br>EngineModeNotRunTimer Error MAP_SensorFA TC_BoostPresSnsrCktFA AAP2_SnsrFA<br><br>MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP | 999 failures out of 5 samples<br><br>1 sample every 12.5 msec | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Barometric Pressure (BARO) Sensor Circuit Low (non-boosted applications) | P2228 | Detects a continuous short to low or open in either the signal circuit or the BARO sensor. | BARO Voltage | < 40.0 % of 5 Volt Range ( 2.0 Volts = 50.9 kPa) | Engine Run Time | > 30.00 seconds | 320 failures out of 400 samples<br><br>1 sample every 12.5 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Barometric Pressure (BARO) Sensor Circuit High (non-boosted applications) | P2229 | Detects an open sensor ground or continuous short to high in either the signal circuit or the BARO sensor. | BARO Voltage | > 90.0 % of 5 Volt Range ( 4.5 Volts = 115.0 kPa) | Engine Run Time | > 30.00 seconds | 320 failures out of 400 samples<br><br>1 sample every 12.5 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Barometric Pressure (BARO) Sensor Circuit Intermittent | P2230 | Detects a noisy or erratic barometric pressure input | String Length<br><br>Where:<br>"String Length" = sum of "Diff" calculated over<br><br>And where:<br>"Diff" = ABS(current BARO reading - BARO reading from 12.5 milliseconds previous) | > 150 kPa<br><br><br>80 consecutive BARO samples | No Active DTCs: | AmbPresSnsrCktFA<br>ECT_Sensor_Ckt_FA<br>IAT_SensorFA<br>MAF_SensorFA<br>AfterThrottlePressureFA<br>TPS_FA<br>TPS_Performance_FA<br>VehicleSpeedSensor_FA | 4 failures out of 5 samples<br><br>Each sample takes 1.00 seconds | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2 Sensor Signal Stuck Lean Bank 1 Sensor 2 | P2270 | This DTC determines if the post catalyst O2 sensor is stuck in a normal lean voltage range and thereby can no longer be used for post oxygen sensor fuel control or for catalyst monitoring. The diagnostic is an intrusive test (during coast) which increases the delivered fuel to achieve the required rich threshold. | Post O2 sensor signal<br><br>AND<br><br>The Accumulated mass air flow monitored during the Stuck Lean Voltage Test | < 825 mvolts<br><br><br>> 47 grams | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br>B1S2 DTC's Not active this key cycle<br><br>System Voltage<br>ICAT MAT Burnoff delay<br><br>Green O2S Condition<br><br><br><br><br><br><br><br><br><br><br><br><br><br>Low Fuel Condition Diag<br>Pedal position<br><br>Engine Speed to initially enable test<br>Engine Speed range to keep test enabled (after initially enabled)<br><br>Engine Airflow | TPS_ThrottleAuthorityDefaulted<br>ECT_Sensor_FA<br>IAT_SensorFA<br>MAF_SensorFA<br>MAP_SensorFA<br>AIR System FA<br>FuelInjectorCircuit_FA<br>FuelTrimSystemB1_FA<br>FuelTrimSystemB2_FA<br>EngineMisfireDetected_FA<br>EthanolCompositionSensor_FA<br>P013A, P013B, P013E, P013F, P2270 or P2271<br><br>10.0 < Volts < 32.0<br>= Not Valid<br><br>= Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab.<br><br>= False<br>≤ 4.0 %<br><br>1,250 ≤ RPM ≤ 2,300<br><br><br>1,100 ≤ RPM ≤ 2,450<br><br>3 ≤ gps ≤ 12 | Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed. | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Vehicle Speed to initially enable test | $34.2 \le$ MPH $\le 74.6$ | | |
| | | | | | Vehicle Speed range to keep test enabled (after initially enabled) | $31.7 \le$ MPH $\le 82.0$ | | |
| | | | | | Closed loop integral | $0.85 \le$ C/L Int $\le 1.07$ | | |
| | | | | | Closed Loop Active | = TRUE | | |
| | | | | | Evap | not in control of purge | | |
| | | | | | Ethanol | not in estimate mode | | |
| | | | | | Post fuel cell | = enabled | | |
| | | | | | EGR Intrusive diagnostic | = not active | | |
| | | | | | All post sensor heater delays | = not active | | |
| | | | | | O2S Heater (post sensor) on Time | $\ge 175.0$ sec | | |
| | | | | | Predicted Catalyst temp | $600 \le$ ºC $\le 850$ | | |
| | | | | | Fuel State | = DFCO possible | | |
| | | | | | ================= All of the above met for at least 1.0 seconds, and then the Force Cat Rich intrusive stage is requested. ================= During Stuck Lean test the following must stay TRUE or the test will abort: $0.96 \le$ Fuel EQR $\le 1.01$ | ================= | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2 Sensor Signal Stuck Rich Bank 1 Sensor 2 | P2271 | This DTC determines if the post catalyst O2 sensor is stuck in a normal rich voltage range and thereby can no longer be used for post oxygen sensor fuel control or for catalyst monitoring. The diagnostic is an intrusive test which requests the DFCO mode to achieve the required lean threshold. | Post O2 sensor signal AND The Accumulated mass air flow monitored during the Stuck Rich Voltage Test | > 100 mvolts > 33 grams | No Active DTC's B1S2 DTC's Not Active this key cycle System Voltage ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Engine Speed Engine Airflow Vehicle Speed Closed loop integral Closed Loop Active Evap Ethanol Post fuel cell | TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013A, P013B, P013E, P013F or P2270 $10.0 <$ Volts $< 32.0$ = Not Valid = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. = False $1,250 \le$ RPM $\le 2,300$ $3 \le$ gps $\le 12$ $34.2 \le$ MPH $\le 74.6$ $0.85 \le$ C/L Int $\le 1.07$ = TRUE not in control of purge not in estimate mode = enabled | Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed. | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Power Take Off<br>EGR Intrusive diagnostic<br>All post sensor heater delays<br>O2S Heater (post sensor) on Time<br><br>Predicted Catalyst temp<br>Fuel State<br><br>DTC's Passed<br><br><br><br><br><br>==================<br>After above conditions are met: DFCO mode is continued (wo driver initiated pedal input). | = not active<br>= not active<br><br>= not active<br><br>$\geq$ 175.0 sec<br><br>$600 \leq {}^oC \leq 850$<br> DFCO possible<br><br>= P2270 (and P2272 if applicable)<br>= P013E (and P014A if applicable)<br>= P013A (and P013C if applicable)<br><br><br>================== | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| SIDI High Pressure Pump | P228C | This DTC Diagnoses the measured fuel rail pressure bias too low from desired fuel pressure. | Desired Pressure - Measure Pressure | >= 3.00 Mpa | Battery Voltage<br><br>Low Side Fuel Pressure<br><br>Engine Run Time<br><br><br>Additional Enable Conditions:<br>All must be true<br>(High Pressure Pump is enabled and<br>High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and<br>High Pressure fuel pump ckt is Not (FA,FP or TFTKO) andCam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement | >= 11 Volts<br><br>> 0.250 MPa<br><br>>= KtFHPD_t_PumpCntrlEng RunThrsh (see supporting tables)<br><br>Enabled when a code clear is not active or not exiting device control Engine is not cranking | Pressure Error - 750 0 failures out of 938 samples | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | detected is true and Manufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation  error(P1682) not active | | | |
| | | | | | Barometric Pressure Inlet Air Temp Fuel Temp | >= 70.0 KPA >= -20.0  degC -20 <=Temp degC <=  90 | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| SIDI High Pressure Pump | P228D | This DTC Diagnoses the measured fuel rail pressure bias too high from desired fuel pressure | Desired Pressure - Measure Pressure | <= -3.00 Mpa | Battery Voltage<br><br>Low Side Fuel Pressure<br><br>Engine Run Time<br><br><br>Additional Enable Conditions:<br>All must be true<br>(High Pressure Pump is enabled and<br>High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and<br>High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and<br>Cam or Crank Sensor Not FA and<br>IAT,IAT2,ECT Not FA and<br>Low side Fuel Pump Relay ckt Not FA and<br>Estimate fuel rail pressure is valid and<br>Green Engine (In assembly plant) is not enabled and<br>Not if low fuel condition and<br>Low side Fuel Pump is on and<br>Injector Flow Test is not active and<br>Device control commanded pressure is false and<br>Device control pump ckt enabled on is false and | >= 11 Volts<br><br>> 0.250 MPa<br><br>>= KtFHPD_t_PumpCntrlEng RunThrsh (see supporting tables)<br><br>Enabled when a code clear is not active or not exiting device control Engine is not cranking | Pressure Error - 750 failures out of 938 samples | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  | Engine movement detected is true andManufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation  error(P1682) not active<br><br>Barometric Pressure Inlet Air Temp Fuel Temp | >=  70.0 KPA >=  -20.0 DegC -20 <= Temp degC <=  90 |  |  |
|  |  |  |  |  |  |  |  |  |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Secondary AIR System Pressure Sensor Circuit Bank 1 | P2430 | This DTC detects a stuck in range pressure sensor signal when the AIR pump is commanded on. | Average Pressure Error<br><br>AND<br>Signal Variation | < 0.50 kPa<br><br><br>< 0.15 kPa | BARO<br>Inlet Air Temp<br>Coolant Temp<br>Engine off time<br>System Voltage<br>MAP not<br>Engine Speed<br>MAF not<br><br>No active DTCs: | > 60 kPa<br>> -11.0 deg C<br>> -11.0 deg C < 56.0<br>> 1,800.0 seconds<br>> 10.0 Volts < 32.0<br>< 20 kPa for 2.0 sec<br>< 5,000 RPM<br>> 50 gm/s for 3.0 sec<br><br>AIRValveControlCircuit FA<br>AIRPumpControlCircuit FA<br>AIRSysPressSnsrB1CktLoFA<br>AIRSysPressSnsrB1CktHiFA<br>ControllerProcessorPerf_FA | Stuck in range cumulative time > 5.0 seconds<br><br>Frequency: Once per trip when SAI pump is commanded On | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Secondary AIR System Pressure Sensor Performance Bank 1 | P2431 | This DTC detects a skewed pressure sensor signal via a comparison of the AIR pressure sensor signal and estimated BARO, as well as an evaluation of the quality of the comparison. | Difference between AIR pressure sensor and BARO (Pump Commanded Off) or OR Difference between AIR pressure sensor and BARO (Pump Commanded On) | > 18.0 kPa < -10.0 kPa > 50.0 kPa | BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not Transfer Case not in 4WD Low Run/crank active No active DTCs: | > 60 kPa > -11.0 deg C > -11.0 deg C < 56.0 > 1,800.0 seconds > 10.0 Volts < 32.0 < 20 kPa for 2.0 sec < 5,000 RPM > 50 gm/s for 3.0 sec AIRValveControlCircuit FA AIRPumpControlCircuit FA AIRSysPressSnsrB1CktLoFA AIRSysPressSnsrB1CktHi FA MAF_SensorFA EngineMisfireDetected_FA ControllerProcessorPerf_FA | Skewed sensor cumulative test weight > 15.0 seconds Continuous 6.25ms loop Skewed sensor cumulatative test weight is based on distance from the last Baro update. See **Baro Skewed Sensor Weight Factor** table. | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Secondary AIR System Pressure Sensor Circuit Low Voltage Bank 1 | P2432 | This DTC detects an out of range low AIR pressure sensor signal | AIR Pressure Sensor signal | < 6 % of 5Vref for 800 failures out of 1,000 samples | No active DTCs: | ControllerProcessorPerf_FA | 1,000 samples (6.25 ms per sample)  Continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Secondary AIR System Pressure Sensor Circuit Hi Voltage Bank 1 | P2433 | This DTC detects an out of range high AIR pressure sensor signal | AIR Pressure Sensor signal | > 94 % of 5Vref for 800 failures out of 1,000 samples | No active DTCs: | ControllerProcessorPerf_ FA | 1,000 samples (6.25 ms per sample)  Continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Secondary AIR System Shut-off Valve Stuck Open | P2440 | This DTC detects if the AIR system control valve is stuck openThis test is run during Phase 2 (Pump commanded On, valve commanded closed) | Average Pressure Error<br><br>or | < **Bank 1 Valve Pressure Error** table<br><br>> 32 kPa | BARO<br>Inlet Air Temp<br>Coolant Temp<br>Engine off time<br>System Voltage<br>MAP not<br>Engine Speed<br>MAF not<br>Stability Time<br><br>AIR diagnostic Phase 1 passed<br><br>No active DTCs:<br><br>AIRSystemPressureSensor FA<br>AIRValveControlCircuit FA<br>AIRPumpControlCircuit FA<br>MAF_SensorFAAmbientAirDefault_NA<br>IAT_SensorFAECT_Sensor_FA<br>EngineMisfireDetected_FA<br>CatalystSysEfficiencyLoB1_FA<br>CatalystSysEfficiencyLoB2_FA<br>ControllerProcessorPerf_FA<br>IgnitionOutputDriver_FA<br>FuelInjectorCircuit_FA | > 60 kPa<br>> -11.0 deg C<br>> -11.0 deg C < 56.0<br>> 1,800.0 seconds<br>> 10.0 Volts < 32.0<br>< 20 kPa for 2.0 sec<br>< 5,000 RPM<br>> 50 gm/s for 3.0 sec<br>> 0.5 seconds | Phase 2 Conditional test weight > 1.5 sec<br><br>Frequency: Once per trip when AIR pump commanded On<br><br>Conditional test weight is calculated by multiplying the following Factors: **Phase 2 Baro Test Weight Factor, Phase 2 MAF Test Weight Factor, Phase 2 System Volt Test Weight Factor, Phase 2 Ambient Temp Test Weight Factor** (see Supporting Tables) | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Secondary AIR System Pump Stuck On | P2444 | This DTC detects if the SAI pump is stuck On. This test is run during Phase 3 (Pump commanded Off, valve commanded closed) | Average Pressure Error<br><br>or | > **Bank 1 Pump Pressure Error** table<br><br>< -32 kPa | BARO<br>Inlet Air Temp<br>Coolant Temp<br>Engine off time<br>System Voltage<br>MAP not<br>Engine Speed<br>MAF not<br>Stability Time<br><br>AIR diagnostic Phase 1 passed<br>AIR diagnostic Phase 2 passed<br><br><br>No active DTCs: | > 60 kPa<br>> -11.0 deg C<br>> -11.0 deg C < 56.0<br>> 1,800.0 seconds<br>> 10.0 Volts < 32.0<br>< 20 kPa for > 2.0 sec.<br>< 5,000 RPM<br>> 50 gm/s for > 3.0 sec.<br>> 4.0 seconds<br><br>Phase 3 cumulatative test weight is based on the distance from the last Baro update. See **Baro Skewed Sensor Weight Factor** table.<br><br><br>AIRSystemPressureSensorFA<br>AIRValveControlCircuit FA<br>AIRPumpControlCircuit FA<br>MAF_SensorFA<br>AmbientAirDefault_NA<br>IAT_SensorFA<br>ECT_Sensor_FA<br>EngineMisfireDetected_FA<br>CatalystSysEfficiencyLoB1_FA<br>CatalystSysEfficiencyLoB2_FA<br>ControllerProcessorPerf_FA<br>IgnitionOutputDriver_FA<br>FuelInjectorCircuit_FA | Phase 3 Cumlatative test weight > 2.0 sec.<br><br>Frequency: Once per trip when AIR pump commanded On | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Transmission Control Torque Request Circuit | P2544 | Determines if the torque request from the TCM is valid | Protect error - Serial Communication message - ($199 - PTEI3) | Message <> two's complement of message | Diagnostic enabled/ disabled | Enabled | >= 10  Protect errors during key cycle. | Type B, 2 Trips |
| | | | | | Power Mode | = Run | Performed on every received message | |
| | | | OR | | | | | |
| | | | Rolling count error - Serial Communication message ($199 - PPEI3) rolling count value | Message <> previous message rolling count value + one | Ignition Voltage | > 6.41 volts | >= 6 Rolling count errors out of 10 samples. | |
| | | | | | Engine Running | = True | Performed on every received message | |
| | | | OR | | Run/Crank Active | > 0.50  Sec | | |
| | | | | | | | >= 6  range errors out of 10 samples. | |
| | | | Range Error - Serial Communication message - ($199 - PTEI3) TCM Requested Torque Increase | > 350  Nm | No Serial communication loss to TCM (U0101) | No loss of communication | Performed on every received message | |
| | | | OR | | | | >= 3  multi-transitions out of 5 samples. Performed every 200 msec | |
| | | | Multi-transition error - Trans torque intervention type request change | Requested torque intervention type toggles from not increasing request to increasing request | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Control Module Power Off Timer Performance | P262B | This DTC determines if the hardware timer does not initialize or count properly. There are two tests to ensure proper functioning of the timer: Count Up Test (CUT) and Range Test (RaTe).<br><br>Count Up Test (CUT): Verifies that the HWIO timer is counting up with the proper increment.<br><br>Range Test (RaTe): When the run/crank is not active both the hardware and mirror timers are started. The timers are compared when module shutdown is initiated or run/crank becomes active. | Count Up Test:<br><br>Time difference between the current read and the previous read of the timer<br><br><br><br><br><br>Range Test:<br><br>The variation of the HWIO timer and mirror timer is | > 1.50 seconds<br><br><br><br><br><br><br><br>> 25 %. | | | Count Up Test: 4 failures out of 20 samples<br><br>1 sec / sample<br><br>Continuous while run/crank is not active and until controller shutdown is initiated.<br><br><br>Range Test: Once per trip when controller shutdown is initiated or run/ crank becomes active. | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump "A" Low Flow / Performance | P2635 | This DTC detects degradation in the performance of the SIDI electronically regulated fuel system | Filtered fuel rail pressure error | <= Low Threshold (tabulated function of desired fuel rail pressure and fuel flow rate -- 15% of requested Target Pressure ) OR >= High Threshold (tabulated function of desired fuel rail pressure and fuel flow rate -- 15% of requested Target Pressure) ( See Supporting Tables tab ) | 1. FRP Circuit Low DTC (P018C) 2. FRP Circuit High DTC (P018D) 3. Fuel Rail Pressure Sensor Performance DTC (P018B) 4. FuelPump Circuit Low DTC (P0231) 5. FuelPump Circuit High DTC (P0232) 6. FuelPump Circuit Open DTC (P023F) 7. Reference Voltage DTC (P0641) | Not active Not active . Not active Not active Not active Not active Not active Not active Not occurred Valid (for absolute fuel pressure sensor) >= 30 seconds Not low Enabled | Filtered fuel rail pressure error Time Constant = 12.5 seconds Frequency: Continuous 12.5 ms loop | DTC Type B 2 trips |

| Component/System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | 8. Fuel Pump Control Module Driver Over-temperature DTC's (P064A)<br><br>9. Control Module Internal Performance DTC (P0606)<br><br>10. An ECM fuel control system failure (PPEI $1ED)<br><br>11. The Barometric pressure (PPEI $4C1) signal<br><br>12. Engine run time<br><br>13. Emissions fuel level<br><br>(PPEI $3FB)<br><br>14. Fuel pump control<br><br>15. Fuel pump control state<br><br>16. Battery Voltage<br><br>17. Fuel flow rate<br><br>( See Supporting Tables tab )<br><br>18. Fuel Pressure Control System | Normal<br><br>11V<=voltage=<32V<br><br>> 0.047 g/s<br><br>AND<br><br><= Max allowed fuel flow rate as a function of desired rail pressure & Vbatt (Typical values in the range of 11 to 50 g/s)<br><br>Is not responding to an over-pressurization due to pressure build during DFCO or a decreasing desired pressure command. | | |

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

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Malfunction Indicator Lamp (MIL) Control Circuit (ODM) Low | P263A | Diagnoses the malfunction indicator lamp control low side driver circuit for circuit faults. | Voltage low during driver off state (indicates short-to-ground) | Short to ground: ≤ 0.5 Ω impedance between signal and controller ground | Run/Crank Voltage<br><br>Remote Vehicle Start is not active | Voltage ≥ 11 volts | 20 failures out of 25 samples<br><br>250 ms / sample | Type B, No MIL<br><br>NO MIL<br><br>Note: In certain controllers P0650 may also set (MIL Control Open Circuit) |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2Sensor Circuit Range / Performance Bank 1 Sensor 1 | P2A00 | This DTC determines if the O2 sensor voltage is not meeting the voltage criteria to enable closed loop fueling. | ==================== Closed Loop O2S ready flag<br><br>A) O2S signal must be To set Closed Loop ready flag<br><br>==================== Closed Loop O2S ready flag<br><br>B) Once set to ready O2S cannot be<br><br>for Then set Closed Loop ready flag<br><br>==================== | ============== <br><br>= False<br><br>< 1,250 mvolts<br><br>= True<br><br>============== <br><br>= True<br><br>> 1,250 mvolts<br><br>> 5.0 seconds<br>= False<br><br>============== | No Active DTC's<br><br><br><br>System Voltage<br>Engine Speed<br>Engine Airflow<br>Engine Coolant<br>Engine Metal Overtemp Active<br>Converter Overtemp ActiveFuel State<br>AFM Status<br>Predicted Exhaust Temp (B1S1)<br>Engine run time<br>Fuel Enrichment<br><br>All of the above met for | TPS_ThrottleAuthorityDefaulted<br>MAP_SensorFA<br>ECT_Sensor_FA<br>FuelInjectorCircuit_FAP0131, P0151P0132, P0152<br>10.0 < Volts < 32.0<br>500 ≤ RPM ≤ 3,400<br>3.2 ≤ gps ≤ 30.0<br>≥ 70.0 ºC<br><br>= False<br>= False<br>DFCO not active<br>= All Cylinders active<br><br>≥ 0.0 ºC<br>> 100 seconds<br>= Not Active<br><br>> 5 seconds | 200 failures out of 250 samples.<br><br>Frequency: Continuous 100 msec loop | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Control Module Communicati on Bus A Off | U0073 | This DTC monitors for a BUS A off condition | Bus off failures exceeds<br><br>before the sample time of is reached | 5 counts (equivalent to 0.06 seconds)<br><br>0.56 seconds | General Enable Criteria:<br><br>U0073<br><br>Normal CAN transmission on Bus A<br><br>Device Control<br><br>High Voltage Virtual Network Management<br><br>Ignition Voltage Criteria:<br><br>Ignition voltage<br><br><br><br>Power Mode<br><br><br>Off Cycle Enable Criteria:<br><br>KeCAND_b_OffKeyCycle DiagEnbl<br><br>Ignition Accessory Line and<br>Battery Voltage<br><br><br>General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds<br><br>CAN hardware is bus OFF for | <br><br><br>Not Active on Current Key Cycle<br><br>Enabled<br><br>Not Active<br><br>Not Active<br><br><br><br>>= 11.00<br>or<br>>= 6.41<br><br><br>= run<br><br><br><br><br>= 0<br>( 1 indicates enabled)<br><br>= Active<br><br>> 11.00<br><br><br><br><br><br><br><br>> 0.1125 seconds | Diagnostic runs in 12.5 ms loop | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Control Module Communicati on Bus B Off | U0074 | This DTC monitors for a BUS B off condition | Bus off failures exceeds<br><br><br>before the sample time of is reached | 5 counts (equivalent to 0.06 seconds)<br><br>0.56 seconds | General Enable Criteria:<br><br>U0074<br><br>Normal CAN transmission on Bus B<br><br>Device Control<br><br>High Voltage Virtual Network Management<br><br>Ignition Voltage Criteria:<br><br>Ignition voltage<br><br><br><br>Power Mode<br><br><br><br>Off Cycle Enable Criteria:<br><br>KeCAND_b_OffKeyCycle DiagEnbl<br><br>Ignition Accessory Line and<br>Battery Voltage<br><br><br>General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds<br><br>CAN hardware is bus OFF for | <br><br><br>Not Active on Current Key Cycle<br><br>Enabled<br><br>Not Active<br><br>Not Active<br><br><br><br>>= 11.00<br>or<br>>= 6.41<br><br><br>= run<br><br><br><br><br>= 0<br>(1 indicates enabled)<br><br>= Active<br><br>> 11.00<br><br><br><br><br><br><br>> 0.1125 seconds | Diagnostic runs in 12.5 ms loop | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Lost Communication With TCM | U0101 | This DTC monitors for a loss of communication with the transmission control module | Message is not received from controller for<br><br>Message $0AB<br><br>Message $0BD<br><br>Message $0C7<br><br>Message $0F9<br><br>Message $189<br><br>Message $199<br><br>Message $19D<br><br>Message $1AF<br><br>Message $1BE<br><br>Message $1BF<br><br>Message $1F5<br><br>Message $4C9 | <br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds | General Enable Criteria:<br><br>U0073<br><br>Normal CAN transmission on Bus A<br><br>Device Control<br><br>High Voltage Virtual Network Management<br><br>Ignition Voltage Criteria:<br><br>Ignition voltage<br><br><br>Power Mode<br><br>Off Cycle Enable Criteria:<br><br>KeCAND_b_OffKeyCycle DiagEnbl<br><br>Ignition Accessory Line and<br>Battery Voltage<br><br><br>General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds<br><br>Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is | <br><br>Not Active on Current Key Cycle<br><br>Enabled<br><br>Not Active<br><br>Not Active<br><br><br><br>>= 11.00<br>or<br>>= 6.41<br><br>= run<br><br><br>= 0<br>(1 indicates enabled)<br><br>= Active<br><br>> 11.00 | Diagnostic runs in 12.5 ms loop | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | not active for | > 0.4000 seconds | | |
| | | | | | U0101 | Not Active on Current Key Cycle | | |
| | | | | | TCM | is present on the bus | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Lost Communication With Fuel Pump Control Module | U0109 | This DTC monitors for a loss of communication with the fuel pump control module | Message is not received from controller for<br><br>Message $1EB<br><br>Message $4D9 | ≥ 10.0 seconds<br><br>≥ 10.0 seconds | General Enable Criteria:<br><br>U0073<br><br>Normal CAN transmission on Bus A<br><br>Device Control<br><br>High Voltage Virtual Network Management<br><br>Ignition Voltage Criteria:<br><br>Ignition voltage<br><br><br><br>Power Mode<br><br><br>Off Cycle Enable Criteria:<br><br>KeCAND_b_OffKeyCycle DiagEnbl<br><br>Ignition Accessory Line and<br>Battery Voltage<br><br><br>General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds<br><br>Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is | <br><br>Not Active on Current Key Cycle<br><br>Enabled<br><br>Not Active<br><br>Not Active<br><br><br><br>>= 11.00<br>or<br>>= 6.41<br><br>= run<br><br><br><br>= 0<br>( 1 indicates enabled)<br><br> = Active<br><br>> 11.00 | Diagnostic runs in 12.5 ms loop | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | not active for | > 0.4000 seconds | | |
| | | | | | U0109 | Not Active on Current Key Cycle | | |
| | | | | | Fuel Pump Control Module | is present on the bus | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Lost Communication With Anti-Lock Brake System (ABS) Control Module | U0121 | This DTC monitors for a loss of communication with the Anti-Lock Brake System (ABS) Control Module (Non-OBD Module ID 243). | Message is not received from controller for<br><br>Message $0C1<br><br>Message $0C5<br><br>Message $0D1<br><br>Message $1C6<br><br>Message $1C7<br><br>Message $1E9<br><br>Message $2F1<br><br>Message $2F9 | <br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds | General Enable Criteria:<br><br>U0073<br><br>Normal CAN transmission on Bus A<br><br>Device Control<br><br>High Voltage Virtual Network Management<br><br>Ignition Voltage Criteria:<br><br>Ignition voltage<br><br><br>Power Mode<br><br>Off Cycle Enable Criteria:<br><br>KeCAND_b_OffKeyCycle DiagEnbl<br><br><br>Ignition Accessory Line<br> and<br>Battery Voltage<br><br><br>General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds<br><br>Power Mode is in accessory or run or crank and High Voltage Virtual | <br><br>Not Active on Current Key Cycle<br><br>Enabled<br><br>Not Active<br><br>Not Active<br><br><br>>= 11.00<br>or<br>>= 6.41<br><br>= run<br><br><br>= 0<br>(1 indicates enabled)<br><br><br>= Active<br><br>> 11.00 | Diagnostic runs in 12.5 ms loop | Type C, No MIL "Special Type C" |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Network Management is not active for<br><br>U0121<br><br>Anti-Lock Brake System Control Module | > 0.4000 seconds<br><br>Not Active on Current Key Cycle<br><br>is present on the bus | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Lost Communication With Body Control Module | U0140 | This DTC monitors for a loss of communication with the Body Control Module. | Message is not received from controller for<br><br>Message $0F1<br><br>Message $12A<br><br>Message $1E1<br><br>Message $1F1<br><br>Message $1F3<br><br>Message $3C9<br><br>Message $3CB<br><br>Message $3F1<br><br>Message $451<br><br>Message $4D7<br><br>Message $4E1<br><br>Message $4E9 | ≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0  seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds | General Enable Criteria:<br><br>U0073<br><br>Normal CAN transmission on Bus A<br><br>Device Control<br><br>High Voltage Virtual Network Management<br><br>Ignition Voltage Criteria:<br><br>Ignition voltage<br><br><br>Power Mode<br><br><br>Off Cycle Enable Criteria:<br><br>KeCAND_b_OffKeyCycle DiagEnbl<br><br>Ignition Accessory Line  and<br>Battery Voltage<br><br><br>General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000  seconds<br><br>Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is | Not Active on Current Key Cycle<br><br>Enabled<br><br>Not Active<br><br><br>Not Active<br><br><br><br>>= 11.00<br>or<br>>= 6.41<br><br><br>= run<br><br><br><br><br>= 0<br>(1 indicates enabled)<br><br>= Active<br><br>> 11.00<br><br><br><br><br><br>> 0.4000  seconds | Diagnostic runs in 12.5 ms loop | Type C, No MIL "Special Type C" |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | not active for<br><br>U0140<br><br>Body Control Module | Not Active on Current Key Cycle<br><br>is present on the bus | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Lost Communication with Fuel Pump Driver Control Module | U18A2 | This DTC monitors for a loss of communication with the Fuel Pump Driver Control Module on Bus B | Message is not received from controller for<br><br>Message $0D5<br><br>Message $0D7 | ≥ 10.0 seconds<br><br>≥ 10.0 seconds | General Enable Criteria:<br><br>U0074<br><br>Normal CAN transmission on Bus B<br><br>Device Control<br><br>High Voltage Virtual Network Management<br><br>Ignition Voltage Criteria:<br><br>Ignition voltage<br><br><br>Power Mode<br><br>Off Cycle Enable Criteria:<br><br>KeCAND_b_OffKeyCycle DiagEnbl<br><br><br>Ignition Accessory Line and<br>Battery Voltage<br><br>General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds<br><br>Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for | Not Active on Current Key Cycle<br><br>Enabled<br><br>Not Active<br><br>Not Active<br><br><br>>= 11.00<br>or<br>>= 6.41<br><br>= run<br><br><br>= 0<br>(1 indicates enabled)<br><br><br>=Active<br><br>> 11.00<br><br><br><br><br><br>> 0.4000 seconds | Diagnostic runs in 12.5 ms loop | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | U18A2<br><br>Fuel Pump Driver Control Module | Not Active on Current Key Cycle<br><br>is present on the bus | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Driver Control Module Lost Communication with ECM/PCM | U2616 | To detect lost serial data communication from the power driver controller to the ECM | FPPM Received Serial Data Communication Status | == enumeration faulted | a) FPPM configuration KeFRPR_e_ChassisFuel PresSysType b) Fault state determination enabled c) Run_Crank status d) FPPM Control Status Alive Rolling Count result e) FPPM Diagnostic feedback received f) System Voltage | a) == CeFRPR_e_ECM_FPPM _Sys) b) == TRUE c) == Active d) == Valid e) == TRUE f) 9v < Sys Voltage > 32v | 64 failures / 80 samples 1 sample / 12.5 millisec | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Level Sensor 1 Performance<br><br>(For use on vehicles with mechanical transfer pump dual fuel tanks) | P0461 | This DTC will detect a fuel sender stuck in range in the primary fuel tank. | ****************************<br>Fuel Level in Primary and Secondary Tanks Remain in an Unreadable Range too Long<br>****************************<br>This subtest is used<br><br>If fuel volume in primary tank is<br>and fuel volume in secondary tank<br>and remains in this condition for<br><br>OR<br>****************************<br>After Refuel Event<br>****************************<br>If the secondary fuel volume changes by 18.4 liters from engine "off" to engine "on" the primary volume should change by 3.0 liters.<br><br>OR<br>****************************<br>Distance Traveled without a Primary Fuel Level Change<br>****************************<br>Delta fuel volume change over an accumulated 118 miles. | ≥ 28.7 liters<br><br>< 2.8 liters<br><br>149 miles.<br><br><br><br><br><br>< 3 liters | Engine Running<br><br>No active DTCs:<br><br><br><br><br><br><br><br><br>The shutdown primary tank volume + 3.0 liters must be | VehicleSpeedSensor_FA<br><br><br><br><br><br><br><br><br>< 28.7 liters | 250 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cruise Control On Switch Circuit | P0565 | | Cruise Control On switch remains applied for greater than a calibratable period of time for architecture where cruise switch states are received over serial data | | CAN cruise switch diagnostic enable in ECM | 1.00 | fail continuously for greater than 20.00 seconds | MIL Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cruise Control Multi-function Circuit Low Voltage | P0580 | detects short to ground failure for cruise multi-function switch circuit | Cruise Control analog circuit voltage must be in an "Open Short To Ground" for greater than a calibratable period of time for cruise switch states that are received over serial data | | CAN cruise switch diagnostic enable in ECM | 1.00 | fail continuously for greater than 2.00 seconds | MIL: Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cruise Control Multi-function Circuit High Voltage | P0581 | | Cruise Control analog circuit voltage must be in an "Short To Power" for greater than a calibratable period of time for cruise switch states that are received over serial data | | CAN cruise switch diagnostic enable in ECM | 1.00 | fail continuously for greater than 2.00 seconds | MIL: Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Transmission Mode Switch Signal Circuit<br><br>Include for programs that are NOT hybrid start stop conventional | P1762 | Vehicles that are not hybrid start stop conventional applications, this diagnoses the transmission mode switch signal circuit (BCM to ECM Rolling Count check) | Rolling count value received from BCM does not match expected value | = TRUE | Engine Speed<br>Engine Speed<br><br>Engine speed between min/max for<br><br>Vehicle Speed<br>for | ≥ 200 RPM<br>≤ 7,500 RPM<br><br>≥ 5.0 seconds<br><br>≤ 318.14 MPH<br>≥ 5.0 seconds | > 3 error counts for > 10.0 seconds<br><br>100 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Level Sensor 2 Performance<br><br>(For use on vehicles with mechanical transfer pump dual fuel tanks) | P2066 | This DTC will detect a fuel sender stuck in range in the secondary fuel tank. | ******************************<br>Fuel Level in Primary and Secondary Tanks Remain in an Unreadable Range too Long<br>******************************<br>This subtest is  used<br><br>If fuel volume in primary tank is<br>and fuel volume in secondary tank is<br>and remains in this condition for<br><br>OR<br>******************************<br>Fuel Level is in a Readable Range for both Primary and Secondary Tanks too Long<br>******************************<br>This subtest is  not used<br><br>Volume in primary tank is<br>and volume in secondary tank is<br>and remains in this condition for<br><br>OR<br>******************************<br>Distance Traveled without a Secondary Fuel Level Change<br>******************************<br>If the vehicle is driven a |  <br><br><br><br><br><br><br><br>$\geq$ 28.7 liters<br><br>< 2.8 liters<br><br> 149 miles<br><br><br><br><br><br><br><br><br><br><br><br>< 29 liters<br><br>> 3 liters<br><br> 2,430 seconds | Engine Running<br><br>No active DTCs:<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>Volume in secondary tank | VehicleSpeedSensor_FA<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>$\geq$ 2.8  liters | 250 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | distance of 81 miles without the secondary fuel level changing by 3 liters, then the sender must be stuck. | | | | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Level Sensor 2 Circuit Low Voltage  (For use on vehicles with dual fuel tanks) | P2067 | This DTC will detect a fuel sender stuck out of range low in the secondary fuel tank. | Fuel level Sender % of 5V range | < 10 % | | | 100 failures out of 125 samples  100 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Level Sensor 2 Circuit High Voltage<br><br>(For use on vehicles with dual fuel tanks) | P2068 | This DTC will detect a fuel sender stuck out of range low in the secondary fuel tank. | Fuel level Sender % of 5V range | > 60 % | | | 100 failures out of 125 samples<br><br>100 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Crankshaft Position Signal Output Circuit Low | P2618 | Diagnoses the Crankshaft Position Signal Output low side driver circuit for circuit faults | Voltage low during driver off state (indicates short-to-ground or open circuit) | Short to ground: <= 0.5 Ohms impedance between signal and controller ground Open Circuit: >= 200 K Ohms impedance between signal and controller ground | Powertrain Relay Voltage Engine is not cranking Crankshaft Position Output is commanded high | >= 11.00 Volts | 40 failures out of 50 samples 1 sample every 100 msec | Type C, No MIL Note: In certain controllers P2617 may also set (Crankshaft Position Signal Output Circuit / Open) |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Crankshaft Position Signal Output Circuit High | P2619 | Diagnoses the Crankshaft Position Signal Output low side driver circuit for circuit faults | Voltage low during driver on state (indicates short-to-power) | Short to power: <= 0.5 Ohms impedance between signal and controller power | Powertrain Relay Voltage<br><br>Engine is not cranking<br><br>Crankshaft Position Output is commanded low | >= 11.00 Volts | 40 failures out of 50 samples<br><br>1 sample every 100 msec | Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Turbo/Super Charger Bypass Valve Control Circuit | P0033 | Detect Turbocharger Bypass Valve - Open Circuit | ECM detects that commanded and actual states of output driver do not match because the output is open circuit | | Diagnostic Enabled<br><br>EnabledPowertrain relay Voltage<br><br>Ignition run crank voltage<br><br>Engine is not cranking | 1<br><br>>= 11.00 Volts<br><br>>= 5.00 Volts | 20<br><br>failures out of 100<br><br>samples<br><br>1 sample every 100ms | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Turbo/Super Charger Bypass Valve Control Circuit Low | P0034 | Detect Turbocharger Bypass Valve - Shorted to Ground | ECM detects that commanded and actual states of output driver do not match because the output is shorted to ground | | Diagnostic Enabled | 1 | 20 failures out of 100 samples 1 sample every 100ms | Type B, 2 Trips |
| | | | | | EnabledPowertrain relay Voltage | >= 11.00 Volts | | |
| | | | | | Ignition run crank voltage | >= 5.00 Volts | | |
| | | | | | Engine is not cranking | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Turbo/Super Charger Bypass Valve Control Circuit High | P0035 | Detect Turbocharger Bypass Valve - Shorted to Power | ECM detects that commanded and actual states of output driver do not match because the output is shorted to power | | Diagnostic Enabled<br><br>EnabledPowertrain relay Voltage<br><br>Ignition run crank voltage<br><br>Engine is not cranking | 1<br><br>>= Volts 11.00<br><br>>= 5.00 Volts | 20<br><br>failures out of 100<br><br>samples<br><br>1 sample every 100ms | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Air Pressure Measurement System - Multiple Sensor Correlation (turbocharged) | P00C7 | Detects an inconsistency between pressure sensors in the induction system in which a particular sensor cannot be identified as the failed sensor | ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure) OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure) OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure) OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold | > 10.0 kPa <= 10.0 kPa <= 10.0 kPa <= 10.0 kPa > 10.0 kPa <= 10.0 kPa <= 10.0 kPa <= 10.0 kPa > 10.0 kPa > 10.0 kPa | Time between current ignition cycle and the last time the engine was running Engine is not rotating Manifold Pressure Manifold Pressure Baro Pressure Baro Pressure Turbocharger Boost Pressure Turbocharger Boost Pressure No Active DTCs: No Pending DTCs: | > 10.0 seconds >= 50.0 kPa <= 115.0 kPa >= 50.0 kPa <= 115.0 kPa >= 50.0 kPa <= 115.0 kPa EngineModeNotRunTimer Error MAP_SensorFA AAP_SnsrFA AAP2_SnsrFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP | 4 failures out of 5 samples 1 sample every 12.5 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure) | > 10.0 kPa  > 10.0 kPa | | | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Mass Air Flow System Performance (turbocharged) | P0101 | Determines if the MAF sensor is stuck within the normal operating range | See table "Turbocharger Intake Flow Rationality Diagnostic Failure Matrix" for combinations of model failures that can set this DTC.<br><br>MAF model fails when ABS(Measured Flow – Modeled Air Flow) Filtered<br><br>MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered<br><br>MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered<br><br>MAP3 model fails when ABS(Measured MAP – MAP Model 3) Filtered<br><br>TIAP1 model fails when ABS(Measured TIAP – TIAP Model 1) Filtered<br><br>TPS model fails when Filtered Throttle Model Error<br><br>TIAP Correlation model fails when High Engine Air Flow is TRUE AND Measured TIAP - measured MAP - offset as a function of engine speed | > 20 grams/sec<br><br>> 24.0 kPa<br><br>> 30.0 kPa<br><br>> 30.0 kPa<br><br>> 30.0 kPa<br><br>> 300 kPa*(g/s)<br><br>> 24.0 kPa | Engine Speed<br>Engine Speed<br>Coolant Temp<br>Coolant Temp<br>Intake Air Temp<br>Intake Air Temp<br>Minimum total weight factor (all factors multiplied together) | >= 400 RPM<br><= 6,000 RPM<br>> -7 Deg C<br>< 125 Deg C<br>> -20 Deg C<br>< 125 Deg C<br><br>>= 0.50<br><br>Modeled Air Flow Error multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor based on MAF Est<br><br>MAP Model 1 Error multiplied by MAP1 Residual Weight Factor based on RPM<br><br>MAP Model 2 Error multiplied by MAP2 Residual Weight Factor based on RPM<br><br>MAP Model 3 Error multiplied by MAP3 Residual Weight Factor based on RPM<br><br>TIAP Model 1 Error multiplied by TIAP Residual Weight Factor based on RPM<br><br>Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM | Continuous<br><br>Calculation are performed every 12.5 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | See table "TIAP-MAP Correlation Offset"<br><br>OR<br><br>Low Engine Air Flow is TRUE<br>AND<br>Measured TIAP - measured Baro - offset as a function of engine speed<br>See table "TIAP-Baro Correlation Offset" | > 24.0 kPa | No Active DTCs:<br><br><br><br><br><br><br>No Pending DTCs: | See "Residual Weight Factor" tables.<br><br>MAP_SensorCircuitFA<br>EGRValvePerformance_FA<br>MAF_SensorCircuitFA<br>CrankSensor_FA<br>ECT_Sensor_FA<br>IAT_SensorFA<br>MnfdTempSensorFA<br>TC_BoostPresSnsrCktFA<br>AmbientAirDefault<br><br>EGRValve_FP<br>ECT_Sensor_Ckt_FP<br>IAT_SensorCircuitFP<br>MnfdTempSensorCktFP | | |
| | | | TIAP Correlation is valid when<br>High Engine Air Flow has been TRUE for a period of time<br>OR<br>Low Engine Air Flow has been TRUE for a period of time | > 1.0 seconds<br><br><br><br><br>> 1.0 seconds | | | | |
| | | | High Engine Air Flow is TRUE when<br>Mass Air Flow<br><br><br><br><br>AND<br>Manifold Pressure<br><br><br><br><br>AND | > a threshold in gm/sec as a function of engine speed<br>See table "TIAP-MAP Correlation Min Air Flow"<br><br>> a threshold in kPa as a function of engine speed<br>See table "TIAP-MAP Correlation Min MAP" | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Filtered Mass Air Flow - Mass Air Flow | < 3.0 gm/sec | | | | |
| | | | Low Engine Air Flow is TRUE when Mass Air Flow | < a threshold in gm/sec as a function of engine speed See table "TIAP-Baro Correlation Max Air Flow" | | | | |
| | | | AND Manifold Pressure | < a threshold in kPa as a function of engine speed See table "TIAP-Baro Correlation Max MAP" | | | | |
| | | | AND Mass Air Flow - Filtered Mass Air Flow | < 2.0 gm/sec | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Manifold Absolute Pressure Sensor Performance (turbocharged) | P0106 | Determines if the MAP sensor is stuck within the normal operating range | See table "Turbocharger Intake Flow Rationality Diagnostic Failure Matrix" for combinations of model failures that can set this DTC.<br><br>MAF model fails when ABS(Measured Flow – Modeled Air Flow) Filtered<br><br>MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered<br><br>MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered<br><br>MAP3 model fails when ABS(Measured MAP – MAP Model 3) Filtered<br><br>TIAP1 model fails when ABS(Measured TIAP – TIAP Model 1) Filtered<br><br>TPS model fails when Filtered Throttle Model Error<br><br>TIAP Correlation model fails when<br><br>High Engine Air Flow is TRUE AND Measured TIAP - measured MAP - offset as a function of engine speed See table "TIAP-MAP | <br><br><br><br><br>> 20 grams/sec<br><br><br><br>> 24.0 kPa<br><br><br><br>> 30.0 kPa<br><br><br><br>> 30.0 kPa<br><br><br><br>> 30.0 kPa<br><br><br><br>> 300 kPa*(g/s)<br><br><br><br><br><br><br><br>> 24.0 kPa | Engine Speed<br>Engine Speed<br>Coolant Temp<br>Coolant Temp<br>Intake Air Temp<br>Intake Air Temp<br>Minimum total weight factor (all factors multiplied together) | >= 400 RPM<br><= 6,000 RPM<br>> -7 Deg C<br>< 125 Deg C<br>> -20 Deg C<br>< 125 Deg C<br><br><br>>= 0.50<br><br>Modeled Air Flow Error multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor based on MAF Est<br><br>MAP Model 1 Error multiplied by MAP1 Residual Weight Factor based on RPM<br><br>MAP Model 2 Error multiplied by MAP2 Residual Weight Factor based on RPM<br><br>MAP Model 3 Error multiplied by MAP3 Residual Weight Factor based on RPM<br><br>TIAP Model 1 Error multiplied by TIAP Residual Weight Factor based on RPM<br><br>Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM | Continuous<br><br>Calculation are performed every 12.5 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Correlation Offset" OR Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed See table "TIAP-Baro Correlation Offset" TIAP Correlation is valid when | > 24.0 kPa | No Active DTCs: | See "Residual Weight Factor" tables. MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault | | |
| | | | High Engine Air Flow has been TRUE for a period of time OR Low Engine Air Flow has been TRUE for a period of time | > 1.0 seconds > 1.0 seconds | No Pending DTCs: | EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP | | |
| | | | High Engine Air Flow is TRUE when Mass Air Flow | > a threshold in gm/sec as a function of engine speed See table "TIAP-MAP Correlation Min Air Flow" | | | | |
| | | | AND Manifold Pressure | > a threshold in kPa as a function of engine speed See table "TIAP-MAP Correlation Min MAP" | | | | |
| | | | AND Filtered Mass Air Flow - Mass Air Flow | < 3.0 gm/sec | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Low Engine Air Flow is TRUE when Mass Air Flow | < a threshold in gm/sec as a function of engine speed See table "TIAP-Baro Correlation Max Air Flow" | | | | |
| | | | AND Manifold Pressure | < a threshold in kPa as a function of engine speed See table "TIAP-Baro Correlation Max MAP" | | | | |
| | | | AND Mass Air Flow - Filtered Mass Air Flow | < 2.0 gm/sec | | | | |
| | | | Manifold Pressure OR Manifold Pressure | < 50.0 kPa > 115.0 kPa | Time between current ignition cycle and the last time the engine was running | > 10.0 seconds | 4 failures out of 5 samples | |
| | | | OR | | Engine is not rotating | | 1 sample every 12.5 msec | |
| | | | ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure) | > 10.0 kPa > 10.0 kPa <= 10.0 kPa | No Active DTCs: No Pending DTCs: | EngineModeNotRunTimer Error MAP_SensorFA TC_BoostPresSnsrCktFA AAP2_SnsrFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Engine Coolant Temperature (ECT) Sensor Performance | P0116 | This DTC detects ECT temp sensor stuck in mid range. | A failure will be reported if any of the following (1-3) occur after the following soak conditions, Engine off time > 25,200 seconds Propulsion system off time > 0 seconds<br><br>1) ECT at power up > IAT at power up by an IAT based table lookup value (fast fail).<br><br>2) ECT at power up > IAT at power up by 15.8 Deg C and a block heater has not been detected.<br><br>3) ECT at power up > IAT at power up by 15.8 Deg C and the time spent cranking the engine without starting is greater than 10.0 seconds with the LowFuelConditionDiag | See the table named: **P0116_Fail if power up ECT exceeds IAT by these values** in the Supporting tables section<br><br><br><br><br>= False | No Active DTC's<br><br><br><br>Non-volatile memory initization<br><br>Test complete this trip Test aborted this trip IAT LowFuelCondition Diag<br><br>==================<br>Block Heater detection is enabled when either of the following occurs:<br><br>1) ECT at power up > IAT at power up by<br><br>2) Cranking time<br><br>==================<br>Block Heater is detected and diagnostic is aborted when 1) or 2) occurs:<br><br>1a) Vehicle drive time<br><br>1b) Vehicle speed<br><br>1c) Additional Vehicle drive time is provided to 1a when Vehicle speed is below 1b as follows:<br><br>1d) IAT drops from power | VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_Ckt_FA IgnitionOffTime Valid TimeSinceEngineRunning Valid<br><br>= Not occurred<br><br>= False<br>= False<br>≥ -7 ºC<br><br>= False<br><br>==================<br><br><br><br><br><br><br>> 15.8 ºC<br><br>< 10.0 seconds<br><br>==================<br><br><br><br><br>> 400 seconds<br><br>> 14.9 MPH<br><br><br>0.50 times the seconds with vehicle speed below 1b | 1 failure<br><br>500 msec/ sample<br><br>Once per valid cold start | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | up IAT | ≥ 5.3 ºC | | |
| | | | | | 2a) ECT drops from power up ECT | ≥ 5 ºC | | |
| | | | | | 2b) Engine run time | Within ≤ 60 seconds | | |
| | | | | | ================== Diagnostic is aborted when 3) or 4) occurs: | ================== | | |
| | | | | | 3) Engine run time with vehicle speed below 1b | > 1800 seconds | | |
| | | | | | 4) Minimum IAT during test | ≤ -7 ºC | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Throttle Position Sensor Performance (turbocharged) | P0121 | Determines if the Throttle Position Sensor input is stuck within the normal operating range | See table "Turbocharger Intake Flow Rationality Diagnostic Failure Matrix" for combinations of model failures that can set this DTC.<br><br>MAF model fails when ABS(Measured Flow – Modeled Air Flow) Filtered<br><br>MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered<br><br>MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered<br><br>MAP3 model fails when ABS(Measured MAP – MAP Model 3) Filtered<br><br>TIAP1 model fails when ABS(Measured TIAP – TIAP Model 1) Filtered<br><br>TPS model fails when Filtered Throttle Model Error<br><br>TIAP Correlation model fails when<br><br>High Engine Air Flow is TRUE AND Measured TIAP - measured MAP - offset as a function of engine speed<br>See table "TIAP-MAP | > 20 grams/sec<br><br>> 24.0 kPa<br><br>> 30.0 kPa<br><br>> 30.0 kPa<br><br>> 30.0 kPa<br><br>> 300 kPa*(g/s)<br><br>> 24.0 kPa | Engine Speed<br>Engine Speed<br>Coolant Temp<br>Coolant Temp<br>Intake Air Temp<br>Intake Air Temp<br>Minimum total weight factor (all factors multiplied together) | >= 400 RPM<br><= 6,000 RPM<br>> -7 Deg C<br>< 125 Deg C<br>> -20 Deg C<br>< 125 Deg C<br><br>>= 0.50<br><br>Modeled Air Flow Error multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor based on MAF Est<br><br>MAP Model 1 Error multiplied by MAP1 Residual Weight Factor based on RPM<br><br>MAP Model 2 Error multiplied by MAP2 Residual Weight Factor based on RPM<br><br>MAP Model 3 Error multiplied by MAP3 Residual Weight Factor based on RPM<br><br>TIAP Model 1 Error multiplied by TIAP Residual Weight Factor based on RPM<br><br>Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM | Continuous<br><br>Calculation are performed every 12.5 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Correlation Offset" <br><br> OR <br><br> Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed <br> See table "TIAP-Baro Correlation Offset" <br><br> TIAP Correlation is valid when <br> High Engine Air Flow has been TRUE for a period of time <br> OR <br> Low Engine Air Flow has been TRUE for a period of time <br><br> High Engine Air Flow is TRUE when <br> Mass Air Flow <br><br><br><br> AND <br> Manifold Pressure <br><br><br><br> AND <br> Filtered Mass Air Flow - Mass Air Flow | <br><br><br><br><br><br><br><br> > 24.0 kPa <br><br><br><br><br><br><br><br><br> > 1.0 seconds <br><br><br><br> > 1.0 seconds <br><br><br> > a threshold in gm sec as a function of engine speed <br> See table "TIAP-MAP Correlation Min Air Flow" <br><br> > a threshold in kPa as a function of engine speed <br> See table "TIAP-MAP Correlation Min MAP" <br><br> < 3.0 gm/sec | No Active DTCs: <br><br><br><br><br><br><br><br><br><br><br><br> No Pending DTCs: | See "Residual Weight Factor" tables. <br><br> MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault <br><br> EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Low Engine Air Flow is TRUE when Mass Air Flow<br><br><br><br>AND Manifold Pressure<br><br><br>AND Mass Air Flow - Filtered Mass Air Flow | < a threshold in gm sec as a function of engine speed See table "TIAP-Baro Correlation Max Air Flow"<br><br>< a threshold in kPa as a function of engine speed See table "TIAP-Baro Correlation Max MAP"<br><br><br>< 2.0 gm/sec | | | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Turbo/Super Charger Engine Overboost Turbocharger with wastegate. Not supercharger with mechanical compressor | P0234 | Detect Negative Boost Pressure Control Deviation | Desired Boost Pressure - Actual Boost Pressure | < (KtBSTD_p_CntrlDevN egLim - KtBSTD_p_CntrlDevA mbAirCorr)    See Tables in Supporting Tables Sheet | Diagnostic Enabled | 1 | 25 failures out of 30 samples  1 sample every 100ms | Type B, 2 Trips |
| | | | | | Engine Speed | > 1,600 rpm | | |
| | | | | | Engine Speed | < 6,000 rpm | | |
| | | | | | Desired Boost Pressure | > 140.0 kPa | | |
| | | | | | Desired Boost Pressure | < 300.0 kPa | | |
| | | | | | Desired Boost Pressure Derivative | > -75.0 kPa/s | | |
| | | | | | Desired Boost Pressure Derivative | < 75.0 kPa/s | | |
| | | | | | Ambient Pressure | > 60.0 kPa | | |
| | | | | | Ambient Pressure | < 120.0 kPa | | |
| | | | | | Coolant Temp | > -40.0 Deg C | | |
| | | | | | Coolant Temp | < 120.0 Deg C | | |
| | | | | | Intake Air Temp | > -40.0 Deg C | | |
| | | | | | Intake Air Temp | < 80.0 Deg C | | |
| | | | | | Wait for steady state: | > KtBSTD_t_CntrlDevEnblD elay  See Table in Supporting Tables Sheet | | |
| | | | | | No Active DTCs: | Desired Boost Pressure > BasicPressure  AmbientAirDefault_Snsr BSTR_b_PCA_CktFA BSTR_b_TurboBypassCkt FA ECT_Sensor_FAIAT_Sen | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | No Active DVCs: | sorFA<br>BSTR_b_ExcsvBstTFTKO<br>BSTR_b_PCA_CktTFTKO<br>TC_BoostPresSnsrFA<br>AnyCamPhaser_FA<br>BSTR_b_PresCntrlTooLoTFTKO<br>BSTR_b_PresCntrlTooHiTFTKO<br>EnginePowerLimited<br><br>BSTR_b_DVC_PCA_DC_Actv<br>BSTR_b_DVC_PCA_PstnActv<br>BSTR_b_DVC_TurboComprBypActv | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Turbocharger Boost Pressure (TIAP) Sensor Performance | P0236 | Determines if the Turbocharger Boost (TIAP) Pressure Sensor input is stuck within the normal operating range | See table "Turbocharger Intake Flow Rationality Diagnostic Failure Matrix" for combinations of model failures that can set this DTC.<br><br>MAF model fails when ABS(Measured Flow – Modeled Air Flow) Filtered<br><br>MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered<br><br>MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered<br><br>MAP3 model fails when ABS(Measured MAP – MAP Model 3) Filtered<br><br>TIAP1 model fails when ABS(Measured TIAP - TIAP Model 1) Filtered<br><br>TPS model fails when Filtered Throttle Model Error<br><br>TIAP Correlation model fails when High Engine Air Flow is TRUE AND Measured TIAP - measured MAP - offset as a function of engine speed See table "TIAP-MAP Correlation Offset" | > 20 grams/sec<br><br><br><br>> 24.0 kPa > 30.0 kPa<br><br><br><br>> 30.0 kPa<br><br><br><br>> 30.0 kPa<br><br><br><br>> 300 kPa*(g/s)<br><br><br><br><br><br>> 24.0 kPa | Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) | >= 400 RPM <= 6,000 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C<br><br>>= 0.50<br><br>Modeled Air Flow Error multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor based on MAF Est<br><br>MAP Model 1 Error multiplied by MAP1 Residual Weight Factor based on RPM<br><br>MAP Model 2 Error multiplied by MAP2 Residual Weight Factor based on RPM<br><br>MAP Model 3 Error multiplied by MAP3 Residual Weight Factor based on RPM<br><br>TIAP Model 1 Error multiplied by TIAP Residual Weight Factor based on RPM<br><br>Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM | Continuous<br><br>Calculation are performed every 12.5 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | OR<br><br>Low Engine Air Flow is TRUE AND<br>Measured TIAP - measured Baro - offset as a function of engine speed<br>See table "TIAP-Baro Correlation Offset" | > 24.0 kPa | No Active DTCs: | See "Residual Weight Factor" tables.<br><br>MAP_SensorCircuitFA<br>EGRValvePerformance_FA<br>MAF_SensorCircuitFA<br>CrankSensor_FA<br>ECT_Sensor_FA<br>IAT_SensorFA<br>MnfdTempSensorFA<br>TC_BoostPresSnsrCktFA<br>AmbientAirDefault | | |
| | | | TIAP Correlation is valid when<br>High Engine Air Flow has been TRUE for a period of time | > 1.0 seconds | No Pending DTCs: | EGRValve_FP<br>ECT_Sensor_Ckt_FP<br>IAT_SensorCircuitFP<br>MnfdTempSensorCktFP | | |
| | | | OR<br>Low Engine Air Flow has been TRUE for a period of time | > 1.0 seconds | | | | |
| | | | High Engine Air Flow is TRUE when<br>Mass Air Flow | > a threshold in gm/sec as a function of engine speed See table "TIAP-MAP Correlation Min Air Flow" | | | | |
| | | | AND<br>Manifold Pressure | > a threshold in kPa as a function of engine speed See table "TIAP-MAP Correlation Min MAP" | | | | |
| | | | AND<br>Filtered Mass Air Flow - Mass Air Flow | < 3.0 gm/sec | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Low Engine Air Flow is TRUE when Mass Air Flow<br><br>AND Manifold Pressure<br><br>AND Mass Air Flow - Filtered Mass Air Flow | < a threshold in gm/sec as a function of engine speed See table "TIAP-Baro Correlation Max Air Flow"<br><br>< a threshold in kPa as a function of engine speed See table "TIAP-Baro Correlation Max MAP"<br><br>< 2.0 gm/sec | | | | |
| | | | Turbocharger Boost Pressure OR Turbocharger Bosst Pressure<br><br>OR<br><br>ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure) | < 50.0 kPa<br><br>> 115.0 kPa<br><br><= 10.0 kPa<br><br>> 10.0 kPa<br><br>> 10.0 kPa | Time between current ignition cycle and the last time the engine was running<br><br>Engine is not rotating<br><br>No Active DTCs:<br><br>No Pending DTCs: | > 10.0 seconds<br><br>EngineModeNotRunTimer Error MAP_SensorFA TC_BoostPresSnsrCktFA AAP2_SnsrFA<br><br>MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP | 4 failures out of 5 samples<br><br>1 sample every 12.5 msec | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Turbocharger Boost Pressure Sensor Circuit Low | P0237 | Detects a continuous short to low or open in either the signal circuit or the turbocharger boost pressure sensor. | Turbocharger Boost Pressure Voltage | < 18.0 % of 5 Volt Range (This is equal to 0.90 Volts, or 44.0 kPa) | Engine Run Time | > 0.00 seconds | 320 failures out of 400 samples<br><br>1 sample every 12.5 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Turbocharger Boost Pressure Sensor Circuit High | P0238 | Detects an open sensor ground or continuous short to high in either the signal circuit or the turbocharger boost pressure sensor. | Turbocharger Boost Pressure Voltage | > 78.0 % of 5 Volt Range (This is equal to 3.90 Volts, or 299.0 kPa) | Engine Run Time | > 0.00 seconds | 320 failures out of 400 samples<br><br>1 sample every 12.5 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Turbocharger Wastegate / Supercharger Boost Solenoid A Control Circuit | P0243 | Detect Turbocharger Boost Solenoid -Open Circuit | ECM detects that commanded and actual states of output driver do not match because the output is open circuit | | Diagnostic Enabled<br><br>Powertrain relay voltage<br><br>Ignition run crank voltage<br><br>Engine is not cranking | 1<br><br>>= 11.00 Volts<br><br>>= 5.00 Volts | 10<br><br>failures out of 20<br><br>samples<br><br>1 sample every 100ms | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Turbocharger Wastegate / Supercharger Boost Solenoid A Control Circuit Low | P0245 | Detect Turbocharger Boost Solenoid - Shorted to ground | ECM detects that commanded and actual states of output driver do not match because the output is shorted to ground | | Diagnostic Enabled<br><br>Powertrain relay voltage<br><br>Ignition run crank voltage<br><br>Engine is not cranking | 1<br><br>>= 11.00 Volts<br><br>>= 5.00 Volts | 10<br><br>failures out of 20<br><br>samples<br><br>1 sample every 100ms | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Turbocharger Wastegate / Supercharger Boost Solenoid A Control Circuit High | P0246 | Detect Turbocharger Boost Solenoid - Shorted to Power | ECM detects that commanded and actual states of output driver do not match because the output is shorted to power | | Diagnostic Enabled<br><br>Powertrain relay voltage<br><br>Ignition run crank voltage<br><br>Engine is not cranking | 1<br><br>>= 11.00 Volts<br><br>>= 5.00 Volts | 10<br><br>failures out of 20<br><br>samples<br><br>1 sample every 100ms | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Turbo/Super Charger Engine Underboost Turbocharger with wastegate. Not supercharger with mechanical compressor | P0299 | Detect Positive Boost Pressure Control Deviation | Desired Boost Pressure - Actual Boost Pressure | > (KtBSTD_p_CntrlDevPosLim + KtBSTD_p_CntrlDevAmbAirCorr)<br><br>See Tables in Supporting Tables Sheet | Diagnostic Enabled | 1 | 25 failures out of 30 samples<br><br>1 sample every 100ms | Type B, 2 Trips |
| | | | | | Engine Speed | > 1,600 rpm | | |
| | | | | | Engine Speed | < 6,000 rpm | | |
| | | | | | Desired Boost Pressure | > 140.0 kPa | | |
| | | | | | Desired Boost Pressure | < 300.0 kPa | | |
| | | | | | Desired Boost Pressure Derivative | > -75.0 kPa/s | | |
| | | | | | Desired Boost Pressure Derivative | < 75.0 kPa/s | | |
| | | | | | Ambient Pressure | > 60.0 kPa | | |
| | | | | | Ambient Pressure | < 120.0 kPa | | |
| | | | | | Coolant Temp | > -40.0 Deg C | | |
| | | | | | Coolant Temp | < 120.0 Deg C | | |
| | | | | | Intake Air Temp | > -40.0 Deg C | | |
| | | | | | Intake Air Temp | < 80.0 Deg C | | |
| | | | | | Wait for steady state: | > KtBSTD_t_CntrlDevEnblDelay See Table in Supporting Tables Sheet | | |
| | | | | | No Active DTCs: | Desired Boost Pressure > Basic Pressure<br><br>AmbientAirDefault_Snsr BSTR_b_PCA_CktFA BSTR_b_TurboBypassCktFA ECT_Sensor_FA | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | No Active DVCs: | IAT_SensorFA BSTR_b_ExcsvBstTFTKO BSTR_b_PCA_CktTFTKO TC_BoostPresSnsrFA AnyCamPhaser_FA BSTR_b_PresCntrlTooLoTFTKO BSTR_b_PresCntrlTooHiTFTKO EnginePowerLimited<br><br>BSTR_b_DVC_PCA_DC_Actv BSTR_b_DVC_PCA_PstnActv BSTR_b_DVC_TurboComprBypActv | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cruise Control Multi- Function Input B Circuit | P0589 | Detect when cruise control multi-function switch circuit B (analog) voltage is in an illegal range | Cruise Control analog circuit B voltage must be in an "illegal range" or "between ranges" for greater than a calibratable period of time for cruise switch states that are received over serial data | | CAN cruise switch diagnostic enable in ECM | 1.00 | fail continuously for greater than 0.700 seconds | MIL: Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cruise Control Multi- Function Input B Circuit Low | P0592 | detects short to ground failure for cruise multi-function switch circuit B | Cruise Control analog circuit B voltage must be in an "Open Short To Ground" for greater than a calibratable period of time for cruise switch states that are received over serial data | | CAN cruise switch diagnostic enable in ECM | 1.00 | fail continuously for greater than 2.00 seconds | MIL: Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cruise Control Multi-Function Input B Circuit High | P0593 | | Cruise Control analog circuit B voltage must be in an "Short To Power" for greater than a calibratable period of time for cruise switch states that are received over serial data | | CAN cruise switch diagnostic enable in ECM | 1.00 | fail continuously for greater than 2.00 seconds | MIL: Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Relay Control Circuit Open | P0627 | Diagnoses the fuel pump relay control high side driver circuit for circuit faults | Voltage high during driver off state (indicates open circuit) | Open circuit: ≥ 200 K Ω impedance between signal and controller ground | Run/Crank Voltage<br><br>Engine Speed | Voltage ≥ 11 volts<br><br>≥ 0 RPM | 8 failures out of 10 samples<br><br>250 ms / sample | Type B, 2 Trips<br><br>Note: In certain controllers P0629 may also set (Fuel Pump Relay Control Short to Power) |

| Component/System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Inlet Airflow System Performance (turbocharged) | P1101 | Determines if there are multiple air induction problems affecting airflow and/or manifold pressure. | See table "Turbocharger Intake Flow Rationality Diagnostic Failure Matrix" for combinations of model failures that can set this DTC.<br><br>MAF model fails when ABS(Measured Flow – Modeled Air Flow) Filtered<br><br>MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered<br><br>MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered<br><br>MAP3 model fails when ABS(Measured MAP – MAP Model 3) Filtered<br><br>TIAP1 model fails when ABS(Measured TIAP – TIAP Model 1) Filtered<br><br>TPS model fails when Filtered Throttle Model Error<br><br>TIAP Correlation model fails when High Engine Air Flow is TRUE AND Measured TIAP - measured MAP - offset as a function of engine speed See table "TIAP-MAP | > 20 grams/sec<br><br>> 24.0 kPa<br><br>> 30.0 kPa<br><br>> 30.0 kPa<br><br>> 30.0 kPa<br><br>> 300 kPa*(g/s)<br><br>> 24.0 kPa | Engine Speed<br>Engine Speed<br>Coolant Temp<br>Coolant Temp<br>Intake Air Temp<br>Intake Air Temp<br>Minimum total weight factor (all factors multiplied together) | >= 400 RPM<br><= 6,000 RPM<br>> -7 Deg C<br>< 125 Deg C<br>> -20 Deg C<br>< 125 Deg C<br><br><br>>= 0.50<br><br>Modeled Air Flow Error multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor based on MAF Est<br><br>MAP Model 1 Error multiplied by MAP1 Residual Weight Factor based on RPM<br><br>MAP Model 2 Error multiplied by MAP2 Residual Weight Factor based on RPM<br><br>MAP Model 3 Error multiplied by MAP3 Residual Weight Factor based on RPM<br><br>TIAP Model 1 Error multiplied by TIAP Residual Weight Factor based on RPM<br><br>Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM | Continuous<br><br>Calculation are performed every 12.5 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Correlation Offset"<br><br>OR<br><br>Low Engine Air Flow is TRUE AND Measured TIAP - measured Baro - offset as a function of engine speed See table "TIAP-Baro Correlation Offset"<br><br>TIAP Correlation is valid when High Engine Air Flow has been TRUE for a period of time OR Low Engine Air Flow has been TRUE for a period of time<br><br>High Engine Air Flow is TRUE when Mass Air Flow<br><br><br><br><br>AND Manifold Pressure<br><br><br><br>AND Filtered Mass Air Flow - Mass Air Flow | > 24.0 kPa<br><br><br><br>> 1.0 seconds<br><br><br><br>> 1.0 seconds<br><br>> a threshold in gm sec as a function of engine speed See table "TIAP-MAP Correlation Min Air Flow"<br><br>> a threshold in kPa as a function of engine speed See table "TIAP-MAP Correlation Min MAP"<br><br>< 3.0 gm/sec | No Active DTCs:<br><br><br><br><br>No Pending DTCs: | See "Residual Weight Factor" tables.<br><br>MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA AmbientAirDefault<br><br>EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Low Engine Air Flow is TRUE when Mass Air Flow | < a threshold in gm sec as a function of engine speed See table "TIAP-Baro Correlation Max Air Flow" | | | | |
| | | | AND Manifold Pressure | < a threshold in kPa as a function of engine speed See table "TIAP-Baro Correlation Max MAP" | | | | |
| | | | AND Mass Air Flow - Filtered Mass Air Flow | < 2.0 gm/sec | | | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Air Temperature Sensor 3 Circuit Performance (applications with humidity sensor and manifold temperature sensor) | P112B | Detects an IAT3 sensor that has stuck in range by comparing to IAT and IAT2 at startup | ABS(Power Up IAT - Power Up IAT2)<br><br>AND<br><br>ABS(Power Up IAT - Power Up IAT3)<br><br>AND<br><br>ABS(Power Up IAT2 - Power Up IAT3) | <= 30 deg C<br><br><br>> 25 deg C<br><br><br>> 25 deg C | Time between current ignition cycle and the last time the engine was running<br><br>Powertrain Relay Voltage for a time<br><br>No Active DTCs: | > 28,800 seconds<br><br>>= 11.00 Volts<br>>= 0.9 seconds<br><br>PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA | Executes once at the beginning of each ignition cycle if enable conditions are met | Type B, 2 Trips |
|  |  |  | Power Up IAT is between Power Up IAT2 and Power Up IAT3<br><br>AND<br><br>ABS(Power Up IAT2 - Power Up IAT3)<br><br>AND<br><br>ABS(Power Up IAT - Power Up IAT3) > ABS(Power Up IAT - Power Up IAT2) | > 25 Deg C | Time between current ignition cycle and the last time the engine was running<br><br>Powertrain Relay Voltage for a time<br><br>No Active DTCs: | > 28,800 seconds<br><br>>= 11.00 Volts<br>>= 0.9 seconds<br><br>PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA | Executes once at the beginning of each ignition cycle if enable conditions are met |  |
|  |  |  | Power Up IAT2 is between Power Up IAT and Power Up IAT3<br><br>AND<br><br>ABS(Power Up IAT - Power Up IAT3)<br><br>AND<br><br>ABS(Power Up IAT2 - | > 25 deg C | Time between current ignition cycle and the last time the engine was running<br><br>Powertrain Relay Voltage for a time<br><br>No Active DTCs: | > 28,800 seconds<br><br>>= 11.00 Volts<br>>= 0.9 seconds<br><br>PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA | Executes once at the beginning of each ignition cycle if enable conditions are met |  |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Power Up IAT3) > ABS(Power Up IAT2 - Power Up IAT) | | | HumTempSnsrCktFA | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Air Temperature Sensor Circuit 3 Low (applications with manifold temperature and humidity) | P112C | Detects a continuous short to ground in the IAT 3 signal circuit or the IAT 3 sensor | Raw IAT 3 Input | < 57 Ohms (~150 deg C) | Engine Run Time | > 0.00 seconds | 40 failures out of 50 samples<br><br>1 sample every 100 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Air Temperature Sensor Circuit 3 High (applications with manifold temperature and humidity) | P112D | Detects a continuous open circuit in the IAT 3 signal circuit or the IAT 3 sensor | Raw IAT 3 Input | > 162,529 Ohms (~-60 deg C) | Engine Run Time | > 0.00 seconds | 40 failures out of 50 samples<br><br>1 sample every 100 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Intake Air Temperature Sensor 3 Intermittent In-Range | P112E | Detects a noisy or erratic IAT 3 signal circuit or IAT 3 sensor | String Length<br><br>Where:<br>"String Length" = sum of "Diff" calculated over<br><br>And where:<br>"Diff" = ABS(current IAT 3 reading - IAT 3 reading from 100 milliseconds previous) | > 250.00 DegC<br><br>10 consecutive IAT 3 samples | Continuous | | 4 failures out of 5 samples<br><br>Each sample takes 1.0 seconds | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Adaptive Cruise Control Signal Circuit | P1553 | Detects rolling count or protection value errors in Adaptive Cruise Control Axle Torque Command serial data signal | If x of y rolling count / protection value faults occur, disable adaptive cruise control for duration of fault | | Adaptive Cruise Control Command Serial Data Error Diagnostic Enable | 1.00 | 10 / 16 counts | MIL: Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cruise Control Set/ Coast Signal 2 Circuit | P155B | Detects a failure of the cruise set 2 switch in a continously applied state | Cruise Control Set 2 switch remains applied for greater than a calibratable period of time for architecture where cruise switch states are received over serial data | | CAN cruise switch diagnostic enable in ECM | 1.00 | fail continuously for greater than 90.000 seconds | MIL: Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cruise Control Resume/ Acceleration Signal 2 Circuit | P155C | Detects a failure of the cruise resume 2 switch in a continously applied state | Cruise Control Resume 2 switch remains applied for greater than a calibratable period of time for architecture where cruise switch states are received over serial data | | CAN cruise switch diagnostic enable in ECM | 1.00 | fail continuously for greater than 90.000 seconds | MIL: Type C, No MIL |

| Component/System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Front Object Detection Control Module Torque Request Signal Message Counter Incorrect | P15F6 | Detects rolling count or protection value errors in Collision Preparation System Axle Torque Command serial data signal | If x of y rolling count / protection value faults occur, disable collision preparation system for duration of fault | | Front Object Detection Module Torque Request Serial Data Error Diagnostic Enable | 1.00 | 4 / 10 counts | MIL: Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Rear Object Detection Control Module Torque Request Signal Message Counter Incorrect | P15F7 | Detects rolling count or protection value errors Rear Virtual Bumper Axle Torque Command serial data signal | If x of y rolling count / protection value faults occur, disable rear virtual bumper for duration of fault | | Rear Object Detection Module Torque Request Serial Data Error Diagnostic Enable | 1.00 | 4 / 10 counts | MIL: Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Automatic Braking Engine Torque Request Signal Message Incorrect | P15F8 | Detects rolling count or protection value errors Rear Virtual Bumper Axle Torque Command serial data signal | If x of y rolling count / protection value faults occur, disable rear virtual bumper or collision preparation system for duration of fault | | Automatic Braking Engine Torque Request Serial Data Error Diagnostic Enable | 1.00 | 4 / 10 counts | MIL: Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Barometric Pressure (BARO) Sensor Performance (turbocharged) | P2227 | Compares baro sensor to the calculated baro estimate (part throttle calculation or unthrottled MAP) | Difference between baro sensor reading and estimated baro when distance since last estimated baro update<br><br>OR<br><br>Difference between baro sensor reading and estimated baro when distance since last estimated baro update | > 15.0 kPa<br><br><= 0.06 miles<br><br><br><br>> 20.0 kPa<br><br>> 0.06 miles | Engine Run Time<br><br>No Active DTCs: | > 0.00 seconds<br><br>AmbPresSnsrCktFA<br>ECT_Sensor_Ckt_FA<br>IAT_SensorFA<br>MAF_SensorFA<br>AfterThrottlePressureFA<br>TPS_FA<br>TPS_Performance_FA<br>VehicleSpeedSensor_FA | 320 failures out of 400 samples<br><br>1 sample every 12.5 msec | Type B, 2 Trips |
| | | | Barometric Pressure<br>OR<br>Barometric Pressure<br><br>OR<br><br>ABS(Manifold Pressure - Baro Pressure)<br>AND<br>ABS(Turbocharger Boost Pressure - Manifold Pressure)<br>AND<br>ABS(Turbocharger Boost Pressure - Baro Pressure) | < 50.0 kPa<br><br>> 115.0 kPa<br><br><br><br>> 10.0 kPa<br><br><br><br><= 10.0 kPa<br><br><br>> 10.0 kPa | Time between current ignition cycle and the last time the engine was running<br><br>Engine is not rotating<br><br>No Active DTCs:<br><br><br><br>No Pending DTCs: | > 10.0 seconds<br><br><br><br>EngineModeNotRunTimer Error<br>MAP_SensorFA<br>TC_BoostPresSnsrCktFA<br>AAP2_SnsrFA<br><br>MAP_SensorCircuitFP<br>AAP_SnsrCktFP<br>AAP2_SnsrCktFP | 4 failures out of 5 samples<br><br>1 sample every 12.5 msec | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Barometric Pressure (BARO) Sensor Circuit Low (boosted applications) | P2228 | Detects a continuous short to low or open in either the signal circuit or the BARO sensor. | BARO Voltage | < 34.5 % of 5 Volt Range ( 1.7 Volts = 43.9 kPa) | Engine Run Time | > 0.00 seconds | 320 failures out of 400 samples<br><br>1 sample every 12.5 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Barometric Pressure (BARO) Sensor Circuit High (boosted applications) | P2229 | Detects an open sensor ground or continuous short to high in either the signal circuit or the BARO sensor. | BARO Voltage | > 90.0 % of 5 Volt Range ( 4.5 Volts = 115.0 kPa) | Engine Run Time | > 0.00 seconds | 320 failures out of 400 samples<br><br>1 sample every 12.5 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Turbo/Super Charger Bypass Valve - Mechanical Turbocharger with wastegate. Not supercharger with mechanical compressor | P2261 | Detect Stuck Closed Bypass Valve | Accumulation time is high pass filtered. Accumulated air mass flow or boost pressure larger then thresholds<br><br><br>Filter Frequency<br><br>Filtered Air Mass Flow<br><br>Filtered Boost Pressure | 0.25 Second < Accumulation time < 1.00 Second<br><br><br><br>10.00 Hz<br><br>> 40.000 g/s<br><br>> 40.00 kPa | Diagnostic Enabled<br><br>Engine Speed<br><br>Pressure ratio over the compressor<br><br><br><br>Relative Boost Pressure (Boost - Ambient) and Negative Transient in Manifold Air Pressure<br><br><br><br><br><br><br><br><br>Bypass Valve Commanded Open<br><br>No Active DTCs: | 1<br><br>>= 1,500 rpm<br><br>>KtBSTD_r_ExcsvBstPresLim Enable condition kept true for 0.8 seconds extra<br>See Tables in Supporting Tables Sheet<br><br>IF ( RelativeBoost < 0.0 kPa OR DerivativeMAP > 10.00 kPa/s )<br>[ FALSE ]<br>Else<br>( RelativeBoost >= 25.0 kPa AND DerivativeMAP <= -150.00 kPa )<br>[ TRUE ]<br><br>> 6.0 percentEnable condition kept true for 0.50 seconds extra<br><br><br><br>TC_BoostPresSnsrFA<br>MAF_SensorFABSTR_b_ TurboBypassCktFA | 7 Failed tests out of 10 Tests<br><br>1 sample every 25ms | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Lost Communication With Cruise Control Module | U0104 | This DTC monitors for a loss of communication with the Cruise Control Module. | Message is not received from controller for<br><br>Message $2CB<br><br>Message $2CD | ≥ 12.0 seconds<br><br>≥ 12.0 seconds | General Enable Criteria:<br><br>U0073<br><br>Normal CAN transmission on Bus A<br><br>Device Control<br><br>High Voltage Virtual Network Management<br><br>Ignition Voltage Criteria:<br><br>Ignition voltage<br><br><br><br>Power Mode<br><br>Off Cycle Enable Criteria:<br><br>KeCAND_b_OffKeyCycle DiagEnbl<br><br><br>Ignition Accessory Line<br> and<br>Battery Voltage<br><br>General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds<br><br>Power Mode is in accessory or run or crank and High Voltage Virtual | <br><br>Not Active on Current Key Cycle<br><br><br><br>Enabled<br><br>Not Active<br><br><br>Not Active<br><br><br><br><br>>= 11.00<br>or<br>>= 6.41<br><br><br>= run<br><br><br><br>= 0<br>(1 indicates enabled)<br><br><br><br>= Active<br><br>> 11.00 | Diagnostic runs in 12.5 ms loop | Type X, No MIL |

| Component/System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Network Management is not active for<br><br>U0104<br><br>Cruise Control Module | > 0.4000 seconds<br><br>Not Active on Current Key Cycle<br><br>is present on the bus | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Transmission Output Speed Sensor (TOSS) | P0502 | No activity in the TOSS circuit | TOSS Raw Speed | ≤ 60 RPM | Engine TorqueMinimum Throttle openingEngine SpeedIgnition voltagePTO EngineTorqureInaccurate P0503 | 90.0 ≤ N-M ≤ 8,191.8 ≥ 8.0 % 1,500 ≤ RPM ≤ 6,500 11.0 ≤ Volts ≤ 32.00 not activeKeETQC_b_MinTransRemedial = TRUE: MSFR_b_EngMisfDtctd_FA, MAFR_b_MAF_SnsrTFTKO, MAPR_b_MAP_SnsrTFTKO KeETQC_b_MinTransRemedial = FALSE: FULR_b_FuelInjCkt_TFTKO, MAFR_b_MAF_SnsrTFTKO, XOYR_b_SecurityFlt, Not failed this key cycle | ≥ 4.5 sec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Transmission Output Speed Sensor (TOSS) | P0503 | TOSS Signal Intermittent | Loop-to-Loop change in TOSS | ≥ 350 RPM | Raw Output SpeedOutput Speed changeTime since transfer case range changeIgnition voltageEngine SpeedVehicle Speed PTO | > 300 RPM for ≥ 2.0 sec≤ 150 RPM for ≥ 2.0 sec≥ 6.0 sec 11.0 ≤ Volts ≤ 32.00 200 ≤ RPM ≤ 7,500 for ≥ 5.0 seconds≤ 511.99 MPH for ≥ 5.0 secnot active | ≥ 3.3 sec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Clutch Pedal Position Sensor Circuit Range / Performance | P0806 | Detects if Clutch Pedal Position Sensor is Stuck in a range indicative of a vehicle NOT in gear, when the vehicle is determined to be in gear. Gear determination is made by verifying that the ratio of engine RPM versus Transmission Output Speed (N/TOS) represents a valid gear. | Filtered Clutch Pedal Position Error when the vehicle is determined to be in gear | > 4 % | N/TOS Ratio:<br><br>Transfer Case:<br><br>Vehicle speed:<br><br>Engine Torque:<br><br>Clutch Pedal Position:<br><br>OR<br><br>No Active DTCs: | Must match actual gear (i.e. vehicle in gear)<br><br>Not in 4WD Low range<br><br>> 6.2 MPH<br><br>> **EngTorqueThreshold** (see Supporting Tables)<br><br>< **ResidualErrEnableLow** (see Supporting Tables)<br>> **ResidualErrEnableHigh** (see Supporting Tables)<br><br>ClutchPstnSnsrCktHi FA ClutchPstnSnsrCktLo FA CrankSensor_FA Transmission Output Shaft Angular Velocity Validity VehicleSpeedSensor_FA | 25 ms loop Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Clutch Pedal Position Sensor Circuit  Low | P0807 | Detects Continuous Circuit Out-of-Range Low or Open | Clutch Position Sensor Circuit  for | < 4  % of Vref  200  counts out of 250 samples | Engine Not Cranking System Voltage  No active DTCs: | >  11.0  Volts | 25 ms loop Continuous | Type A, 1 Trips |

| Component/System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Clutch Pedal Position Sensor Circuit High | P0808 | Detects Continuous Circuit Out-of-Range High | Clutch Position Sensor Circuit<br><br>for | > 96 % of Vref<br><br>200 counts out of 250 samples | Engine Not Cranking System Voltage<br><br>No active DTCs: | > 11.0 Volts | 25 ms loop Continuous | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Clutch Pedal Position Not Learned | P080A | Detects Invalid Clutch Pedal Fully Applied Learn Position values | Fully Applied Learn Position<br><br>OR | < 9.0 %<br><br>> 36.0 % | OBD Manufacturer's Enable Counter | = 0 | 250 ms loop Continuous | Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| O2S Insufficient Switching Bank 1 Sensor 1 | P1133 | This DTC determines if the O2 sensor is no longer sufficiently switching. | Fault condition present if Half Cycle L/R or R/L Switches are below the threshold.<br><br>OR<br><br>Slope Time L/R Switches<br><br>OR<br><br>Slope Time R/L Switches | H/C L/R switches < Threshold, or H/C R/L switches < Threshold, (refer to tables named **P1133_O2S HC L to R Switches Limit Bank 1 Sensor 1 "Pass/Fail Threshold table"** and **P1133_O2S HC R to L Switches Limit Bank 1 Sensor 1 "Pass/ Fail Threshold table"** in Supporting tables tab)<br><br>< 5<br><br><br>< 5 | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>Bank 1 Sensor 1 DTC's not active<br><br>System Voltage<br>EGR Device Control<br>Idle Device Control<br>Fuel Device Control<br>AIR Device Control<br>Low Fuel Condition Diag<br>Green O2S Condition | TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefaultMAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA EthanolCompositionSensor_FA EngineMisfireDetected_FA<br><br>= P0131, P0132 or P0134<br><br>10.0 < Volts < 32.0<br>= Not active<br>= Not active<br>= Not active<br>= Not active<br>= False<br>= Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S1, B2S1 (if applicable) | Sample time is 60 seconds<br><br>Frequency: Once per trip | Type B, 2 Trips |

| Component/System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | in Supporting Tables tab. | | |
| | | | | | O2 Heater on for Learned Htr resistance | ≥ 40 seconds = Valid ( the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's" ) | | |
| | | | | | Engine Coolant IAT Engine run Accum | > 68 ºC > -40 ºC > 120 seconds | | |
| | | | | | Time since any AFM status change Time since Purge On to Off change Time since Purge Off to On change | > 2.0 seconds > 0.0 seconds > 1.5 seconds | | |
| | | | | | Engine airflow Engine speed Fuel Baro Air Per Cylinder | 14 ≤ gps ≤ 40 1,000 ≤ RPM ≤ 3,500 < 87 % Ethanol > 70 kpa ≥ 200 mgrams | | |
| | | | | | Fuel Control State Closed Loop Active LTM fuel cell Transient Fuel Mass Baro Fuel Control State Fuel State Commanded Proportional Gain | = Closed Loop = TRUE = Enabled ≤ 100.0 mgrams = Not Defaulted not = Power Enrichment DFCO not active  ≥ 0.0 % | | |
| | | | | | ================= All of the above met for Time | ================= > 3.0 seconds | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Secondary AIR System Pressure Sensor Circuit Bank 2 | P2435 | This DTC detects a stuck in range pressure sensor signal when the AIR pump is commanded on. | Average Pressure Error AND Signal Variation | < 0.50 kPa < 0.15 kPa | BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not No active DTCs: | > 60 kPa > -11.0 deg C > -11.0 deg C < 56.0 > 1,800.0 seconds > 10.0 Volts < 32.0 < 20 kPa for 2.0 sec < 5,000 RPM > 50 gm/s for 3.0 sec AIRValveControlCircuit FA AIRPumpControlCircuit FA AIRSysPressSnsrB1CktL oFA AIRSysPressSnsrB1CktHi FA ControllerProcessorPerf_ FA 5VoltReferenceA_FA 5VoltReferenceB_FA | Stuck in range cumulative time > 5.0 seconds Frequency: Once per trip when SAI pump is commanded On | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Secondary AIR System Pressure Sensor Performance Bank 2 | P2436 | This DTC detects a skewed pressure sensor signal via a comparison of the AIR pressure sensor signal and estimated BARO, as well as an evaluation of the quality of the comparison. | Difference between AIR pressure sensor and BARO (Pump Commanded Off) or OR Difference between AIR pressure sensor and BARO (Pump Commanded On) | > 10.0 kPa <br><br> < -10.0 kPa <br><br> > 50.0 kPa | BARO <br> Inlet Air Temp <br> Coolant Temp <br> Engine off time <br> System Voltage <br> MAP not <br> Engine Speed <br> MAF not <br><br> Transfer Case not in 4WD Low <br> Run/crank active <br><br><br> No active DTCs: | > 60 kPa <br> > -11.0 deg C <br> > -11.0 deg C < 56.0 <br> > 1,800.0 seconds <br> > 10.0 OR < 32.0 Volts <br> < 20 kPa for 2.0 sec <br> < 5,000 RPM <br> > 50 gm/s for 3.0 sec <br><br><br><br><br> AIRValveControlCircuit FA <br> AIRPumpControlCircuit FA <br> AIRSysPressSnsrB1CktLoFA <br> AIRSysPressSnsrB1CktHi FA <br> MAF_SensorFA <br> EngineMisfireDetected_FA <br> ControllerProcessorPerf_ FA <br> 5VoltReferenceA_FA <br> 5VoltReferenceB_FA | Skewed sensor cumulative test weight > 15.0 seconds <br><br> Continuous 6.25ms loop <br><br> Skewed sensor cumulatative test weight is based on distance from the last Baro update. See **Baro Skewed Sensor Weight Factor** table. | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Secondary AIR System Pressure Sensor Circuit Low Voltage Bank 2 | P2437 | This DTC detects an out of range low AIR pressure sensor signal | AIR Pressure Sensor signal | < 6 % of 5Vref for 800 failures out of 1,000 samples | No active DTCs: | ControllerProcessorPerf_ FA 5VoltReferenceA_FA 5VoltReferenceB_FA | 1,000 samples (6.25 ms per sample) Continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Secondary AIR System Pressure Sensor Circuit Hi Voltage Bank 2 | P2438 | This DTC detects an out of range high AIR pressure sensor signal | AIR Pressure Sensor signal | > 94 % of 5Vref for 800 failures out of 1,000 samples | No active DTCs: | ControllerProcessorPerf_ FA 5VoltReferenceA_FA 5VoltReferenceB_FA | 1,000 samples (6.25 ms per sample) Continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Secondary AIR System Shut-off Valve Stuck Open | P2440 | This DTC detects if one or both of the AIR system control valves is stuck openThis test is run during Phase 2 (Pump commanded On, valve commanded closed) | Average Pressure Error<br><br>or<br><br>or | < **Bank 1 Valve Pressure Error** table<br><br>< **Bank 2 Valve Pressure Error** table<br><br>> 32 kPa for either Bank | BARO<br>Inlet Air Temp<br>Coolant Temp<br>Engine off time<br>System Voltage<br>MAP not<br>Engine Speed<br>MAF not<br>Stability Time<br><br>AIR diagnostic Phase 1 passed<br><br>No active DTCs:<br><br>AIRSystemPressureSensor FA<br>AIRValveControlCircuit FA<br>AIRPumpControlCircuit FA<br>MAF_SensorFA<br>AmbientAirDefault_NA<br>IAT_SensorFA<br>ECT_Sensor_FA<br>EngineMisfireDetected_FA<br>CatalystSysEfficiencyLoB1_FA<br>CatalystSysEfficiencyLoB2_FA<br>ControllerProcessorPerf_FA<br>5VoltReferenceA_FA<br>5VoltReferenceB_FA<br>IgnitionOutputDriver_FA<br>FuelInjectorCircuit_FA | > 60 kPa<br>> -11.0 deg C<br>> -11.0 deg C < 56.0<br>> 1,800.0 seconds<br>> 10.0 Volts < 32.0<br>< 20 kPa for 2.0 sec<br>< 5,000 RPM<br>> 50 gm/s for 3.0 sec<br>> 0.5 seconds | Phase 2 Conditional test weight > 1.5 sec<br><br>Frequency: Once per trip when AIR pump commanded On<br><br>Conditional test weight is calculated by multiplying the following Factors:<br>**Phase 2 Baro Test Weight Factor, Phase 2 MAF Test Weight Factor, Phase 2 System Volt Test Weight Factor, Phase 2 Ambient Temp Test Weight Factor** (see Supporting Tables) | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Composition Sensor Circuit Low | P0178 | Detects Out of Range Low Frequency Signal | Flex Fuel Sensor Output Frequency | < 45 Hertz | Powertrain Relay | > 11.0 Volts | 50 failures out of 63 samples 100 ms loop Continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Composition Sensor Circuit  High | P0179 | Detects Out of Range High Frequency Signal | Flex Fuel Sensor Output Frequency | > 155 Hertz <= 185 | Powertrain Relay | > 11.0 Volts | 50 failures out of 63 samples 100 ms loop Continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Economy Mode Circuit Low | P159F | This DTC will detect a fuel saver switch input that is too low out of range. | Fuel Saver Switch % of 5V range<br><br>The normal operating range of the fuel saver mode switch is:<br><br>Switch depressed % of 5V range:<br><br>Switch released % of 5V range: | < 29.0 %<br><br><br><br><br>< 66.8 %<br>≥ 29.0 %<br><br><br>< 88.8 %<br>≥ 72.8 % | | | 200 failures out of 250 samples<br><br>25 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Economy Mode Circuit High | P15A0 | This DTC will detect a fuel saver switch input that is too high out of range. | Fuel Saver Switch % of 5V range<br><br>The normal operating range of the fuel saver mode switch is:<br><br>Switch depressed % of 5V range:<br><br>Switch released % of 5V range: | ≥ 88.8 %<br><br><br><br><br><br>< 66.8 %<br>≥ 29.0 %<br><br>< 88.8 %<br>≥ 72.8 % | | | 200 failures out of 250 samples<br><br>25 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Economy Mode Switch Performance | P15A1 | This DTC will detect a fuel saver switch input that is in an indeterminate range. | Fuel Saver Switch % of 5V is in an indeterminate range:<br><br>The normal operating range of the fuel saver mode switch is:<br><br>Switch depressed % of 5V range:<br><br>Switch released % of 5V range: | 66.8 % ≤ % of 5 volts < 72.8 %<br><br><br><br>< 66.8 %<br>≥ 29.0 %<br><br>< 88.8 %<br>≥ 72.8 % | | | 200 failures out of 250 samples<br><br>25 ms / sample | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Fuel Conductivity Out Of Range (water in fuel) | P2269 | Detects the presence of High Conductivity Fuel (e.g. water in fuel) via a specific range of sensor frequency | Flex Fuel Sensor Output Frequency | > 185 Hertz | Powertrain Relay | > 11.0 Volts | 50 failures out of 63 samples 100 ms loop Continuous | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Camshaft Position Signal Output Circuit Low | P2615 | Diagnoses the Camshaft Position Signal Output low side driver circuit for circuit faults | Voltage low during driver off state (indicates short-to-ground or open circuit) | Short to ground: <= 0.5 Ohms impedance between signal and controller ground<br><br>Open Circuit: >= 200 K Ohms impedance between signal and controller ground | Powertrain Relay Voltage<br><br>Engine is not cranking<br><br>Camshaft Position Output is commanded high | >= 11.00 Volts | 40 failures out of 50 samples<br><br>1 sample every 100 msec | Type C, No MIL<br><br>Note: In certain controllers P2614 may also set (Camshaft Position Signal Output Circuit / Open) |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Camshaft Position Signal Output Circuit High | P2616 | Diagnoses the Camshaft Position Signal Output low side driver circuit for circuit faults | Voltage low during driver on state (indicates short-to-power) | Short to power: <= 0.5 Ohms impedance between signal and controller power | Powertrain Relay Voltage<br><br>Engine is not cranking<br><br>Camshaft Position Output is commanded low | >= 11.00 Volts | 40 failures out of 50 samples<br><br>1 sample every 100 msec | Type C, No MIL |

## Closed Loop Enable Clarification: Calibration values are in the Supporting Tables

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

| AutoStart Coolant | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 | X11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Close Loop Enable Time | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 | Y9 | Y10 | Y11 |

**and**
**KtFSTA_t_ClosedLoopTime**

| Start-Up Coolant | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 | X11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Close Loop Enable Time | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 | Y9 | Y10 | Y11 |

**and pre converter 02 sensor voltage less**
**than**
**KfFULC_U_O2_SensorReadyThrsh**
**Lo**

Voltage $<$ *XXXX* milliVolts

**for**
**KcFULC_O2_SensorReadyEvents**

Time (events * 12.5 milliseconds) $>$ *XXXX* events

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

**Long Term FT Enable Criteria**

**Closed Loop Enable Clarification: Calibration values are in the Supporting Tables**

**Closed Loop Enable and**
**Coolant greater than**
**KfFCLL_T_AdaptiveLoCoolant**

Coolant> *XXXX*Celcius

**or less than**
**KfFCLL_T_AdaptiveHiCoolant**

Coolant< *XXXX*Celcius

**and**
**KtFCLL_p_AdaptiveLowMAP_Limit**

| Barometric Pressure | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 |
|---|---|---|---|---|---|---|---|---|---|
| Manifold Air Pressure | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 | Y9 |

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

**Secondary Fuel Trim Enable**
**Criteria**

**Closed Loop Enable and**
**KfFCLP_U_O2ReadyThrshLo**

Voltage< *XXXX*milliVolts

**for**
**KcFCLP_Cnt_O2RdyCyclesThrsh**

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

**Long Term Secondary Fuel Trim**
**Enable Criteria**

**KtFCLP_t_PostIntglDisableTime**

| **Closed Loop Enable Clarification: Calibration values are in the Supporting Tables** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|

| Start-Up Coolant | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 | X11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Post Integral Enable Time | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 | Y9 | Y10 | Y11 |

**Plus**
**KtFCLP_t_PostIntglRampInTime**

| Start-Up Coolant | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 | X11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Post Integral Ramp In Time | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 | Y9 | Y10 | Y11 |

**and**
**KeFCLP_T_IntegrationCatalystMax**
**Modeled Catalyst Temperature**    < *XXXX* Celcius
**and**
**KeFCLP_T_IntegrationCatalystMin**
**Modeled Catalyst Temperature**    > *XXXX* Celcius
**and**
**PO2S_Bank_1_Snsr_2_FA and**
**PO2S_Bank_2_Snsr_2_FA = False**
**and**
**(KeFCLP_Pct_CatAccuSlphrPostDsbl**

**Modeled converter sulfur percent < XXXX Percent**

**and**
**Post Integral < KaFCLP_U_SlphrIntglOfst_Thrsh)**

**X axis: Post O2 Sensor**
**Y axis: Post O2 Mode**
**Z: Post Integral threshold**

## Supporting Table - P0011_CamPosErrorLimIc1

**Description:** P0011 - Cam Position Error Limit for performance diagnostic

**Notes:** KtPHSD_phi_CamPosErrorLimIc1

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 400 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| 800 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| 1,200 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| 1,600 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| 2,000 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| 2,400 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| 2,800 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| 3,200 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| 3,600 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| 4,000 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| 4,400 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| 4,800 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| 5,200 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| 5,600 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| 6,000 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| 6,400 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| 6,800 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |

## Supporting Table - P0014_CamPosErrorLimEc1

**Description:** P0014 - Cam Position Error Limit for performance diagnostic

**Notes:** KtPHSD_phi_CamPosErrorLimEc1

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 400 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 800 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 1,200 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 1,600 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 2,000 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 2,400 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 2,800 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 3,200 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 3,600 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 4,000 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 4,400 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 4,800 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 5,200 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 5,600 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 6,000 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 6,400 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| 6,800 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |

**Supporting Table - P0011_StablePositionTimeIc1**

**Description:** P0011 - Delay after transient move

**Notes:** KtPHSD_t_StablePositionTimeIc1

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 400 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 800 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 1,200 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 1,600 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 2,000 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 2,400 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 2,800 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 3,200 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 3,600 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 4,000 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 4,400 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 4,800 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 5,200 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 5,600 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 6,000 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 6,400 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 6,800 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

## Supporting Table - P0014_StablePositionTimeEc1

**Description:** P0014 - Delay after transient move

**Notes:** KtPHSD_t_StablePositionTimeEc1

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 400 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 800 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 1,200 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 1,600 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 2,000 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 2,400 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 2,800 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 3,200 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 3,600 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 4,000 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 4,400 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 4,800 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 5,200 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 5,600 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 6,000 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 6,400 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 6,800 | 100.0 | 80.0 | 20.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

**Supporting Table - P0011_PerfMaxlc1**

**Description:** P0011 - Range of phaser travel where diagnostic cannot make a decision if both desired & measured positions are greater than

**Notes:**

| y/x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| 2 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| 3 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| 4 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| 5 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| 6 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| 7 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| 8 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| 9 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| 10 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| 11 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| 12 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| 13 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| 14 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| 15 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| 16 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| 17 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |

**Supporting Table - P0014_PerfMaxEc1**

**Description:** P0014 - Range of phaser travel where diagnostic cannot make a decision if both desired & measured positions are greater than

**Notes:**

| y/x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| 2 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| 3 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| 4 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| 5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| 6 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| 7 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| 8 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| 9 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| 10 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| 11 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| 12 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| 13 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| 14 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| 15 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| 16 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| 17 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |

## Supporting Table - P0324_P0326_P0331_AbnormalNoise_Threshold

**Description:** Fail threshold for the Knock Performance Abnormal Noise Diagnostic

**Notes:** Used for P0324, P0326 and P0331. Cal Name: KtKNKD_k_PerfAbnLimitLo.  X-axis =  Engine Speed (RPM).  Diagnostic fails when VaKNKD_k_PerfCylAbnFiltIntnsity < KtKNKD_k_PerfAbnLimitLo

| y/x | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 8,500 |
|-----|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 0.154 | 0.158 | 0.160 | 0.167 | 0.168 | 0.175 | 0.187 | 0.234 | 0.228 | 0.247 | 0.244 | 0.280 | 0.292 | 0.292 | 0.292 | 0.292 | 0.292 |

| Supporting Table - P0325_P0330_OpenCktThrshMin (20 kHz) |
|---|

**Description:** Knock Open Circuit Diagnostic Minimum Threshold when using the 20 kHz method (see "OpenMethod" description)

**Notes:** Used for P0325 and P0330.  Cal name:  KtKNKD_k_OpenMin20K.  x-axis = Engine Speed (RPM)

Diagnostic fails when the filtered diagnostic output is between the OpenCktThrshMin and OpenCktThrshMax:
i.e.:  KtKNKD_k_OpenMin20K  < VaKNKD_k_OpenFiltIntensity < KtKNKD_k_OpenMax20K.

| y/x | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.2227 | 9.9746 | 9.8594 | 9.8359 | 9.8594 | 9.8828 | 9.8672 | 9.7637 | 9.5332 | 9.1289 | 8.5059 | 7.6250 | 6.4355 | 5.2383 | 5.2383 | 5.2383 | 5.2383 |

| Supporting Table - P0325_P0330_OpenCktThrshMax (20 kHz) |
|---|

**Description:** Knock Open Circuit Diagnostic Maximum Threshold when using the 20 kHz method (see "OpenMethod" description)

**Notes:** Used for P0325 and P0330.  Cal name:  KtKNKD_k_OpenMax20K.  x-axis = Engine Speed (RPM).

Diagnostic fails when the filtered diagnostic output is between the OpenCktThrshMin and OpenCktThrshMax:
i.e.:  KtKNKD_k_OpenMin20K  < VaKNKD_k_OpenFiltIntensity < KtKNKD_k_OpenMax20K.

| y/x | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 33.4434 | 32.9434 | 32.7695 | 32.7949 | 32.8926 | 32.9355 | 32.7930 | 32.3379 | 31.4453 | 29.9863 | 27.8301 | 24.8516 | 21.3594 | 21.3594 | 21.3594 | 21.3594 | 21.3594 |

## Supporting Table - P0325_P0330_OpenCktThrshMin (Normal Noise)

**Description:** Knock Open Circuit Diagnostic Minimum Threshold when using the Normal Noise method (see "OpenMethod" description): When using the Normal Noise method (see "OpenMethod" description).

**Notes:** Used for P0325 and P0330.  Cal name: KtKNKD_k_OpenMinNN.  x-axis = Engine Speed (RPM)

Diagnostic fails when the filtered diagnostic output is between the OpenCktThrshMin and OpenCktThrshMax:
i.e.:  KtKNKD_k_OpenMinNN  < VaKNKD_k_OpenFiltIntensity < KtKNKD_k_OpenMaxNN.

| y/x | 2,700 | 2,900 | 3,000 | 3,250 | 3,500 | 3,750 | 4,000 | 4,250 | 4,500 | 4,750 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

## Supporting Table - P0325_P0330_OpenCktThrshMax (Normal Noise)

**Description:** Knock Open Circuit Diagnostic Minimum Threshold when using the Normal Noise method (see "OpenMethod" description): When using the Normal Noise method (see "OpenMethod" description).

**Notes:** Used for P0325 and P0330.  Cal name: KtKNKD_k_OpenMaxNN.  x-axis = Engine Speed (RPM)

Diagnostic fails when the filtered diagnostic output is between the OpenCktThrshMin and OpenCktThrshMax:
i.e.:  KtKNKD_k_OpenMinNN  < VaKNKD_k_OpenFiltIntensity < KtKNKD_k_OpenMaxNN.

| y/x | 2,700 | 2,900 | 3,000 | 3,250 | 3,500 | 3,750 | 4,000 | 4,250 | 4,500 | 4,750 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

## Supporting Table - P06B6_P06B7_OpenTestCktThrshMin

**Description:** Knock Open Circuit Minimum Threshold for Internal Circuit Diagnostic.  Used only when the 20 kHz method is being used (see "OpenMethod" description).  The Open Test Circuit ensures that the internal circuit used to generate the 20 kHz signal for the Open Circuit diags (P0325, P0330) is within range.

**Notes:** Used for P0325 and P0330.  Cal name: KtKNKD_k_OpenTestCktMin.  x-axis = Engine Speed (RPM).

Diagnostic fails when the filtered diagnostic output is between the OpenTestCktThrshMin and OpenTestCktThrshMax:
i.e.  KtKNKD_k_OpenTestCktMin < VaKNKD_k_OpenTestCktIntFilter < KtKNKD_k_OpenTestCktMax

| y/x | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.135 | 0.141 | 0.145 | 0.145 | 0.145 | 0.148 | 0.158 | 0.176 | 0.205 | 0.248 | 0.307 | 0.385 | 0.484 | 0.607 | 0.760 | 0.940 | 1.150 |

**Supporting Table - P06B6_P06B7_OpenTestCktThrshMax**

**Description:** Knock Open Circuit Minimum Threshold for Internal Circuit Diagnostic. Used only when the 20 kHz method is being used (see "OpenMethod" description). The Open Test Circuit ensures that the internal circuit used to generate the 20 kHz signal for the Open Circuit diags (P0325, P0330) is within range.

**Notes:** Used for P0325 and P0330. Cal name: KtKNKD_k_OpenTestCktMax. x-axis = Engine Speed (RPM).

Diagnostic fails when the filtered diagnostic output is between the OpenTestCktThrshMin and OpenTestCktThrshMax:
i.e. KtKNKD_k_OpenTestCktMin < VaKNKD_k_OpenTestCktIntFilter < KtKNKD_k_OpenTestCktMax

| y/x | 500 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 | 8,000 | 8,500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.260 | 0.293 | 0.305 | 0.309 | 0.313 | 0.326 | 0.361 | 0.428 | 0.537 | 0.695 | 0.918 | 1.211 | 1.588 | 2.059 | 2.631 | 3.316 | 4.125 |

## Supporting Table - P0324_P0326_P0331_AbnormalNoise_CylsEnabled

**Description:** Specifies which cylinders will be used for the Abnormal Noise portion of the performance diagnostics (1 = cylinder used, 0 = cylinder not used)

**Notes:** Used for P0324, P0326 and P0331.  Cal name:  KaKNKD_b_PerfAbnIncludeCyl.  x-axis = Cylinder number in firing order (i.e. Cyl 0 = first cylinder in firing order, Cyl 1 = second cylinder in firing order....)

A cal value = 1 specifies the cylinder is used for the Abnormal Noise diagnostic.  A cal value = 0 specifies the cylinder is not used.  Only the first four values in the table are relavent for a four-cylinder engine and only the first six values in the table are relavent for a six-cylinder engine.

Typically, all cylinders are used.  Cylinders are only excluded if the signal from that cylinder is weak and there is no separation between normal and faulted conditions (can occur if the sensor location results in poor signal-to-noise ratio for a given cylinder).

| y/x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |

**Supporting Table - P0101_P0106_P0121_P012B_P0236_P1101 TPS Residual Weight Factor based on RPM**

**Description:** P0101_P0106_P0121_P012B_P0236_P1101 TPS Residual Weight Factor based on RPM

**Notes:**

| y/x | 0 | 400 | 800 | 1,200 | 1,600 | 2,000 | 2,400 | 2,800 | 3,200 | 3,600 | 4,000 | 4,400 | 4,800 | 5,200 | 5,600 | 6,000 | 6,600 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

## Supporting Table - P0101_P0106_P0121_P012B_P0236_P1101 MAF Residual Weight Factor based on RPM

**Description:** P0101_P0106_P0121_P012B_P0236_P1101 MAF Residual Weight Factor based on RPM

**Notes:**

| y/x | 0 | 400 | 800 | 1,200 | 1,600 | 2,000 | 2,400 | 2,800 | 3,200 | 3,600 | 4,000 | 4,400 | 4,800 | 5,200 | 5,600 | 6,000 | 6,600 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.976 | 0.857 | 1.000 | 0.903 | 0.602 | 0.885 | 0.918 |

| Supporting Table - P0101_P0106_P0121_P012B_P0236_P1101 MAF Residual Weight Factor based on MAF Est |
|---|

**Description:** P0101_P0106_P0121_P012B_P0236_P1101 MAF Residual Weight Factor based on MAF Est

**Notes:**

| y/x | 0 | 50 | 70 | 73 | 76 | 79 | 82 | 85 | 89 | 95 | 100 | 110 | 120 | 150 | 200 | 280 | 350 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

## Supporting Table - P0101_P0106_P0121_P012B_P0236_P1101 MAP1 Residual Weight Factor based on RPM

**Description:** P0101_P0106_P0121_P012B_P0236_P1101 MAP1 Residual Weight Factor based on RPM

**Notes:**

| y/x | 0 | 400 | 800 | 1,200 | 1,600 | 2,000 | 2,400 | 2,800 | 3,200 | 3,600 | 4,000 | 4,400 | 4,800 | 5,200 | 5,600 | 6,000 | 6,600 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

## Supporting Table - P0101_P0106_P0121_P012B_P0236_P1101 MAP2 Residual Weight Factor based on RPM

**Description:** P0101_P0106_P0121_P012B_P0236_P1101 MAP2 Residual Weight Factor based on RPM

**Notes:**

| y/x | 0 | 400 | 800 | 1,200 | 1,600 | 2,000 | 2,400 | 2,800 | 3,200 | 3,600 | 4,000 | 4,400 | 4,800 | 5,200 | 5,600 | 6,000 | 6,600 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

**Supporting Table - P0101_P0106_P0121_P012B_P0236_P1101 MAP3 Residual Weight Factor based on RPM**

**Description:** P0101_P0106_P0121_P012B_P0236_P1101 MAP3 Residual Weight Factor based on RPM

**Notes:**

| y/x | 0 | 250 | 750 | 1,250 | 1,750 | 2,250 | 2,750 | 3,250 | 3,750 | 4,250 | 4,750 | 5,250 | 5,750 | 6,250 | 6,750 | 7,250 | 9,000 |
|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

## Supporting Table - P0101_P0106_P0121_P0236_P1101 TIAP Residual Weight Factor based on RPM

**Description:** P0101_P0106_P0121_P0236_P1101 TIAP Residual Weight Factor based on RPM

**Notes:**

| y/x | 0 | 400 | 800 | 1,200 | 1,600 | 2,000 | 2,400 | 2,800 | 3,200 | 3,600 | 4,000 | 4,400 | 4,800 | 5,200 | 5,600 | 6,000 | 6,600 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

## Supporting Table - P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Offset

**Description:** P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Offset

**Notes:**

| y/x | 1,000 | 1,750 | 2,500 | 3,250 | 4,000 | 4,750 | 5,500 | 6,250 | 7,000 |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |

## Supporting Table - P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Offset

**Description:** P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Offset

**Notes:**

| y/x | 1,000 | 1,750 | 2,500 | 3,250 | 4,000 | 4,750 | 5,500 | 6,250 | 7,000 |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 0.0 | 1.5 | 3.5 | 6.0 | 9.0 | 12.0 | 16.0 | 20.0 | 25.0 |

## Supporting Table - P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Min Air Flow

**Description:** P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Min Air Flow

**Notes:**

| y/x | 1,000 | 1,750 | 2,500 | 3,250 | 4,000 | 4,750 | 5,500 | 6,250 | 7,000 |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 17.0 | 32.0 | 32.0 | 32.0 | 32.0 | 32.0 | 32.0 | 32.0 | 32.0 |

## Supporting Table - P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Max Air Flow

**Description:** P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Max Air Flow

**Notes:**

| y/x | 1,000 | 1,750 | 2,500 | 3,250 | 4,000 | 4,750 | 5,500 | 6,250 | 7,000 |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1   | 5.0   | 9.0   | 13.0  | 16.0  | 20.0  | 24.0  | 28.0  | 31.0  | 32.0  |

| Supporting Table - P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Min MAP |
|---|

**Description:** P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Min MAP

**Notes:**

| y/x | 1,000 | 1,750 | 2,500 | 3,250 | 4,000 | 4,750 | 5,500 | 6,250 | 7,000 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 110.0 | 110.0 | 110.0 | 110.0 | 110.0 | 110.0 | 110.0 | 110.0 | 110.0 |

## Supporting Table - P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Max MAP

**Description:** P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Max MAP

**Notes:**

| y/x | 1,000 | 1,750 | 2,500 | 3,250 | 4,000 | 4,750 | 5,500 | 6,250 | 7,000 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 |

## Supporting Table - P0101_P0106_P0121_P012B_P1101 Boost Residual Weight Factor based on % of Boost

**Description:** P0101_P0106_P0121_P012B_P1101 Boost Residual Weight Factor based on % of Boost

**Notes:**

| y/x | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

## Supporting Table - P0101_P0106_P0121_P012B_P1101 SCIAP1 Residual Weight Factor based on RPM

**Description:** P0101_P0106_P0121_P012B_P1101 SCIAP1 Residual Weight Factor based on RPM

**Notes:**

| y/x | 0 | 1,500 | 2,200 | 2,500 | 2,800 | 3,100 | 3,200 | 3,300 | 3,500 | 3,700 | 4,000 | 4,200 | 4,500 | 5,000 | 5,500 | 6,500 | 8,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

## Supporting Table - P0101_P0106_P0121_P012B_P1101 SCIAP2 Residual Weight Factor based on RPM

**Description:** P0101_P0106_P0121_P012B_P1101 SCIAP2 Residual Weight Factor based on RPM

**Notes:**

| y/x | 0 | 1,500 | 2,200 | 2,500 | 2,800 | 3,100 | 3,200 | 3,300 | 3,500 | 3,700 | 4,000 | 4,200 | 4,500 | 5,000 | 5,500 | 6,500 | 8,000 |
|-----|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

## Supporting Table - P0806 EngTorqueThreshold Table

**Description:** The diagnostic is inhibited if torque (NM) is less than this value. Prevents false fails in regions where false in-gear N/TOS ratios are possible due to low torque, where high torque would otherwise cause slip and prevent a valid in-gear state.

**Notes:** DTCs: P0806; Calibration Name: KtMTCI_M_TorqueEnable;  Axis is Percent Clutch Pedal Position (%), 0% = bottom of pedal travel.

| y/x | 0.00 | 6.25 | 12.50 | 18.75 | 25.00 | 31.25 | 37.50 | 43.75 | 50.00 | 56.25 | 62.50 | 68.75 | 75.00 | 81.25 | 87.50 | 93.75 | 100.00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Supporting Table - P0806 ResidualErrEnableLow Table**

**Description:** Represents the lower threshold of a deadband where the diagnostic will be inhibited to prevent false fails due to clutch slip that can falsely indicate a valid in-gear N/TOS ratio.

**Notes:** DTCs: P0806; Calibration Name: KaMTCI_Pct_ResidErrCalcEnbLow; Axis identifies Gear, where "0" - "5" is gear 1 - 6, respectively; "6" is reverse and "7" is neutral

| y/x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Supporting Table - P0806 ResidualErrEnableHigh Table**

**Description:** Represents the upper threshold of a deadband where the diagnostic will be inhibited to prevent false fails due to clutch slip that can falsely indicate a valid in-gear N/TOS ratio.

**Notes:** DTCs: P0806; Calibration Name: KaMTCI_Pct_ResidErrCalcEnbHigh; Axis identifies Gear, where "0" - "5" is gear 1 - 6, respectively; "6" is reverse and "7" is neutral

| y/x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Supporting Table - Closed Loop Enable Clarification - KtFSTA_t_ClosedLoopAutostart**

**Description:** Engine run time following an autostart, as a function of begin run coolant, which must be exceeded to enable CLOSED LOOP.

**Notes:** Time in seconds: Hybrid use Only

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 100.0 | 100.0 | 100.0 | 55.0 | 19.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Supporting Table - Closed Loop Enable Clarification - KtFSTA_t_ClosedLoopTime**

**Description:** Engine run time, as a function of startup coolant temperature, which must be exceeded to enable CLOSED LOOP.

**Notes:** Time in seconds

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 100.0 | 100.0 | 100.0 | 55.0 | 19.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Supporting Table - Closed Loop Enable Clarification - KtFCLL_p_AdaptiveLowMAP_Limit**

**Description:** KtFCLL_p_AdaptiveLowMAP_Limit

**Notes:** MAP in KPa

| y/x | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 105 |
|-----|------|------|------|------|------|------|------|------|------|
| 1 | 14.0 | 14.0 | 14.0 | 14.5 | 15.0 | 15.5 | 16.0 | 16.0 | 16.0 |

**Supporting Table - Closed Loop Enable Clarification - KtFCLP_t_PostIntglDisableTime**

**Description:** Disable integral offset after engine start for this amount of time.

**Notes:** Time in seconds

| y/x | -40 | -29 | -18 | -6 | 5 | 16 | 28 | 39 | 50 | 61 | 73 | 84 | 95 | 106 | 118 | 129 | 140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 400.0 | 400.0 | 400.0 | 275.0 | 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 100.0 | 50.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |

**Supporting Table - Closed Loop Enable Clarification - KtFCLP_t_PostIntglRampInTime**

**Description:** Time required to ramp integral offset to desired value.

**Notes:** Time in seconds

| y/x | -40 | -29 | -18 | -6 | 5 | 16 | 28 | 39 | 50 | 61 | 73 | 84 | 95 | 106 | 118 | 129 | 140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 40.0 | 30.0 | 20.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |

| Supporting Table - Closed Loop Enable Clarification - KfFULC_U_O2_SensorReadyThrshLo |
|---|

| | |
|---|---|
| **Description:** Lower limit checked against when determining if an oxygen sensor is in range | |
| **Notes:** Voltage in millivolts | |

| y/x | 1 |
|---|---|
| 1 | 1,250 |

**Supporting Table - Closed Loop Enable Clarification - KcFULC_O2_SensorReadyEvents**

**Description:** Number of times an oxygen sensor value must be in range before declaring it ready

**Notes:** Time (events * 12.5 milliseconds)

| y/x | 1 |
|-----|-----|
| 1 | 10 |

**Supporting Table - Closed Loop Enable Clarification - KfFCLL_T_AdaptiveLoCoolant**

**Description:** LTM learning is inhibited if the engine coolant temperature is below this calibration.

**Notes:** Degrees Celcius

| y/x | 1 |
|-----|---|
| 1 | 40 |

**Supporting Table - Closed Loop Enable Clarification - KfFCLL_T_AdaptiveHiCoolant**

**Description:** LTM learning is inhibited if the engine coolant temperature is above this calibration.

**Notes:** Degrees Celcius

| y/x | 1 |
|-----|-----|
| 1 | 120 |

**Supporting Table - Closed Loop Enable Clarification - KfFCLP_U_O2ReadyThrshLo**

**Description:** Lower threshold defining not ready window for post oxygen sensor voltage.

**Notes:** Voltage in millivolts

| y/x | 1 |
|---|---|
| 1 | 1,100 |

| Supporting Table - Closed Loop Enable Clarification - KcFCLP_Cnt_O2RdyCyclesThrsh |
|---|

**Description:** Number of post catalyst oxygen sensor samples which must be outside not ready window before post oxygen sensor is READY.

**Notes:** Time (events * 12.5 milliseconds)

| y/x | 1 |
|---|---|
| 1 | 10 |

| Supporting Table - Closed Loop Enable Clarification - KeFCLP_T_IntegrationCatalystMax |
|---|

**Description:** Maximum allowed estimated catalytic converter temperature for post O2 integral terms to be updated.

**Notes:** Modeled catalyst Temperature in Celcius

| y/x | 1 |
|---|---|
| 1 | 930 |

**Supporting Table - Closed Loop Enable Clarification - KeFCLP_T_IntegrationCatalystMin**

**Description:** Minimum allowed estimated catalytic converter temperature to begin using post O2 integration correction terms. Converter temperature must remain above this threshold to ramp-in the post O2 integration adjustments. Once the ramp-in has started, a converter temperature below this threshold will freeze the ramp-in multiplier. Post O2 integration will not be allowed below this converter temperature

**Notes:** Modeled catalyst Temperature in Celcius

| y/x | 1 |
|---|---|
| 1 | 550 |

## Supporting Table - Closed Loop Enable Clarification - KeFCLP_Pct_CatAccuSlphrPostDsbl

**Description:** Sulphur percent threshold above which post integral learning is disabled if the threshold criteria KaFCLP_U_SlphrIntglOfst_Thrsh is also met.

**Notes:** Percent

| y/x | 1 |
|---|---|
| 1 | 255 |

**Supporting Table - Closed Loop Enable Clarification - KaFCLP_U_SlphrIntglOfst_Thrsh**

**Description:** Integral Offset voltage thresholds (bank and cell specific cals) used with KeFCLP_Pct_CatAccuSlphrPostDsbl to check for sulphur poisoning.

**Notes:** millivolts

| y/x | CiOXYR_O2_PostCat1 | CiOXYR_O2_PostCat2 |
|---|---|---|
| CiFCLP_Decel | 2,048 | 2,048 |
| CiFCLP_Idle | 2,048 | 2,048 |
| CiFCLP_Cruise | 2,048 | 2,048 |
| CiFCLP_LightAccel | 2,048 | 2,048 |
| CiFCLP_HeavyAccel | 2,048 | 2,048 |

**Supporting Table - P0116_Fail if power up ECT exceeds IAT by these values**

**Description:** KtECTD_T_HSC_FastFailTempDiff

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

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|-----|-----|-----|-----|----|---|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|
| 1 | 80 | 80 | 80 | 60 | 60 | 40 | 40 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |

## Supporting Table - P0128_Maximum Accumulated Energy for Start-up ECT conditions - Primary

**Description:** Maximum Total Energy transferred to Cooling System for Ambient and Start-up ECT conditions (Primary Test)

**Notes:** Z axis is the cooling system energy failure threshold (kJ), X axis is ECT Temperature at Power up (° C) , (Deluxe version)

| y/x | -40 | -5 | 10 | 30 | 76 | 79 | 86 |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 21,039 | 16,712 | 14,858 | 12,386 | 6,706 | 6,329 | 5,464 |

**Supporting Table - P0128_Maximum Accumulated Energy for Start-up ECT conditions - Alternate**

**Description:** Maximum Total Energy transferred to Cooling System for Ambient and Start-up ECT conditions (Alternate Test)

**Notes:** Z axis is the cooling system energy failure threshold (kJ), X axis is ECT Temperature at Power up (° C), (Deluxe version)

| y/x | -40 | -5 | 10 | 30 | 76 | 79 | 86 |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 14,170 | 10,014 | 8,232 | 5,857 | 1,200 | 1,200 | 1,200 |

**Supporting Table - P1400_ColdStartDiagnosticDelayBasedOnEngineRunTime**

**Description:** Quality weight-based on engine run time.  This allows adjustment of the weighting factors at various engine run times in order to prevent the updating of the cumulative quality timer or to change the value of the average qualified residual energy calculation to prevent false Fails of the diagnostic under circumstances inappropriate to update the calculation of the average qualified residual value.

**Notes:** KtCSED_K_TimeWght - This is used for P1400.

| y/x | 0 | 3 | 3 | 4 | 5 | 10 | 15 | 20 | 30 |
|-----|---|---|---|---|---|----|----|----|----|
| 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

## Supporting Table - P050D_P1400_CatalystLightOffExtendedEngineRunTimeExit

**Description:** Exit Catalyst Warm-up mode if Engine Run Time is greater than this value. This table is based on percent ethanol (x-axis) and catmon's NormRatio_EWMA value (y-axis). The NormRatio_EWMA value determines the state of the catalyst. Typically, NormRatio_EWMA values below 0.35 (0 is bad and 1 is good) represent catalysts that have degraded. The emission performance of these degraded catalysts can be improved by extending catalyst light off of GetE85R_Pct_FFS_CompAtEngFloat.

**Notes:** KtCSEC_t_ExtendedEngineExit. Used for both P050D and P1400.

| y/x | 0 | 25 | 50 | 75 | 100 |
|---|---|---|---|---|---|
| 0.000 | 18 | 18 | 18 | 18 | 18 |
| 0.125 | 18 | 18 | 18 | 18 | 18 |
| 0.250 | 18 | 18 | 18 | 18 | 18 |
| 0.375 | 18 | 18 | 18 | 18 | 18 |
| 0.500 | 18 | 18 | 18 | 18 | 18 |
| 0.625 | 18 | 18 | 18 | 18 | 18 |
| 0.750 | 18 | 18 | 18 | 18 | 18 |
| 0.875 | 18 | 18 | 18 | 18 | 18 |
| 1.000 | 18 | 18 | 18 | 18 | 18 |

**Supporting Table - P1400_ColdStartDiagnosticDelayBasedOnEngineRunTimeCalAxis**

**Description:** This is the x-axis for the KtCSED_K_TimeWght calibration table.  Refer to the description for KtCSED_K_TimeWght for details.

**Notes:** KnCSED_t_TimeWght - This is used for P1400.

| y/x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 3 | 3 | 4 | 5 | 10 | 15 | 20 | 30 |

**Supporting Table - P0016 P0017 P0018 P0019 Cam Correlation Oil Temperature Threshold**

Description: KtEPSI_t_RtnHomeDlyLmt

Notes:

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 300.0 | 300.0 | 160.0 | 18.0 | 18.0 | 18.0 | 18.0 | 10.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

**Supporting Table - P0442: Engine Off Time Before Vehicle Off Maximum as a Function of Estimated Ambient Temperature Table**

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

**Notes:** KtEONV_t_EngOffTimeBefVehOffMax

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

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

**Description:** Data is Purge Valve Leak Test Engine Vacuum Test Time (in seconds) and Axis is Fuel Level in %

**Notes:** KtEVPD_t_PVLT_EngineVacTimeCold

| y/x | 0 | 6 | 12 | 19 | 25 | 31 | 37 | 44 | 50 | 56 | 62 | 69 | 75 | 81 | 87 | 94 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 68 | 67 | 66 | 65 | 64 | 64 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 |

**Supporting Table - P0461, P2066, P2636: Transfer Pump Enable Time Table**

**Description:** Data is TransferPumpOnTimeLimit (in seconds) and Axis is Fuel Level in %

**Notes:** KtFLVC_t_XferFuelPmpOnTmLim

| y/x | 0 | 3 | 6 | 9 | 13 | 16 | 19 | 22 | 25 | 28 | 31 | 34 | 38 | 41 | 44 | 47 | 50 | 53 | 56 | 59 | 63 | 66 | 69 | 72 | 75 | 78 | 81 | 84 | 88 | 91 | 94 | 97 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 85 | 90 | 95 | 135 | 135 | 160 | 160 | 260 | 260 | 360 | 360 | 360 | 360 | 360 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 |

**Supporting Table - P0442: EONV Pressure Threshold (Pascals) Table**

**Description:** Data is EONV Pressure Threshold in Pascals, X axis (horizontal) is fuel level in % from 0 to 100 with step size 6.25, and Y axis (vertical) is temperature in deg C from -10 to 80 with step size 5.625

**Notes:** KtEONV_p_PressureThreshold

| y/x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -460.7 | -460.7 | -460.7 | -460.7 | -460.7 | -452.4 | -410.4 | -368.5 | -326.4 | -284.4 | -242.3 | -200.4 | -158.4 | -124.5 | -124.5 | -124.5 | -124.5 |
| 2 | -460.7 | -460.7 | -460.7 | -460.7 | -460.7 | -452.4 | -410.4 | -368.5 | -326.4 | -284.4 | -242.3 | -200.4 | -158.4 | -124.5 | -124.5 | -124.5 | -124.5 |
| 3 | -460.7 | -460.7 | -460.7 | -460.7 | -460.7 | -452.4 | -410.4 | -368.5 | -326.4 | -284.4 | -242.3 | -200.4 | -158.4 | -124.5 | -124.5 | -124.5 | -124.5 |
| 4 | -460.7 | -460.7 | -460.7 | -460.7 | -460.7 | -452.4 | -410.4 | -368.5 | -326.4 | -284.4 | -242.3 | -200.4 | -158.4 | -124.5 | -124.5 | -124.5 | -124.5 |
| 5 | -460.7 | -460.7 | -460.7 | -460.7 | -460.7 | -452.4 | -410.4 | -368.5 | -326.4 | -284.4 | -242.3 | -200.4 | -158.4 | -124.5 | -124.5 | -124.5 | -124.5 |
| 6 | -460.7 | -460.7 | -460.7 | -460.7 | -460.7 | -452.4 | -410.4 | -368.5 | -326.4 | -284.4 | -242.3 | -200.4 | -158.4 | -124.5 | -124.5 | -124.5 | -124.5 |
| 7 | -460.7 | -460.7 | -460.7 | -460.7 | -460.7 | -452.4 | -410.4 | -368.5 | -326.4 | -284.4 | -242.3 | -200.4 | -158.4 | -124.5 | -124.5 | -124.5 | -124.5 |
| 8 | -460.7 | -460.7 | -460.7 | -460.7 | -460.7 | -452.4 | -410.4 | -368.5 | -326.4 | -284.4 | -242.3 | -200.4 | -158.4 | -124.5 | -124.5 | -124.5 | -124.5 |
| 9 | -460.7 | -460.7 | -460.7 | -460.7 | -460.7 | -452.4 | -410.4 | -368.5 | -326.4 | -284.4 | -242.3 | -200.4 | -158.4 | -124.5 | -124.5 | -124.5 | -124.5 |
| 10 | -460.7 | -460.7 | -460.7 | -460.7 | -460.7 | -452.4 | -410.4 | -368.5 | -326.4 | -284.4 | -242.3 | -200.4 | -158.4 | -124.5 | -124.5 | -124.5 | -124.5 |
| 11 | -460.7 | -460.7 | -460.7 | -460.7 | -460.7 | -452.4 | -410.4 | -368.5 | -326.4 | -284.4 | -242.3 | -200.4 | -158.4 | -124.5 | -124.5 | -124.5 | -124.5 |
| 12 | -460.7 | -460.7 | -460.7 | -460.7 | -460.7 | -452.4 | -410.4 | -368.5 | -326.4 | -284.4 | -242.3 | -200.4 | -158.4 | -124.5 | -124.5 | -124.5 | -124.5 |
| 13 | -460.7 | -460.7 | -460.7 | -460.7 | -460.7 | -452.4 | -410.4 | -368.5 | -326.4 | -284.4 | -242.3 | -200.4 | -158.4 | -124.5 | -124.5 | -124.5 | -124.5 |
| 14 | -460.7 | -460.7 | -460.7 | -460.7 | -460.7 | -452.4 | -410.4 | -368.5 | -326.4 | -284.4 | -242.3 | -200.4 | -158.4 | -124.5 | -124.5 | -124.5 | -124.5 |
| 15 | -460.7 | -460.7 | -460.7 | -460.7 | -460.7 | -452.4 | -410.4 | -368.5 | -326.4 | -284.4 | -242.3 | -200.4 | -158.4 | -124.5 | -124.5 | -124.5 | -124.5 |
| 16 | -460.7 | -460.7 | -460.7 | -460.7 | -460.7 | -452.4 | -410.4 | -368.5 | -326.4 | -284.4 | -242.3 | -200.4 | -158.4 | -124.5 | -124.5 | -124.5 | -124.5 |
| 17 | -460.7 | -460.7 | -460.7 | -460.7 | -460.7 | -452.4 | -410.4 | -368.5 | -326.4 | -284.4 | -242.3 | -200.4 | -158.4 | -124.5 | -124.5 | -124.5 | -124.5 |

## Supporting Table - P219A Variance Threshold Bank1 Table

**Description:** Bank 1 lookup table of Variance metric used to calculate the Ratio for the current sample period

**Notes:** DTCs: P219A;  Calibration Name: KtFABD_U_VarThresh1;  Horizontal axis is RPM; Vertical Axis is Air Per Cylinder (APC) in mg/cylinder

| y/x | 250 | 500 | 750 | 1,000 | 1,250 | 1,500 | 1,750 | 2,000 | 2,250 | 2,500 | 2,750 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 6,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40 | 9,999.00 | 9,999.00 | 9,999.00 | 4.25 | 4.25 | 3.25 | 5.00 | 5.75 | 4.50 | 4.00 | 4.50 | 2.75 | 3.00 | 3.50 | 3.50 | 9,999.00 | 9,999.00 |
| 80 | 9,999.00 | 9,999.00 | 9,999.00 | 4.25 | 4.25 | 3.25 | 5.00 | 5.75 | 4.50 | 4.00 | 4.50 | 2.75 | 3.75 | 3.50 | 3.50 | 9,999.00 | 9,999.00 |
| 120 | 9,999.00 | 9,999.00 | 9,999.00 | 5.75 | 5.75 | 5.00 | 3.25 | 4.50 | 2.75 | 3.50 | 5.75 | 5.25 | 5.00 | 6.00 | 6.00 | 9,999.00 | 9,999.00 |
| 160 | 9,999.00 | 9,999.00 | 9,999.00 | 7.00 | 7.00 | 6.50 | 5.25 | 7.00 | 5.50 | 3.25 | 3.00 | 4.75 | 6.00 | 5.75 | 5.75 | 9,999.00 | 9,999.00 |
| 200 | 9,999.00 | 9,999.00 | 9,999.00 | 10.00 | 10.00 | 8.00 | 8.25 | 7.00 | 5.75 | 4.25 | 8.00 | 6.25 | 9.25 | 7.75 | 7.75 | 9,999.00 | 9,999.00 |
| 240 | 9,999.00 | 9,999.00 | 9,999.00 | 19.50 | 19.50 | 12.00 | 8.50 | 8.75 | 9.50 | 6.75 | 8.00 | 6.50 | 8.50 | 5.50 | 5.50 | 9,999.00 | 9,999.00 |
| 280 | 9,999.00 | 9,999.00 | 9,999.00 | 18.25 | 18.25 | 12.00 | 19.25 | 11.25 | 10.75 | 10.50 | 11.25 | 10.50 | 12.00 | 9.00 | 9.00 | 9,999.00 | 9,999.00 |
| 320 | 9,999.00 | 9,999.00 | 9,999.00 | 23.50 | 23.50 | 23.00 | 21.25 | 15.25 | 12.25 | 16.00 | 16.50 | 14.50 | 13.00 | 9.25 | 9.25 | 9,999.00 | 9,999.00 |
| 360 | 9,999.00 | 9,999.00 | 9,999.00 | 39.00 | 39.00 | 42.25 | 23.50 | 20.00 | 18.75 | 25.50 | 20.00 | 15.25 | 12.75 | 9.00 | 9.00 | 9,999.00 | 9,999.00 |
| 400 | 9,999.00 | 9,999.00 | 9,999.00 | 47.00 | 47.00 | 41.50 | 28.00 | 28.25 | 28.75 | 31.75 | 30.25 | 31.50 | 17.75 | 17.75 | 17.75 | 9,999.00 | 9,999.00 |
| 440 | 9,999.00 | 9,999.00 | 9,999.00 | 64.25 | 64.25 | 54.00 | 51.50 | 44.00 | 30.00 | 27.25 | 30.50 | 27.50 | 15.25 | 19.50 | 19.50 | 9,999.00 | 9,999.00 |
| 480 | 9,999.00 | 9,999.00 | 9,999.00 | 46.25 | 46.25 | 44.50 | 46.50 | 37.25 | 37.00 | 38.25 | 30.50 | 26.75 | 27.50 | 32.50 | 32.50 | 9,999.00 | 9,999.00 |
| 520 | 9,999.00 | 9,999.00 | 9,999.00 | 46.25 | 46.75 | 47.00 | 53.25 | 48.75 | 45.00 | 36.50 | 40.75 | 30.25 | 41.75 | 37.25 | 32.50 | 9,999.00 | 9,999.00 |
| 560 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 71.75 | 71.75 | 51.00 | 44.50 | 45.00 | 38.00 | 60.00 | 47.00 | 28.25 | 28.25 | 9,999.00 | 9,999.00 | 9,999.00 |
| 640 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 71.75 | 71.75 | 51.00 | 44.50 | 45.00 | 38.00 | 60.00 | 47.00 | 28.25 | 28.25 | 9,999.00 | 9,999.00 | 9,999.00 |
| 720 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 |
| 800 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 |

| Supporting Table - P219A Quality Factor Bank1 Table |
|---|

**Description:** Bank 1 lookup table of Quality Factors used in the calculation of the Ratio for the current sample period

**Notes:** DTCs: P219A;  Calibration Name: KtFABD_K_QualFactor1;  Horizontal axis is RPM; Vertical Axis is Air Per Cylinder (APC) in mg/cylinder

| y/x | 250 | 500 | 750 | 1,000 | 1,250 | 1,500 | 1,750 | 2,000 | 2,250 | 2,500 | 2,750 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 6,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 80 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 120 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 |
| 160 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 |
| 200 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 |
| 240 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 |
| 280 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 |
| 320 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 360 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 |
| 400 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 |
| 440 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 |
| 480 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 |
| 520 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 560 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 640 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 720 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 800 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Supporting Table - P219A Normalizer Bank1 Table**

**Description:** Bank 1 Normalizer table used in the calculation of the Ratio for the current sample period.

**Notes:** DTCs: P219A;  Calibration Name: KtFABD_U_Normalizer1;  Horizontal axis is RPM; Vertical Axis is Air Per Cylinder (APC) in mg/cylinder

| y/x | 250 | 500 | 750 | 1,000 | 1,250 | 1,500 | 1,750 | 2,000 | 2,250 | 2,500 | 2,750 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 6,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40 | 9,999.00 | 9,999.00 | 9,999.00 | 203.75 | 203.75 | 56.50 | 23.25 | 27.50 | 43.50 | 53.25 | 49.00 | 46.50 | 43.50 | 40.25 | 40.25 | 9,999.00 | 9,999.00 |
| 80 | 9,999.00 | 9,999.00 | 9,999.00 | 203.75 | 203.75 | 56.50 | 23.25 | 27.50 | 43.50 | 53.25 | 49.00 | 46.50 | 47.75 | 40.25 | 40.25 | 9,999.00 | 9,999.00 |
| 120 | 9,999.00 | 9,999.00 | 9,999.00 | 133.50 | 133.50 | 104.00 | 83.00 | 75.50 | 78.25 | 84.75 | 78.50 | 69.00 | 56.50 | 62.50 | 62.50 | 9,999.00 | 9,999.00 |
| 160 | 9,999.00 | 9,999.00 | 9,999.00 | 161.75 | 161.75 | 153.25 | 80.00 | 118.00 | 199.75 | 165.50 | 164.25 | 135.25 | 158.25 | 160.50 | 160.50 | 9,999.00 | 9,999.00 |
| 200 | 9,999.00 | 9,999.00 | 9,999.00 | 146.25 | 146.25 | 118.50 | 112.75 | 126.25 | 135.75 | 108.25 | 113.00 | 107.00 | 104.75 | 105.00 | 105.00 | 9,999.00 | 9,999.00 |
| 240 | 9,999.00 | 9,999.00 | 9,999.00 | 180.50 | 180.50 | 177.25 | 122.50 | 133.00 | 130.00 | 122.00 | 124.50 | 121.00 | 117.00 | 116.75 | 116.75 | 9,999.00 | 9,999.00 |
| 280 | 9,999.00 | 9,999.00 | 9,999.00 | 264.00 | 264.00 | 230.25 | 170.00 | 160.00 | 215.50 | 160.00 | 154.50 | 114.50 | 112.00 | 109.75 | 109.75 | 9,999.00 | 9,999.00 |
| 320 | 9,999.00 | 9,999.00 | 9,999.00 | 278.75 | 278.75 | 260.75 | 246.25 | 251.50 | 249.75 | 245.00 | 204.00 | 190.50 | 114.75 | 131.50 | 131.50 | 9,999.00 | 9,999.00 |
| 360 | 9,999.00 | 9,999.00 | 9,999.00 | 284.00 | 284.00 | 263.75 | 230.00 | 252.50 | 267.25 | 252.50 | 241.25 | 235.00 | 165.50 | 172.50 | 172.50 | 9,999.00 | 9,999.00 |
| 400 | 9,999.00 | 9,999.00 | 9,999.00 | 249.75 | 249.75 | 289.25 | 286.00 | 281.75 | 253.50 | 202.25 | 245.75 | 192.50 | 223.00 | 200.00 | 200.00 | 9,999.00 | 9,999.00 |
| 440 | 9,999.00 | 9,999.00 | 9,999.00 | 265.00 | 265.00 | 281.50 | 279.00 | 244.75 | 270.25 | 228.25 | 218.75 | 195.25 | 221.75 | 182.50 | 182.50 | 9,999.00 | 9,999.00 |
| 480 | 9,999.00 | 9,999.00 | 9,999.00 | 211.50 | 211.50 | 308.00 | 288.50 | 263.75 | 264.75 | 247.75 | 259.75 | 226.50 | 225.25 | 181.50 | 181.50 | 9,999.00 | 9,999.00 |
| 520 | 9,999.00 | 9,999.00 | 9,999.00 | 211.50 | 259.25 | 306.75 | 287.50 | 306.00 | 279.75 | 270.00 | 263.75 | 236.00 | 200.00 | 190.75 | 181.50 | 9,999.00 | 9,999.00 |
| 560 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 242.00 | 242.00 | 302.25 | 297.25 | 236.00 | 220.00 | 251.25 | 235.00 | 234.00 | 234.00 | 9,999.00 | 9,999.00 | 9,999.00 |
| 640 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 242.00 | 242.00 | 302.25 | 297.25 | 236.00 | 220.00 | 251.25 | 235.00 | 234.00 | 234.00 | 9,999.00 | 9,999.00 | 9,999.00 |
| 720 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 |
| 800 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 | 9,999.00 |

| Supporting Table - P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage |
|---|

**Description:** Identifies which Long Term Fuel Trim Cell I.D.s are used for diagnosis. Only cells identified as "CeFADD_e_NonSelectedCell" are not used for diagnosis.

**Notes:** DTCs: P0171, P0172, P0174, P0175;  Calibration Name: KaFADD_e_SelectCellSet;  Axis is Long Term Fuel Trim Cell I.D.

| P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 1 | | | |
|---|---|---|---|
| y/x | CeFADR_e_Cell00_PurgOnAirMode5 | CeFADR_e_Cell01_PurgOnAirMode4 | CeFADR_e_Cell02_PurgOnAirMode3 | CeFADR_e_Cell03_PurgOnAirMode2 |
| 1 | CeFADD_e_SelectedPurgeCell | CeFADD_e_SelectedPurgeCell | CeFADD_e_SelectedPurgeCell | CeFADD_e_SelectedPurgeCell |

| P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 2 | | | |
|---|---|---|---|
| y/x | CeFADR_e_Cell04_PurgOnAirMode1 | CeFADR_e_Cell05_PurgOnAirMode0 | CeFADR_e_Cell06_PurgOnIdle | CeFADR_e_Cell07_PurgOnDecel |
| 1 | CeFADD_e_SelectedPurgeCell | CeFADD_e_SelectedPurgeCell | CeFADD_e_SelectedPurgeCell | CeFADD_e_NonSelectedCell |

| P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 3 | | | |
|---|---|---|---|
| y/x | CeFADR_e_Cell08_PurgOffAirMode5 | CeFADR_e_Cell09_PurgOffAirMode4 | CeFADR_e_Cell10_PurgOffAirMode3 | CeFADR_e_Cell11_PurgOffAirMode2 |
| 1 | CeFADD_e_SelectedNonPurgeCell | CeFADD_e_SelectedNonPurgeCell | CeFADD_e_SelectedNonPurgeCell | CeFADD_e_SelectedNonPurgeCell |

| P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 4 | | | |
|---|---|---|---|
| y/x | CeFADR_e_Cell12_PurgOffAirMode1 | CeFADR_e_Cell13_PurgOffAirMode0 | CeFADR_e_Cell14_PurgOffIdle | CeFADR_e_Cell15_PurgOffDecel |
| 1 | CeFADD_e_SelectedNonPurgeCell | CeFADD_e_SelectedNonPurgeCell | CeFADD_e_SelectedNonPurgeCell | CeFADD_e_NonSelectedCell |

**Supporting Table - P0420_P0430_CatmonMinEngineRunTimeToEnable**

**Description:** This cal value is a 1x5 array of minimum engine run time values based on powerup coolant temperatures.  When the appropriate required minimum engine run time value is chosen based on the coolant temperature at powerup, this value is the minimum time from engine start before stabilized conditions are met.  Used in determining if a ValidIdleIsMet condition exists.

**Notes:** KtCATD_t_EngRunTimeMin - Used for P0420 and P0430.  Axis is the coolant and the output is the min engine run time

| y/x | 40 | 50 | 60 | 70 | 80 |
|-----|-----|-----|-----|-----|-----|
| 1 | 100 | 100 | 100 | 100 | 100 |

**Supporting Table - P0420_P0430_CatmonMinAirflowForWarmCatalystDetermination**

**Description:** This is a 1x3 table with the axis being engine coolant temperature.  The implementation of this cal value as a table also included some changes to the way that the WarmedUpEvents counter increments and resets.  To summarize, whenever WarmedUpEvents resets to 0 (this could be either at startup, if the closed throttle time exceeds a cal value, or if the predicted exhaust temperature falls below the ExhWarmMin cal value), the appropriate MinAirflowToWrmupCat value is chosen from the table based on engine coolant at the time the WarmedUpEvents counter reset to 0.  This cal value is used along with the min exhaust temp to increment the WarmedUpEvents counter.

**Notes:** KtCATD_dm_MinAirFlowToWrmCat - Used for P0420 and P0430.  Axis is the engine coolant and the output is the minimum airflow required to warmup the catalyst.

| y/x | 0 | 45 | 90 |
|-----|-----|-----|-----|
| 1 | 10 | 9 | 8 |

## Supporting Table - P00C6 - KtFHPD_p_HPS_PressFallLoThrsh

**Description:** The minimum acceptable value of fuel rail pressure after High Pressure Start (HPS) is executed. This ensures the pressure does not fall off drastically after High Pressure Start (HPS) is executed, but before engine is in run mode.

**Notes:** Axes are

| y/x | -40 | -32 | -24 | -16 | -8 | 0 | 8 | 16 | 20 | 24 | 32 | 40 | 48 | 64 | 80 | 96 | 112 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.0 | 0.7 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| 13 | 2.0 | 2.0 | 2.0 | 2.0 | 1.0 | 0.7 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| 25 | 2.0 | 2.0 | 2.0 | 2.0 | 1.0 | 0.7 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| 38 | 2.0 | 2.0 | 2.0 | 2.0 | 1.0 | 0.7 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| 50 | 2.0 | 2.0 | 2.0 | 2.0 | 1.0 | 0.7 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| 63 | 2.0 | 2.0 | 2.0 | 2.0 | 1.0 | 0.7 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| 75 | 2.0 | 2.0 | 2.0 | 2.0 | 1.0 | 0.7 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| 88 | 2.0 | 2.0 | 2.0 | 2.0 | 1.0 | 0.7 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| 100 | 2.0 | 2.0 | 2.0 | 2.0 | 1.0 | 0.7 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |

| Supporting Table - P00C6 - KtFHPD_Cnt_HPS_PressFallLoThrsh |
|---|

**Description:** The maximum acceptable counts of fuel rail pressure below KtFHPD_p_HPS_PressFallLoThrsh after High Pressure Start (HPS) is executed but before engine is in run mode.

**Notes:**

| y/x | -40 | -32 | -24 | -16 | -8 | 0 | 8 | 16 | 20 | 24 | 32 | 40 | 48 | 64 | 80 | 96 | 112 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| 13 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| 25 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| 38 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| 50 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| 63 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| 75 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| 88 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| 100 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |

**Supporting Table - P00C6 - KtFHPC_p_HighPressStart**

**Description:** This calibration is the minimum pressure in MPa that will exit High Pressure Start mode and allow fuel delivery

**Notes:**

| y/x | -40 | -32 | -24 | -16 | -8 | 0 | 8 | 16 | 20 | 24 | 32 | 40 | 48 | 64 | 80 | 96 | 112 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 10.0 | 10.0 | 10.0 | 4.0 | 3.0 | 1.0 | 0.8 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 |
| 13 | 10.0 | 10.0 | 10.0 | 4.0 | 3.0 | 1.0 | 0.8 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 |
| 25 | 10.0 | 10.0 | 10.0 | 4.0 | 3.0 | 1.0 | 0.8 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 |
| 38 | 10.0 | 10.0 | 10.0 | 8.0 | 4.0 | 2.0 | 0.8 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 |
| 50 | 10.0 | 10.0 | 10.0 | 10.0 | 6.0 | 6.0 | 2.8 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 |
| 63 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 6.0 | 3.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 75 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 6.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 88 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 6.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| 100 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 6.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

**Supporting Table - P00C6 - KtFHPC_t_HighPressStartTmout**

**Description:** High Pressure Pump Control Mode will exit (Fuel will be delivered) if this timeout in seconds is reached.

**Notes:**

| y/x | -40 | -32 | -24 | -16 | -8 | 0 | 8 | 16 | 20 | 24 | 32 | 40 | 48 | 64 | 80 | 96 | 112 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.0 | 5.0 | 5.0 | 4.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

## Supporting Table - P0089 - P163A - P228C - P228D - P0191 - KtFHPD_t_PumpCntrlEngRunThrsh

**Description:** The High Pressure Control Performance Diagnostic and Pump Current Diagnostic will not run when the engine run time is below this timer following an engine start.

**Notes:**

| y/x | -30 | -20 | -10 | 0 | 10 | 20 | 80 | 100 | 110 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 30.0 | 30.0 | 30.0 | 10.0 | 10.0 | 10.0 | 20.0 | 30.0 | 30.0 |

**Supporting Table - P0191 - KtFHPD_t_SnsPrfStuckCrankTmout**

**Description:** The maximum crank time allowed before allowing the Sensor Performance Stuck Test to fail

**Notes:**

| y/x | -30 | -20 | -10 | 0 | 10 | 20 | 80 | 100 | 110 |
|-----|-----|-----|-----|---|----|----|----|-----|-----|
| 1 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |

## Supporting Table - P0191 - KtFHPD_Cnt_SnsPrfIdlePumpOffDly

**Description:** The delay counter following the disabling of the high pressure pump used Only for the Sensor Performance Idle Test

**Notes:**

| y/x | 0 | 13 | 25 | 38 | 50 | 63 | 75 | 88 | 100 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 65 | 195.0 | 195.0 | 195.0 | 195.0 | 195.0 | 195.0 | 195.0 | 195.0 | 195.0 |
| 70 | 190.0 | 190.0 | 190.0 | 190.0 | 190.0 | 190.0 | 190.0 | 190.0 | 190.0 |
| 75 | 185.0 | 185.0 | 185.0 | 185.0 | 185.0 | 185.0 | 185.0 | 185.0 | 185.0 |
| 80 | 180.0 | 180.0 | 180.0 | 180.0 | 180.0 | 180.0 | 180.0 | 180.0 | 180.0 |
| 85 | 175.0 | 175.0 | 175.0 | 175.0 | 175.0 | 175.0 | 175.0 | 175.0 | 175.0 |
| 90 | 170.0 | 170.0 | 170.0 | 170.0 | 170.0 | 170.0 | 170.0 | 170.0 | 170.0 |
| 95 | 165.0 | 165.0 | 165.0 | 165.0 | 165.0 | 165.0 | 165.0 | 165.0 | 165.0 |
| 100 | 160.0 | 160.0 | 160.0 | 160.0 | 160.0 | 160.0 | 160.0 | 160.0 | 160.0 |
| 105 | 160.0 | 160.0 | 160.0 | 160.0 | 160.0 | 160.0 | 160.0 | 160.0 | 160.0 |

**Supporting Table - P0133_O2S Slow Response Bank 1 Sensor 1 "Pass/Fail Threshold table"**

**Description:** KaEOSD_x_ST_ResponseLimRS1[x][y]

**Notes:** X axis is Lean to Rich response time (in sec), Please see the table below named "KnEOSD_t_ST_LRC_LimRS1" for the 17 X axis table breakpoints. Y axis is Rich to Lean response time (sec), Please see the cal table below named "KnEOSD_t_ST_RLC_LimRS1" for the 17 Y axis table breakpoints. Z axis is the pass/fail result, Note: If the cell contains a "0" then the fault is indicated, if it contains a "1" a fault is not indicated.

| y/x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 6 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 7 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 8 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 9 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 11 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 12 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 13 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 14 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 15 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 16 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

## Supporting Table - P1133_O2S HC L to R Switches Limit Bank 1 Sensor 1 "Pass/Fail Threshold table"

**Description:** KtEOSD_d_HC_LRSLimRS1

**Notes:** X axis is estimated Ethanol percentage, Please see the table below named "KnE85G_Pct_FFS_CompAtEngAxis" for the 5 X axis table breakpoints.  Y axis is Average airflow during the response test (gps).  Z axis is the limit for L2R Half Cycle switches, Note: The cell contains the minumum switches, below which the fault is indicated.

| y/x | 0 | 20 | 30 | 50 | 80 |
|-----|-----|-----|-----|-----|-----|
| 0.0 | 29 | 29 | 29 | 29 | 29 |
| 6.3 | 29 | 29 | 29 | 29 | 29 |
| 12.5 | 29 | 29 | 29 | 29 | 29 |
| 18.8 | 29 | 29 | 29 | 29 | 29 |
| 25.0 | 29 | 29 | 29 | 29 | 29 |
| 31.3 | 29 | 29 | 29 | 29 | 29 |
| 37.5 | 29 | 29 | 29 | 29 | 29 |
| 43.8 | 29 | 29 | 29 | 29 | 29 |
| 50.0 | 29 | 29 | 29 | 29 | 29 |
| 56.3 | 29 | 29 | 29 | 29 | 29 |
| 62.5 | 29 | 29 | 29 | 29 | 29 |
| 68.8 | 29 | 29 | 29 | 29 | 29 |
| 75.0 | 29 | 29 | 29 | 29 | 29 |
| 81.3 | 29 | 29 | 29 | 29 | 29 |
| 87.5 | 29 | 29 | 29 | 29 | 29 |
| 93.8 | 29 | 29 | 29 | 29 | 29 |
| 100.0 | 29 | 29 | 29 | 29 | 29 |

## Supporting Table - P1133_O2S HC R to L Switches Limit Bank 1 Sensor 1  "Pass/Fail Threshold table"

**Description:** KtEOSD_d_HC_RLSLimRS1

**Notes:** X axis is estimated Ethanol percentage, Please see the table below named "KnE85G_Pct_FFS_CompAtEngAxis" for the 5 X axis table breakpoints.  Y axis is Average airflow during the response test (gps).  Z axis is the limit for R2L Half Cycle switches, Note: The cell contains the minumum switches, below which the fault is indicated.

| y/x | 0 | 20 | 30 | 50 | 80 |
|---|---|---|---|---|---|
| 0.0 | 29 | 29 | 29 | 29 | 29 |
| 6.3 | 29 | 29 | 29 | 29 | 29 |
| 12.5 | 29 | 29 | 29 | 29 | 29 |
| 18.8 | 29 | 29 | 29 | 29 | 29 |
| 25.0 | 29 | 29 | 29 | 29 | 29 |
| 31.3 | 29 | 29 | 29 | 29 | 29 |
| 37.5 | 29 | 29 | 29 | 29 | 29 |
| 43.8 | 29 | 29 | 29 | 29 | 29 |
| 50.0 | 29 | 29 | 29 | 29 | 29 |
| 56.3 | 29 | 29 | 29 | 29 | 29 |
| 62.5 | 29 | 29 | 29 | 29 | 29 |
| 68.8 | 29 | 29 | 29 | 29 | 29 |
| 75.0 | 29 | 29 | 29 | 29 | 29 |
| 81.3 | 29 | 29 | 29 | 29 | 29 |
| 87.5 | 29 | 29 | 29 | 29 | 29 |
| 93.8 | 29 | 29 | 29 | 29 | 29 |
| 100.0 | 29 | 29 | 29 | 29 | 29 |

**Supporting Table - P0133_KnEOSD_t_ST_LRC_LimRS1**

**Description:** KnEOSD_t_ST_LRC_LimRS1.  X Table Axis (in sec) for P0133, L2R Reponse time breakpoints for table

**Notes:**

| y/x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0.000 | 0.010 | 0.024 | 0.037 | 0.051 | 0.064 | 0.078 | 0.091 | 0.105 | 0.119 | 0.132 | 0.146 | 0.159 | 0.173 | 0.186 | 0.200 | 2.000 |

## Supporting Table - P0133_KnEOSD_t_ST_RLC_LimRS1

**Description:** KnEOSD_t_ST_RLC_LimRS1.  Y Table Axis (in sec) for P0133, R2L Reponse time breakpoints for table

**Notes:**

| y/x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0.000 | 0.010 | 0.023 | 0.035 | 0.048 | 0.060 | 0.073 | 0.085 | 0.098 | 0.110 | 0.123 | 0.135 | 0.148 | 0.160 | 0.173 | 0.185 | 2.000 |

| Supporting Table - P1133_P1153_KnE85G_Pct_FFS_CompAtEngAxis |
|---|

**Description:** KnE85G_Pct_FFS_CompAtEngAxis.  X Table Axis for P1133, P1153 (both L2R and R2L tables)

**Notes:** Ethanol percentage breakpoints

| y/x | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1 | 0 | 20 | 30 | 50 | 80 |

**Supporting Table - P0411 SL Threshold Bank 1 Table**

**Description:** Bank 1 SAI Flow (Phase 1) Test Average String Length failure threshold versus MAF (g/sec).

**Notes:** DTCs: P0411;  Cal: KtAIRD_dp_SAI_SL_ThrshBank1

| y/x | 0.0 | 3.0 | 6.0 | 9.0 | 12.0 | 15.0 | 18.0 | 21.0 | 24.0 | 27.0 | 30.0 | 33.0 | 36.0 | 39.0 | 42.0 | 45.0 | 48.0 |
|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |

**Supporting Table - P0411 SL Threshold Bank 2 Table**

**Description:** Bank 2 SAI Flow (Phase 1) Test Average String Length failure threshold versus MAF (g/sec).

**Notes:** DTCs: P0411;  Cal: KtAIRD_dp_SAI_SL_ThrshBank2: For dual valve SAI systems only.

| y/x | 0.0 | 3.0 | 6.0 | 9.0 | 12.0 | 15.0 | 18.0 | 21.0 | 24.0 | 27.0 | 30.0 | 33.0 | 36.0 | 39.0 | 42.0 | 45.0 | 48.0 |
|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |

**Supporting Table - P0411 Phase 1 Baro Test Weight Factor**

**Description:** SAI Flow (Phase 1) Test baro weight factor.

**Notes:** DTC: P0411; Cal: KtAIRD_K_SAI_TstBaroDsbld;  Axis is atmospheric pressure (kPa)

| y/x | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0.0 | 0.0 | 0.5 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.0 |

**Supporting Table - P0411 Phase 1 MAF Test Weight Factor**

**Description:** KtAIRD_K_SAI_TstMAF_Dsbld: SAI Flow (Phase 1) Test MAF weight factor.

**Notes:** Axis is Mass Airflow (g/sec).

| y/x | 0.0 | 3.0 | 6.0 | 9.0 | 12.0 | 15.0 | 18.0 | 21.0 | 24.0 | 27.0 | 30.0 | 33.0 | 36.0 | 39.0 | 42.0 | 45.0 | 48.0 |
|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1.0 | 0.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Supporting Table - P0411 Phase 1 System Volt Test Weight Factor**

**Description:** SAI Flow (Phase 1) Test system voltage weight factor.

**Notes:** DTC: P0411; Cal: KtAIRD_K_SAI_TstVoltDsbld; Axis is system voltage (V).

| y/x | 5.0 | 6.0 | 7.0 | 8.0 | 9.0 | 10.0 | 11.0 | 12.0 | 13.0 | 14.0 | 15.0 | 16.0 | 17.0 | 18.0 | 19.0 | 20.0 | 21.0 |
|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|
| 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.8 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.8 | 0.5 | 0.5 | 0.5 | 0.5 |

## Supporting Table - P0411 Phase 1 Amb Temp Test Weight Factor

**Description:** SAI Flow (Phase 1) Test ambient temperature weight factor.

**Notes:** DTC: P0411; Cal: KtAIRD_K_SAI_TstTempDsbld;  Axis is Ambient (IAT) Temp (C).

| y/x | -30 | -20 | -10 | 0 | 10 | 20 | 30 | 40 | 50 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0 | 0.0 | 0.0 | 0.5 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |

## Supporting Table - P2431_P2436 Baro Skewed Sensor Weight Factor

**Description:** The AIR Pressure Sensor Test quality factor based on the distance traveled since the last unthrottled ambient pressure update.

**Notes:** DTCs: P2431 & P2436; Cal: KtAIRD_K_APPD_BaroQlty;  P2436 is applicable on dual valve applications only. Axis is distance traveled from last Baro update in Km (1Km = 0.62 Miles).

| y/x | 0.0 | 2.0 | 4.0 | 6.0 | 8.0 | 10.0 | 12.0 | 14.0 | 16.0 | 18.0 | 20.0 | 22.0 | 24.0 | 26.0 | 28.0 | 30.0 | 32.0 |
|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|
| 1.0 | 1.0 | 0.8 | 0.5 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

## Supporting Table - P2440 Bank 1 Valve Pressure Error

**Description:** Sensor 1 minimum average pressure error (kPa) threshold for the valve-shut (Phase 2) test .

**Notes:** DTCs: P2440; Cal: KaAIRD_p_VlvTstPresErrMin[CeAIRR_e_PresSnsrOne]; Axis is Conditional Test Weight Time in seconds.

| y/x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-----|------|------|------|------|------|------|------|------|------|
| 1 | -3.0 | -3.0 | -3.0 | -3.0 | -3.0 | -3.0 | -3.0 | -3.0 | -3.0 |

## Supporting Table - P2440 Bank 2 Valve Pressure Error

**Description:** Sensor 2 minimum average pressure error (kPa) threshold for the valve-shut (Phase 2) test .

**Notes:** DTCs: P2440; Cal: KaAIRD_p_VlvTstPresErrMin[CeAIRR_e_PresSnsrTwo];  For dual valve SAI systems only. Axis is Conditional Test Weight Time in seconds.

| y/x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | -3.0 | -3.0 | -3.0 | -3.0 | -3.0 | -3.0 | -3.0 | -3.0 | -3.0 |

**Supporting Table - P2440 Phase 2 Baro Test Weight Factor**

**Description:** Ambient pressure component of the conditional test weight for the valve-shut (Phase 2) test .

**Notes:** DTCs: P2440; Cal: KtAIRD_K_VlvTstBaroDsbld;  Axis is ambient pressure (kPa).

| y/x | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0.0 | 0.0 | 0.5 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.0 |

**Supporting Table - P2440 Phase 2 MAF Test Weight Factor**

**Description:** Mass Airflow (MAF) component of the conditional test weight for the valve-shut (Phase 2) test.

**Notes:** DTCs: P2440; Cal: KtAIRD_K_VlvTstMAF_Dsbld;  Axis is mass airflow (g/s).

| y/x | 0.0 | 3.0 | 6.0 | 9.0 | 12.0 | 15.0 | 18.0 | 21.0 | 24.0 | 27.0 | 30.0 | 33.0 | 36.0 | 39.0 | 42.0 | 45.0 | 48.0 |
|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1.0 | 0.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Supporting Table - P2440 Phase 2 System Volt Test Weight Factor**

**Description:** System Voltage component of the conditional test weight for the valve-shut (Phase 2) test.

**Notes:** DTCs: P2440; Cal: KtAIRD_K_VlvTstVoltDsbld;  Axis is system volts (V).

| y/x | 5.0 | 6.0 | 7.0 | 8.0 | 9.0 | 10.0 | 11.0 | 12.0 | 13.0 | 14.0 | 15.0 | 16.0 | 17.0 | 18.0 | 19.0 | 20.0 | 21.0 |
|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|
| 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.8 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.8 | 0.5 | 0.5 | 0.5 | 0.5 |

## Supporting Table - P2440 Phase 2 Amb Temp Test Weight Factor

**Description:** Ambient Temperature component of the conditional test weight for the valve-shut (Phase 2) test.

**Notes:** DTCs: P2440; Cal: KtAIRD_K_VlvTstTempDsbld; Axis is ambient temperature (IAT) in Deg C.

| y/x | -30 | -20 | -10 | 0 | 10 | 20 | 30 | 40 | 50 |
|-----|-----|-----|-----|---|----|----|----|----|----|
| 1 | 0.0 | 0.0 | 0.0 | 0.5 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |

**Supporting Table - P2444 Bank 1 Pump Pressure Error**

**Description:** Sensor 1 maximum average pressure error threshold for the pump-off (Phase 3) test.

**Notes:** DTCs: P2444; Cal: KaAIRD_p_PmpTstPresErrMax[CeAIRR_e_PresSnsrOne]; Axis is Conditional Test Weight Time in seconds.

| y/x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |

## Supporting Table - P2444 Bank 2 Pump Pressure Error

**Description:** Sensor 2 maximum average pressure error threshold for the pump-off (Phase 3) test.

**Notes:** DTCs: P2444; Cal: KaAIRD_p_PmpTstPresErrMax[CeAIRR_e_PresSnsrTwo]; For dual sensor SAI systems only. Axis is Conditional Test Weight Time in seconds.

| y/x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |

**Supporting Table - P0068_Delta MAP Threshold f(TPS)**

**Description:** Table of delta MAP values as a function of desired throttle position. The output of this table provides a delta MAP that if the measured minus the estimated MAP exceeds, is considered a fail.

**Notes:** P0068, KtTPSD_p_MAP_DesThrDelt

| y/x | 5.00 | 10.00 | 15.00 | 20.00 | 25.00 | 30.00 | 35.00 | 40.00 | 100.00 |
|------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| 1.00 | 33.36 | 35.16 | 32.36 | 25.88 | 25.00 | 21.95 | 24.70 | 255.00 | 255.00 |

| Supporting Table - P0068_Delta MAF Threshold f(TPS) |
|---|

**Description:** Table of delta MAF values as a function of desired throttle position. The output of this table provides a delta MAF that if the measured minus the estimated MAF exceeds, is considered a fail.

**Notes:** P0068, KtTPSD_dm_MAF_DesThrDelt

| y/x | 5.00 | 10.00 | 15.00 | 20.00 | 25.00 | 30.00 | 35.00 | 40.00 | 100.00 |
|---|---|---|---|---|---|---|---|---|---|
| 1.00 | 18.33 | 17.10 | 17.10 | 18.21 | 21.80 | 27.38 | 41.76 | 255.00 | 255.00 |

**Supporting Table - P0068_Maximum MAF f(RPM)**

**Description:** Table of maximum MAF values vs. engine speed.  This is the maximum MAF the engine can see under all ambient conditions.

**Notes:** P0068, KtTPSD_dm_MaxMAF_VsRPM

| y/x | 600.00 | 1,400.00 | 2,200.00 | 3,000.00 | 3,800.00 | 4,600.00 | 5,400.00 | 6,200.00 | 7,000.00 |
|-----|--------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1.00 | 8.00 | 27.00 | 41.00 | 59.00 | 79.00 | 105.00 | 122.00 | 141.00 | 149.00 |

## Supporting Table - P0068_Maximum MAF f(Volts)

**Description:** Table of maximum MAF values vs. system voltage.  The output of the air meter is clamped to lower values as system voltage drops off.

**Notes:** P0068, KtTPSD_dm_MaxMAF_VsVoltage

| y/x | 6.00 | 7.00 | 8.00 | 9.00 | 10.00 | 11.00 | 12.00 | 13.00 | 14.00 |
|------|-------|-------|--------|--------|--------|--------|--------|--------|--------|
| 1.00 | 31.00 | 72.00 | 130.00 | 190.00 | 238.00 | 238.00 | 238.00 | 238.00 | 238.00 |

**Supporting Table - P0606_Last Seed Timeout f(Loop Time)**

**Description:** The max time for the Last Seed Timeout as a function of operating loop time sequence.

**Notes:** P0606, KaPISD_t_LastSeedTimeout[x]

| y/x | CePISR_e_6p25msSeq | CePISR_e_12p5msSeq | CePISR_e_25msSeq | CePISR_e_LORES_C |
|---|---|---|---|---|
| 1 | 0.175 | 0.175 | 0.175 | 409.594 |

**Supporting Table - P0606_Program Sequence Watch Enable f(Loop Time)**

**Description:** The enabling flags for the program sequence watch as a function of operating loop time sequence.

**Notes:** P0606, KaPISD_b_ProgSeqWatchEnbl

| y/x | CePISR_e_6p25msSeq | CePISR_e_12p5msSeq | CePISR_e_25msSeq | CePISR_e_LORES_C |
|-----|--------------------|--------------------|-----------------|-------------------|
| 1 | 1 | 1 | 1 | 1 |

**Supporting Table - P0606_PSW Sequence Fail f(Loop Time)**

**Description:** Fail threshold for PSW per operating loop.

**Notes:** P0606, KaPISD_Cnt_SequenceFail[x]

| y/x | CePISR_e_6p25msSeq | CePISR_e_12p5msSeq | CePISR_e_25msSeq | CePISR_e_LORES_C |
|-----|--------------------|--------------------|------------------|------------------|
| 1   | 3                  | 3                  | 3                | 5                |

## Supporting Table - P0606_PSW Sequence Sample f(Loop Time)

**Description:** Sample threshold for PSW per operating loop.

**Notes:** P0606, KaPISD_Cnt_SequenceSmpl[x]

| y/x | CePISR_e_6p25msSeq | CePISR_e_12p5msSeq | CePISR_e_25msSeq | CePISR_e_LORES_C |
|---|---|---|---|---|
| 1 | 4 | 4 | 4 | 4 |

## Supporting Table - P16F3_Delta Spark Threshold f(RPM,APC)

**Description:** Threshold for determining when the difference between commanded spark and applied spark exceeds the torque security requirement. It is a function of engine rpm and APC.

**Notes:** P16F3, KtSPRK_phi_DeltTorqueScrtyAdv

| y/x | 500.00 | 980.74 | 1,461.48 | 1,942.23 | 2,422.97 | 2,903.71 | 3,384.45 | 3,865.20 | 4,345.94 | 4,826.68 | 5,307.42 | 5,788.16 | 6,268.91 | 6,749.65 | 7,230.39 | 7,711.13 | 8,191.88 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 80.00 | 125.00 | 62.73 | 59.22 | 62.53 | 53.41 | 52.27 | 39.30 | 35.03 | 33.61 | 31.08 | 28.63 | 26.69 | 25.53 | 24.39 | 24.28 | 24.28 | 24.28 |
| 160.00 | 125.00 | 51.05 | 42.83 | 44.63 | 44.13 | 38.27 | 31.75 | 29.86 | 28.92 | 27.17 | 25.45 | 23.89 | 22.61 | 21.33 | 21.19 | 21.19 | 21.19 |
| 240.00 | 125.00 | 42.52 | 32.38 | 34.52 | 37.33 | 30.25 | 26.86 | 25.64 | 24.97 | 23.47 | 21.94 | 20.66 | 19.77 | 18.89 | 18.80 | 18.80 | 18.80 |
| 320.00 | 125.00 | 33.63 | 25.67 | 28.16 | 31.00 | 24.88 | 22.28 | 21.22 | 20.58 | 19.13 | 17.61 | 16.66 | 16.61 | 16.55 | 16.55 | 16.55 | 16.55 |
| 400.00 | 125.00 | 27.81 | 21.28 | 23.77 | 26.52 | 21.05 | 18.63 | 17.75 | 17.45 | 16.13 | 14.70 | 13.89 | 14.05 | 14.20 | 14.22 | 14.22 | 14.22 |
| 480.00 | 125.00 | 23.72 | 18.17 | 20.56 | 23.16 | 18.23 | 16.00 | 15.17 | 15.14 | 13.95 | 12.63 | 11.92 | 12.17 | 12.44 | 12.47 | 12.47 | 12.47 |
| 560.00 | 125.00 | 20.67 | 15.84 | 18.13 | 20.56 | 16.09 | 14.02 | 13.23 | 13.36 | 12.28 | 11.06 | 10.44 | 10.75 | 11.06 | 11.09 | 11.09 | 11.09 |
| 640.00 | 125.00 | 18.31 | 14.06 | 16.20 | 18.48 | 14.39 | 12.48 | 11.75 | 11.92 | 10.95 | 9.83 | 9.28 | 9.63 | 9.97 | 10.00 | 10.00 | 10.00 |
| 720.00 | 125.00 | 16.45 | 12.63 | 14.66 | 16.72 | 13.02 | 11.25 | 10.56 | 10.77 | 9.88 | 8.84 | 8.36 | 8.70 | 9.06 | 9.09 | 9.09 | 9.09 |
| 800.00 | 125.00 | 16.03 | 12.31 | 14.30 | 16.33 | 12.70 | 10.97 | 10.28 | 10.50 | 9.64 | 8.63 | 8.16 | 8.50 | 8.86 | 8.89 | 8.89 | 8.89 |
| 880.00 | 125.00 | 16.03 | 12.31 | 14.30 | 16.33 | 12.70 | 10.97 | 10.28 | 10.50 | 9.64 | 8.63 | 8.16 | 8.50 | 8.86 | 8.89 | 8.89 | 8.89 |
| 960.00 | 125.00 | 16.03 | 12.31 | 14.30 | 16.33 | 12.70 | 10.97 | 10.28 | 10.50 | 9.64 | 8.63 | 8.16 | 8.50 | 8.86 | 8.89 | 8.89 | 8.89 |
| 1,040.00 | 125.00 | 16.03 | 12.31 | 14.30 | 16.33 | 12.70 | 10.97 | 10.28 | 10.50 | 9.64 | 8.63 | 8.16 | 8.50 | 8.86 | 8.89 | 8.89 | 8.89 |
| 1,120.00 | 125.00 | 16.03 | 12.31 | 14.30 | 16.33 | 12.70 | 10.97 | 10.28 | 10.50 | 9.64 | 8.63 | 8.16 | 8.50 | 8.86 | 8.89 | 8.89 | 8.89 |
| 1,200.00 | 125.00 | 16.03 | 12.31 | 14.30 | 16.33 | 12.70 | 10.97 | 10.28 | 10.50 | 9.64 | 8.63 | 8.16 | 8.50 | 8.86 | 8.89 | 8.89 | 8.89 |
| 1,280.00 | 125.00 | 16.03 | 12.31 | 14.30 | 16.33 | 12.70 | 10.97 | 10.28 | 10.50 | 9.64 | 8.63 | 8.16 | 8.50 | 8.86 | 8.89 | 8.89 | 8.89 |
| 1,360.00 | 125.00 | 16.03 | 12.31 | 14.30 | 16.33 | 12.70 | 10.97 | 10.28 | 10.50 | 9.64 | 8.63 | 8.16 | 8.50 | 8.86 | 8.89 | 8.89 | 8.89 |

**Supporting Table - P16F3_Delta MAP Threshold f(Desired Engine Torque)**

**Description:** Engine Sync based and Time based delta pressure threshold above which Torque Security error is reported.

**Notes:** P16F3, KtMAPI_p_ES_TB_MAP_DeltaThresh

| y/x | 0.00 | 50.00 | 100.00 | 150.00 | 200.00 | 300.00 |
|-----|------|-------|--------|--------|--------|--------|
| 1.00 | 21.95 | 21.95 | 21.95 | 21.95 | 21.95 | 21.95 |

## Supporting Table - P16F3_Speed Control External Load f(Oil Temp, RPM)

**Description:** Specifies the external load table for SPDR torque security as a function of engine oil temperature and engine RPM.

**Notes:** P16F3, KtSPDC_M_ExternalLoad

| y/x | -40.00 | -20.00 | -10.00 | 0.00 | 50.00 | 90.00 |
|---|---|---|---|---|---|---|
| 450.00 | 248.00 | 248.00 | 248.00 | 248.00 | 248.00 | 248.00 |
| 550.00 | 248.00 | 248.00 | 248.00 | 248.00 | 248.00 | 248.00 |
| 650.00 | 125.00 | 98.46 | 100.52 | 90.40 | 73.43 | 59.30 |
| 700.00 | 100.00 | 95.53 | 99.94 | 90.42 | 69.21 | 56.18 |
| 800.00 | 100.00 | 95.28 | 98.00 | 93.26 | 67.38 | 54.94 |
| 900.00 | 90.00 | 92.64 | 93.00 | 90.94 | 65.01 | 68.79 |
| 1,000.00 | 71.62 | 89.68 | 86.75 | 79.49 | 62.73 | 75.22 |
| 1,100.00 | 71.37 | 87.22 | 84.34 | 78.17 | 60.85 | 69.79 |
| 1,300.00 | 65.00 | 73.00 | 70.00 | 75.00 | 75.31 | 64.97 |
| 1,500.00 | 65.00 | 65.00 | 67.91 | 51.66 | 42.56 | 45.31 |
| 2,000.00 | 15.00 | 15.00 | 16.00 | 18.00 | 15.00 | 16.00 |
| 2,500.00 | 15.00 | 15.00 | 16.00 | 18.00 | 15.00 | 16.00 |
| 3,000.00 | 5.00 | 5.00 | 6.00 | 8.00 | 5.00 | 6.00 |
| 3,500.00 | -5.00 | -5.00 | -4.00 | -2.00 | -5.00 | -4.00 |
| 4,500.00 | 29.00 | 20.00 | 18.00 | 14.00 | 12.00 | 2.00 |
| 5,500.00 | 48.00 | 38.00 | 35.00 | 31.00 | 25.00 | 16.00 |
| 7,200.00 | 64.00 | 53.00 | 50.00 | 45.00 | 37.00 | 28.00 |

| Supporting Table - P0068_Delta MAP Threshold f(TPS) |
|---|

**Description:** Table of delta MAP values as a function of desired throttle position. The output of this table provides a delta MAP that if the measured minus the estimated MAP exceeds, is considered a fail.

**Notes:** P0068, KtTPSD_p_MAP_DesThrDelt

| y/x | 5.00 | 10.00 | 15.00 | 20.00 | 25.00 | 30.00 | 35.00 | 40.00 | 100.00 |
|---|---|---|---|---|---|---|---|---|---|
| 1.00 | 33.36 | 35.16 | 32.36 | 25.88 | 25.00 | 21.95 | 24.70 | 255.00 | 255.00 |

## Supporting Table - P0068_Delta MAF Threshold f(TPS)

**Description:** Table of delta MAF values as a function of desired throttle position. The output of this table provides a delta MAF that if the measured minus the estimated MAF exceeds, is considered a fail.

**Notes:** P0068, KtTPSD_dm_MAF_DesThrDelt

| y/x | 5.00 | 10.00 | 15.00 | 20.00 | 25.00 | 30.00 | 35.00 | 40.00 | 100.00 |
|---|---|---|---|---|---|---|---|---|---|
| 1.00 | 18.33 | 17.10 | 17.10 | 18.21 | 21.80 | 27.38 | 41.76 | 255.00 | 255.00 |

**Supporting Table - P0068_Maximum MAF f(RPM)**

**Description:** Table of maximum MAF values vs. engine speed.  This is the maximum MAF the engine can see under all ambient conditions.

**Notes:** P0068, KtTPSD_dm_MaxMAF_VsRPM

| y/x | 600.00 | 1,400.00 | 2,200.00 | 3,000.00 | 3,800.00 | 4,600.00 | 5,400.00 | 6,200.00 | 7,000.00 |
|------|--------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1.00 | 8.00 | 27.00 | 41.00 | 59.00 | 79.00 | 105.00 | 122.00 | 141.00 | 149.00 |

**Supporting Table - P0068_Maximum MAF f(Volts)**

**Description:** Table of maximum MAF values vs. system voltage.  The output of the air meter is clamped to lower values as system voltage drops off.

**Notes:** P0068, KtTPSD_dm_MaxMAF_VsVoltage

| y/x | 6.00 | 7.00 | 8.00 | 9.00 | 10.00 | 11.00 | 12.00 | 13.00 | 14.00 |
|---|---|---|---|---|---|---|---|---|---|
| 1.00 | 31.00 | 72.00 | 130.00 | 190.00 | 238.00 | 238.00 | 238.00 | 238.00 | 238.00 |

**Supporting Table - P0606_Last Seed Timeout f(Loop Time)**

**Description:** The max time for the Last Seed Timeout as a function of operating loop time sequence.

**Notes:** P0606, KaPISD_t_LastSeedTimeout[x]

| y/x | CePISR_e_6p25msSeq | CePISR_e_12p5msSeq | CePISR_e_25msSeq | CePISR_e_LORES_C |
|---|---|---|---|---|
| 1 | 0.175 | 0.175 | 0.175 | 409.594 |

**Supporting Table - P0606_Program Sequence Watch Enable f(Loop Time)**

**Description:** The enabling flags for the program sequence watch as a function of operating loop time sequence.

**Notes:** P0606, KaPISD_b_ProgSeqWatchEnbl

| y/x | CePISR_e_6p25msSeq | CePISR_e_12p5msSeq | CePISR_e_25msSeq | CePISR_e_LORES_C |
|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 |

**Supporting Table - P0606_PSW Sequence Fail f(Loop Time)**

**Description:** Fail threshold for PSW per operating loop.

**Notes:** P0606, KaPISD_Cnt_SequenceFail[x]

| y/x | CePISR_e_6p25msSeq | CePISR_e_12p5msSeq | CePISR_e_25msSeq | CePISR_e_LORES_C |
|---|---|---|---|---|
| 1 | 3 | 3 | 3 | 5 |

## Supporting Table - P0606_PSW Sequence Sample f(Loop Time)

**Description:** Sample threshold for PSW per operating loop.

**Notes:** P0606, KaPISD_Cnt_SequenceSmpl[x]

| y/x | CePISR_e_6p25msSeq | CePISR_e_12p5msSeq | CePISR_e_25msSeq | CePISR_e_LORES_C |
|-----|--------------------|--------------------|--------------------|--------------------|
| 1 | 4 | 4 | 4 | 4 |

**Supporting Table - P1682_PT Relay Pull-in Run/Crank Voltage f(IAT)**

**Description:** The Run/Crank voltages required to pull in the PT relay as a function of induction air temperature.

**Notes:** P1682, KtEROR_U_PT_RelayPullInEnbl

| y/x | 23.00 | 85.00 | 95.00 | 105.00 | 125.00 |
|-----|-------|-------|-------|--------|--------|
| 1.00 | 7.00 | 8.70 | 9.00 | 9.20 | 10.00 |

## Supporting Table - P16F3_Delta Spark Threshold f(RPM,APC)

**Description:** Threshold for determining when the difference between commanded spark and applied spark exceeds the torque security requirement. It is a function of engine rpm and APC.

**Notes:** P16F3, KtSPRK_phi_DeltTorqueScrtyAdv

| y/x | 500.00 | 980.74 | 1,461.48 | 1,942.23 | 2,422.97 | 2,903.71 | 3,384.45 | 3,865.20 | 4,345.94 | 4,826.68 | 5,307.42 | 5,788.16 | 6,268.91 | 6,749.65 | 7,230.39 | 7,711.13 | 8,191.88 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 80.00 | 125.00 | 62.73 | 59.22 | 62.53 | 53.41 | 52.27 | 39.30 | 35.03 | 33.61 | 31.08 | 28.63 | 26.69 | 25.53 | 24.39 | 24.28 | 24.28 | 24.28 |
| 160.00 | 125.00 | 51.05 | 42.83 | 44.63 | 44.13 | 38.27 | 31.75 | 29.86 | 28.92 | 27.17 | 25.45 | 23.89 | 22.61 | 21.33 | 21.19 | 21.19 | 21.19 |
| 240.00 | 125.00 | 42.52 | 32.38 | 34.52 | 37.33 | 30.25 | 26.86 | 25.64 | 24.97 | 23.47 | 21.94 | 20.66 | 19.77 | 18.89 | 18.80 | 18.80 | 18.80 |
| 320.00 | 125.00 | 33.63 | 25.67 | 28.16 | 31.00 | 24.88 | 22.28 | 21.22 | 20.58 | 19.13 | 17.61 | 16.66 | 16.61 | 16.55 | 16.55 | 16.55 | 16.55 |
| 400.00 | 125.00 | 27.81 | 21.28 | 23.77 | 26.52 | 21.05 | 18.63 | 17.75 | 17.45 | 16.13 | 14.70 | 13.89 | 14.05 | 14.20 | 14.22 | 14.22 | 14.22 |
| 480.00 | 125.00 | 23.72 | 18.17 | 20.56 | 23.16 | 18.23 | 16.00 | 15.17 | 15.14 | 13.95 | 12.63 | 11.92 | 12.17 | 12.44 | 12.47 | 12.47 | 12.47 |
| 560.00 | 125.00 | 20.67 | 15.84 | 18.13 | 20.56 | 16.09 | 14.02 | 13.23 | 13.36 | 12.28 | 11.06 | 10.44 | 10.75 | 11.06 | 11.09 | 11.09 | 11.09 |
| 640.00 | 125.00 | 18.31 | 14.06 | 16.20 | 18.48 | 14.39 | 12.48 | 11.75 | 11.92 | 10.95 | 9.83 | 9.28 | 9.63 | 9.97 | 10.00 | 10.00 | 10.00 |
| 720.00 | 125.00 | 16.45 | 12.63 | 14.66 | 16.72 | 13.02 | 11.25 | 10.56 | 10.77 | 9.88 | 8.84 | 8.36 | 8.70 | 9.06 | 9.09 | 9.09 | 9.09 |
| 800.00 | 125.00 | 16.03 | 12.31 | 14.30 | 16.33 | 12.70 | 10.97 | 10.28 | 10.50 | 9.64 | 8.63 | 8.16 | 8.50 | 8.86 | 8.89 | 8.89 | 8.89 |
| 880.00 | 125.00 | 16.03 | 12.31 | 14.30 | 16.33 | 12.70 | 10.97 | 10.28 | 10.50 | 9.64 | 8.63 | 8.16 | 8.50 | 8.86 | 8.89 | 8.89 | 8.89 |
| 960.00 | 125.00 | 16.03 | 12.31 | 14.30 | 16.33 | 12.70 | 10.97 | 10.28 | 10.50 | 9.64 | 8.63 | 8.16 | 8.50 | 8.86 | 8.89 | 8.89 | 8.89 |
| 1,040.00 | 125.00 | 16.03 | 12.31 | 14.30 | 16.33 | 12.70 | 10.97 | 10.28 | 10.50 | 9.64 | 8.63 | 8.16 | 8.50 | 8.86 | 8.89 | 8.89 | 8.89 |
| 1,120.00 | 125.00 | 16.03 | 12.31 | 14.30 | 16.33 | 12.70 | 10.97 | 10.28 | 10.50 | 9.64 | 8.63 | 8.16 | 8.50 | 8.86 | 8.89 | 8.89 | 8.89 |
| 1,200.00 | 125.00 | 16.03 | 12.31 | 14.30 | 16.33 | 12.70 | 10.97 | 10.28 | 10.50 | 9.64 | 8.63 | 8.16 | 8.50 | 8.86 | 8.89 | 8.89 | 8.89 |
| 1,280.00 | 125.00 | 16.03 | 12.31 | 14.30 | 16.33 | 12.70 | 10.97 | 10.28 | 10.50 | 9.64 | 8.63 | 8.16 | 8.50 | 8.86 | 8.89 | 8.89 | 8.89 |
| 1,360.00 | 125.00 | 16.03 | 12.31 | 14.30 | 16.33 | 12.70 | 10.97 | 10.28 | 10.50 | 9.64 | 8.63 | 8.16 | 8.50 | 8.86 | 8.89 | 8.89 | 8.89 |

**Supporting Table - P16F3_Delta MAP Threshold f(Desired Engine Torque)**

**Description:** Engine Sync based and Time based delta pressure threshold above which Torque Security error is reported.

**Notes:** P16F3, KtMAPI_p_ES_TB_MAP_DeltaThresh

| y/x | 0.00 | 50.00 | 100.00 | 150.00 | 200.00 | 300.00 |
|-----|------|-------|--------|--------|--------|--------|
| 1.00 | 21.95 | 21.95 | 21.95 | 21.95 | 21.95 | 21.95 |

## Supporting Table - P16F3_Speed Control External Load f(Oil Temp, RPM)

**Description:** Specifies the external load table for SPDR torque security as a function of engine oil temperature and engine RPM.

**Notes:** P16F3, KtSPDC_M_ExternalLoad

| y/x | -40.00 | -20.00 | -10.00 | 0.00 | 50.00 | 90.00 |
|---|---|---|---|---|---|---|
| 450.00 | 248.00 | 248.00 | 248.00 | 248.00 | 248.00 | 248.00 |
| 550.00 | 248.00 | 248.00 | 248.00 | 248.00 | 248.00 | 248.00 |
| 650.00 | 125.00 | 98.46 | 100.52 | 90.40 | 73.43 | 59.30 |
| 700.00 | 100.00 | 95.53 | 99.94 | 90.42 | 69.21 | 56.18 |
| 800.00 | 100.00 | 95.28 | 98.00 | 93.26 | 67.38 | 54.94 |
| 900.00 | 90.00 | 92.64 | 93.00 | 90.94 | 65.01 | 68.79 |
| 1,000.00 | 71.62 | 89.68 | 86.75 | 79.49 | 62.73 | 75.22 |
| 1,100.00 | 71.37 | 87.22 | 84.34 | 78.17 | 60.85 | 69.79 |
| 1,300.00 | 65.00 | 73.00 | 70.00 | 75.00 | 75.31 | 64.97 |
| 1,500.00 | 65.00 | 65.00 | 67.91 | 51.66 | 42.56 | 45.31 |
| 2,000.00 | 15.00 | 15.00 | 16.00 | 18.00 | 15.00 | 16.00 |
| 2,500.00 | 15.00 | 15.00 | 16.00 | 18.00 | 15.00 | 16.00 |
| 3,000.00 | 5.00 | 5.00 | 6.00 | 8.00 | 5.00 | 6.00 |
| 3,500.00 | -5.00 | -5.00 | -4.00 | -2.00 | -5.00 | -4.00 |
| 4,500.00 | 29.00 | 20.00 | 18.00 | 14.00 | 12.00 | 2.00 |
| 5,500.00 | 48.00 | 38.00 | 35.00 | 31.00 | 25.00 | 16.00 |
| 7,200.00 | 64.00 | 53.00 | 50.00 | 45.00 | 37.00 | 28.00 |

**Supporting Table - P0300_IdleSCD_Decel**

**Description:** Crankshaft decel threshold while in SCD mode.    SCD mode uses smaller windows near TDC.    Thresholds are a function of rpm and % engine Load.

**Notes:** Used for P0300-P0308.  Cal Name: KtMISF_dt_SCD_IdleMode
Note: Misfire's Load term is %, but not PID$04.   PID $04 is not robust to temperature and alititude shifts.  (especially decel and jerk thresholds since they track actual air trapped in cylinder)

| y/x | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 9 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 11 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 12 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 13 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 15 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 17 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 19 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 22 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 25 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 29 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 33 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 38 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 42 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 48 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 54 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 60 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |

### Supporting Table - P0300_IdleSCD_Jerk

**Description:** Crankshaft jerk threshold while in SCD mode.  SCD mode uses smaller windows near TDC.  Thresholds are a function of rpm and % engine Load.

**Notes:** Used for P0300-P0308.  Cal Name:  KtMISF_ddt_SCD_IdleMode

| y/x | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 9 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 11 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 12 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 13 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 15 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 17 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 19 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 22 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 25 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 29 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 33 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 38 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 42 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 48 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 54 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 60 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |

**Supporting Table - P0300_SCD_Decel**

**Description:** Crankshaft decel threshold.   SCD mode uses smaller windows near TDC.  Thresholds are a function of rpm and % engine Load.

**Notes:** Used for P0300-P0308.  Cal Name: KtMISF_dt_SCD_OffIdleMode

| y/x | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 9 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 11 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 12 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 13 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 15 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 17 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 19 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 22 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 25 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 29 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 33 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 38 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 42 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 48 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 54 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 61 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |

## Supporting Table - P0300_SCD_Jerk

**Description:** Crankshaft jerk threshold.   SCD mode uses smaller windows near TDC.  Thresholds are a function of rpm and % engine Load.

**Notes:** Used for P0300-P0308.  Cal Name: KtMISF_ddt_SCD_OffIdleMode

| y/x | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 9 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 11 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 12 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 13 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 15 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 17 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 19 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 22 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 25 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 29 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 33 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 38 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 42 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 48 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 54 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 61 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |

**Supporting Table - P0300_IdleCylModeDecel**

**Description:** Crankshaft decel threshold.  Thresholds are a function of rpm and % engine Load.

**Notes:** Used for P0300-P0308.  Cal Name: KtMSFD_dt_IdleCylinderMode

| y/x | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 4,500 | 4,500 | 4,000 | 1,700 | 1,200 | 800 | 600 | 450 | 300 | 175 | 75 | 80 | 75 |
| 9 | 4,500 | 4,500 | 4,900 | 2,000 | 1,300 | 800 | 450 | 425 | 300 | 175 | 100 | 82 | 75 |
| 11 | 4,500 | 4,500 | 4,900 | 2,000 | 1,600 | 800 | 450 | 425 | 300 | 175 | 100 | 95 | 95 |
| 12 | 4,500 | 4,500 | 4,900 | 2,000 | 1,600 | 900 | 550 | 500 | 300 | 175 | 100 | 100 | 80 |
| 13 | 4,500 | 4,500 | 4,900 | 2,000 | 1,600 | 1,200 | 800 | 500 | 300 | 175 | 100 | 120 | 80 |
| 15 | 4,500 | 4,500 | 4,000 | 1,700 | 1,600 | 1,500 | 950 | 500 | 350 | 225 | 125 | 120 | 90 |
| 17 | 4,500 | 4,500 | 4,000 | 1,700 | 1,500 | 1,500 | 1,100 | 1,000 | 450 | 225 | 150 | 130 | 100 |
| 19 | 4,500 | 4,500 | 4,000 | 1,700 | 1,500 | 1,500 | 1,100 | 1,000 | 450 | 250 | 175 | 150 | 120 |
| 22 | 4,500 | 4,500 | 4,000 | 1,700 | 1,500 | 1,600 | 1,100 | 1,000 | 550 | 450 | 275 | 175 | 120 |
| 25 | 4,500 | 4,500 | 4,000 | 2,150 | 1,500 | 1,600 | 1,100 | 1,000 | 750 | 700 | 500 | 200 | 140 |
| 29 | 4,500 | 4,500 | 4,000 | 2,400 | 1,500 | 1,600 | 1,100 | 1,000 | 900 | 750 | 500 | 240 | 150 |
| 33 | 4,500 | 4,500 | 4,500 | 3,000 | 1,800 | 1,800 | 1,100 | 1,000 | 900 | 750 | 500 | 275 | 200 |
| 38 | 4,500 | 4,500 | 4,500 | 3,500 | 2,000 | 1,800 | 1,100 | 1,000 | 900 | 750 | 500 | 300 | 200 |
| 42 | 5,000 | 5,000 | 5,000 | 4,000 | 3,000 | 2,500 | 1,500 | 1,400 | 1,000 | 750 | 500 | 350 | 210 |
| 48 | 5,500 | 5,500 | 5,500 | 4,500 | 3,500 | 3,000 | 2,500 | 2,000 | 1,400 | 750 | 500 | 350 | 260 |
| 54 | 6,000 | 6,000 | 6,000 | 5,000 | 4,000 | 3,500 | 2,500 | 2,500 | 1,600 | 750 | 500 | 400 | 300 |
| 60 | 6,500 | 6,500 | 6,500 | 5,500 | 4,500 | 4,000 | 3,000 | 3,000 | 2,000 | 750 | 600 | 450 | 350 |

## Supporting Table - P0300_IdleCylModeJerk

**Description:** Crankshaft jerk threshold.  Thresholds are a function of rpm and % engine Load.

**Notes:** Used for P0300-P0308.  Cal Name: KtMSFD_ddt_IdleCylinderMode

| y/x | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 4,500 | 4,500 | 4,000 | 1,600 | 1,300 | 800 | 600 | 840 | 400 | 300 | 175 | 125 | 105 |
| 9 | 4,500 | 4,500 | 4,000 | 2,000 | 1,300 | 800 | 600 | 450 | 450 | 300 | 175 | 125 | 105 |
| 11 | 4,500 | 4,500 | 4,900 | 2,000 | 1,600 | 800 | 800 | 500 | 475 | 300 | 200 | 130 | 130 |
| 12 | 4,500 | 4,500 | 4,900 | 2,000 | 1,600 | 1,000 | 800 | 575 | 475 | 300 | 200 | 130 | 120 |
| 13 | 4,500 | 4,500 | 4,900 | 2,000 | 1,600 | 1,300 | 1,200 | 575 | 400 | 300 | 200 | 130 | 110 |
| 15 | 4,500 | 4,500 | 4,000 | 1,800 | 1,600 | 1,500 | 1,200 | 575 | 450 | 375 | 200 | 145 | 110 |
| 17 | 4,500 | 4,500 | 4,000 | 2,100 | 1,500 | 1,500 | 1,200 | 700 | 600 | 400 | 225 | 170 | 125 |
| 19 | 4,500 | 4,500 | 4,000 | 2,200 | 2,000 | 1,500 | 1,200 | 1,000 | 600 | 450 | 275 | 200 | 175 |
| 22 | 4,500 | 4,500 | 4,000 | 2,500 | 2,100 | 1,800 | 1,300 | 1,000 | 750 | 500 | 310 | 225 | 200 |
| 25 | 4,500 | 4,500 | 4,000 | 2,500 | 2,100 | 2,500 | 1,300 | 1,200 | 1,050 | 750 | 525 | 275 | 250 |
| 29 | 4,500 | 4,500 | 4,000 | 3,400 | 2,600 | 3,000 | 1,300 | 1,200 | 1,050 | 750 | 525 | 325 | 250 |
| 33 | 5,500 | 5,500 | 5,500 | 4,000 | 3,500 | 3,800 | 1,600 | 1,300 | 1,050 | 750 | 525 | 400 | 300 |
| 38 | 6,000 | 6,000 | 6,000 | 4,500 | 3,500 | 3,800 | 1,800 | 1,500 | 1,050 | 750 | 550 | 500 | 350 |
| 42 | 8,000 | 8,000 | 8,000 | 5,000 | 4,000 | 4,000 | 2,400 | 2,000 | 1,400 | 750 | 625 | 500 | 400 |
| 48 | 9,000 | 9,000 | 9,000 | 5,500 | 5,000 | 5,000 | 3,000 | 2,500 | 2,000 | 800 | 700 | 650 | 500 |
| 54 | 9,000 | 9,000 | 9,000 | 6,000 | 5,500 | 5,500 | 3,500 | 3,000 | 2,200 | 1,200 | 750 | 650 | 600 |
| 60 | 9,500 | 9,500 | 9,500 | 6,500 | 6,000 | 6,000 | 4,000 | 3,500 | 2,600 | 1,200 | 800 | 700 | 650 |

## Supporting Table - P0300_CylMode_Decel

**Description:** Crankshaft decel threshold.  Thresholds are a function of rpm and % engine Load.

**Notes:** Used for P0300-P0308.  Cal Name: KtMISF_CylinderMode

| y/x | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 | 2,200 | 2,400 | 2,600 | 2,800 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 1,800 | 1,800 | 1,800 | 1,400 | 1,150 | 800 | 575 | 500 | 280 | 165 | 125 | 80 | 75 | 70 | 30 | 20 | 20 | 20 | 12 | 22 | 12 | 13 | 11 | 10 | 8 | 7 |
| 9 | 1,800 | 1,800 | 1,800 | 1,400 | 1,150 | 800 | 575 | 525 | 300 | 170 | 125 | 82 | 75 | 70 | 40 | 25 | 25 | 22 | 12 | 10 | 11 | 12 | 7 | 10 | 8 | 7 |
| 11 | 1,800 | 1,800 | 1,800 | 1,600 | 1,150 | 800 | 575 | 525 | 375 | 175 | 125 | 95 | 95 | 82 | 45 | 30 | 28 | 28 | 13 | 10 | 10 | 10 | 8 | 7 | 8 | 7 |
| 12 | 1,800 | 1,800 | 1,800 | 1,600 | 1,150 | 850 | 600 | 550 | 375 | 200 | 125 | 100 | 80 | 75 | 45 | 40 | 30 | 28 | 15 | 11 | 9 | 7 | 8 | 7 | 7 | 7 |
| 13 | 1,800 | 1,800 | 1,800 | 1,600 | 1,200 | 900 | 650 | 550 | 400 | 200 | 150 | 120 | 80 | 75 | 45 | 40 | 30 | 28 | 17 | 11 | 9 | 6 | 8 | 7 | 7 | 7 |
| 15 | 1,800 | 1,800 | 1,800 | 1,600 | 1,300 | 1,050 | 650 | 550 | 400 | 250 | 160 | 120 | 90 | 75 | 45 | 40 | 30 | 30 | 19 | 12 | 9 | 7 | 8 | 7 | 7 | 7 |
| 17 | 1,800 | 1,800 | 1,800 | 2,000 | 1,500 | 1,100 | 825 | 550 | 400 | 275 | 200 | 130 | 100 | 75 | 50 | 50 | 35 | 30 | 23 | 12 | 10 | 8 | 8 | 7 | 7 | 7 |
| 19 | 1,800 | 1,800 | 1,800 | 2,200 | 1,700 | 1,250 | 900 | 600 | 500 | 300 | 225 | 150 | 120 | 75 | 65 | 60 | 45 | 40 | 24 | 15 | 12 | 9 | 8 | 7 | 7 | 7 |
| 22 | 1,800 | 1,800 | 1,800 | 2,300 | 1,900 | 1,500 | 1,100 | 700 | 600 | 350 | 225 | 175 | 120 | 100 | 75 | 60 | 50 | 40 | 25 | 17 | 13 | 10 | 8 | 7 | 7 | 7 |
| 25 | 3,500 | 3,500 | 3,500 | 2,500 | 1,900 | 1,600 | 1,100 | 800 | 600 | 350 | 275 | 200 | 140 | 120 | 90 | 65 | 55 | 50 | 30 | 19 | 16 | 10 | 8 | 8 | 7 | 7 |
| 29 | 3,500 | 3,500 | 3,500 | 3,000 | 2,200 | 1,800 | 1,200 | 900 | 700 | 450 | 300 | 240 | 150 | 140 | 100 | 85 | 60 | 55 | 32 | 22 | 18 | 12 | 9 | 8 | 7 | 7 |
| 33 | 4,500 | 4,500 | 4,500 | 3,000 | 2,800 | 2,300 | 1,400 | 1,000 | 700 | 500 | 300 | 275 | 200 | 150 | 100 | 85 | 70 | 60 | 35 | 25 | 18 | 14 | 10 | 9 | 7 | 7 |
| 38 | 4,500 | 4,500 | 4,500 | 3,500 | 3,000 | 2,400 | 1,500 | 1,100 | 800 | 650 | 350 | 300 | 200 | 170 | 120 | 100 | 80 | 70 | 45 | 27 | 22 | 16 | 12 | 10 | 7 | 7 |
| 42 | 5,000 | 5,000 | 5,000 | 4,000 | 3,500 | 2,500 | 1,800 | 1,400 | 1,000 | 700 | 375 | 350 | 210 | 170 | 135 | 125 | 90 | 75 | 45 | 35 | 25 | 18 | 13 | 12 | 8 | 8 |
| 48 | 5,500 | 5,500 | 5,500 | 4,500 | 3,500 | 3,000 | 2,500 | 2,000 | 1,400 | 700 | 500 | 350 | 260 | 200 | 180 | 150 | 90 | 75 | 50 | 40 | 26 | 19 | 15 | 13 | 9 | 9 |
| 54 | 6,000 | 6,000 | 6,000 | 5,000 | 4,000 | 3,500 | 2,500 | 2,500 | 1,600 | 700 | 500 | 400 | 300 | 220 | 190 | 150 | 115 | 100 | 70 | 45 | 32 | 22 | 18 | 14 | 14 | 14 |
| 61 | 6,500 | 6,500 | 6,500 | 5,500 | 4,500 | 4,000 | 3,000 | 3,000 | 2,000 | 800 | 600 | 450 | 350 | 275 | 200 | 175 | 135 | 125 | 80 | 65 | 35 | 25 | 22 | 16 | 15 | 15 |

**Supporting Table - P0300_CylMode_Jerk**

**Description:** Crankshaft jerk threshold.  Thresholds are a function of rpm and % engine Load.

**Notes:** Used for P0300-P0308.  Cal Name: KtMISF_ddt_CylinderMode

| y/x | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 | 2,200 | 2,400 | 2,600 | 2,800 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 1,400 | 1,400 | 1,400 | 1,400 | 1,200 | 800 | 600 | 550 | 350 | 250 | 175 | 125 | 105 | 90 | 55 | 40 | 35 | 30 | 22 | 22 | 13 | 13 | 11 | 10 | 12 | 12 |
| 9 | 1,400 | 1,400 | 1,400 | 1,400 | 1,200 | 800 | 600 | 550 | 400 | 250 | 190 | 130 | 115 | 110 | 65 | 50 | 35 | 30 | 20 | 14 | 14 | 12 | 10 | 10 | 12 | 12 |
| 11 | 1,500 | 1,500 | 1,500 | 1,500 | 1,200 | 825 | 800 | 550 | 475 | 320 | 220 | 130 | 130 | 110 | 65 | 50 | 40 | 36 | 23 | 16 | 14 | 10 | 10 | 10 | 11 | 11 |
| 12 | 1,800 | 1,800 | 1,800 | 1,500 | 1,200 | 900 | 800 | 575 | 475 | 300 | 200 | 130 | 120 | 110 | 65 | 50 | 40 | 36 | 24 | 18 | 14 | 11 | 10 | 10 | 11 | 11 |
| 13 | 1,800 | 1,800 | 1,800 | 1,500 | 1,200 | 1,000 | 800 | 575 | 500 | 300 | 200 | 130 | 110 | 110 | 65 | 50 | 45 | 36 | 27 | 20 | 14 | 11 | 10 | 10 | 11 | 11 |
| 15 | 1,800 | 1,800 | 1,800 | 1,600 | 1,400 | 1,300 | 800 | 575 | 500 | 300 | 200 | 145 | 110 | 110 | 80 | 75 | 50 | 40 | 27 | 22 | 15 | 12 | 10 | 10 | 11 | 11 |
| 17 | 1,800 | 1,800 | 1,800 | 2,100 | 1,550 | 1,300 | 800 | 700 | 600 | 300 | 225 | 170 | 125 | 110 | 90 | 75 | 50 | 40 | 30 | 24 | 18 | 13 | 10 | 11 | 10 | 10 |
| 19 | 2,000 | 2,000 | 2,000 | 2,200 | 2,000 | 1,300 | 1,000 | 1,000 | 600 | 450 | 275 | 200 | 175 | 135 | 100 | 95 | 60 | 60 | 30 | 27 | 19 | 15 | 12 | 11 | 10 | 10 |
| 22 | 2,400 | 2,400 | 2,400 | 2,500 | 2,100 | 1,800 | 1,300 | 1,000 | 750 | 500 | 310 | 225 | 200 | 150 | 140 | 115 | 80 | 70 | 35 | 27 | 21 | 17 | 13 | 11 | 10 | 10 |
| 25 | 3,800 | 3,800 | 3,800 | 2,500 | 2,100 | 2,500 | 1,300 | 1,300 | 1,000 | 800 | 475 | 275 | 250 | 200 | 180 | 125 | 100 | 75 | 45 | 35 | 22 | 18 | 16 | 13 | 10 | 10 |
| 29 | 4,000 | 4,000 | 4,000 | 3,400 | 2,600 | 3,000 | 1,300 | 1,300 | 1,200 | 800 | 475 | 325 | 250 | 225 | 200 | 140 | 125 | 85 | 55 | 40 | 28 | 20 | 20 | 13 | 11 | 11 |
| 33 | 5,500 | 5,500 | 5,500 | 4,000 | 3,500 | 3,800 | 1,600 | 1,400 | 1,200 | 800 | 500 | 400 | 300 | 250 | 200 | 155 | 135 | 100 | 65 | 50 | 34 | 23 | 22 | 13 | 13 | 13 |
| 38 | 6,000 | 6,000 | 6,000 | 4,500 | 3,500 | 3,800 | 1,800 | 1,500 | 1,200 | 1,200 | 525 | 500 | 350 | 350 | 225 | 180 | 155 | 125 | 70 | 55 | 39 | 27 | 24 | 14 | 14 | 14 |
| 42 | 8,000 | 8,000 | 8,000 | 5,000 | 4,000 | 4,000 | 2,400 | 2,000 | 1,400 | 1,200 | 625 | 500 | 400 | 350 | 300 | 200 | 170 | 135 | 75 | 65 | 43 | 29 | 24 | 16 | 16 | 16 |
| 48 | 9,000 | 9,000 | 9,000 | 5,500 | 5,000 | 5,000 | 3,000 | 2,500 | 2,000 | 1,200 | 700 | 650 | 500 | 400 | 300 | 225 | 190 | 140 | 85 | 75 | 50 | 35 | 25 | 18 | 20 | 20 |
| 54 | 9,000 | 9,000 | 9,000 | 6,000 | 5,500 | 5,500 | 3,500 | 3,000 | 2,200 | 1,200 | 750 | 650 | 600 | 400 | 350 | 300 | 225 | 175 | 110 | 85 | 55 | 55 | 32 | 22 | 25 | 25 |
| 61 | 9,500 | 9,500 | 9,500 | 6,500 | 6,000 | 6,000 | 4,000 | 3,500 | 2,600 | 1,200 | 800 | 700 | 650 | 450 | 350 | 300 | 250 | 200 | 150 | 95 | 70 | 55 | 36 | 25 | 27 | 27 |

**Supporting Table - P0300_RevMode_Decel**

**Description:** Crankshaft decel threshold.  Thresholds are a function of rpm and % engine Load.

**Notes:** Used for P0300-P0308.  Cal Name: KtMISF_RevolutionMode

| y/x | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 | 2,200 | 2,400 | 2,600 | 2,800 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 23 | 20 | 15 | 11 | 10 | 10 |
| 9 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 26 | 20 | 15 | 14 | 11 | 11 |
| 11 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32 | 24 | 17 | 14 | 11 | 11 |
| 12 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 34 | 26 | 17 | 17 | 13 | 13 |
| 13 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 40 | 30 | 22 | 18 | 15 | 15 |
| 15 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 45 | 35 | 25 | 20 | 16 | 16 |
| 17 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 50 | 38 | 25 | 22 | 17 | 17 |
| 19 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 55 | 40 | 30 | 25 | 20 | 20 |
| 22 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 60 | 50 | 35 | 30 | 24 | 22 |
| 25 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 70 | 50 | 40 | 30 | 26 | 25 |
| 29 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 80 | 60 | 45 | 40 | 30 | 27 |
| 33 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 90 | 70 | 50 | 40 | 35 | 30 |
| 38 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 100 | 80 | 60 | 50 | 35 | 35 |
| 42 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 115 | 90 | 70 | 55 | 45 | 40 |
| 48 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 120 | 100 | 80 | 60 | 50 | 45 |
| 54 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 130 | 110 | 90 | 70 | 55 | 50 |
| 61 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 140 | 110 | 100 | 80 | 65 | 60 |

## Supporting Table - P0300_AFM_Decel

**Description:** Crankshaft decel threshold.  Thresholds are a function of rpm and % engine Load.

**Notes:** Used for P0300-P0308.  Cal Name: KtMISF_DoDCylinderMode

| y/x | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 | 2,200 | 2,400 | 2,600 | 2,800 | 3,000 | 3,500 |
|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 6 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 13 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 19 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 25 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 31 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 38 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 44 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 50 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 56 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 63 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 69 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 75 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 81 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 88 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 94 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 100 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |

## Supporting Table - P0300_ZeroTorqueEngLoad

**Description:** %air load that represents Zero Brake torque along the Neutral rev line.  The Zero torque threshold is adjusted for Baro via P0300_ZeroTorqueBaro

**Notes:** Used for P0300-P0308.  Cal Name: KtMISF_ZeroTorqSpd

| y/x | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 | 2,200 | 2,400 | 2,600 | 2,800 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 12.00 | 10.00 | 8.50 | 7.50 | 7.50 | 7.50 | 7.50 | 7.50 | 7.50 | 7.50 | 7.50 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.50 | 10.87 | 13.24 | 15.61 | 17.98 | 20.35 | 22.72 | 25.09 | 27.46 |

## Supporting Table - P0300_ZeroTorqBaro

**Description:** adjusts zero torque for altitude

**Notes:** Used for P0300-P0308.  Cal Name: KtMSFD_K_ZeroTorqBaro

| y/x | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 105 |
|-----|------|------|------|------|------|------|------|------|------|
| 1 | 0.82 | 0.85 | 0.88 | 0.90 | 0.93 | 0.95 | 0.97 | 1.00 | 1.03 |

## Supporting Table - P0300_ZeroTorqDoD

**Description:** Zero torque engine load while in Active Fuel Management

**Notes:** Used for P0300-P0308.  Cal Name: KtMSFD_ZeroTorqDoD

| y/x | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,100 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 | 2,200 | 2,400 | 2,600 | 2,800 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 12.00 | 10.00 | 8.50 | 7.50 | 7.50 | 7.50 | 7.50 | 7.50 | 7.50 | 7.50 | 7.50 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.50 | 10.87 | 13.24 | 15.61 | 17.98 | 20.35 | 22.72 | 25.09 | 27.46 |

## Supporting Table - P0300_Catalyst_Damage_Misfire_Percentage

**Description:** Catalyst Damaging Misfire Percentage" Table whenever secondary conditions are met.

**Notes:** Used for P0300-P0308.  Cal Name: KtMSFD_Pct_CatalystMisfire

| y/x | 0 | 1,000 | 2,000 | 3,000 | 4,000 | 5,000 | 6,000 | 7,000 |
|---|---|---|---|---|---|---|---|---|
| 0 | 22.1 | 22.1 | 22.1 | 19.6 | 7.5 | 7.1 | 4.6 | 4.6 |
| 10 | 22.1 | 22.1 | 22.1 | 16.3 | 7.1 | 6.5 | 4.6 | 4.6 |
| 20 | 22.1 | 22.1 | 22.1 | 14.0 | 6.5 | 6.0 | 4.6 | 4.6 |
| 30 | 19.6 | 19.6 | 16.3 | 9.8 | 5.0 | 4.6 | 4.6 | 4.6 |
| 40 | 19.6 | 16.3 | 11.0 | 8.0 | 4.6 | 4.6 | 4.6 | 4.6 |
| 50 | 16.3 | 11.0 | 5.0 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| 60 | 11.0 | 5.0 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| 70 | 5.0 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| 80 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| 90 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| 100 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |

## Supporting Table - P0300_TOSSRoughRoadThres

**Description:** Only used if Rough Road source = TOSS:   dispersion value on Transmission Output Speed Sensor above which rough road is indicated present

**Notes:** Used for P0300-P0308.  Cal Name: KtRRDI_a_RoughRoadThresh

| y/x | 600 | 800 | 1,000 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 | 2,200 | 2,400 | 2,600 | 2,800 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| 200 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| 300 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| 400 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| 500 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| 600 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| 700 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| 800 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| 900 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| 1,000 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| 1,100 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| 1,200 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| 1,300 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| 1,400 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |

## Supporting Table - P0300_WSSRoughRoadThres

**Description:** Only used if Wheel speed from ABS is used.   If difference between wheel speed readings is larger than this limit, rough road is present

**Notes:** Used for P0300-P0308.  Cal Name: KtRRDI_a_WhlSpdRoughRoadLim

| y/x | 0 | 12 | 24 | 36 | 48 | 60 | 72 | 85 | 97 | 109 | 121 | 133 | 145 | 157 | 169 | 181 | 193 |
|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 |

| **Supporting Table - P0300_Abnormal Cylinder Mode** |
|---|

**Description:** Number of consecutive number of decelerating cylinders after the misfire that would be considered abnormal.   (Cylinder Mode Equation)

**Notes:** Used for P0300-P0308.  Cal Name: KaMSFD_Cnt_CylAbnormal

| y/x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |

### Supporting Table - P0300_Abnormal SCD Mode

**Description:** Number of consecutive number of decelerating cylinders after the misfire that would be considered abnormal.   (SCD Mode Equation)

**Notes:** Used for P0300-P0308.  Cal Name: KaMSFD_Cnt_SCD_CylAbnormal

| y/x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-----|------|------|------|------|------|------|------|------|------|
| 1 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |

## Supporting Table - P0300_Abnormal Rev Mode

**Description:** Abnormal Rev Mode   Number of consecutive number of decelerating cylinders after the misfire that would be considered abnormal.   (Rev Mode Equation)

**Notes:** Used for P0300-P0308.  Cal Name: KaMSFD_Cnt_RevAbnormal

| y/x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-----|------|------|------|------|------|------|------|------|------|
| 1 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

## Supporting Table - P0300_Min_PatternMultiplier

**Description:** Crankshaft should return to normal after the misfire.   If crankshaft snap value after single isolated misfire being evaulated is larger than the misfire's Jerk threshold times this multiplier, its not a real misfire.

**Notes:** Used for P0300-P0308.  Cal Name: KtMSFD_K_SCD_MinPttrnRecogMult

| y/x | 0 | 1,000 | 2,000 | 3,000 | 4,000 | 5,000 | 6,000 | 7,000 | 8,000 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 |

## Supporting Table - P0300_Max_PatternMultiplier

**Description:** Crankshaft should return to normal after the misfire.   If crankshaft snap value after the misfire being evaulated is larger than the misfire's Jerk threshold times this multiplier, its not a real misfire.   However, if random misfire occurs every engine cycle, more noise is allowed to be considered "normal" since the crankshaft does not have time to fully return to normal before the next misfire occurs.

**Notes:** Used for P0300-P0308.  Cal Name: KtMSFD_K_SCD_MaxPttrnRecogMult

| y/x | 0 | 1,000 | 2,000 | 3,000 | 4,000 | 5,000 | 6,000 | 7,000 | 8,000 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

**Supporting Table - P0300 Ring Filter**

**Description:** Driveline Ring Filter
After a low level misfire, another misfire may not be detectable until driveline ringing ceases.  If no ringing seen, stop filter early.

**Notes:** Used for P0300-P0308.  Cal Name: KaMSFD_Cnt_RingFilter

| y/x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-----|------|------|------|------|------|------|------|------|------|
| 1 | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 |

**Supporting Table - P0300 Number of Normals**

**Description:** Number of Normals for the Driveline Ring Filter
After a low level misfire, another misfire may not be detectable until driveline ringing ceases.  If no ringing seen, stop filter early.

**Notes:** Used for P0300-P0308.  Cal Name: KaMSFD_Cnt_NumOfNormalsFil

| y/x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-----|---|---|---|---|---|---|---|---|---|
| 1 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |

## Supporting Table - P0300 EngineOverSpeedLimit

**Description:** Engine OverSpeed Limit versus gear

**Notes:** Used for P0300-P0308.  Cal Name: KaEOSC_n_EngOvrspdLimitGear

### P0300 EngineOverSpeedLimit - Part 1

| y/x | CeTGRR_e_TransGr1 | CeTGRR_e_TransGr2 | CeTGRR_e_TransGr3 | CeTGRR_e_TransGr4 | CeTGRR_e_TransGr5 | CeTGRR_e_TransGr6 | CeTGRR_e_TransGrEVT1 |
|-----|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|----------------------|
| 1 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 |

### P0300 EngineOverSpeedLimit - Part 2

| y/x | CeTGRR_e_TransGrEVT2 | CeTGRR_e_TransGrNeut | CeTGRR_e_TransGrRvrs | CeTGRR_e_TransGrPark | CeTGRR_e_TransGr7 | CeTGRR_e_TransGr8 | |
|-----|----------------------|----------------------|----------------------|----------------------|-------------------|-------------------|--|
| 1 | 7,000 | 4,000 | 7,000 | 4,000 | 7,000 | 7,000 | |

## Fault Bundle Definitions

| |
|---|
| **Bundle Name:** 5VoltReferenceA_FA |
| P0641 |
| **Bundle Name:** 5VoltReferenceB_FA |
| P0651 |
| **Bundle Name:** 5VoltReferenceMAP_OOR_Flt |
| P0697 |
| **Bundle Name:** A/F Imbalance Bank1 |
| P219A |
| **Bundle Name:** A/F Imbalance Bank2 |
| P219B |
| **Bundle Name:** AAP_SnsrCktFP |
| Naturally aspirated: P2228, P2229. Turbocharged: P0237, P0238 |
| **Bundle Name:** AAP_SnsrFA |
| Naturally Aspirated: P2227, P2228, P2229, P2230. Turbocharged: P0237, P0238. |
| **Bundle Name:** AAP_SnsrTFTKO |
| Naturally Aspirated: P2227, P2228, P2229, P2230. Turbocharged: P0237, P0238. |
| **Bundle Name:** AAP2_SnsrCktFP |
| P2228, P2229 |
| **Bundle Name:** AAP2_SnsrFA |
| P2227, P2228, P2229, P2230 |
| **Bundle Name:** AAP2_SnsrTFTKO |
| P2227, P2228, P2229, P2230 |
| **Bundle Name:** AccCktLo_FA |
| P2537 |
| **Bundle Name:** AcceleratorPedalFailure |
| P2122, P2123, P2127, P2128, P2138, P0697, P06A3 |
| **Bundle Name:** ACCMLostComm |
| U016B |
| **Bundle Name:** ACFailedOnSD |
| See ACCM Document |
| **Bundle Name:** ACHighSidePressSnsrCktFA |
| P0532, P0533 |
| **Bundle Name:** ACThrmlRefrigSpdVld |
| See ACCM Document |
| **Bundle Name:** AfterThrottlePressTFTKO |
| Naturally Aspirated or Turbocharged: P0106, P0107, P0108. Supercharged: P012B, P012C, P012D. |
| **Bundle Name:** AfterThrottlePressureFA |
| Naturally Aspirated or Turbocharged: P0106, P0107, P0108. Supercharged: P012B, P012C, P012D. |

### Fault Bundle Definitions

| |
|---|
| **Bundle Name:** AfterThrottleVacuumTFTKO |
| Naturally Aspirated or Turbocharged: P0106, P0107, P0108.  Supercharged: P012B,  P012C,  P012D. |
| **Bundle Name:** AIR System FA |
| P0411, P2440, P2444 |
| **Bundle Name:** AIRPumpControlCircuit FA |
| P0418 |
| **Bundle Name:** AIRSystemPressureSensor FA |
| P2430, P2431, P2432, P2433, P2435, P2436, P2437, P2438 |
| **Bundle Name:** AIRValveControlCircuit FA |
| P0412 |
| **Bundle Name:** AmbientAirDefault |
| Baro Sensor Present: P2227,  P2228,  P2229,  P2230.  No Baro Sensor Present: P0101,  P0102,  P0103,  P0106,  P0107,  P0108,  P0111,  P0112,  P0113,  P0114,  P0121,  P0122,  P0123, P012B,  P012C,  P012D,  P0222,  P0223,  P1221 |
| **Bundle Name:** AmbPresDfltdStatus |
| Baro Sensor Present: P2227,  P2228,  P2229,  P2230.  No Baro Sensor Present: P0101,  P0102,  P0103,  P0106,  P0107,  P0108,  P0111,  P0112,  P0113,  P0114,  P0121,  P0122,  P0123, P012B,  P012C,  P012D,  P0222,  P0223,  P1221 |
| **Bundle Name:** AmbPresSnsrCktFA |
| P2228, P2229 |
| **Bundle Name:** AmbPresSnsrCktFP |
| P2228, P2229 |
| **Bundle Name:** AnyCamPhaser_FA |
| P0010, P0011, P0013, P0014, P0020, P0021, P0023, P0024 |
| **Bundle Name:** AnyCamPhaser_TFTKO |
| P0010, P0011, P0013, P0014, P0020, P0021, P0023, P0024 |
| **Bundle Name:** BrakeBoosterSensorFA |
| P0556, P0557, P0558 |
| **Bundle Name:** BrakeBoosterVacuumValid |
| P0556, P0557, P0558 |
| **Bundle Name:** BSTR_b_ExcsvBstFA |
| P226B |
| **Bundle Name:** BSTR_b_ExcsvBstTFTKO |
| P226B |
| **Bundle Name:** BSTR_b_IC_PmpCktFA |
| P023A, P023C |
| **Bundle Name:** BSTR_b_PCA_CktFA |
| P0033, P0034, P0035, P0045, P0047, P0048, P0243, P0245, P0246, P0247, P0249, P0250 |
| **Bundle Name:** BSTR_b_PCA_CktLoFA |

**Fault Bundle Definitions**

| |
|---|
| P0034, P0047, P0245, P0249 |
| **Bundle Name:** BSTR_b_PCA_CktLoTFTKO |
| P0034, P0047, P0245, P0249 |
| **Bundle Name:** BSTR_b_PCA_CktTFTKO |
| P0033, P0034, P0035, P0045, P0047, P0048, P0243, P0245, P0246, P0247, P0249, P0250 |
| **Bundle Name:** BSTR_b_PCA_FA |
| P0234, P0299, P0033, P0034, P0035, P0045, P0047, P0048, P0243, P0245, P0246, P2261, P0247, P0249, P0250 |
| **Bundle Name:** BSTR_b_PCA_PstnSnsrFA |
| P003A, P2564, P2565 |
| **Bundle Name:** BSTR_b_PCA_PstnSnsrTFTKO |
| P003A, P2564, P2565 |
| **Bundle Name:** BSTR_b_PCA_TFTKO |
| P0234, P0299, P0033, P0034, P0035, P0045, P0047, P0048, P0243, P0245, P0246, P2261, P0247, P0249, P0250 |
| **Bundle Name:** BSTR_b_PresCntrlTooHiFA |
| P0234 |
| **Bundle Name:** BSTR_b_PresCntrlTooHiTFTKO |
| P0234 |
| **Bundle Name:** BSTR_b_PresCntrlTooLoFA |
| P0299 |
| **Bundle Name:** BSTR_b_PresCntrlTooLoTFTKO |
| P0299 |
| **Bundle Name:** BSTR_b_PstnCntrlFA |
| P166D, P166E |
| **Bundle Name:** BSTR_b_PstnCntrlTooHiFA |
| P166E |
| **Bundle Name:** BSTR_b_PstnCntrlTooHiTFTKO |
| P166E |
| **Bundle Name:** BSTR_b_PstnCntrlTooLoFA |
| P166D |
| **Bundle Name:** BSTR_b_PstnCntrlTooLoTFTKO |
| P166D |
| **Bundle Name:** BSTR_b_TurboBypassCktFA |
| P0033, P0034, P0035, P00C0, P00C1, P00C2 |
| **Bundle Name:** BSTR_b_TurboBypassCktTFTKO |
| P0033, P0034, P0035, P00C0, P00C1, P00C2 |
| **Bundle Name:** BSTR_b_TurboBypB_CktFA |
| P00C0, P00C1, P00C2 |
| **Bundle Name:** BSTR_b_TurboBypB_CktTFTKO |

## Fault Bundle Definitions

| |
|---|
| P00C0, P00C1, P00C2 |
| **Bundle Name:** CamLctnExhFA |
| P0017, P0019, P0365, P0366, P0390, P0391 |
| **Bundle Name:** CamLctnIntFA |
| P0016, P0018, P0340, P0341, P0345, P0346 |
| **Bundle Name:** CamSensor_FA |
| P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391 |
| **Bundle Name:** CamSensor_TFTKO |
| P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391 |
| **Bundle Name:** CamSensorAnyLctnTFTKO |
| P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391 |
| **Bundle Name:** CamSensorAnyLocationFA |
| P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391 |
| **Bundle Name:** CamSensorFA |
| P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391 |
| **Bundle Name:** CamSensorTFTKO |
| P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391 |
| **Bundle Name:** CatalystSysEfficiencyLoB1_FA |
| P0420 |
| **Bundle Name:** CatalystSysEfficiencyLoB2_FA |
| P0430 |
| **Bundle Name:** ClutchPstnSnsr FA |
| P0806, P0807, P0808 |
| **Bundle Name:** ClutchPstnSnsrCktHi FA |
| P0808 |
| **Bundle Name:** ClutchPstnSnsrCktLo FA |
| P0807 |
| **Bundle Name:** ClutchPstnSnsrNotLearned |
| P080A |
| **Bundle Name:** CoolingFanSpeedTooHigh_FA |
| P0495 |
| **Bundle Name:** CrankCamCorrelationTFTKO |
| P0016, P0017, P0018, P0019 |
| **Bundle Name:** CrankExhaustCamCorrelationFA |
| P0017, P0019 |
| **Bundle Name:** CrankExhaustCamCorrFA |
| P0017, P0019 |
| **Bundle Name:** CrankIntakeCamCorrelationFA |

**Fault Bundle Definitions**

| |
|---|
| P0016, P0018 |
| **Bundle Name:** CrankIntakeCamCorrFA |
| P0016, P0018 |
| **Bundle Name:** CrankSensor_FA |
| P0335, P0336 |
| **Bundle Name:** CrankSensor_TFTKO |
| P0335, P0336 |
| **Bundle Name:** CrankSensorFA |
| P0335, P0336 |
| **Bundle Name:** CrankSensorFaultActive |
| P0335, P0336 |
| **Bundle Name:** CrankSensorTestFailedTKO |
| P0335, P0336 |
| **Bundle Name:** CrankSensorTFTKO |
| P0335, P0336 |
| **Bundle Name:** CylDeacSystemTFTKO |
| P3400 |
| **Bundle Name:** CylnderDeacDriverTFTKO |
| P3401, P3409, P3417, P3425, P3433, P3441, P3449 |
| **Bundle Name:** ECT_Sensor_Ckt_FA |
| P0117, P0118, P0119 |
| **Bundle Name:** ECT_Sensor_Ckt_FP |
| P0117, P0118 |
| **Bundle Name:** ECT_Sensor_Ckt_High_FP |
| P0118 |
| **Bundle Name:** ECT_Sensor_Ckt_Low_FP |
| P0117 |
| **Bundle Name:** ECT_Sensor_Ckt_TFTKO |
| P0117, P0118, P0119 |
| **Bundle Name:** ECT_Sensor_Ckt_TPTKO |
| P0117, P0118, P0019 |
| **Bundle Name:** ECT_Sensor_DefaultDetected |
| P0117, P0118, P0116, P0125 |
| **Bundle Name:** ECT_Sensor_FA |
| P0117, P0118, P0116, P0125, P0128 |
| **Bundle Name:** ECT_Sensor_Perf_FA |
| P0116 |
| **Bundle Name:** ECT_Sensor_TFTKO |

**Fault Bundle Definitions**

| |
|---|
| P0117, P0118, P0116, P0125, P0119 |
| **Bundle Name:** EGRValve_FP |
| P0405, P0406, P042E |
| **Bundle Name:** EGRValveCircuit_FA |
| P0403, P0404, P0405, P0406 |
| **Bundle Name:** EGRValveCircuit_TFTKO |
| P0403, P0404, P0405, P0406 |
| **Bundle Name:** EGRValvePerformance_FA |
| P0401, P042E |
| **Bundle Name:** EGRValvePerformance_TFTKO |
| P0401, P042E |
| **Bundle Name:** EngineMetalOvertempActive |
| P1258 |
| **Bundle Name:** EngineMisfireDetected_FA |
| P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308 |
| **Bundle Name:** EngineMisfireDetected_TFTKO |
| P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308 |
| **Bundle Name:** EngineModeNotRunTimer_FA |
| P2610 |
| **Bundle Name:** EngineModeNotRunTimerError |
| P2610 |
| **Bundle Name:** EnginePowerLimited |
| P0068, P0122, P0123, P0222, P0223, P0601, P0604, P0606, P1682, P16F3, P1104, P2100, P2101, P2102, P2103, P2176, P160E, P160D, P0191, P0192, P0193, P00C8, P00C9, P16A0, P16A1, P16A2 |
| **Bundle Name:** EngineTorqueEstInaccurate |
| EngineMisfireDetected_FA, FuelInjedtorCircuit_FA, FuelInjedtorCircuit_TFTKO, FuelTrimSystemB1_FA, FuelTrimSystemB2_FA, MAF_SensorTFTKO, MAP_SensorTFTKO, EGRValuePerforamnce_FA |
| **Bundle Name:** EngModeNotRunTmErr |
| P2610 |
| **Bundle Name:** EngOilModeledTempValid |
| ECT_Sensor_FA, IAT_SensorCircuitFA |
| **Bundle Name:** EngOilPressureSensorCktFA |
| P0522, P0523 |
| **Bundle Name:** EngOilPressureSensorFA |
| P0521, P0522, P0523 |
| **Bundle Name:** EngOilTempFA |
| EngOilTempSensorCircuitFA,  EngOilModeledTempValid,  P16F3 |
| **EngOilTempFA - Other Definitions:**<br>P16F3 with GetXOYR_b_SecurityFlt(CeXOYR_e_EOTR_SecurityFlt) |

**Fault Bundle Definitions**

| |
|---|
| **Bundle Name:** EngOilTempSensorCircuitFA |
| P0197, P0198 |
| **Bundle Name:** Ethanol Composition Sensor FA |
| P0178, P0179, P2269 |
| **Bundle Name:** EvapExcessPurgePsbl_FA |
| Conventional fuel system, P0442, P0455, P0458, P0496 |
| **Bundle Name:** EvapPurgeSolenoidCircuit_FA |
| P0443,  P0458,  P0459 |
| **Bundle Name:** EvapReducedPurgePsbl_FA |
| Only EREV sealed fuel system, P0443, P0446, P0449, P0459, P0497, P0499, P2419, P2422 |
| **Bundle Name:** EvapVentSolenoidCircuit_FA |
| P0449,  P0498,  P0499 |
| **Bundle Name:** ExhaustCamSensor_FA |
| P0017, P0019, P0365, P0366, P0390, P0391 |
| **Bundle Name:** ExhaustCamSensor_TFTKO |
| P0017, P0019, P0365, P0366, P0390, P0391 |
| **Bundle Name:** ExhaustCamSensorFA |
| P0017, P0019, P0365, P0366, P0390, P0391 |
| **Bundle Name:** ExhaustCamSensorTFTKO |
| P0017, P0019, P0365, P0366, P0390, P0391 |
| **Bundle Name:** FanOutputDriver_FA |
| P0480, P0481, P0482, P0691, P0692, P0693, P0694, P0695, P0696,  P1485 (EREV),  P1486 (EREV),  P1487 (EREV) |
| **Bundle Name:** FHPD_b_HPC_PresErrNeg_FA |
| P228D |
| **Bundle Name:** FHPD_b_HPC_PresErrNeg_TFTKO |
| P228D |
| **Bundle Name:** FHPD_b_HPC_PresErrPos_FA |
| P228C |
| **Bundle Name:** FHPD_b_HPC_PresErrPos_TFTKO |
| P228C |
| **Bundle Name:** FHPD_b_HPC_Windup_ TFTKO |
| P0089 |
| **Bundle Name:** FHPD_b_HPC_Windup_FA |
| P0089 |
| **Bundle Name:** FHPD_b_PumpCurr_FA |
| P163A |
| **Bundle Name:** FHPD_b_PumpCurr_TFTKO |
| P163A |

## Fault Bundle Definitions

| |
|---|
| **Bundle Name:** FHPR_b_FRP_SnsrCkt_FA |
| P0192, P0193 |
| **Bundle Name:** FHPR_b_FRP_SnsrCkt_TFTKO |
| P0192, P0193 |
| **Bundle Name:** FHPR_b_FRP_SnsrPerfDiag_FA |
| P0191 |
| **Bundle Name:** FHPR_b_FRP_SnsrPerfDiag_TFTKO |
| P0191 |
| **Bundle Name:** FHPR_b_PumpCkt_FA |
| P0090, P0091, P0092, P00C8, P00C9, P00CA |
| **Bundle Name:** FHPR_b_PumpCkt_TFTKO |
| P0090, P0091, P0092, P00C8, P00C9, P00CA |
| **Bundle Name:** FuelInjectorCircuit_FA |
| P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0261, P0264, P0267, P0270, P0273, P0276, P0279, P0282, P0262, P0265, P0268, P0271, PP0274, P0277, P0280, P0283, P2147, P2150, P2153, P2156, P216B, P216E, P217B, P217E, P2148, P2151, P2154, P2157, P216C, P216F, P217C, P217F, P1248, P1249, P124A, P124B, P124C, P124D, P124E, P124F |
| **Bundle Name:** FuelInjectorCircuit_TFTKO |
| P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0261, P0264, P0267, P0270, P0273, P0276, P0279, P0282, P0262, P0265, P0268, P0271, PP0274, P0277, P0280, P0283, P2147, P2150, P2153, P2156, P216B, P216E, P217B, P217E, P2148, P2151, P2154, P2157, P216C, P216F, P217C, P217F, P1248, P1249, P124A, P124B, P124C, P124D, P124E, P124F |
| **Bundle Name:** FuelLevelDataFault |
| P0461, P0462, P0463, P2066, P2067, P2068 |
| **Bundle Name:** FuelTrimSystemB1_FA |
| P0171, P0172 |
| **Bundle Name:** FuelTrimSystemB1_TFTKO |
| P0171, P0172 |
| **Bundle Name:** FuelTrimSystemB2_FA |
| P0174, P0175 |
| **Bundle Name:** FuelTrimSystemB2_TFTKO |
| P0174, P0175 |
| **Bundle Name:** HumidityFA |
| P0097, P0098, P11C2, P11C3, P2227, P2228, P2229, P2230 |
| **Bundle Name:** HumTempSnsrCktFA |
| P0097, P0098 |
| **Bundle Name:** HumTempSnsrCktFP |
| P0097, P0098 |
| **Bundle Name:** HumTempSnsrFA |
| P0096, P0097, P0098, P0099 |
| **Bundle Name:** IAC_SystemRPM_FA |

## Fault Bundle Definitions

| |
|---|
| P0506, P0507 |
| **Bundle Name:** IAT_ContCorrFA |
| P2199 |
| **Bundle Name:** IAT_SensorCircuitFA |
| P0112, P0113 |
| **Bundle Name:** IAT_SensorCircuitFP |
| P0112, P0113 |
| **Bundle Name:** IAT_SensorCircuitTFTKO |
| P0112, P0113 |
| **Bundle Name:** IAT_SensorFA |
| P0111, P0112, P0113, P0114 |
| **Bundle Name:** IAT_SensorTFTKO |
| P0111, P0112, P0113, P0114 |
| **Bundle Name:** IgnitionOffTimer_FA |
| P2610 |
| **Bundle Name:** IgnitionOffTimeValid |
| P2610 |
| **Bundle Name:** IgnitionOutputDriver_FA |
| P0351, P0352, P0353, P0354, P0355, P0356, P0357, P0358 |
| **Bundle Name:** IntakeCamSensor_FA |
| P0016, P0018, P0340, P0341, P0345, P0346 |
| **Bundle Name:** IntakeCamSensor_TFTKO |
| P0016, P0018, P0340, P0341, P0345, P0346 |
| **Bundle Name:** IntakeCamSensorFA |
| P0016, P0018, P0340, P0341, P0345, P0346 |
| **Bundle Name:** IntakeCamSensorTFTKO |
| P0016, P0018, P0340, P0341, P0345, P0346 |
| **Bundle Name:** IntkCamPhaser_FA |
| P0010, P0011, P0020, P0021 |
| **Bundle Name:** KS_Ckt_Perf_B1B2_FA |
| P0324, P0325, P0326, P0327, P0328, P0330, P0332, P0333, P06B6, P06B7 |
| **Bundle Name:** Long Name |
| Short Name |
| **Bundle Name:** LowFuelConditionDiagnostic |
| |

**LowFuelConditionDiagnostic - Other Definitions:**
Flag set to TRUE if the fuel level < 10.0 % AND
No Active DTCs: FuelLevelDataFault, P0462, P0463 for at least 30.0 seconds

## Fault Bundle Definitions

| |
|---|
| **Bundle Name:** MAF_SensorCircuitFA |
| P0102, P0103, P010C, P010D |
| **Bundle Name:** MAF_SensorCircuitTFTKO |
| P0102, P0103, P010C, P010D |
| **Bundle Name:** MAF_SensorFA |
| P0101, P0102, P0103, P010C, P010D |
| **Bundle Name:** MAF_SensorFP |
| P0102, P0103, P010C, P010D |
| **Bundle Name:** MAF_SensorPerfFA |
| P0101 |
| **Bundle Name:** MAF_SensorPerfTFTKO |
| P0101 |
| **Bundle Name:** MAF_SensorTFTKO |
| P0101, P0102, P0103, P010C, P010D |
| **Bundle Name:** MAF_SnsrCktFA |
| P121B, P121C |
| **Bundle Name:** MAF_SnsrCktTFTKO |
| P121B, P121C |
| **Bundle Name:** MAP_EngineVacuumStatus |
| P0106,  P0107,  P0108 Fault Active OR P0107,  P0108 Fault Pending |
| **Bundle Name:** MAP_SensorCircuitFA |
| P0107, P0108 |
| **Bundle Name:** MAP_SensorCircuitFP |
| P0107, P0108 |
| **Bundle Name:** MAP_SensorFA |
| P0106, P0107, P0108 |
| **Bundle Name:** MAP_SensorPerfFA |
| P0106 |
| **Bundle Name:** MAP_SensorPerfTFTKO |
| P0106 |
| **Bundle Name:** MAP_SensorTFTKO |
| P0106, P0107, P0108 |
| **Bundle Name:** MnfdTempSensorCktFA |
| Turbocharged or Supercharged,  with Humidity sensor: P112C,  P112D.  Turbocharged or Supercharged,  without Humidity sensor: P0097,  P0098.  Naturally Aspirated: P0112,  P0113. |
| **Bundle Name:** MnfdTempSensorCktFP |
| Turbocharged or Supercharged,  with Humidity sensor: P112C,  P112D.  Turbocharged or Supercharged,  without Humidity sensor: P0097,  P0098.  Naturally Aspirated: P0112,  P0113. |
| **Bundle Name:** MnfdTempSensorCktTFTKO |
| Turbocharged or Supercharged,  with Humidity sensor: P112C,  P112D.  Turbocharged or Supercharged,  without Humidity sensor: P0097,  P0098.  Naturally Aspirated: P0112,  P0113. |

**Fault Bundle Definitions**

**Bundle Name:** MnfdTempSensorFA

Turbocharged or Supercharged, with Humidity sensor: P112B, P112C, P112D, P112E. Turbocharged or Supercharged, without Humidity sensor: P0096, P0097, P0098, P0099. Naturally Aspirated: P0111, P0112, P0113, P0114.

**Bundle Name:** MnfdTempSensorTFTKO

Turbocharged or Supercharged, with Humidity sensor: P112B, P112C, P112D, P112E. Turbocharged or Supercharged, without Humidity sensor: P0096, P0097, P0098, P0099. Naturally Aspirated: P0111, P0112, P0113, P0114.

**Bundle Name:** ModuleOffTime_FA

P2610

**Bundle Name:** ModuleOffTimeErr

P2610

**Bundle Name:** no validity name is assigned to this fault bundle

 

**Bundle Name:** OAT_AmbientFilteredFA

ECM OAT: P0071, P0072, P0073, P0074, EngModeNotRunTmErr, VehicleSpeedSensor_FA, IAT_SensorFA, ECT_Sensor_DefaultDetected, MAF_SensorFA. VIMC OAT: P0072, P0073, EngModeNotRunTmErr, VehicleSpeedSensor_FA, ECT_Sensor_DefaultDetected. IAT-Based OAT: not applicable. All other cases: not applicable.

**Bundle Name:** OAT_AmbientSensorFA

ECM OAT: P0071, P0072, P0073, P0074. VIMC OAT: P0071, P0072, P0073, EngModeNotRunTmErr, VehicleSpeedSensor_FA, ECT_Sensor_DefaultDetected. IAT-Based OAT: not applicable. All other cases: not applicable.

**Bundle Name:** OAT_PtEstFiltFA

ECM OAT: P0071, P0072, P0073, P0074, EngModeNotRunTmErr, VehicleSpeedSensor_FA, IAT_SensorFA, ECT_Sensor_DefaultDetected, MAF_SensorFA. VIMC OAT: P0072, P0073, EngModeNotRunTmErr, VehicleSpeedSensor_FA, ECT_Sensor_DefaultDetected. IAT-Based OAT: VehicleSpeedSensor_FA, IAT_SensorFA, MAF_SensorFA. All other cases: EngModeNotRunTmErr, VehicleSpeedSensor_FA, IAT_SensorFA, ECT_Sensor_DefaultDetected.

**Bundle Name:** OAT_PtEstRawFA

ECM OAT: P0071, P0072, P0073, P0074. VIMC OAT: P0071, P0072, P0073, EngModeNotRunTmErr, VehicleSpeedSensor_FA, ECT_Sensor_DefaultDetected. IAT-Based OAT: IAT_SensorFA. All other cases: IAT_SensorFA, ECT_Sensor_DefaultDetected.

**Bundle Name:** OilPmpCktFA

P06DA, P06DB, P06DC

**OilPmpCktFA - Other Definitions:**
Output Driver Codes

**Bundle Name:** OilPmpFA

P06DA, P06DB, P06DC, P06DD, P06DE

**OilPmpFA - Other Definitions:**
FA only for Output Driver and rationality

**Bundle Name:** OilPmpStuckHigh

P06DA, P06DB, P06DD

**OilPmpStuckHigh - Other Definitions:**
TFTKO and FA

**Bundle Name:** OilPmpStuckLow

P06DC, P06DE

**OilPmpStuckLow - Other Definitions:**

**Fault Bundle Definitions**

| |
|---|
| TFTKO and FA |
| **Bundle Name:** OilPmpTFTKO |
| P06DA, P06DB, P06DC, P06DD, P06DE |
| **OilPmpTFTKO - Other Definitions:**<br>TFTKO only for Output Driver and rationality |
| **Bundle Name:** PowertrainRelayFault |
| P1682 |
| **Bundle Name:** PowertrainRelayStateOn_Error |
| P0685 |
| **Bundle Name:** PowertrainRelayStateOn_FA |
| P0685 |
| **Bundle Name:** PPS1_OutOfRange |
| P2122, P2123 |
| **Bundle Name:** PPS1_OutOfRange_Composite |
| P2122, P2123, P06A3 |
| **Bundle Name:** PPS2_OutOfRange |
| P2127, P2128 |
| **Bundle Name:** PPS2_OutOfRange_Composite |
| P2127, P2128, P0697 |
| **Bundle Name:** SCIAP_SensorCircuitFA |
| P012C, P012D |
| **Bundle Name:** SCIAP_SensorCircuitFP |
| P012C, P012D |
| **Bundle Name:** SCIAP_SensorFA |
| P012B, P012C, P012D |
| **Bundle Name:** SCIAP_SensorPerfFA |
| P012B |
| **Bundle Name:** SCIAP_SensorPerfTFTKO |
| P012B |
| **Bundle Name:** SCIAP_SensorTFTKO |
| P012B, P012C, P012D |
| **Bundle Name:** SuperchargerBypassValveFA |
| P2261 |
| **Bundle Name:** SystemVoltageHigh_FA |
| P0563 |
| **Bundle Name:** SystemVoltageLow_FA |
| P0562 |
| **Bundle Name:** TC_BoostPresSnsrCktFA |

**Fault Bundle Definitions**

| |
|---|
| P0237, P0238 |
| **Bundle Name:** TC_BoostPresSnsrFA |
| P0236, P0237, P0238 |
| **Bundle Name:** TCM_EngSpdReqCkt |
| P150C |
| **Bundle Name:** THMR_AHV_FA |
| P2681, P26A3, P26A6, P26A7, P26A9 |
| **Bundle Name:** THMR_AWP_AuxPumpFA |
| B2920, B2923, B2922 |
| **Bundle Name:** THMR_ECT_Sensor_Ckt_FA |
| P0116, P0117, P0118, P00B6 |
| **Bundle Name:** THMR_Insuff_Flow_FA |
| P00B7 |
| **Bundle Name:** THMR_RCT_Sensor_Ckt_FA |
| P00B3, P00B4 |
| **Bundle Name:** THMR_SWP_Control_FA |
| P261D, P261A, P261C |
| **Bundle Name:** THMR_Therm_Control_FA |
| P0597, P0598, P0599 |
| **Bundle Name:** ThrotTempSensorFA |
| Turbocharged or Supercharged, with Humidity sensor: P112B, P112C, P112D, P112E.  Turbocharged or Supercharged, without Humidity sensor: P0096, P0097, P0098, P0099.  Naturally Aspirated: P0111, P0112, P0113, P0114. |
| **Bundle Name:** ThrotTempSensorTFTKO |
| Turbocharged or Supercharged, with Humidity sensor: P112B, P112C, P112D, P112E.  Turbocharged or Supercharged, without Humidity sensor: P0096, P0097, P0098, P0099.  Naturally Aspirated: P0111, P0112, P0113, P0114. |
| **Bundle Name:** ThrottlePositionSnsrPerfFA |
| P0121 |
| **Bundle Name:** ThrottlePositionSnsrPerfTFTKO |
| P0121 |
| **Bundle Name:** TIAP_SensorPerfFA |
| P0236 |
| **Bundle Name:** TPS_FA |
| P0122, P0123, P0222, P0223, P2135 |
| **Bundle Name:** TPS_FaultPending |
| P0122, P0123, P0222, P0223, P2135 |
| **Bundle Name:** TPS_Performance_FA |
| P0068, P0121, P1104, P2100, P2101, P2102, P2103 |
| **Bundle Name:** TPS_Performance_TFTKO |

**Fault Bundle Definitions**

| |
|---|
| P0068, P0121, P1104, P2100, P2101, P2102, P2103 |
| **Bundle Name:** TPS_TFTKO |
| P0122, P0123, P0222, P0223, P2135 |
| **Bundle Name:** TPS_ThrottleAuthorityDefaulted |
| P0068, P0122, P0123, P0222, P0223, P16F3, P1104, P2100, P2101, P2102, P2103, P2135 |
| **Bundle Name:** TPS1_OutOfRange_Composite |
| P0122, P0123, P06A3 |
| **Bundle Name:** TPS2_OutOfRange_Composite |
| P0222, P0223, P06A3 |
| **Bundle Name:** Trans Output Rotations Rolling Count Validity |
| |
| **Bundle Name:** Transfer Pump is Commanded On |
| |
| **Transfer Pump is Commanded On - Other Definitions:**<br>Fuel Volume in Primary Fuel Tank < 0.0 liters AND<br>Fuel Volume in Secondary Fuel Tank ≥ 0.0 liters AND<br>Transfer Pump on Time < P0461, P2066, P2636: Transfer Pump Enable (see supporting table for numeric value) AND<br>Transfer Pump had been Off for at least 0.0 seconds AND<br>Evap Diagnostic (Purge Valve Leak Test, Large Leak Test, and Waiting for Purge) is not running AND<br>Engine Running |
| **Bundle Name:** Transmission Actual Gear Validity |
| |
| **Bundle Name:** Transmission Engaged State Validity |
| |
| **Bundle Name:** Transmission Estimated Gear Validity |
| |
| **Bundle Name:** Transmission Gear Ratio Validity |
| |
| **Bundle Name:** Transmission Gear Selector Position Validity |
| |
| **Bundle Name:** Transmission Oil Temperature Validity |
| |
| **Bundle Name:** Transmission Output Shaft Angular Velocity Validity |
| |
| **Bundle Name:** Transmission Overall Actual Torque Ratio Validity |
| |
| **Bundle Name:** Transmission Overall Estimated Torque Ratio Validity |
| |
| **Bundle Name:** Transmission Shift Lever Position Validity |

| **Fault Bundle Definitions** |
|---|

| |
|---|
| **Bundle Name:** Transmission Turbine Angular Velocity Validity |
| |
| **Bundle Name:** TransmissionEngagedState_FA |
| MYD/MYC/MYB:, P182E, P1915 |
| **Bundle Name:** TransmissionGearDefaulted |
| MYD/MYC/MYB:, P182E, P1915 |
| **Bundle Name:** VehicleSpeedSensor_FA |
| P0502, P0503, P0722, P0723 |
| **Bundle Name:** VehicleSpeedSensorError |
| P0502, P0503, P0722, P0723 |

## LD OBD Component System Table

| STATE OF CALIFORNIA<br>California Environmental Protection Agency<br>AIR RESOURCES BOARD<br>MSCD/ESB-113 (NEW 1/11) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **OBD II Gasoline Monitoring Requirements Checklist** | | | | | | | | | |
| **Component/System** | MONITORING REQUIREMENTS: List the DTC of the monitor that detects the following failure mode: | | | | | | | | |
| Catalyst | (e)(1.2.2)<br>Conversion Efficiency | | | | | | | | |
| | P0420 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Heated Catalyst | (e)(2.2)<br>Heating Performance | | | | | | | | |
| | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Misfire | (e)(3.2.1)<br>Catalyst Damage Misfire | (e)(3.2.2)<br>FTP Level Misfire: First 1000-revs | (e)(3.2.2)<br>FTP Level Misfire: 4 x 1000-revs | | | | | | |
| | P0300 | P0300 | P0300 | NA | NA | NA | NA | NA | NA | NA |
| Evaporative System | (e)(4.2.2)(A)<br>Purge Flow | (e)(4.2.2)(B)<br>0.040" Leak Check | (e)(4.2.2)(C)<br>0.020" Leak Check | (e)(4.2.5)<br>0.090" Leak Check in Lieu of 0.040" | | | | | |
| | P0455 | P0442 | P0442 | NA | NA | NA | NA | NA | NA | NA |
| Secondary Air | (e)(5.2.3)<br>Insufficient Flow Emission Threshold | (e)(5.2.4)<br>Functional Monitor In Lieu of Emission Threshold | | | | | | | |
| | P0411 | P0411, P2440, P2444 | NA | NA | NA | NA | NA | NA | NA | NA |
| Fuel System | (e)(6.2.1)(A)<br>Emission Threshold | (e)(6.2.1)(B)<br>Secondary Fuel Trim Emission Threshold | (e)(6.2.1)(C)<br>Air-fuel Ratio Cylinder Imbalance | (e)(6.2.2)<br>Adaptive Limits Reached | (e)(6.2.3)<br>Secondary Fuel Trim Adaptive Limits Reached | (e)(6.2.4)<br>Fails to Enter Closed Loop | | | |
| | P0171, P0172 | P2096, P2097 | P219A, P0300 | P0171, P0172 | P2096, P2097 | NA | NA | NA | NA | NA |
| Upstream Exhaust Gas Sensor | (e)(7.2.1)(A)<br>Emission Threshold | (e)(7.2.1)(B)<br>Open Circuit | (e)(7.2.1)(B)<br>Out-of-Range High | (e)(7.2.1)(B)<br>Out-of-Range Low | (e)(7.2.1)(C)<br>Feedback: Slow/ fails to Enter, Default OL | (e)(7.2.1)(D)<br>Sufficient for Other Diagnostics | (e)(7.2.3)(A)<br>Heater Performance | (e)(7.2.3)(B)<br>Heater Circuit Continuity | |
| | P0133, P0133, P015A, P015B | P0134, P2A00 | P0132 | P0131 | P2A00 | P0131, P0132, P0134, P0133, P015A, P015B | P0053, P0135 | P0030 | NA | NA |
| Downstream Exhaust Gas Sensor | (e)(7.2.2)(A)<br>Emissions Threshold | (e)(7.2.2)(B)<br>Open Circuit | (e)(7.2.2)(D)<br>Out-of-Range High | (e)(7.2.2)(D)<br>Out-of-Range Low | (d)(2.2.3) & (e) (6.2.4)<br>Feedback: Slow/ fails to Enter, Default OL | (e)(7.2.2)(C)<br>Sufficient for Other Diagnostics | (e)(7.2.3)(A)<br>Heater Performance | (e)(7.2.3)(B)<br>Heater Circuit Continuity | |
| | P013A, P013B, P013E, P013F | P0140 | P0138, P2271 | P0137, P2270 | P0054, P0137, P0138, P0140, P0141, P013A, P013B, P013E, P013F, P2270, P2271 | P013A, P013B, P013E, P013F, P2270, P2271 | P0054, P0141 | P0036 | NA | NA |
| | (e)(8.2.1) | (e)(8.2.1) | (e)(8.2.2) | | | | | | |

## LD OBD Component System Table

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| EGR | Low Flow Emission Threshold | High Flow Emission Threshold | Functional Monitor in Lieu of Emission Threshold | | | | | | | |
| | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Crankcase Ventilation | (e)(9.2.2) Disconnection | | | | | | | | | |
| | P0106, P0171, P0300 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Engine Cooling System | (e)(10.2.1) Time to Reach Threshold Temp | (e)(10.2.2)(A) ECT Open Circuit | (e)(10.2.2)(A) ECT Out-of-Range High | (e)(10.2.2)(A) ECT Out-of-Range Low | (e)(10.2.2)(B) Time to Reach Closed Loop | (e)(10.2.2)(C) ECT Stuck Below Highest Minimum Enable Temp | (e)(10.2.2)(D) ECT Stuck Above Lowest Maximum Enable Temp | | | |
| | P0128, P2181 | P0118, P0119 | P0118 | P0117 | NA | P0128 | P0116 | NA | NA | NA |
| Cold Start Strategy | (e)(11.2.1)(A) Emission Threshold | (e)(11.2.1)(B) Functional Monitor In Lieu of Emission Threshold | (e)(11.2.2)(A) Phase-in Single Element Functional Monitor | (e)(11.2.2)(B) Phase-in Emission Threshold | | | | | | |
| | P1400 | P1400 | P0300, P050D, P1400 | P1400 | NA | NA | NA | NA | NA | NA |
| VVT System | (e)(13.2.1) Target Error Emission Threshold | (e)(13.2.3) Target Error Functional Monitor in Lieu of Emission Threshold | (e)(13.2.2) Slow Response Emission Threshold | (e)(13.2.3) Slow Response Functional Monitor in Lieu of Emission Threshold | | | | | | |
| | P0011, P0014 | P0011, P0014 | P0011, P0014 | P0011, P0014 | NA | NA | NA | NA | NA | NA |
| Direct Ozone Reduction (DOR) System | (e)(14.2.1) Functional Monitor for <50% Std Credit | (e)(14.2.2) Emission Threshold Monitor for >50% Std Credit | | | | | | | | |
| | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

**LD OBD Monitor System Table**

STATE OF CALIFORNIA
California Environmental Protection Agency
AIR RESOURCES BOARD
MSCD/ESB-113 (NEW 1/11)

**OBD II Gasoline Monitoring Requirements Checklist**

List the DTC of comprehensive component monitor that detects the following failure mode:

| Monitor/System | Input Out-of-Range High | Input Out-of-Range Low | Input Open Circuit | Input Rationality Low | Input Rationality High | Input Other Rationality | Output Functional | Output Shorted High | Output Shorted Low | Output Open Circuit |
|---|---|---|---|---|---|---|---|---|---|---|
| | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| A/C Clutch Relay Control | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| A/C High Side | P0533 | P0532 | P0532, P0533 | NA | NA | NA | NA | NA | NA | NA |
| AIR Pressure Sensor Bank 1 | P2433 | P2432 | P2432 | P2431 | P2431 | P2430 | NA | NA | NA | NA |
| AIR Pressure Sensor Bank 2 | P2438 | P2437 | P2437 | P2436 | P2436 | P2435 | NA | NA | NA | NA |
| AIR Pump Command Bank 1 | NA | NA | NA | NA | NA | NA | NA | P0418 | P0418 | P0418 |
| AIR Pump Solenoid Relay | NA | NA | NA | NA | NA | NA | NA | P0412 | P0412 | P0412 |
| Auto Start Stop Select Switch | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Barometric Pressure | P2229 | P2228 | P2228 | P2227 | P2227 | P00C7, P2230 | NA | NA | NA | NA |
| Brake Booster Pressure | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Brake Pedal Position | P057D | P057C | P057C | NA | NA | P057B | NA | NA | NA | NA |
| CAM Phase Control Bank 1 Exhaust | NA | NA | NA | NA | NA | NA | P0014 | P2091 | P2090 | P0013 |
| CAM Phase Control Bank 1 Intake | NA | NA | NA | NA | NA | NA | P0011 | P2089 | P2088 | P0010 |
| CAM Phase Control Bank 2 Exhaust | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| CAM Phase Control Bank 2 Intake | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Cam Position Bank1 Exhaust | P0365 | P0365 | P0365 | P0366 | P0366 | P0017 | NA | NA | NA | NA |
| Cam Position Bank1 Intake | P0340 | P0340 | P0340 | P0341 | P0341 | P0016 | NA | NA | NA | NA |
| Cam Position Bank2 Exhaust | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Cam Position Bank2 Intake | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Camshaft Position Output Signal | NA | NA | NA | NA | NA | NA | NA | P2616 | P2615 | NA |
| Canister Vent Solenoid | NA | NA | NA | NA | NA | NA | P0446 | P0499 | P0449, P0498 | P0449, P0498 |
| Charge Intercooler | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Clutch Pedal Position | P0808 | P0807 | P0807 | P0806 | NA | P080A | NA | NA | NA | NA |
| Control Canister Purge Solenoid | NA | NA | NA | NA | NA | NA | P0496 | P0459 | P0443, P0458 | P0443, P0458 |
| Crank Position | P0335 | P0335 | P0335 | P0336 | P0336 | NA | NA | NA | NA | NA |
| Crankshaft Position Output Signal | NA | NA | NA | NA | NA | NA | NA | P2619 | P2618 | NA |
| Cylinder  Deactivate A | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Cylinder  Deactivate B | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Cylinder  Deactivate C | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Cylinder  Deactivate D | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| EGR Valve Position | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| ELCP Pressure Sensor | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| ELCP Switching Valve | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| ELCP Vacuum Pump | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Engine Metal Over Temperature Active | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| EST A | NA | NA | NA | NA | NA | NA | NA | P0351 | P0351 | P0351 |
| EST B | NA | NA | NA | NA | NA | NA | NA | P0352 | P0352 | P0352 |
| EST C | NA | NA | NA | NA | NA | NA | NA | P0353 | P0353 | P0353 |
| EST D | NA | NA | NA | NA | NA | NA | NA | P0354 | P0354 | P0354 |

# LD OBD Monitor System Table

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| EST E | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| EST F | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| EST G | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| EST H | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| ETC Motor Close | NA | NA | NA | NA | NA | NA | P2101, P1516, P2176 | NA | NA | NA |
| ETC Motor Open | NA | NA | NA | NA | NA | NA | P2101, P1516, P2176 | NA | NA | NA |
| Fan Control #1 | NA | NA | NA | NA | NA | NA | NA | P0692 | P0480, P0691 | P0480, P0691 |
| Fan Control #2 | NA | NA | NA | NA | NA | NA | NA | P0694 | P0481, P0693 | P0481, P0693 |
| Fan Control #3 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Feul Economy Mode Switch Circuit | NA | NA | NA | P159F | P15A0 | P15A1 | NA | NA | NA | NA |
| Fuel Composition | P0179 | P0178 | P0178 | NA | NA | P2269 | NA | NA | NA | NA |
| Fuel Injector A | NA | NA | NA | NA | NA | NA | P1248 | P0262, P2148 | P0261, P2147 | P0201 |
| Fuel Injector B | NA | NA | NA | NA | NA | NA | P1249 | P0265, P2151 | P0264, P2150 | P0202 |
| Fuel Injector C | NA | NA | NA | NA | NA | NA | P124A | P0268, P2154 | P0267, P2153 | P0203 |
| Fuel Injector D | NA | NA | NA | NA | NA | NA | P124B | P0271, P2157 | P0270, P2156 | P0204 |
| Fuel Injector E | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Fuel Injector F | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Fuel Injector G | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Fuel Injector H | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Fuel Level | P0463 | P0462 | P0463 | NA | NA | P0461, P0464 | NA | NA | NA | NA |
| Fuel Level 2 | P2068 | P2067 | P2068 | NA | NA | P0464, P2066 | NA | NA | NA | NA |
| Fuel Pump 2 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Fuel pump Control | NA | NA | NA | NA | NA | NA | NA | P0627 | P0628 | P0627 |
| Fuel Tank Vapor Pressure | P0453 | P0452 | P0452 | NA | NA | P0451, P0454 | NA | NA | NA | NA |
| Humidity | P11C3 | P11C2 | P11C2 | NA | NA | P11C4 | NA | NA | NA | NA |
| Hybrid Control Torque Request Circuit | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Ignition Off Timer | NA | NA | NA | NA | NA | P262B | NA | NA | NA | NA |
| IMTV Position | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Intake Air Temperature | P0113 | P0112 | P0113 | P0111 | P0111 | P0114, P2199 | NA | NA | NA | NA |
| Intake Air Temperature 2 | P0098 | P0097 | P0098 | P0096 | P0096 | P0099, P2199 | NA | NA | NA | NA |
| Intake Air Temperature 2 | P112D | P112C | P112D | P112B | P112B | P112E | NA | NA | NA | NA |
| Intake Manifold Runner Control | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Intake Manifold Tuning Valve Control | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Knock Internal Circuit | NA | NA | NA | NA | NA | P06B6 | NA | NA | NA | NA |
| Knock Internal Circuit #2 | NA | NA | NA | NA | NA | P06B7 | NA | NA | NA | NA |
| Knock Sensor-Flat | P0328 | P0327 | P0325 | P0326 | P0324, P0326 | NA | NA | NA | NA | NA |
| Knock Sensor-Flat #2 | P0333 | P0332 | P0330 | P0331 | P0324, P0331 | NA | NA | NA | NA | NA |
| Malfunction Indicator Lamp | NA | NA | NA | NA | NA | NA | NA | NA | P0650, P263A | P0650, P263A |
| Manifold Absolute Pressure | P0108 | P0107 | P0107 | P0106 | P0106 | P00C7, P1101 | NA | NA | NA | NA |
| Mass Air Flow | P0103 | P0102 | P0102 | P0101 | P0101 | P1101 | NA | NA | NA | NA |
| Mass Air Flow 2 | NA | NA | NA | NA | NA | P1101 | NA | NA | NA | NA |
| Mass Air Flow Supply Voltage Control | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Outside Air Temperature | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Pedal Position 1 | P2123 | P2122 | P2122 | P2138 | P2138 | NA | NA | NA | NA | NA |
| Pedal Position 2 | P2128 | P2127 | P2127 | P2138 | P2138 | NA | NA | NA | NA | NA |
| Performance Traction | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

## LD OBD Monitor System Table

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Torque Request Circuit | | | | | | | | | | |
| Powertrain Relay Control | NA | NA | NA | NA | NA | NA | NA | P0687 | P0685, P0686 | P0685, P0686 |
| Powertrain Relay Feedback | NA | NA | NA | NA | P0690 | NA | NA | NA | NA | NA |
| Reverse Inhibit | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| SENT Communication A Circuit (Throttle) | P16A0 | P16A1 | P16A1 | P16A2 | P16A2 | NA | NA | NA | NA | NA |
| SIDI High Pressure Pump | NA | NA | NA | NA | NA | NA | P0089, P163A, P228C, P228D | P0092, P00CA | P0091, P00C9 | P0090, P00C8 |
| SIDI High Pressure Sensor | P0193 | P0192 | P0192 | P0191 | P0191 | P0191 | NA | NA | NA | NA |
| SIDI High Pressure Start | NA | NA | NA | NA | NA | NA | P00C6 | NA | NA | NA |
| SIDI Ignition Module Supply Voltage - Group 1 | NA | P135A | P135A | NA | NA | NA | NA | NA | NA | NA |
| SIDI Ignition Module Supply Voltage - Group 2 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| SIDI Injector Driver Circuit | NA | NA | NA | NA | NA | NA | P062B | P062B | P062B | P062B |
| Skip Shift Solenoid | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Starter Relay Control | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Supercharger Bypass Control | NA | NA | NA | NA | NA | NA | P0299, P0234 | P0246 | P0245 | P0243 |
| Supercharger Inlet Pressure | NA | NA | NA | NA | NA | P00C7, P1101 | NA | NA | NA | NA |
| System Voltage | NA | NA | NA | P0562 | P0563 | NA | NA | NA | NA | NA |
| Throttle Position 1 | P0123 | P0122 | P0122 | P2135 | P2135 | P0068, P0121, P2119 | NA | NA | NA | NA |
| Throttle Position 2 | P0223 | P0222 | P0223 | P2135 | P2135 | P0068, P0121, P2119 | NA | NA | NA | NA |
| Traction Control Torque Request Circuit | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Transmission Control Torque Request Circuit | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Transmission Mode Switch | NA | NA | NA | NA | NA | P1762 | NA | NA | NA | NA |
| Transmission Output Speed Hi : Replicated TOS | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Turbocharger Boost Pressure | P0238 | P0237 | P0237 | P0236 | P0236 | P00C7, P1101 | NA | NA | NA | NA |
| Turbocharger Bypass | NA | NA | NA | NA | NA | NA | P2261 | P0035 | P0034 | P0033 |
| Turbocharger Bypass B | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Turbocharger Wastegate B Control | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Turbocharger Wastegate Control | NA | NA | NA | NA | NA | NA | P0299, P0234 | P0246 | P0245 | P0243 |
| Two Stage Oil Pump | NA | NA | NA | NA | NA | NA | P06DD, P06DE | P06DC | P06DB | P06DA |
| Vehicle Speed | P0502 | P0502 | P0502 | P0502 | P0502 | P0503 | NA | NA | NA | NA |
| Vehicle Speed Sensor B | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |