| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Heater Coolant Pump Control Circuit Open | B269A | Diagnoses the Heater Coolant Pump 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<br><br>Run Crank active<br><br>== Above is true and ==<br><br>Last Open Circuit Test | = True<br><br>= True<br><br>= True<br><br>====================<br><br>not Indeterminate | 5 failures out of 10 samples<br><br>1 sec/ sample<br><br>Continuous | Type B, 2 Trips Note: In certian controlle rs B269C may also set |

# 15 OBDG05 ECM Summary Tables (Initial DTCs)

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Heater Coolant Pump Control Circuit Low | B269C | Diagnoses the Heater Coolant Pump 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<br><br>Run Crank active<br><br>== Above is true and ==<br><br>Last Ground Short Circuit Test | = True<br><br>= True<br><br>= True<br><br>=================<br><br>not Indeterminate | 5 failures out of 10 samples<br><br>1 sec/ sample<br><br>Continuous | Type B, 2 Trips Note: In certian controllers B269A may also set |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Heater Coolant Pump Control Circuit High | B269D | Diagnoses the Heater Coolant Pump 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><br>Run Crank active<br><br>== Above is true and ==<br><br>Last Power Short Circuit Test | = True<br><br>= True<br><br>= True<br><br>=================<br><br>not Indeterminate | 5 failures out of 10 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. |
|---|---|---|---|---|---|---|---|---|
| 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<br><br>Open Circuit: ≥ 200 K Ω impedance between signal and controller ground | System supply voltage<br><br>Output driver is commanded on<br><br>Ignition switch is in crank or run position | > 11.00 Volts | 20 failures out of 25 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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)<br><br>Cam Position Error > (**P0011_CamPosError LimIc1**) deg | System Voltage<br><br>Engine Running<br><br>Power Take Off (PTO) active<br><br>Desired cam position<br><br>Desired AND Measured cam position<br><br><br><br>Desired cam position variation<br><br><br>No Active DTCs<br><br><br>Bundle: **IntakeVVT_Enabled** | > 11.00 Volts<br><br>= TRUE<br><br>= FALSE<br><br><br>> 0 deg<br><br>> (**P0011_CamPosErrorLi mIc1**) deg AND < (**P0011_PerfMaxIc1**) deg<br><br>< 3.00 Deg for (**P0011_P05CC_StableP ositionTimeIc1**) sec<br><br>P0010 P2088 P2089<br><br>= TRUE (Reference Supporting **Tables: P0011_P0021_P05CC_P 05CD_HiEngSpdHiDsbIl c P0011_P0021_P05CC_P 05CD_HiEngSpdLoEnbIl c P0011_P0021_P05CC_P 05CD_LoRpmHiEnbIlc P0011_P0021_P05CC_P 05CD_LoRpmLoDsbIlc P0011_P0021_P05CC_P 05CD_LoPresHiEnbIlc P0011_P0021_P05CC_P 05CD_LoPresLoDsbIlc** | 135.00 failures out of 150.00 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | P0011_P0021_P05CC_P05CD_EngOilPressEnbllc<br><br>P0011_P0021_P05CC_P05CD_P0014_P0024_P05CE_P05CF_ColdStartEngRunning<br><br>Reference Fault Bundles:<br>**IntakeVVT_Enabled**<br>**CrankIntakeCamCorrFA**<br>**IntakeCamSensorTFTKO**<br>**CrankSensorTFTKO**<br>**CamLctnIntFA**) | | |
| | | | | | | | | |

| 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<br><br>Open Circuit: ≥ 200 K Ω impedance between signal and controller ground | System supply voltage<br><br>Output driver is commanded on<br><br>Ignition switch is in crank or run position | > 11.00 Volts | 20 failures out of 25 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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)<br><br>Cam Position Error > (**P0014_CamPosError LimEc1**) deg | System Voltage<br><br>Engine Running<br><br>Power Take Off (PTO) active<br><br>Desired cam position<br><br>Desired AND Measured cam position<br><br><br><br><br>Desired cam position variation<br><br><br>No Active DTCs<br><br><br>Bundle: **ExhaustVVT_Enabled** | > 11.00 Volts<br><br>= TRUE<br><br>= FALSE<br><br><br>> 0 deg<br><br>> (**P0014_CamPosErrorLi mEc1**) deg AND < (**P0014_PerfMaxEc1**) deg<br><br>< 3.00 Deg for (**P0014_P05CE_StableP ositionTimeEc1**) sec<br><br>P0013 P2090 P2091<br><br>= TRUE (Reference Supporting Tables:<br><br>**P0014_P0024_P05CE_P 05CF_HiEngSpdHiDsblE c**<br>**P0014_P0024_P05CE_P 05CF_HiEngSpdLoEnbl Ec**<br>**P0014_P0024_P05CE_P 05CF_LoRpmHiEnblEc**<br>**P0014_P0024_P05CE_P 05CF_LoRpmLoDsblEc**<br>**P0014_P0024_P05CE_P 05CF_LoPresHiEnblEc**<br>**P0014_P0024_P05CE_P** | 135.00 failures out of 150.00 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 05CF_LoPresLoDsblEc P0014_P0024_P05CE_P 05CF_EngOilPressEnbl Ec P0011_P0021_P05CC_P 05CD_P0014_P0024_P0 5CE_P05CF_ColdStartE ngRunning<br><br>Reference Fault Bundles: **ExhaustVVT_Enabled CrankExhaustCamCorrF A ExhaustCamSensorTFT KO CrankSensorTFTKO CamLctnExhFA**) | | |
| | | | | | | | | |

| 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>Time since last execution of diagnostic | P0335, P0336 P0340,P0341<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 **"P0016_P0017_P0018_P0019 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>Time since last execution of diagnostic | P0335, P0336 P0365,P0366<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 **"P0016_P0017_ P0018_P0019 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 250 ms / sample Continuous | Type B, 2 Trips Note: In certain controllers P0030 may also set |

## 15 OBDG05 ECM Summary Tables (Initial DTCs)

| 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 controllers 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<br><br>250 ms / sample<br><br>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<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. |
|---|---|---|---|---|---|---|---|---|
| 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 | $3.6 < \Omega < 10.3$ | No Active DTC's<br><br>Coolant – IAT Engine Soak Time<br>Coolant Temp<br>Ignition Voltage<br>Engine Run time | ECT_Sensor_FA P2610 IAT_SensorFA<br>$< 8.0$ °C<br>$> 28,800$ seconds<br>$-30.0 <$ °C $< 125.0$<br>$< 32.0$ volts<br>$< 0.05$ 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 | $4.0 < \Omega < 10.7$ | 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<br>$< 8.0$ ºC<br>$> 28,800$ seconds<br>$-30.0 < $ºC$ < 125.0$<br>$< 32.0$ volts<br>$< 0.15$ 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 <= 125 | Windup High -<br><br>1,000 failures out of 1,250 samples<br><br><br>Windup Low -<br><br>1,000 failures out of 1,250 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 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 off state indicates short to power | Short to power: ≤ 1.1 or 15 Amps selectable thershold based on High pressure Pump . | Engine Speed Battery Voltage | >= 50 RPM >= 11 Volts 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. |
|---|---|---|---|---|---|---|---|---|
| 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>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 |

**15 OBDG05 ECM Summary Tables (Initial DTCs)**

| 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) | > 100.00 DegC<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. |
|---|---|---|---|---|---|---|---|---|
| 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 <= 125<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<br>Inlet Air Temp | counter is 0)<br>Flex Fuel Sensor Not FA<br>Ignition voltage out of correlation  error(P1682) not active<br>>= 70.0  KPA<br>>= -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 High Side 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: $\geq$ 200 K $\Omega$ 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 High Side Circuit Short to ground | 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 High Side Circuit Short to power | P00CA | The DTC Diagnoses the Fuel Press Regulator Solenoid Supply Voltage Control Circuit for circuit faults. | Voltage high during driver off 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. |
|---|---|---|---|---|---|---|---|---|
| Humidity Sensor Circuit Low | P00F4 | 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>>= 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. |
|---|---|---|---|---|---|---|---|---|
| Humidity Sensor Circuit High | P00F5 | 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>>= 0.9 seconds<br><br>PowertrainRelayFault | 40 failures out of 50 samples<br><br>1 sample every 100 msec | Type B, 2 Trips |

# 15 OBDG05 ECM Summary Tables (Initial DTCs)

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Humidity Sensor Circuit Intermittent | P00F6 | 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) | > 80 %<br><br>10 consecutive Humidity 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 1.00 seconds | 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 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>> 12.0 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>No Active DTCs:<br><br><br><br><br><br>No Pending DTCs: | >= 575 RPM<br><= 6,600 RPM<br>>= -7 Deg C<br><= 129 Deg C<br>>= -20 Deg C<br><= 125 Deg C<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<br>EGRValvePerformance_FA<br>MAF_SensorCircuitFA<br>CrankSensor_FA<br>ECT_Sensor_FA<br>IAT_SensorFA<br><br>EGRValve_FP<br>ECT_Sensor_Ckt_FP<br>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 (~ 0.00 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 (~ 261.1 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. |
|---|---|---|---|---|---|---|---|---|
| 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 <= 129 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 | > 409.6 seconds | 1 sample every 12.5 msec | |
| | | | | | Engine is not rotating | | | |
| | | | | | No Active DTCs: | EngineModeNotRunTimer Error MAP_SensorCircuitFA AAP_SnsrCktFA | | |
| | | | | | No Pending DTCs: | MAP_SensorCircuitFP AAP_SnsrCktFP | | |
| | | | | | | | | |

| 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  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 ECT_Sensor_Ckt_FA IAT_SensorCircuitFA HumTempSnsrCktFA | Executes once at the beginning of each ignition cycle if enable conditions are met | Type B, 2 Trips |

## 15 OBDG05 ECM Summary Tables (Initial DTCs)

| 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) | > 80.00 DegC<br><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 Temperature (ECT) Sensor Performance | P0116 | This DTC detects ECT temp sensor stuck in mid range. | A failure will be reported if any of the following occur:<br><br>1) ECT at power up > IAT at power up by an IAT based table lookup value after a minimum 25,200 second soak (fast fail).<br><br>2) ECT at power up > IAT at power up by 15.8 C after a minimum 25,200 second soak and a block heater has not been detected.<br><br>3) ECT at power up > IAT at power up by 15.8 C after a minimum 25,200 seconds soak and the time spent cranking the engine without starting is greater than 10.0 seconds with the LowFuelConditionDiag<br><br>= False | See "**P0116_Fail if power up ECT exceeds IAT by these values**" in the Supporting tables section | No Active DTC's<br><br>Non-volatile memory initization<br><br>Test complete this trip<br>Test aborted this trip<br>IAT<br>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: | 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>> 15.8 ºC<br><br>< 10.0 seconds<br><br>==================<br><br><br><br>> 400 seconds<br><br>with > 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | 1d) IAT drops from power up IAT | ≥ 5.3 ºC | | |
| | | | | | 2a) ECT drops from power up ECT | ≥ 1 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. |
|---|---|---|---|---|---|---|---|---|
| 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  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 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 for the next reading 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. | 10.0 seconds -80.0 Deg C 200.0 Deg C | No Active DTC's | ECT_Sensor_Ckt_FP | 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. |
|---|---|---|---|---|---|---|---|---|
| | | | *************************** | | | | | |
| | | | | | | | | |

| 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)<br><br>> 12.0 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>No Active DTCs:<br><br><br><br><br><br>No Pending DTCs: | >= 575 RPM<br><= 6,600 RPM<br>> -7 Deg C<br>< 129 Deg C<br>> -20 Deg C<br>< 125 Deg C<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>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><br>EGRValve_FP<br>ECT_Sensor_Ckt_FP<br>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. |
|---|---|---|---|---|---|---|---|---|
| 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;<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. |
|---|---|---|---|---|---|---|---|---|
| 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>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) = 0 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>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 71 °C<br>== == == ==<br>Range #2 (Alternate) ECT reaches Commanded temperature minus 35 °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 **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 | ECT_Sensor_Ckt_FA ECT_Sensor_Perf_FA VehicleSpeedSensor_FA OAT_PtEstFiltFA IAT_SensorCircuitFA MAF_SensorFA THMR_AWP_AuxPumpFA THMR_AHV_FA THMR_SWP_Control_FA THMR_SWP_NoFlow_FA THMR_SWP_FlowStuckOn_FA ETQR_IndTorqInaccurate<br><br>≥ 1,800 seconds<br><br>30 ≤ Eng Run Tme ≤ 1,800 seconds<br><br>Ethanol ≤ 87 %<br><br>≥ 0.50 miles<br><br><br>****************************<br><br>9,999 rpm 5.0 seconds<br><br><br>****************************<br><br><br>****************************<br><br><br>> 20.0 % duty cycle > 5.0 seconds | 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><br>Type cal above = 0 (non - heated t-stat)<br>== == == ==<br>Range #1 (Primary) ECT reaches  71 °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. | key cycle will abort<br><br>***************************<br>ECT at start run | ***************************<br><br>-40 ≤ ECT ≤ 66 °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 | < 40.0 mVolts | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br>AIR intrusive test<br>Fuel intrusive test<br>Idle intrusive test<br>EGR intrusive test<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>Equivalence Ratio<br>Air Per Cylinder<br>Fuel Control State<br>Closed Loop Active<br>All Fuel Injectors for active Cylinders<br>Fuel Condition<br>Fuel State<br><br>All of the above met for | TPS_ThrottleAuthorityDefaulted<br>MAP_SensorFA<br>AIR System FA<br>Ethanol Composition Sensor FA<br>EvapPurgeSolenoidCircuit_FA<br>EvapFlowDuringNonPurge_FA<br>EvapVentSolenoidCircuit_FA<br>EvapSmallLeak_FA<br>EvapEmissionSystem_FA<br>FuelTankPressureSnsrCkt_FA<br>FuelInjectorCircuit_FA<br>= Not active<br>= Not active<br>= Not active<br>= Not active<br>10.0 < Volts<br>= Not active<br>= Not active<br>= Not active<br>= Not active<br>= False<br>0.9912 < ratio < 1.0098<br>120 < mgram < 500<br>= Closed Loop<br>= TRUE<br><br>Enabled (On)<br>Ethanol ≤ 87 %<br>DFCO not active<br><br>> 5.0 seconds | 285 failures out of 350 samples<br><br>Frequency: Continuous in 100 milli - second loop | Type B, 2 Trips |

## 15 OBDG05 ECM Summary Tables (Initial DTCs)

| 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 | No Active DTC's | TPS_ThrottleAuthority Defaulted MAF_SensorFA MAP_SensorFA ExcessPurgePsbl_FA FuelInjectorCircuit_FA EthanolCompositionSensor_FA AIR System FA | 100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop | Type B, 2 Trips |
| | | | | | System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum | 10.0 < Volts = All Cylinders active = Complete > 5.0 seconds > 50.0 seconds | | |
| | | | | | Low Fuel Condition Diag | = False | | |
| | | | | | Initial delay after Open Test Criteria met (cold start condition) | > 45.0 seconds when engine soak time > 28,800 seconds | | |
| | | | | | Initial delay after Open Test Criteria met (not cold start condition) | > 45.0 seconds when engine soak time ≤ 28,800 seconds | | |
| | | | | | Equivalence Ratio | 0.9912 ≤ ratio ≤ 1.0098 | | |
| | | | | | 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><br>< 5<br><br><br><br>< 5<br><br><br>The test averages the signal response time over 60.0 seconds when the signal is transitioning between 325 mvolts and 600 mvolts. An average rich to lean time and lean to rich time are each calculated separately. | No Active DTC's<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<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<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 ºC > -40 ºC > 30 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 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<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 | < 40 mvolts | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br>AIR intrusive test<br>Fuel intrusive test<br>Idle intrusive test<br>EGR intrusive test<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>Equivalence Ratio<br>Air Per Cylinder<br>Fuel Control State<br>Closed Loop Active<br>All Fuel Injectors for active Cylinders<br>Fuel Condition<br>Fuel State<br><br>All of the above met for | TPS_ThrottleAuthority DefaultedMAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit _FA EvapFlowDuringNonPurg e_FA EvapVentSolenoidCircuit_ FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt _FA FuelInjectorCircuit_FA = Not active<br>= Not active<br>= Not active<br>= Not active<br>10.0 < Volts<br>= Not active<br>= Not active<br>= Not active<br>= Not active<br>= False<br>0.9912 ≤ ratio ≤ 1.0098<br>120 ≤ mgrams ≤ 500<br>= Closed Loop<br>= TRUE<br><br>Enabled (On)<br>Ethanol <= 87<br>%DFCO not active<br><br>> 5.0 seconds | 320 failures out of 400 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. |
|---|---|---|---|---|---|---|---|---|
| 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 | No Active DTC's | TPS_ThrottleAuthorityDefaulted MAF_SensorFA MAP_SensorFA ExcessPurgePsbl_FA FuelInjectorCircuit_FA EthanolCompositionSensor_FA AIR System_FA | 100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop | Type B, 2 Trips |
| | | | | | System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum | 10.0 < Volts = All Cylinders active = Complete > 5.0 seconds > 50.0 seconds | | |
| | | | | | Low Fuel Condition Diag | = False | | |
| | | | | | Initial delay after Open Test Criteria met (cold start condition) | > 105.0 seconds when engine soak time > 28,800 seconds | | |
| | | | | | Initial delay after Open Test Criteria met (not cold start condition) | > 105.0 seconds when engine soak time ≤ 28,800 seconds | | |
| | | | | | Equivalence Ratio Fuel Control State | 0.9912 ≤ ratio ≤ 1.0098 not = Power Enrichment | | |
| | | | | | 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 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>> 27.0 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>B1S2 DTC's Not Active this key cycle<br><br>System Voltage<br>Learned heater resistance<br><br><br><br><br><br>ICAT MAT Burnoff delay<br>Green O2S Condition<br><br><br><br><br><br><br><br><br><br>Low Fuel Condition Diag<br><br>Post fuel cell (Decel)<br>Crankshaft Torque | 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<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><br>= enabled<br>< 100.0 Nm | 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | DTC's Passed<br><br>==================<br>After above conditions are met: DFCO mode is continued (wo driver initiated pedal input). | P2270 (and P2272 if applicable)<br>P013E (and P014A if applicable)<br><br>==================<br> | | |
| | | | | | | | | |

| 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) | > 8.0 units<br><br><br>> 230 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>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>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, P013E, P013F, P2270 or P2271<br><br><br>10.0 < Volts<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 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>> 27 grams<br><br><br>> 1 secs<br><br><br>> 5 grams | No Active DTC's<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>Low Fuel Condition Diag<br><br>Post fuel cell (Decel) | 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>10.0 < Volts<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><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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Crankshaft Torque<br><br>DTC's Passed<br><br>Number of fueled cylinders<br>==================<br>After above conditions are met: DFCO mode entered (wo driver initiated pedal input). | < 100.0 Nm<br><br>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>> 179 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>ICAT MAT Burnoff delay<br><br>Green O2S Condition<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>10.0 < Volts<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<br>= enabled | | |
| | | | | | DTC's Passed | P2270 (and P2272 if applicable)<br>P013E (and P014A if applicable)<br>P013A (and P013C if applicable)<br>P2271 (and P2273 if applicable) | | |
| | | | | | Number of fueled cylinders<br>==================<br>After above conditions are met: Fuel Enrich mode entered.<br>=================<br>During this test the following must stay TRUE or the test will abort: 0.96 ≤ Fuel EQR ≤ 1.01 | ≥ 1 cylinders<br>================== | | |

| 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 = 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 | > 0.4 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><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<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>> 30 seconds | | |
| | | | | | Engine Speed to initially enable test<br>Engine Speed range to keep test enabled (after initially enabled) | 1,150 ≤ RPM ≤ 2,300<br><br>1,050 ≤ 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 ≤ 11<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>≥ 60.0 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | ==================== All of the above met for at least 4.0 seconds, and then the Force Cat Rich intrusive stage is requested. ==================== Pre O2S voltage B1S1 at end of Cat Rich stage Fuel State Number of fueled cylinders ==================== After above conditions are met: DFCO Mode is entered (wo driver initiated pedal input). | ================== ================== ≥ 690 mvolts = DFCO active ≤ 3 cylinders ================== | | |
| | | | | | | | | |

| 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 | > 0.4 EWMA (sec)<br><br><br><br>≥ 1.5 Seconds<br><br><br><br>< 350 mvolts<br><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><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<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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab. | | |
| | | | | | O2 Heater (pre sensor) on for<br>Learned Htr resistance | ≥ 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>> 30 seconds | | |
| | | | | | Engine Speed to initially enable test<br>Engine Speed range to keep test enabled (after initially enabled) | 1,150 ≤ RPM ≤ 2,300<br><br>1,050 ≤ 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 ≤ 11<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>≥ 60.0 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<br>Number of fueled cylinders<br><br>================<br>When above conditions are met: Fuel Enrich mode is entered.<br><br>================<br><br>During this test: Engine Airflow must stay between:<br>and the delta Engine Airflow over 12.5msec must be : | = DFCO inhibit<br><br>≥ 1 cylinders<br><br>================<br><br><br>================<br><br><br><br>$0 ≤ gps ≤ 10$<br><br>≤ 5.0 gps | | |
| | | | | | | | | |

## 15 OBDG05 ECM Summary Tables (Initial DTCs)

| 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<br>(Note: any value below 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><br><br><br>Long Term Fuel Trim data accumulation:<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><br>Closed Loop<br>Long Term FT<br><br><br><br><br><br><br>EGR Diag.<br>Catalyst Diag.<br>Post O2 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 the diagnostic will bypass the fuel level criteria.<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>Intrusive Test Not Active<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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Device Control EVAP Diag.<br><br>No active DTC: | Not Active "tank pull down" Not Active<br><br>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 can be made up until the time that purge is first enabled. From that point forward, rich faults can only be detected by turning purge off intrusively.<br><br>Intrusive Test:<br>If the filtered Purge Long Term Fuel Trim metric > 0.800 , the test passes without intrusively checking the filtered Non-Purge Long Term Fuel Trim metric. However if the filtered Purge Long Term Fuel Trim metric is <= 0.800 , purge is ramped off to determine if excess purge vapor is the cause of the rich condition.<br><br>Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, | Passive Test: The filtered Non-Purge Long Term Fuel Trim metric<br><br>AND<br><br>The filtered Short Term Fuel Trim metric (Note: any value above 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 (Note: any value above 1.05 effectively nullifies the short-term fuel trim criteria)<br><br>Segment Def'n: Segments can last up to 35 seconds and are separated by the lesser of 30 seconds of purge-on time or enough time to | <= 0.790<br><br><br><br><br>    <= 2.000<br><br><br><br><br><br><br><br>    <= 0.800<br><br><br><br><br><br><br>    <= 0.790<br><br><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. |
|---|---|---|---|---|---|---|---|---|
| | | and the execution frequency of other diagnostics. | purge 18 grams of vapor. 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 Long Term Fuel Trim metric > 0.800 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 using an intrusive test ( see Notes) | Absolute value of fuel pressure change ( as sensed during intrusive test) | <= 30 kPa | a] Diagnostic KeFRPD_b _FPSS_DiagEnbld<br><br>b] Engine Run Time<br><br>c] Engine Fuel Flow<br><br>d] Fu Pump Control Enabled<br><br>e] Fu Pump Control State<br><br>f] Emissions Fuel Level Low<br><br>g] Validity status VeFRPD_b_FPSS_ DataIntegrityOK<br>  IF<br>[1] FRP Circuit Low Fault Active (DTC P018C)<br>[2] FRP Circuit High Fault Active (DTC P018D)<br>[3] Fu Pump Circuit Low Fault Active (DTC P0231)<br>[4] Fu Pump Circuit High Fault Active (DTC P0232)<br>[5] Fu Pump Circuit Open Fault Active (DTC P023F)<br>[6] Reference Voltage Fault Status ( DTC P0641)<br>[7] Fu Pump Control Module Driver Over-temperature Fault Active ( DTC P1255)<br>[8] Fu Pump Driver Mod | a] == TRUE<br><br>b] >= 5 sec<br><br>c] > calibration value KeFRPD_dm_StkPresMin FuelFlow ( 0.047 gram/ sec typical)<br><br>d] == TRUE<br><br>e] Normal OR Fu Pres Snsr Stk Ctrl ( rationality)<br><br>f] <> TRUE<br><br>g] == TRUE<br><br>  IF<br>[1] <> TRUE<br>[2] <> TRUE<br>[3] <> TRUE<br>[4] <> TRUE<br>[5] <> TRUE<br>[6] <> Active This Key<br>[7] <> TRUE<br><br>[8] <> TRUE | 1 sample / 12.5 millisec<br><br>Intrusive Test Duration: Fu Flow -related ( 5 to 12 sec) | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Ign Sw RunStart Pstn Ckt Low Fault Active (DTC P129D) [9] Fu Pump Driver Control Mod Enable Ckt Perf Fault Active(DTC P12A6) | [9] <> TRUE | | |
| | | | | | | | | |

| 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 | Fuel Pressure Sensor Voltage Percent, 5.0V Nominal ((Abs( 5.0V - SensorV_actual) /5.0V) *100) | < 4.00 | Ignition circuit input state | High ( Run or Crank) | 64 failures / 80 samples

1 sample/12.5 ms | Type B, 2 Trips |

| 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 | Fuel Pressure Sensor Voltage Percent, 5.0V Nominal ((Abs( 5.0V - SensorV_actual) /5.0V) *100) | > 96.00 | Ignition circuit input state | High ( Run or Crank) | 64 failures / 80 samples<br><br>1 sample/12.5 millisec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| SIDI High Pressure Sensor Performance - Single Sensor | 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 Diagnostic Enabled and SIDI High Pressure Sensor Performance Idle Test Enabled <= -1.000 MPa OR >= 1.000 MPa | Vehicle Speed<br><br>Pedal Position = 0 for<br><br>Battery Voltage<br><br>Low Pressure Fuel Pump Pressure<br><br>Engine Run Time<br><br><br><br><br><br><br>Delay counts after pump is turned off | Enabled when a code clear is not active or not exiting device control Engine is not cranking<br><br><= 0.62 MPH<br><br>200 Counts (12.5ms per count)<br><br>>= 11 Volts<br><br>>= 0.250 MPa<br><br>>= KtFHPD_t_PumpCntrlEngRunThrsh (see supporting tables)<br><br>Enabled when a code clear is not active or not exiting device control<br><br>Engine is not cranking<br><br>>= 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 Diagnostic Enabled and | ------------------ Engine Speed<br><br>Desired High Side Pressure<br><br>Vehicle Speed | ------------------ 1,000 <= RPM <= 3,000<br><br>4 <= MPa <= 6<br><br>>= 22 MPH | ------------------ KtFHPD_Cnt_SnsPrfIdlePumpOff Dly runs in 12.5 ms loopHigh Drive Test >= 160 | |

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

| 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 Diagnostic Enabled and SIDI High Pressure Sensor Performance Stuck Test Enabled <= 0.100 MPa | ------------------------------<br><br>Engine Speed<br><br>Vehicle Speed | exiting device control<br><br>Engine is not cranking<br><br>------------------------------<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) | ------------------------------<br><br>Stuck Test Engine Run Time >= KtFHPD_t_PumpCntrlEngRunThrsh (See Supporting Tables) or Accumulating engine crank time >= KtFHPD_t_SnsPrfStuckCrankTmout (See Supporting Tables) | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Barometric Pressure Inlet Air Temp Fuel Temp | not active Fuel InjCkt Not (FA or TFTKO) EST Driver Not(FA) Misfire detected 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 >= 70.0 KPA >= -20.0 DegC -20 <= Temp degC <= 125 | | |
| | | | | | | | | |

| 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 | SIDI High Pressure Sensor 1 Out of range Time Based Enabled<br><br>or<br><br>SIDI High Pressure Sensor 1 Out of range Engine Synchronous Enabled<br><br><= 5 % 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 | SIDI High Pressure Sensor 1 Out of range Time Based Enabled<br><br>or<br><br>SIDI High Pressure Sensor 1 Out of range Engine Synchronous Enabled<br><br>>= 95 % 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<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 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 <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 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 >= 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<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. |
|---|---|---|---|---|---|---|---|---|
| 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>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; 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 | Power driver output current ( Fuel Pump Power Module Driver Circuit Ground Short enumeration) | Current >= 18.0 A ( Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state) | a) FPPM configuration KeFRPR_e_ChassisFuel PresSysType<br><br>b) Diagnostic KeFRPR_b_FPPM_ DrvrGshtDiagEnbld<br><br>c) Fuel Pump Control Enable command<br><br>d) Fuel Pump Control Enable time<br><br>e) System Voltage<br><br>f] FPPM Driver Status Alive Rolling Count Sample Faulted<br><br>g] Diagnostic feedback received<br><br>h] Fuel Pump Power Module output current | a) == CeFRPR_e_ECM_FPPM _Sys<br><br>b) == TRUE<br><br>c) == TRUE<br><br>d) >= calibration value KeFRPR_Cnt_FPPM_ GshtDlyThrsh ( 0-80 sample loops)<br><br>e) 9v < System V > 32v<br><br>f] <> TRUE<br><br>g] == TRUE<br><br>h] < 75A | 64 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 Secondary Circuit High | P0232 | This DTC detects if the fuel pump control circuit is shorted to high voltage | Voltage offset relative to low state level of duty cycle pulse measured at fuel pump circuit | > 4.0 V | a)  FPPM configuration KeFRPR_e_ChassisFuel PresSysType<br><br>b)  Diagnostic KeFRPR_b_FPPM_ DrvrPshtDiagEnbld<br><br>c)  Fuel Pump Control Enabled<br><br>d]  FPPM Arbitrated Fu Pmp Duty Cycle Rate of Change<br><br>e]  System voltage<br><br>f]  FPPM Driver Status Alive Rolling Count Sample Faulted<br><br>g]  Diagnostic feedback Received | a)  == CeFRPR_e_ECM_ FPPM_Sys<br><br>b)  == TRUE<br><br>c)  == TRUE<br><br>d]  >= calibration value KeFRPR_cmp_FPPM_ PshtDC_ROC_Min<br><br>e]  9v < System V > 32v<br><br>f]  <> TRUE<br><br>g]  == TRUE | 64 failures / 80 samples<br><br>1 sample / 12.5 millisec | Type B, 2 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 | Output driver current ( Fuel Pump Power Module Driver Circuit Open  enumeration) | Current <= 1.0 A (Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate) | a)  FPPM configuration KeFRPR_e_ChassisFuel PresSysType<br><br>b) Diagnostic KeFRPR_b_FPPM_ OpenCktDiagEnbld<br><br>c) Arbitrated Fu Pmp Duty Cycle ( %)<br><br>d]  Fuel Pump Control Enable Faulted<br><br>e] FPPM Fu Pmp Driver Over-temperature Faulted<br><br>f]  FPPM Driver Status Alive Rolling Count Sample Faulted<br><br>g]  Diagnostic feedback received<br><br>h]  System Voltage | a)  == CeFRPR_e_ECM_ FPPM_Sys<br><br>b)  == TRUE<br><br>c)  > calibration value KeFRPR_Pct_FPPM_ OpenCktDC_Thrsh ( 30% - 60%)<br><br>d]  <> TRUE<br><br>e]  <> TRUE<br><br>f]  <> TRUE<br><br>g]  == TRUE<br><br>h]  9v < System V > 32v | 40 test failures / 80 test samples;<br><br>1 sample/12.5ms | 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 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<br><br>Cylinder 1 Misfire Detected<br><br>Cylinder 2 Misfire Detected<br><br>Cylinder 3 Misfire Detected<br><br>Cylinder 4 Misfire Detected | P0300<br><br><br>P0301<br><br><br>P0302<br><br><br>P0303<br><br><br>P0304 | 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. | Crankshaft Deceleration Value(s) vs. Engine Speed and Engine load<br><br>The equation used to calculate deceleration value is tailored to specific vehicle operating conditions.<br>The selection of the equation used is based on the 1st single cylinder continuous misfire threshold 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><br>SINGLE CYLINDER CONTINUOUS MISFIRE(<br>      (Medres_Decel<br>      Medres_Jerk<br><br>  OR  (Medres_Decel<br>      Medres_Jerk<br><br>  OR   (Lores_Decel<br>      Lores_Jerk<br><br>  OR   (Lores_Decel<br>      Lores_Jerk<br><br>  OR RevBalanceTime<br>) | - see details of thresholds on Supporting Tables Tab (P0300 Section)<br><br><br>> **IdleSCD_Decel** AND<br>> **IdleSCD_Jerk)**<br><br>>**SCD_Decel** AND<br>> **SCD_Jerk)**<br><br>>**IdleCyl_Decel** AND<br>> **IdleCyl_Jerk)**<br><br>>**CylModeDecel** AND<br>> **CylModeJerk)**<br><br>>**RevMode_Decel** | 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>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 ºC < ECT <  127 ºC<br>< -7 ºC<br>21 ºC < ECT <  127 ºC<br><br>9.00  < volts <  32.00<br>< 95.00 % per 25 ms<br>< 95.00 % per 25 ms<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><br>OR<br>when Early Termination Reporting = Enabled and engine rev > 1,000  revs and < 3,200 revs at end of trip<br><br><br>any Catalyst Exceedence = ( 1 ) 200 rev block as data supports for catalyst damage. | Type B, 2 Trips (Mil Flashes with Catalyst damage level of Misfire) |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Other patterns of misfire use adjustments to the single cylinder continuous misfire threshold tables:<br><br>RANDOM MISFIRE<br> Use random misfire thresholds If no misfire for<br><br>    (Medres_Decel<br><br>         AND<br>    Medres_Jerk)<br><br><br>OR    (Medres_Decel<br><br>         AND<br>    Medres_Jerk)<br><br><br>OR    (Lores_Decel<br><br>         AND<br>    Lores_Jerk)<br><br><br>OR    (Lores_Decel<br><br>         AND<br>    Lores_Jerk)<br><br><br>OR RevBalanceTime | > 6 Engine Cycles<br><br>> **IdleSCD_Decel** * **Random_SCD_Decel**<br><br>> **IdleSCD_Jerk** * **Random_SCD_Jerk**<br><br><br>> **SCD_Decel** * **Random_SCD_Decel**<br><br> > **SCD_Jerk** * **Random_SCD_Jerk**<br><br><br>> **IdleCyl_Decel** * **RandomCylModDecel**<br><br> > **IdleCyl_Jerk** * **RandomCylModeJerk**<br><br><br>> **CylModeDecel** * **RandomCylModDecel**<br><br>> **CylModeJerk** * **RandomCylModeJerk**<br><br><br>> **RevMode_Decel** * **RandomRevModDecl** | | | Catalyst Failure reported with (1 or 3) Exceedences in FTP, or (1) Exceedence outside FTP.<br><br>Continuous | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | PAIRED CYLINDER MISFIRE<br>If a cylinder & it's pair are above PAIR thresholds<br>      (Medres_Decel<br><br>      AND<br>    Medres_Jerk)<br><br><br>OR    (Medres_Decel<br><br>      AND<br>    Medres_Jerk)<br><br><br>OR    (Lores_Decel<br><br>      AND<br>    Lores_Jerk)<br><br><br>OR    (Lores_Decel<br><br>      AND<br>    Lores_Jerk)<br><br>OR (Revmode Active AND (within one engine cycle: 2nd largest Lores_Decel)<br><br>      AND<br>  Above TRUE for) ) | $>$ **IdleSCD_Decel** * **Pair_SCD_Decel**<br><br>$>$ **IdleSCD_Jerk** * **Pair_SCD_Jerk**<br><br>$>$ **SCD_Decel** * **Pair_SCD_Decel**<br><br>$>$ **SCD_Jerk** * **Pair_SCD_Jerk**<br><br>$>$ **IdleCyl_Decel** * **PairCylModeDecel**<br><br>$>$ **IdleCyl_Jerk** * **PairCylModeJerk**<br><br>$>$ **CylModeDecel** * **PairCylModeDecel**<br><br>$>$ **CylModeJerk** * **PairCylModeJerk**<br><br>$>$ **CylModeDecel** * **PairCylModeDecel**<br><br>$>$ 50 engine cycles out of 100 engine cycles | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | BANK MISFIRE<br>    Cylinders above<br>    Bank Thresholds<br><br>    (Medres_Decel<br><br>    AND<br>    Medres_Jerk)<br><br><br>OR   (Medres_Decel<br><br>    AND<br>    Medres_Jerk)<br><br><br>OR    (Lores_Decel<br><br>    AND<br>    Lores_Jerk)<br><br><br>OR   (Lores_Decel<br><br>    AND<br>    Lores_Jerk)<br><br><br>CONSECUTIVE<br>CYLINDER MISFIRE<br>    1st cylinder uses<br>    single cyl continuous<br>    misfire thresholds;<br>    2nd Cylinder uses:<br>    (Medres_Decel | >= 4 cylinders<br><br>> **IdleSCD_Decel** *<br>  **Bank_SCD_Decel**<br><br>> **IdleSCD_Jerk** *<br>  **Bank_SCD_Jerk**<br><br><br>> **SCD_Decel** *<br>  **Bank_SCD_Decel**<br><br>> **SCD_Jerk** *<br>  **Bank_SCD_Jerk**<br><br><br>> **IdleCyl_Decel** *<br>  **BankCylModeDecel**<br><br>> **IdleCyl_Jerk** *<br>  **BankCylModeJerk**<br><br><br>> **CylModeDecel** *<br>  **BankCylModeDecel**<br><br>> **CylModeJerk** *<br>  **BankCylModeJerk**<br><br><br><br><br>> **IdleSCD_Decel** *<br>  **ConsecSCD_Decel** | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | AND Medres_Jerk) | > **IdleSCD_Jerk** * **ConsecSCD_Jerk** | | | | |
| | | | OR (Medres_Decel AND Medres_Jerk) | > **SCD_Decel** * **ConsecSCD_Decel** <br> > **SCD_Jerk** * **ConsecSCD_Jerk** | | | | |
| | | | OR (Lores_Decel AND Lores_Jerk) | > **IdleCyl_Decel** * **ConsecCylModDecel** <br> > **IdleCyl_Jerk** * **ConsecCylModeJerk** | | | | |
| | | | OR (Lores_Decel AND Lores_Jerk) | > **CylModeDecel** * **ConsecCylModDecel** <br> > **CylModeJerk** * **ConsecCylModeJerk** | | | | |
| | | | CYLINDER DEACTIVATION MODE (Active Fuel Managment) <br><br> AFM: SINGLE CYLINDER CONTINUOUS MISFIRE (CylAfterDeacCyl_Decel AND CylAfterDeacCyl_Jerk) <br><br> OR | > **CylModeDecel** * **ClyAfterAFM_Decel** <br> > **CylModeJerk** * **CylAfterAFM_Jerk** <br> > **CylModeDecel** * | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | (CylBeforeDeacCylDecel AND CylBeforeDeacCyl_Jerk) | **CylBeforeAFM_Decel** > **CylModeJerk * ClyBeforeAFM_Jerk** | | | | |
| | | | AFM: RANDOM MISFIRE Use random misfire thresholds If no misfire for (CylAfterDeacCyl_Decel AND CylAfterDeacCyl_Jerk) | > 6 Engine Cycles > **CylModeDecel * ClyAfterAFM_Decel * RandomAFM_Decl** > **CylModeJerk * CylAfterAFM_Jerk * RandomAFM_Jerk** | | | | |
| | | | (CylBeforeDeacCylDecel AND CylBeforeDeacCyl_Jerk) | > **CylModeDecel * ClyAfterAFM_Decel * RandomAFM_Decl** > **CylModeJerk * CylAfterAFM_Jerk * RandomAFM_Jerk** - see details on Supporting Tables Tab (P0300 Section) | | | | |
| | | | Misfire Percent Emission Failure Threshold | ≥ 0.63 % P0300 | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Misfire Percent Catalyst Damage<br><br>When engine speed and load are less than the FTP cals (3) catalyst damage exceedences are allowed. | > **Catalyst_Damage_ Misfire_Percentage** in Supporting Tables whenever secondary conditions are met.<br><br>≤ 0 FTP rpm AND<br>≤ 0 FTP % load<br><br><br>disable conditions: | (at low speed/loads, one cylinder may not cause cat damage)<br>Engine Speed<br>Engine Load<br>Misfire counts | > 1,400 rpm AND<br>> 18 % load AND<br>< 180 counts on one cylinder | | |
| | | | | | Engine Speed | 500 < rpm < ((Engine Over Speed Limit) - 150<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 | 4 cycle delay | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | CamLctnIntFA CamLctnExhFA CamSensorAnyLctnTFTKO AnyCamPhaser_FA AnyCamPhaser_TFTKO AmbPresDfltdStatus | | | |
| | | | | | 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 | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Manual Trans | Clutch shift | 4 cycle delay | |
| | | | | | Accel Pedal Position AND Automatic transmission shift | > 100.00 % | 7 cycle delay | |
| | | | | | | | 2 Cylinder delay | |
| | | | | | After Fuel resumes on Automatic shift containing Fuel Cut | | | |
| | | | | | 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.<br>    Filter Driveline ring: | > "**Ring Filter**" # of engine cycles after misfire in Supporting Tables | | |
| | | | | |     Stop filter early: | > "**Number of Normals**" # of engine cycles after misfire in Supporting Tables tab | | |
| | | | | | ABNORMAL ENGINE SPEED OSCILLATION: (checks each "misfire" candidate in 100 engine Cycle test to see if it looks like some disturbance like rough road (abnormal). ) | | | |
| | | | | | Used Off Idle, and while not shifting,<br>    TPS<br>    Engine Speed<br>    Veh Speed<br>    Auto Transmission | > 3 %<br>> 1,000 rpm<br>> 3 mph<br>not shifting | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | indivdual candidate deemed abnormal if number of consecutive decelerating cylinders after "misfire": (Number of decels can vary with misfire detection equation)<br><br>Consecutive decels while in    SCD Mode<br>                Cyl Mode<br>                Rev Mode<br><br>At the end of 100 engine cycle test, the ratio of abnormal/candidate is checked to confirm if real misfire is present within the 100 engine cycles.<br><br>abnormal candidates/ total candidates | **> Abnormal SCD Mode**<br>**> Abnormal Cyl Mode**<br>**> Abnormal Rev Mode**<br>in Supporting Tables<br><br><br>> 0.50 ratio | <br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>discard 100 engine cycle test | |
| | | | | | MISFIRE CRANKSHAFT PATTERN RECOGNITION checks each "misfire" candidate in 100 engine Cycle test to see if overall crankshaft pattern looks like real misfire (recognized), or some disturbance like rough road (unrecognized). | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | At the end of 100 engine cycle test, the ratio of unrecog/recognized is checked to confirm if real misfire is present within the 100 engine cycles. Typically used for checking a single misfire per engine cycle but can support some other patterns on some packages | | | |
| | | | | | Pattern Recog Enabled: | Enabled | | |
| | | | | | Pattern Recog Enabled during Cylinder Deac | Not Enabled | | |
| | | | | | Pattern Recog Enabled consecutive cyl pattrn | Enabled | | |
| | | | | | Engine Speed<br>Veh Speed | 700 < rpm < 6,800<br>> 0.6 mph | | |
| | | | | | The 1st check for "recognized" is the 1st fired cylinder after the misfire candidate should both accelerate and jerk an amount based acceleration and jerk of Single Cylinder Misfire thresholds in effect at that speed and load.<br>(CylAfter_Accel AND | > Misfire_ decel * **1st_FireAftrMisfr_Acel** | | |
| | | | | | CylAfter_Jerk) | > Misfire_Jerk * **1st_FireAftrMisfr_Jerk** | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Addtionally, the crankhaft is checked again a small calibratible number of cylinders later to see if the distrubance is still large like rough road, or has calmed down like real misfire. The size of disturbance is compared to a multiplier times the ddt_jerk value used to detect misfire at that speed and load. If there is repetitive misfire on consecutive engine cycles, the expected snap is adjusted due to the higher expected disturbance. | | | |
| | | | | | Num of Cylinders after misfire to start check of crankshaft snap | 2 Cylinders | | |
| | | | | | "misfire" recognized if: Crankshaft snap after: isolated "misfire" | < Misfire_Jerk * **SnapDecayAfterMisfire** | | |
| | | | | | repetative "misfire" | < Misfire_Jerk * **SnapDecayAfterMisfire * RepetSnapDecayAdjst** in Supporting Tables | discard 100 engine cycle test | |
| | | | | | At the end of 100 engine cycle test, the ratio of unrecog/recognized is checked to confirm if real misfire is present. | | | |
| | | | | | Ratio of Unrecog/Recog | > 0.90 | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | : NON-CRANKSHAFT BASED ROUGH ROAD:<br><br>Rough Road Source<br><br>IF Rough Road Source = WheelSpeedInECM<br>ABS/TCS<br>Wheel speed noise<br>VSES<br><br>IF Rough Road Source = "FromABS"<br>ABS/TCS<br>RoughRoad<br>VSES<br><br>IF Rough Road Source = "TOSS"<br>TOSS dispersion<br><br>AND No Active DTCs | Disabled<br><br>TOSS<br><br>active<br>> **WSSRoughRoadThres**<br>active<br><br><br>active<br>detected<br>active<br><br><br>>**TOSSRoughRoadThres**<br>in supporting tables<br><br>Transmission Output Shaft Angular Velocity Validity TransmissionEngagedState_FA (Auto Trans only) ClutchPstnSnsr FA (Manual Trans only) | discard 100 engine cycle test<br><br>discard 100 engine cycle test<br><br><br><br>discard 100 engine cycle test<br><br><br>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: 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? Engine Run Time Engine Speed Engine Air Flow ECT IAT | Yes ≥ 2.0 seconds ≤ 8,500 RPM ≥ 40 mg/cylinder and ≤ 2,000 mg/cylinder ≥ -40 deg's C ≥ -40 deg's C | | Type B, 2 Trips |
| | | | Specific Enable Criteria and Thresholds for 3 individual parts of the performance diag: -------------------- | | | | First Order Lag Filters with Weight Coefficients -------------- | |
| | | | 1. Excessive Knock Diag: Filtered Knock Intensity VaKNKD_k_PerfCylKnockIntFilt (where 'Knock Intensity' = 0 with no knock; and > 0 & proportional to knock magnitude with knock) -------------------- | > 3.00 (no units) | Engine Speed Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle) -------------------- | ≥ 600 RPM ≥ 100 Revs -------------------- | Excessive Knk Weight Coefficient = 0.0400 Updated each engine event -------------- | |
| | | | 2. Abnormal Noise Diag: Filtered FFT Intensity (where 'FFT Intensity' = Non-knocking, background noise) | < **P0324_P0326_P0331_ AbnormalNoise_Threshold** (Supporting Table) | Individual Cylinders enabled for Abnormal Noise Engine Speed Cumlative Number of Engine Revs Above Min | **P0324_P0326_P0331_AbnormalNoise_CylsEnabled** (1 = cylinder enabled, 0 = cylinder not enabled) ≥ 8,500 RPM ≥ 400 Revs | Abn Noise Weight Coefficient = 0.0100 Updated each engine event | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Eng Speed (per key cycle) | | | |
| | | | 3. Flat Signal Diag: Filtered Signal Delta (Current FFT Intensity - Ave_Intensity_No-Knock)  VaKNKD_k_PerfCylFlatFiltInt | < 0.008 (no units) | Engine Speed  Cumlative Number of Engine Revs Above Min Eng Speed (per keycycle) | ≥ 8,500 RPM  ≥ 400 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 Bank 1 | P0325 | This diagnostic checks for an open in the knock sensor circuit.<br><br>There are two possible methods used:<br>1. 20 kHz<br>2. Normal Noise<br><br>See **Supporting Tables** for method definition: **P0325_P0330_OpenMethod**<br><br>Typical implementations:<br>A. Use 20 kHz method at all RPM (used when acceptable separation achieved at all RPM) or<br>B. Use 20 kHz method at low/medium RPM and Normal Noise at high RPM | **Open Circuit Method chosen** (2 possible methods: 20 kHz or Normal Noise):<br><br>**Thresholds for OpenMethod = 20 kHZ**<br><br>Filtered FFT Output<br><br>**Thresholds for OpenMethod = NormalNoise:**<br><br>Filtered FFT Output | Supporting Table: **P0325_P0330_OpenMethod_2**<br><br>(See Supporting Tables)<br><br>**>** **P0325_P0330_OpenCktThrshMin (20 kHz) AND** **<** **P0325_P0330_OpenCktThrshMax (20 kHz)**<br><br>**>** **P0325_P0330_OpenCktThrshMin (Normal Noise) AND** **<** **P0325_P0330_OpenCktThrshMax (Normal Noise)** | Diagnostic Enabled?<br><br>Engine Run Time<br><br>Engine Speed<br><br>Cumulative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above)<br><br>Engine Air Flow<br><br>ECT<br><br>IAT | Yes<br><br>≥ 2.0 seconds<br><br>≥ 600 RPM and ≤ 8,500 RPM<br><br>≥ 200 revs<br><br>≥ 40 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 = 0.0100<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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |

| 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<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) | | Diagnostic Enabled?<br><br>Engine Run Time<br><br>Engine Speed<br><br>Engine Air Flow<br><br><br><br>ECT<br><br>IAT | Yes<br><br>$\geq 2.0$ seconds<br><br>$\leq 8,500$ RPM<br><br>$\geq 40$ mg/cylinder<br>and<br>$\leq 2,000$ mg/cylinder<br><br>$\geq -40$ deg's C<br><br>$\geq -40$ deg's C | | Type B, 2 Trips |
| | | | Specific Enable Criteria and Thresholds for 3 individual parts of the performance diag: | | | | First Order Lag Filters with Weight Coefficients | |
| | | | 1. Excessive Knock Diag: Filtered Knock Intensity<br><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) | $\geq 8,500$ RPM<br><br>$\geq 200$ Revs | Excessive Knk Weight Coefficient =<br><br> 0.0100<br><br>Updated each engine event | |
| | | | 2. Abnormal Noise Diag:<br><br>Filtered FFT Intensity:<br>(where 'FFT Intensity' = Non-knocking, background noise) | <<br>**P0324_P0326_P0331_AbnormalNoise_Threshold**<br>(Supporting Table) | Individual Cylinders enabled for Abnormal Noise<br><br><br><br>Engine Speed<br><br>Cumlative Number of Engine Revs Above Min | **P0324_P0326_P0331_AbnormalNoise_CylsEnabled**<br>(Supporting Table)<br><br>$\geq 2,200$ RPM<br><br>$\geq 200$ Revs | Abnormal Noise Weight Coefficient =<br><br> 0.0100<br><br>Updated each engine event | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | 3. Flat Signal Diag: Filtered Signal Delta (Current FFT Intensity - Ave_Intensity_No-Knock) | < 0.008 (no units) | Eng Speed (per key cycle)<br><br>Engine Speed<br><br>Cumlative Number of Engine Revs Above Min Eng Speed (per keycycle) | ≥ 8,500 RPM<br><br>≥ 200 Revs | Flat Signal Weight Coefficient =<br><br>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 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,<br>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 (of 5 Volt Reference) | Diagnostic Enabled? Engine Speed | Yes > 0 RPM and < 8,500 RPM | 50 Failures out of 63 Samples 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<br><br>There are two possible methods used:<br> 1. 20 kHz<br> 2. Normal Noise<br><br>See **Supporting Tables** for method definition: **P0325_P0330_OpenMethod**<br><br>Typical implementations:<br> A. Use 20 kHz method at all RPM (used when acceptable separation achieved at all RPM) or<br> B. Use 20 kHz method at low/medium RPM and Normal Noise at high RPM | **Open Circuit Method chosen** (2 possible methods: 20 kHz or Normal Noise):<br><br><br>**Thresholds for OpenMethod = 20 kHZ**<br><br>Filtered FFT Output<br><br><br><br><br>**Thresholds for OpenMethod = NormalNoise:**<br><br>Filtered FFT Output | Supporting Table: **P0325_P0330_OpenMethod_2**<br><br><br>(See Supporting Tables)<br><br><br>><br>**P0325_P0330_OpenCktThrshMin (20 kHz)**<br>AND<br><<br>**P0325_P0330_OpenCktThrshMax (20 kHz)**<br><br><br><br>><br>**P0325_P0330_OpenCktThrshMin (Normal Noise)**<br>AND<br><<br>**P0325_P0330_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><br>Engine Air Flow<br><br><br><br><br>ECT<br><br>IAT | Yes<br><br>≥ 2.0 seconds<br><br>≥ 600 RPM<br>    and<br>≤ 8,500 RPM<br><br>≥ 200 revs<br><br><br><br><br>≥ 40 mg/cylinder<br>    and<br>≤ 2,000 mg/cylinder<br><br><br>≥ -40 deg's C<br><br>≥ -40 deg's C | First Order Lag Filter with Weight Coefficient<br><br>Weight Coefficient = 0.0100<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><br><br>ECT<br><br>IAT | Yes<br><br>≥ 2.0 seconds<br><br>≤ 8,500 RPM<br><br>≥ 40 mg/cylinder<br>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: | | | | First Order Lag Filters with Weight Coefficients | |
| | | | 1. Excessive Knock Diag: Filtered Knock Intensity<br><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) | ≥ 8,500 RPM<br><br>≥ 200 Revs | Excessive knk Weight Coefficient =<br><br>0.0100<br><br>Updated each engine event | |
| | | | 2. Abnormal Noise Diag:<br><br>Filtered FFT Intensity:<br><br><br>(where 'FFT Intensity' = Non-knocking, background noise) | <<br>**P0324_P0326_P0331_ AbnormalNoise_Thre shold**<br>(Supporting Table) | Individual Cylinders enabled for Abnormal Noise<br><br><br>Engine Speed<br><br>Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle) | **P0324_P0326_P0331_Ab normalNoise_CylsEnabl ed**<br>(Supporting Table)<br><br>≥ 2,200 RPM<br><br>≥ 200 Revs | Abnormal Noise Weight Coefficient =<br><br>0.0100<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 Speed<br><br>Cumlative Number of Engine Revs Above Min Eng Speed (per keycycle) | - - - - - - - - - - - - - - - - - - -<br>≥ 8,500 RPM<br><br>≥ 200 Revs | - - - - - - - - - - -<br><br>Flat Signal Weight Coefficient = 0.010 Updated each engine event | |
| | | | | | | | | |

**15 OBDG05 ECM Summary Tables (Initial DTCs)**

| 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<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 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 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 ( MAF_SensorFA AND Engine Air Flow | = FALSE<br><br>> 3.0 grams/second ) ) | Continuous every 100 msec | Type B, 2 Trips |
| | | | No crankshaft pulses received | >= 1.0 seconds | Engine is Running<br><br>Starter is not engaged | | Continuous every 12.5 msec | |
| | | | No crankshaft pulses received | | Engine is Running OR Starter is engaged<br><br>No DTC Active: | P0365 P0366 | 2 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. |
|---|---|---|---|---|---|---|---|---|
| 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>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 | | Continuous every 12.5 msec | |
| | | | Time since starter engaged without detecting crankshaft synchronization gap | >= 1.5 seconds | Starter engaged AND (cam pulses being received OR ( MAF_SensorFA AND Engine Air Flow | = FALSE<br><br>> 3.0 grams/second ) ) | Continuous every 100 msec | |
| | | | Crank pulses received in one engine revolution OR Crank pulses received in one engine revolution | < 51<br><br>> 65 | Engine is Running OR Starter is engaged<br><br>No DTC Active: | P0365 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>>= 4.0 seconds | Starter engaged AND (crank pulses being received OR ( MAF_SensorFA AND Engine Air Flow | = 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 | | 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: | 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: | 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: | 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: | 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. |
|---|---|---|---|---|---|---|---|---|
| Crankshaft Position Sensor - Crankshaft Start Position Incorrect | P034A | Monitors the position of the crankshaft during a hybrid auto-start to verify that the sensor has reported the crankshaft position properly. | Crankshaft position is in error by a number of crankshaft wheel teeth | > 2 crankshaft teeth | Engine has started rotating during a hybrid auto-start<br><br>Crankshaft position is being verified<br><br>No Active DTCs: | CrankSensorFA | 2 failures out of 3 samples<br><br>a sample occurs each time the engine is started | Type B, 2 Trips |
| | | | Crankshaft position is in error by at least one crankshaft wheel tooth | | Engine has started rotating during a hybrid auto-start<br><br>Crankshaft position is being verified<br><br>No Active DTCs: | CrankSensorFA | 4 failures out of 5 samples<br><br>a sample occurs each time the engine is started | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Crankshaft Position Sensor - Crankshaft Direction Incorrect | P034B | The Crankshaft Direction Incorrect test monitors the number of crankshaft reversals reported by a bi-directional crank sensor. | Number of crankshaft sensor reversals<br><br>within a period of time | >= 3<br><br><= 10.0 seconds | Engine Speed<br>Engine Speed<br>Engine Air Flow<br><br>Engine Movement Detected<br><br>No Active DTCs: | > 400 RPM<br>< 2,000 RPM<br>>= 3.0 g/s<br><br><br><br>CrankSensorFA | Continuous<br><br>Every 250 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| IGNITION CONTROL #1 CIRCUIT | P0351 | Diagnoses Cylinder #1 Ignition Control (EST) output driver circuit for an Open Circuit fault. | High impedance during driver high state (indicates open circuit) | ≥ 30 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 |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| IGNITION CONTROL #2 CIRCUIT | P0352 | Diagnoses Cylinder #2 Ignition Control (EST) output driver circuit for an Open Circuit fault. | High impedance during driver high state (indicates open circuit) | ≥30 kΩ impedance between signal and controller ground | Engine running<br><br>Ignition Voltage | > 5.00 Volts | 50 Failures<br><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. |
|---|---|---|---|---|---|---|---|---|
| IGNITION CONTROL #3 CIRCUIT | P0353 | Diagnoses Cylinder #3 Ignition Control (EST) output driver circuit for an Open Circuit fault. | High impedance during driver high state (indicates open circuit) | ≥ 30 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 |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| IGNITION CONTROL #4 CIRCUIT | P0354 | Diagnoses Cylinder #4 Ignition Control (EST) output driver circuit for an Open Circuit fault. | High impedance during driver high state (indicates open circuit) | ≥ 30 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 |

| 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 OR Time that starter has been engaged without a camshaft sensor pulse | >= 5.5 seconds >= 4.0 seconds | Starter engaged AND (crank pulses being received OR ( MAF_SensorFA AND Engine Air Flow | = FALSE > 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 Starter is not engaged | | Continuous every 100 msec | |
| | | | No camshaft pulses received during first 12 MEDRES events (There are 12 MEDRES events per engine cycle | | 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: | CrankSensor_FA | Continuous every MEDRES event | |
| | | | The number of camshaft pulses received during 100 engine cycles | = 0 | Crankshaft is synchronized No DTC Active: | CrankSensor_FA | 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. |
|---|---|---|---|---|---|---|---|---|
| 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: | 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: | 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. |
|---|---|---|---|---|---|---|---|---|
| Catalyst System Low Efficiency Bank 1 | P0420 | NOTE:  The information below applies to applications that use the Decel Catalyst Monitor Algorithm<br><br>Oxygen StorageThe 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 Rich (intrusive rich) and Lean (decel fuel cutoff)  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 | Normalized Ratio OSC Value (EWMA filtered) | < 0.35 | All enable criteria associated with P0420 can be found under P2270 - (O2 Sensor Signal Stuck Lean Bank 1 Sensor 2)<br><br>Rapid Step Response (RSR) feature will initiate multiple tests:<br><br>If the difference between current EWMA value and the current OSC Normalized Ratio value is<br><br>and the current OSC Normalized Ratio value  is<br><br>Maximum number of RSR tests to detect failure when RSR is enabled.<br><br>General Enable Criteria<br><br>In addition to the p-codes listed under P2270, the following DTC's shall also not be set: | <br><br><br><br><br><br><br><br><br><br> > 0.42<br><br> < 0.10<br><br><br><br> 6<br><br><br><br><br><br><br><br><br><br>O2S_Bank_1_Sensor_1_ FA<br>O2S_Bank_1_Sensor_2_ FA<br>O2S_Bank_2_Sensor_1_ FA<br>O2S_Bank_2_Sensor_2_ FA | 1 test attempted per valid decel period<br><br>Minimum of 1 test per trip<br><br>Maximum of 3 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. |
|---|---|---|---|---|---|---|---|---|
| | | table (based on temp and exhaust gas flow) 3. WorstPassing OSC value (based on temp and exhaust gas flow)<br><br>Normalized Ratio Calculation = (1-2) / (3-2)<br><br>A Normalized Ratio of 1 essentially represents a good part and a ratio of 0 essentially represents a very bad part.<br><br>Refer to the **P0420_WorstPassing OSCTableB1** and **P0420_BestFailingOS CTableB1** in Supporting Tables tab for details<br><br>The Catalyst Monitoring Test is completed during a decel fuel cutoff event. This fuel cutoff event occurs following a rich instrusive fueling event initiated by the O2 Sensor Signal Stuck Lean Bank 1 Sensor 2 test (P2270). Several conditions must be met in order to execute this test.<br><br>These conditions and their related values are listed in the "Secondary | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | Parameters" and "Enable Conditions" section of this document for P2270 (O2 Sensor Signal Stuck Lean Bank 1 Sensor 2) | | | | | | |
| | | | | | | | | |

| 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>(No ELCP - Conventional EVAP Diagnostic with EAT using IAT Sensor) | 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>≤ 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>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>≥ 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>> 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>****************************<br>1.  High Fuel Volatility<br><br>During the volatility phase, pressure in the fuel tank is integrated vs. volatility time.  If the integrated pressure is then test aborts and unsuccessful attempts is incremented.  This value equates to an average integrated fuel tank pressure >  1,245 Pa. Please see **P0442: Volatility Time as a Function of Estimate of Ambient Temperature** in Supporting Tables.<br><br>OR<br>2.  Vacuum Refueling Detected<br><br><br>See P0454 Fault Code for information on vacuum refueling algorithm.<br><br>OR<br>3.  Fuel Level Refueling | ****************************<br><br><br><br><br><br><br><br>< -5 | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Detected<br><br>See P0464 Fault Code for information on fuel level refueling.<br><br>OR<br>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 | | 0.50 seconds | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | No active DTCs: | MAF_SensorFA<br>ECT_Sensor_FA<br>IAT_SensorFA<br>VehicleSpeedSensor_FA<br>IgnitionOffTimeValid<br>AmbientAirDefault<br><br>P0443<br>P0446<br>P0449<br>P0452<br>P0453<br>P0455<br>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)  (No ELCP - Conventional EVAP Diagnostic - For 3 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) | Open circuit: ≥ 200 K Ω impedence between signal and controller ground | PT Relay Voltage | Voltage ≥ 11.0 volts | 20 failures out of 25 samples  250 ms / sample | Type B, 2 Trips  Note: In certain controllers P0458 may also set (Canister Purge Solenoid Short to Ground) |

| 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>(No ELCP - Conventional EVAP Diagnostic) | 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 60 seconds<br><br>> 1,245 Pa 60 seconds<br><br><br><br>> 2,989 Pa 5 seconds ≥ 10 liters | Fuel Level System Voltage<br><br>Startup IAT<br><br>Startup ECT BARO<br><br><br>No active DTCs: | 10 % ≤ Percent ≤ 90 % 11 volts ≤ Voltage ≤ 32 volts<br>4 °C ≤ Temperature ≤ 30 °C<br>≤ 35 °C<br>≥ 70 kPa<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)<br><br>(No ELCP - Conventional EVAP Diagnostic - For 3 DTC Implementation Only) | P0449 | Diagnoses the vent solenoid low side driver circuit for circuit faults. | Voltage low during driver off state (indicates open circuit) | Open circuit: ≥ 200 K Ω impedence between signal and controller ground | | | 20 failures out of 25 samples<br><br>250 ms / sample | Type B, 2 Trips<br><br>Note: In certain controllers P0498 may also set (Vent Solenoid Short to Ground) |

| 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 (No ELCP - Conventional EVAP Diagnostic) | 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. | 0.2 volts<br><br>0.2 volts<br><br>> 0.73 (EWMA Fail Threshold),<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 Run length is 2 trips after code clear or non-volatile reset |

# 15 OBDG05 ECM Summary Tables (Initial DTCs)

| 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 (No ELCP - Conventional EVAP Diagnostic) | 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>(No ELCP - Conventional EVAP Diagnostic) | 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 (No ELCP - Conventional EVAP Diagnostic) | 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 during a 600 second refueling rationality test. | > 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 (No ELCP - Conventional EVAP Diagnostic) | 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. |
|---|---|---|---|---|---|---|---|---|
| Evaporative Emission System Purge Control Valve Circuit Low (No ELCP - Conventional EVAP Diagnostic) | P0458 | Diagnoses the canister purge solenoid low side driver circuit for circuit faults | Voltage low during driver off state (indicates short to ground) | Short to ground: ≤ 0.5 Ω impedence between signal and controller ground | PT Relay Voltage | Voltage ≥ 11.0 volts | 20 failures out of 25 samples 250 ms / sample | Type B, 2 Trips Note: In certain controllers P0443 may also set (Canister Purge Solenoid Open Circuit) |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Evaporative Emission System Purge Control Valve Circuit High<br><br>(No ELCP - Conventional EVAP Diagnostic) | P0459 | Diagnoses the canister purge solenoid low side driver circuit for circuit faults | Voltage high during driver on state (indicates short to power) | 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. |
|---|---|---|---|---|---|---|---|---|
| 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>(No ELCP - Conventional EVAP Diagnostic) | 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, if a refueilng event is not confirmed, then the test sample is considered failing which indicates an intermittent signal problem.<br><br>An intermittent fuel level signal problem is defined as:<br><br>The fuel level changes by and does not remain for 30 seconds during a 600 second refueling rationality test. | > 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  100 ms / sample | Type B, 2 Trips  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>(No ELCP - Conventional EVAP Diagnostic) | 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. |
|---|---|---|---|---|---|---|---|---|
| Evaporative Emission System Vent Solenoid Control Circuit Low (No ELCP - Conventional EVAP Diagnostic) | P0498 | Diagnoses the vent solenoid low side driver circuit for circuit faults. | Voltage low during driver off state (indicates short to ground) | Short to ground: ≤ 0.5 Ω impedence between signal and controller ground | | | 20 failures out of 25 samples<br><br>250 ms / sample | Type B, 2 Trips<br><br>Note: In certain controllers P0449 may also set (Vent Solenoid Open Circuit) |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Evaporative Emission System Vent Solenoid Control Circuit High (No ELCP - Conventional EVAP Diagnostic) | P0499 | Diagnoses the vent solenoid low side driver circuit for circuit faults. If the P0499 is active, an intrusive test is performed with the vent solenoid commanded closed for 15 seconds. | Voltage low during driver on state (indicates short to power) | Short to power: ≤ 0.5 Ω impedence between signal and controller power | | | 20 failures out of 25 samples 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. |
|---|---|---|---|---|---|---|---|---|
| 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_EngCoolHotHiThresh ( 125 °C) | 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 mph | | |
| | | | | | 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | All of the above met for Idle time | TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA FuelLevelDataFault LowFuelConditionDiagnostic Clutch Sensor FA AmbPresDfltdStatus P2771<br><br>> 5 sec<br><br>The diagnostic does not run during autostop as engine is shutdown during that time (occurs in a hybrid or 12v start stop vehicle) | | |
| | | | | | | | | |

| 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) | 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 mph | | |
| | | | | | 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | 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 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | All of the above met for Idle time | FuelLevelDataFaultLow FuelConditionDiagnostic Clutch SensorFA AmbPresDfltdStatus P2771<br><br>> 5 sec<br><br>The diagnostic does not run during autostop as engine is shutdown during that time (occurs in a hybrid or 12v start stop vehicle) | | |
| | | | | | | | | |

| 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>Accel Position<br><br>Engine Run Time<br><br>For the engine speeds and loads in which Dual Pulse is active: | = 0<br><br>< 500.00 degC<br>> -12.00 degC<br><= 56.00 degC<br>>= 75.00 KPa<br><br>>= 250.00 RPM<br><= 3,000.00 RPM<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 | >= 1,000.00 degC >= 17.50 seconds | | |
| | | | | | OR | | | |
| | | | | | Engine Run Time | > **CatalystLightOffExtendedEngineRunTimeExit** This Extended Engine run time exit table is a function of percent ethanol and Catmons NormRatioEWMA. Refer to "Supporting Tables" for details. | | |
| | | | | | OR | | | |
| | | | | | Barometric Pressure | < 75.00 KPa | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Dual Pulse Strategy will 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 | | |
| | | | | | Dynamic Power Enrichment | Not Active | | |
| | | | | | Piston Protection | Not Active | | |
| | | | | | Hot Coolant Enrichment | Not Active | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Injector Flow Test<br><br>General Enable<br><br>DTC's Not Set: | Not Active<br><br><br><br>AcceleratorPedalFailure<br>ECT_Sensor_FA<br>IAT_SensorCircuitFA<br>MnfdTempSensorCktFA<br>CrankSensorFaultActive<br>FuelInjectorCircuit_FA<br>MAF_SensorFA<br>MAP_SensorFA<br>AnyCamPhaser_TFTKO<br>ClutchPstnSnsr FA<br>IAC_SystemRPM_FA<br>IgnitionOutputDriver_FA<br>TPS_FA<br>VehicleSpeedSensor_FA<br>FuelInjectorCircuit_TFTKO<br>FHPR_b_FRP_SnsrCkt_FA<br>FHPR_b_FRP_SnsrCkt_TFTKO<br>FHPR_b_PumpCkt_FA<br>FHPR_b_PumpCkt_TFTKO<br>TransmissionEngagedState_FA<br>EngineTorqueEstInaccurate<br>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 - Two Stage Oil Pump | P0521 | Determines if the Engine Oil Pressure (EOP) Sensor is stuck or biased in range | **Two Stage Oil Pump EOP Sensor Test with Engine Running**<br><br>If enabled:<br><br><br>To Fail when previously passing with the engine running:<br><br>Filtered Engine Oil Pressure below expected threshold<br><br>OR<br><br>Filtered Engine Oil Pressure above expected threshold<br><br><br>To pass when previously failing:<br><br>Filtered Engine Oil Pressure above low threshold plus an offset<br><br><br>OR<br><br>Filtered Engine Oil Pressure below high threshold minus an offset | Filtered Oil Pressure $\leq$ **LowMinOilPresFail** (Details on Supporting Tables Tab)<br><br>OR<br><br>Filtered Oil Pressure $\geq$ **(OP_HiStatePressure * 1.05 + 115.0 kPa)** (Details on Supporting Tables Tab)<br><br><br>Filtered Oil Pressure $\geq$ 10.0 kPa+ **LowMinOilPresFail** (Details on Supporting Tables Tab)<br><br>OR<br><br>Filtered Oil Pressure $\leq$ **(OP_HiStatePressure * 1.05 + 115.0 kPa) -** | Two Stage Oil Pump is Present = TRUE<br><br>Engine Running Diagnostic Status<br><br>Engine Off Rationality Test Diagnostic Reporting Status<br><br>Oil Pressure Sensor In Use<br><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>Filtered Engine Speed within range<br><br><br>Modelled Oil Temperature within range<br><br>No active DTC's | TRUE<br><br><br>Enabled<br><br><br>Test not report a fail state<br><br><br>Yes<br><br><br><br>$\geq$ 5.5 seconds<br><br>$\geq$ 70.0 kPa<br><br>FALSE<br><br><br><br>1,800 RPM $\leq$ Filtered Engine Speed $\leq$ 6,000 RPM<br><br>50.0 deg C $\leq$ Oil Temp $\leq$ 110.0 deg C<br><br>Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA CrankSensorFA EngOilPressureSensorCkt FA AmbientAirDefault EngOilTempFA | $\geq$ 40 errors out of 50 samples.<br><br><br><br>Performed every 100 msec<br><br><br><br><br><br>$\geq$ 10 passes out of 50 samples.<br><br><br>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. |
|---|---|---|---|---|---|---|---|---|
| | | | | 10.0 kPa<br><br>(Details on Supporting Tables Tab) | | | | |
| | | | **Two Stage Oil Pump EOP Sensor Test with Engine Off**<br><br>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 | Two Stage Oil Pump is Present = TRUE<br><br>Engine Off Rationality Test Diagnostic Status<br><br>Engine Running Rationality Test Diagnostic Reporting Status<br><br>Modelled Oil Temperature<br><br>No Engine Movement<br><br>No active DTC's | TRUE<br><br>Enabled<br><br>Test not report a fail state<br><br>≥ 70.0 deg C<br><br>> 4.0 seconds<br><br>EngineModeNotRunTimer _FA<br>EngOilTempFA<br>EngOilPressureSensorCkt FA<br>CrankSensorFA | ≥ 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) *100 | < 5.00 percent | Engine Speed Enable Engine Speed Disable<br><br>Oil Pressure Sensor In Use<br><br>Diagnostic Status | > 400 rpm < 350 rpm<br><br>Yes<br><br>Enabled | 800 failures out of 1,000 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) *100 | > 95.00 percent | Oil Pressure Sensor In Use<br><br>Diagnostic Status | Yes<br><br>Enabled | 800 failures out of 1,000 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) *100 | < 3 percent | AC HSP Sensor Present<br><br>Diagnostic Status | Yes<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) *100 | > 95 percent | AC HSP Sensor Present<br><br>Diagnostic Status | Yes<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. |
|---|---|---|---|---|---|---|---|---|
| Brake Booster Pressure Sensor Performance | P0556 | Determines if the Brake Booster Vacuum Sensor is stuck or skewed within the normal operating range by comparing the engine vacuum to the brake booster vacuum when the engine is producing a large amount of vacuum | Engine vs brake booster vacuum sensor values are compared when % throttle < value for a time period. When throttle once again > calibrated value, min and max vacuum sensor values are normalized and subtracted from a 1st order lag filter value of 1. A properly operating vacuum sensor would have a normalized result of 1 or greater. If the normalized result is greater than 1 it is considered 1. The 1st order lag filter value would be 0 in a passing system.<br><br>1st order lag fail threshold<br><br>1st order lag re-pass threshold | <br><br>> 0.20<br><br>< 0.7 | Throttle Area (with idle included) for time period of<br><br>BrkBoostVacDiff<br><br>For time period of AND Vacuum Delta<br><br>Diagnostic enabled/ disabled<br><br>No active DTC's | <= 5.0 Percent for > 3.0 seconds<br><br>> 0.3 kPa<br><br>>= 0.2 Seconds<br><br>>= 6.0 kPa<br><br>1.00<br><br>Fault bundles: MAP_SensorFA TPS_FA BrakeBoosterSensorCktFA | Pass counter incremented when enable conditions are met, pass achieved when counter >= 8<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| Brake Booster Pressure Sensor Circuit Low Voltage | P0557 | Determines if the Brake Booster Pressure Sensor circuit voltage is too low | (Brake Booster Pressure Sensor Voltage) ÷ 5 Volts * 100 | < 5.00 percent | Brake booster diagnostic enabled/disabled<br><br>Brake booster pressure sensor present | Enabled<br><br>Present | 160 failures out of 200 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| Brake Booster Pressure Sensor Circuit High Voltage | P0558 | Determines if the Brake Booster Pressure Sensor circuit voltage is too high | (Brake Booster Pressure Sensor Voltage) ÷ 5 Volts * 100 | > 95.00 percent | Brake booster diagnostic enabled/disabled<br><br>Brake booster pressure sensor present | Enabled<br><br>Present | 160 failures out of 200 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| Engine Oil Pressure Sensor/ Switch 'B' Performance | P055B | This diagnostic detects if the oil pressure sensor B output is erroneous | The ECM compares the filtered oil pressure readings between sensors A & B under certain conditions. If they do not match within a limit, the DTC will set. | Oil Pressure Delta between sensors > 220.00 kPa | VVL hardware must be present<br><br>Diagnostic must be enabled<br><br>System supply voltage<br><br>Engine speed<br><br>Cam phaser duty cycle<br><br>Engine run time<br><br>No active faults | VVL hardware is Present<br><br>Diagnostic is Enabled<br><br>> 11.00 Volts<br><br>< 1,850.00 rpm<br><br>< 5.00 Pct<br><br>> 4.00 sec<br><br>Fault bundles: EngOilPressureSensorFA | 80 failures out of 100 samples,<br><br>25 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. |
|---|---|---|---|---|---|---|---|---|
| Engine Oil Pressure Sensor/ Switch 'B' Low | P055C | This diagnostic detects if the oil pressure sensor B circuit is open or shorted to ground by comparing the sensor feedback to normal operating ranges | This diagnostic detects if the oil pressure sensor B circuit is open or shorted to ground by comparing the sensor feedback to normal operating ranges | Sensor B oil pressure reading <= 10.00 | VVL hardware must be present<br><br>Diagnostic must be enabled<br><br>System supply voltage<br><br>Output driver is commanded on<br><br>Ignition switch is in crank or run position<br><br>No active faults | VVL hardware is Present<br><br>Diagnostic is Enabled<br><br>> 11.00 Volts<br><br><br>Fault bundles: EngOilPressureSensorFA | 120 failures out of 150 samples,<br><br>25 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. |
|---|---|---|---|---|---|---|---|---|
| Engine Oil Pressure Sensor/ Switch 'B' High | P055D | This diagnostic detects if the oil pressure sensor B circuit is shorted to high by comparing the sensor feedback to normal operating ranges | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. | Sensor B oil pressure reading >= 1,000.00 | VVL hardware must be present<br><br>Diagnostic must be enabled<br><br>System supply voltage<br><br>Output driver is commanded on<br><br>Ignition switch is in crank or run position<br><br>No active faults | VVL hardware is Present<br><br>Diagnostic is Enabled<br><br>> 11.00 Volts<br><br><br><br>Fault bundles: EngOilPressureSensorFA | 120 failures out of 150 samples,<br><br>25 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. |
|---|---|---|---|---|---|---|---|---|
| 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 89.000 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 89.000 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<br><br>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<br><br>OR<br><br>calculated brake pedal position delta sample counter > 1,000.00 for slow test | calculated brake pedal position delta > 8.00<br><br>OR (for slow test)<br><br>shift lever has been in park once this key cycle<br><br>vehicle speed >= 5.00<br><br>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<br><br>vehicle speed >= 5.00<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| Battery Monitor Module Current Monitoring Performance | P058B | Determines that the Battery Monitor Module Current Monitoring is functioning properly by comparing it to a reference current sensor directly connected to, and measured by ECM. | The absolute value of the difference between the Battery Monitor Module current and the ECM measured reference current is greater than threshold value. | >= 22.00 Amp | Diagnostic Enabled<br><br>P118C<br><br>P118D<br><br>Run/Crank or Accessory<br><br>Hybrid Starter Status | TRUE<br><br>Not FA or TFTKO<br><br>Not FA or TFTKO<br><br>TRUE<br><br><> Engine Starting or Engine Stopping for 40.00 counts | 160.00 failures out of 200.00 samples<br><br>25 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. |
|---|---|---|---|---|---|---|---|---|
| Battery Monitor Module Voltage Monitoring Performance | P058D | Determines that the Battery Monitor Module Voltage Monitoring is functioning properly by comparing it to a reference battery voltage directly measured by ECM. | The absolute value of the difference between the Battery Monitor Module voltage and the ECM measured reference voltage is greater than threshold value. | >= 2.00 Volt | Diagnostic Enabled<br><br>PT Relay<br><br>Run/Crank or Accessory<br><br>Hybrid Starter Status | TRUE<br><br>Not FA or TFTKO<br><br>TRUE<br><br><> Engine Starting or Engine Stopping for 40.00 counts | 160.00 failures out of 200.00 samples<br><br>25 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. |
|---|---|---|---|---|---|---|---|---|
| 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 ECU is a service part that has not been programmed. | Service (reflash) controller calibration present | = 1 | | none | 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_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 | |
| | | | 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 | |
| | | | Software background task first pass time to complete exceeds | | | Run/Crank voltage > 6.41 | 360.000 seconds | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | 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 >= | 3 | | 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 controller initialization. Counter >= | 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 | |
| | | | Checks for ECC (error | 3 (results in MIL), | | KeMEMD_b_RAM_ECC_ | variable, | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | 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 >= | 5 (results in MIL and remedial action) | | CktTestEnbl == 1 Value of KeMEMD_b_RAM_ECC_ CktTestEnbl is: 1 . (If 0, this test is disabled) | 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 the ECM main processor | |
| | | | MAIN processor | Previous seed value | | KePISD_b_SeedUpdKey | Table, f(Loop | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | determines a seed has not changed within a specified time period within the 50ms task. | equals current seed value. | | StorFltEnbl == 1 Value of KePISD_b_SeedUpdKey StorFltEnbl is: 1 . (If 0, this test is disabled) | 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. |
|---|---|---|---|---|---|---|---|---|
| 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><br><br><= 40 Volts<br><br><br><br>= Not Ready<br><br><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 B, 2 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 | 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 | 50 failures out of 63 samples<br><br>50 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<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. |
|---|---|---|---|---|---|---|---|---|
| Powertrain Relay Control (ODM) Open | 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 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 |

**15 OBDG05 ECM Summary Tables (Initial DTCs)**

| 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 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  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. |
|---|---|---|---|---|---|---|---|---|
| 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<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. |
|---|---|---|---|---|---|---|---|---|
| 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 | > **P06B6_P06B7_OpenTestCktThrshMin** **AND** < **P06B6_P06B7_OpenTestCktThrshMax** **See Supporting Tables** | Diagnostic Enabled? Engine Run Time Engine Speed Cumlative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) Engine Air Flow | Yes ≥ 2.0 seconds > 600 RPM  and < 8,500 RPM ≥ 200 Revs ≥ 40 mg/cylinder  and ≤ 2,000 mg/cylinder | First Order Lag Filter with Weight Coefficient Weight Coefficient = 0.0400 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 | > **P06B6_P06B7_OpenTestCktThrshMin** <br><br>**AND**<br><br> < **P06B6_P06B7_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>> 600 RPM<br>  and<br>< 8,500 RPM<br><br>≥ 200 Revs<br><br><br><br>≥ 40 mg/cylinder<br>  and<br>≤ 2,000 mg/cylinder | First Order Lag Filter with Weight Coefficient<br><br>Weight Coefficient = <br><br> 0.0400<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 Status <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 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 Status<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 Power ≤ 0.5 Ω impedance between signal and controller power | Diagnostic Status<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 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 Performance - Two Sided | P06DD | Diagnoses the two stage oil pump is stuck in the high pressure state | Fail from passing state:<br><br>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** (see P06DD 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>No active DTC's for control enable:<br><br><br><br><br><br><br><br>Active Criteria:<br>One Sided Performance Test = Disabled<br><br>Oil Pump in Low State<br><br>Modelled Oil Temperature | <br><br>TRUE<br><br>≥ 5.5 seconds<br><br>≥ 70.0 kPa<br><br>FALSE<br><br><br><br>Fault bundles:<br>MAF_SensorFA<br>ECT_Sensor_FA<br>IAT_SensorFA<br>CrankSensorFA<br>EngOilPressureSensorCktFA<br>AmbientAirDefault<br>EngOilTempFA<br>OilPmpTFTKO<br><br>Enabled Fault bundles for control disable :<br>OilPmpTFTKO<br>EngineTorqueEstInaccurate<br>EngOilPressureSensorFA<br>PowertrainRelayFault<br>CrankSensorFaultActive<br><br><br>Disabled<br><br>> 1.5 seconds<br><br>60.0 deg C ≤ Oil Temp ≤ | ≥ 12 errors out of 15 samples.<br><br><br>Run once per trip or acitviated 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | within range | 115.0 deg C | | |
| | | | | | Filtered Engine Speed within range | 1,500 RPM ≤ Filtered Engine Speed ≤ 3,500 RPM | | |
| | | | | | Engine Torque within range | **MinEnableTorque_OP** ≤ Indicated Requested Engine Torque ≤ **MaxEnableTorque_OP** (see P06DD details on Supporting Tables Tab) | | |
| | | | | | Delta Filtered Engine Speed within a range | ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.50 seconds ] ≤ 150 RPM | | |
| | | | | | Filtered Oil Pressure within range | Filtered Engine Oil Pressure ≥ **MinOilPressThresh** (see P06DD details on Supporting Tables Tab) | | |
| | | | | | Passive Criteria: | | | |
| | | | | | Active Test Passed | TRUE | | |
| | | | | | Filtered Engine Speed within range | 1,800 RPM ≤ Filtered Engine Speed ≤ 6,000 RPM | | |
| | | | | | Modelled Oil Temperature within range | 50.0 deg C ≤ Oil Temp ≤ 110.0 deg C | | |
| | | | | | Delta Filtered Engine Speed within a range | ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.50 seconds ] ≤ 450 RPM | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Oil Pressure Delta < **OP_StateChangeMin** (see P06DD details on Supporting Tables Tab) | TRUE | | |
| | | | Fast Pass Condition<br><br>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** (see P06DD details on Supporting Tables Tab)<br><br>AND<br><br>Filtered Oil Pressure ≥ (**OP_HiStatePressure** - **OP_LoStatePressure**) / 2 (see P06DD 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: | TRUE<br><br>≥ 5.5 seconds<br><br>≥ 70.0 kPa<br><br>FALSE<br><br><br>Fault bundles:<br>MAF_SensorFA<br>ECT_Sensor_FA<br>IAT_SensorFA<br>CrankSensorFA<br>EngOilPressureSensorCktFA<br>AmbientAirDefault<br>EngOilTempFA<br>OilPmpTFTKO<br><br>Enabled Fault bundles for control disable :<br>OilPmpTFTKO<br>EngineTorqueEstInaccurate<br>EngOilPressureSensorFA<br>PowertrainRelayFault<br>CrankSensorFaultActive | 0 errors out of 5 samples.<br><br>Run once per trip or activiated by the Passive Test | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Active Criteria:<br>One Sided Performance Test = Disabled | Disabled | | |
| | | | | | Oil Pump in Low State | > 1.5 seconds | | |
| | | | | | Modelled Oil Temperature within range | 60.0 deg C ≤ Oil Temp ≤ 115.0 deg C | | |
| | | | | | Filtered Engine Speed within range | 1,500 RPM ≤ Filtered Engine Speed ≤ 3,500 RPM | | |
| | | | | | Engine Torque within range | **MinEnableTorque_OP** ≤ Indicated Requested Engine Torque ≤ **MaxEnableTorque_OP** (see P06DD details on Supporting Tables Tab) | | |
| | | | | | Delta Filtered Engine Speed within a range | ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.50 seconds ] ≤ 150 RPM | | |
| | | | | | Filtered Oil Pressure within range | Filtered Engine Oil Pressure ≥ **MinOilPressThresh** (see P06DD details on Supporting Tables Tab) | | |

| 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 - Two Sided | P06DE | Diagnoses the two stage oil pump is stuck in the low pressure state | Fail from a passing state:<br><br>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** (see P06DE details on Supporting Tables Tab)<br><br>Filtered Oil Pressure ≤ (**OP_HiStatePressure** - **OP_LoStatePressure**) / 2 (see P06DE 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><br>No active DTC's for control enable:<br><br><br><br><br><br>Active Criteria: One Sided Performance Test = Disabled<br><br>Oil Pump in Low State | TRUE<br><br>≥ 5.5 seconds<br><br>≥ 70.0 kPa<br><br>FALSE<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>Disabled<br><br>> 1.5 seconds | ≥ 12 errors out of 15 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 | 60.0 deg C ≤ Oil Temp ≤ 115.0 deg C | | |
| | | | | | Filtered Engine Speed within range | 1,500 RPM ≤ Filtered Engine Speed ≤ 3,500 RPM | | |
| | | | | | Engine Torque within range | **MinEnableTorque_OP** ≤ Indicated Requested Engine Torque ≤ **MaxEnableTorque_OP** (see P06DE details on Supporting Tables Tab) | | |
| | | | | | Delta Filtered Engine Speed within a range | ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.50 seconds ] ≤ 150 RPM | | |
| | | | | | Filtered Oil Pressure within range | Filtered Engine Oil Pressure ≥ **MinOilPressThresh** (see P06DD details on Supporting Tables Tab) | | |
| | | | | | Passive Criteria: | | | |
| | | | | | Active Test Passed | TRUE | | |
| | | | | | Filtered Engine Speed within range | 1,800 RPM ≤ Filtered Engine Speed ≤ 6,000 RPM | | |
| | | | | | Modelled Oil Temperature within range | 50.0 deg C ≤ Oil Temp ≤ 110.0 deg C | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Delta Filtered Engine Speed within a range | ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.50 seconds ] ≤ 450 RPM | | |
| | | | | | Oil Pressure Delta < **OP_StateChangeMin** (see P06DE details on Supporting Tables Tab) | TRUE | | |
| | | | Fast Pass Condition<br><br>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><br><br><br>No active DTC's for control : | TRUE<br><br>≥ 5.5 seconds<br><br>≥ 70.0 kPa<br><br>FALSE<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 | 0 errors out of 5 samples.<br><br>Run once per trip or activiated by the Passive Test | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | EngineTorqueEstInaccurate EngOilPressureSensorFA PowertrainRelayFault CrankSensorFaultActive | | |
| | | | | | Active Criteria: One Sided Performance Test = Disabled | Disabled | | |
| | | | | | Oil Pump in Low State | > 1.5 seconds | | |
| | | | | | Modelled Oil Temperature within range | 60.0 deg C ≤ Oil Temp ≤ 115.0 deg C | | |
| | | | | | Filtered Engine Speed within range | 1,500 RPM ≤ Filtered Engine Speed ≤ 3,500 RPM | | |
| | | | | | Engine Torque within range | **MinEnableTorque_OP** ≤ Indicated Requested Engine Torque ≤ **MaxEnableTorque_OP** (P06DD Performance Test Details on Supporting Tables Tab) | | |
| | | | | | Delta Filtered Engine Speed within a range | ABS [Filtered RPM at beginning of State change - Filtered RPM after 1.50 seconds ] ≤ 150 RPM | | |
| | | | | | Filtered Oil Pressure within range | Filtered Engine Oil Pressure ≥ **MinOilPressThresh** (see P06DD 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 - ($1C7/$1C9 for engine torque, $1CA/$1C6 for axle torque) | Message <> 2's complement of message | Serial communication to EBTCM (U0108)<br><br>Power Mode<br>Engine Running<br><br>Status of traction in GMLAN message ($4E9) | No loss of communication<br><br>= Run<br>= True<br><br>= Traction Present | >= 8 failures out of 10<br><br>Performed on every received message | Type C, No MIL |
| | | | OR<br>Serial Communication message ($1C7/$1C9 for engine torque, $1CA/$1C6 for axle torque) rolling count index value | Message rolling count value <> previous message rolling count value plus one | | | 8 rolling count failures out of 10 samples<br><br>Performed on every received message | |
| | | | OR<br>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.<br><br>Performed every 200 ms | |
| | | | Torque request greater than torque request diagnostic maximum threshold | > 250 Nm for engine torque based traction torque system,<br>OR<br>> 4,000 Nm for axle torque based traction torque system | | | >= 4 out of 10 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| Auxiliary Transmission Fluid Pump Supply Voltage Relay Control Circuit Open | P0B09 | Detects when the auxiliary transmission fluid pump relay control circuit is failed open | HWIO fault status | = Failed Open | Ignition voltage | ≥ 6.41 volts | ≥ 32.00 fail count out of ≥ 40.00 sample count  Frequency 12.5ms | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Auxiliary Transmission Fluid Pump Supply Voltage Circuit Low Voltage | P0B0A | Detects when the auxiliary transmission fluid pump relay control circuit is failed (open, short to ground, short to power) | HWIO fault status | = Failed Short to Ground | Ignition voltage | ≥ 6.41 volts | ≥ 32.00 fail count out of ≥ 40.00 sample count<br><br>Frequency 12.5ms | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Auxiliary Transmission Fluid Pump Supply Voltage Circuit High Voltage | P0B0B | Detects when the auxiliary transmission fluid pump relay control circuit is failed (open, short to ground, short to power) | HWIO fault status | = Failed Short to Power | Ignition voltage | ≥ 6.41 volts | ≥ 32.00 fail count out of ≥ 40.00 sample count<br><br>Frequency 12.5ms | Type B, 2 Trips |

| 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>> 12.0 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><br><br><br><br><br><br><br><br>No Active DTCs: | >= 575 RPM<br><= 6,600 RPM<br>> -7 Deg C<br>< 129 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 EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA 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. |
|---|---|---|---|---|---|---|---|---|
| Battery Current Sensor A Circuit Low | P118C | Detects a continuous short to ground or open in the Battery Current Sensor A signal. | Battery Current Sensor A is less than threshold. | -400.00 Amp | Diagnostic Enabled<br><br>Run/Crank or Accessory | TRUE<br><br>TRUE | 160.00 failures out of 200.00 samples<br><br>25 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. |
|---|---|---|---|---|---|---|---|---|
| Battery Current Sensor A Circuit High | P118D | Detects a continuous short to power in the Battery Current Sensor A signal. | Battery Current Sensor A is greater than threshold. | 150.00 Amp | Diagnostic Enabled<br><br>Run/Crank or Accessory | TRUE<br><br>TRUE | 160.00 failures out of 200.00 samples<br><br>25 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. |
|---|---|---|---|---|---|---|---|---|
| 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<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. |
|---|---|---|---|---|---|---|---|---|
| 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 Circuit Board temperature ( FP Driver Overtemperature enumeration) | T>= 160 degC ( Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate) | a) FPPM configuration KeFRPR_e_ChassisFuel PresSysType<br><br>b) Diagnostic KeFRPR_b_FPPM_ OvertempDiagEnbld<br><br>c] FPPM Driver Status Alive Rolling Count Sample Faulted<br><br>d] Diagnostic feedback received<br><br>e] System Voltage | a) == CeFRPR_e_ECM _FPPM_Sys<br><br>b) == TRUE<br><br>c] <> TRUE<br><br>d] == TRUE<br><br>e] 9V < System V < 32V | 3 failures / 15 samples<br><br>1 sample / 12.5 millisec | Type B, 2 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 | < 7.00 | a) FPPM configuration KeFRPR_e_ChassisFuel PresSysType<br>b) Diagnostic KeFRPR_b_FPPM_BatVo ltLoDiagEnbld<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 | > 18.00 | a) FPPM configuration KeFRPR_e_ChassisFuel PresSysType<br>b) Diagnostic KeFRPR_b_FPPM_RunCrnkRatlEnbld<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<br>b) Diagnostic KeFRPR_b_FPPM_RunCrnkRatlEnbld<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) >= 0.0 v | 64 failures / 80 samples<br><br>1 sample / 12.5 millisec | Type B, 2 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 | <> Transmitted Duty Cycle Rolling Count ( ECM) ( Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state) | a) FPPM configuration KeFRPR_e_ChassisFuel PresSysType b) Fault state determination enabled c) FPPM Received Duty Cycle Count result d) FPPM Diagnostic feedback received e) CAN communication f) System Voltage | a) == CeFRPR_e_ECM_FPPM _Sys b) == TRUE c) == Valid d) == TRUE e) == Valid f) 9v < Sys Voltage > 32v | 64 failures / 80 samples 1 sample / 12.5 millisec | Type B, 2 Trips |
| | | | FPPM Received Duty Cycle Protection Value | <> Transmitted Duty Cycle Protection Value ( ECM) ( Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state) | a) FPPM configuration KeFRPR_e_ChassisFuel PresSysType b) Fault state determination enabled c) FPPM Received Duty Cycle Protection Value result d) FPPM Diagnostic feedback received e) CAN communication f) System Voltage | a) == CeFRPR_e_ECM_FPPM _Sys b) == TRUE c) == Valid d) == TRUE e) == Valid f) 9v < Sys Voltage > 32v | 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. |
|---|---|---|---|---|---|---|---|---|
| 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_ChassisFuelPresSysType<br>b) Diagnostic KeFRPR_b_FPPM_FuelCntrlEnblEnbld<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 |

**15 OBDG05 ECM Summary Tables (Initial DTCs)**

| 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 | <> ECM Control Status Alive  Rolling Count ( Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state) | a)  FPPM configuration KeFRPR_e_ChassisFuel PresSysType b)  Fault state determination enabled c)  FPPM Diagnostic feedback received | a)  == CeFRPR_e_ECM_FPPM _Sys b)  == TRUE c)  == TRUE | 64 failures / 80 samples  1 sample / 12.5 millisec | Type B, 2 Trips |
| | | | FPPM Power Consumption Alive Rolling Count | <> ECM Power Consumption Alive Rolling Count ( Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state) | a)  FPPM configuration KeFRPR_e_ChassisFuel PresSysType b)  Fault state determination enabled c)  FPPM Diagnostic feedback received | a)  == CeFRPR_e_ECM_FPPM _Sys b)  == TRUE c)  == TRUE | 64 failures / 80 samples  1 sample / 12.5 millisec | |
| | | | FPPM Driver Status Alive Rolling Count | <> ECM Driver Status Alive Rolling Count ( Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state) | a)  FPPM configuration KeFRPR_e_ChassisFuel PresSysType b)  Fault state determination enabled c)  FPPM Diagnostic feedback received | a)  == CeFRPR_e_ECM_FPPM _Sys b)  == TRUE c)  == TRUE | 64 failures / 80 samples  1 sample / 12.5 millisec | |
| | | | FPPM Hardware Status Alive Rolling Count | <> ECM Hardware Status Alive Rolling Count ( Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate test state) | a)  FPPM configuration KeFRPR_e_ChassisFuel PresSysType b)  Fault state determination enabled c)  FPPM Diagnostic feedback received | a)  == CeFRPR_e_ECM_FPPM _Sys b)  == TRUE 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 (only 1 is used):<br><br>Case 1: Battery<br>Case 2: Ignition Run/ Crank<br>Case 3: PT Relay<br><br><br>Case Specific Enable Criteria | <br><br>< 2.5 Volts<br><br><br><br>Ignition Coil Power Source =<br><br>(see corresponding case specific enable criteria below)<br><br><br><br>Case 1: Battery<br><br><br><br><br><br>Case 2:  Ignition Run/ Crank<br><br><br><br>Case 3: PT Relay | Diagnostic Enabled?<br><br><br><br><br> PT Relay<br><br><br><br><br>Delay starting at Key-On<br><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><br>5  Engine Revs<br><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)<br><br>Average desired accumulated exhaust power - Average actual accumulated exhaust power (too little energy delivered to catalyst)<br><br>(EWMA filtered)<br><br>Average Power = output of **P1400_EngineSpeedResidual_Table** * output of **P1400_SparkResidual_Table**<br>NOTE: Desired accumulated power would use the desired catalyst light off spark and desired engine speed and the actual accumuated power would use the final commanded spark and actual engine speed. Refer to the Supporting Tables for details | < -32.00 KJ/s (high RPM failure mode)<br><br><br>> 6.00 KJ/s (low RPM failure mode) | 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>The Cold Start Emission Reduction strategy must not be exiting. The strategy will exit per the following:<br><br>Catalyst Temperature AND<br>Engine Run Time<br><br>OR<br><br><br>Engine Run Time<br><br><br><br><br><br>OR<br><br><br><br>Barometric Pressure | < 500.00 degC<br><br>> -12.00 degC<br><br><= 56.00 degC<br><br>>= 75.00 KPa<br><br><br><br><br><br>>= 1,000.00 degC<br><br>>= 17.50 seconds<br><br><br><br>> **CatalystLightOffExtendedEngineRunTimeExit**<br><br>This Extended Engine run time exit is a function of percent ethanol and Catmons NormRatioEWMA. Refer to "Supporting Tables" for details.<br><br>< 75.00 KPa | Runs once per trip when the cold start emission reduction strategy is active<br><br>Frequency: 100ms Loop<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Other Enable Criteria: | | | |
| | | | | | 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 (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 when the: | | | |
| | | | | | Pedal Close Delay Timer | > 2.00 seconds | | |
| | | | | | the diagnostic will continue the calculation. | | | |
| | | | | | A change in gear will initiate a delay in the calculation of the average qualified residual value to allow time for the actual | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | engine speed and actual final commanded spark to achieve their desired values.  Therefore, when the:<br><br>Gear Shift Delay Timer<br><br>the diagnostic will continue the calculation<br><br><br>For Manual Transmission vehicles:<br><br>Clutch Pedal Position<br><br>Clutch Pedal Position<br><br><br><br>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.<br><br>The time weighting factor must be : | > 1.75  seconds<br><br><br><br><br><br><br><br>> 12.00 %<br><br>< 75.00 %<br><br><br><br><br><br><br><br><br><br><br>> 0<br>These are scalar values that are a function of engine run time.  Refer to **ColdStartDiagnosticDelayBasedOnEngineRunTime** | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | General Enable:<br><br>DTC's Not Set: | and the cal axis,<br>**ColdStartDiagnosticDelayBasedOnEngineRunTimeCalAxis**<br>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>ClutchPstnSnsr FA<br>IAC_SystemRPM_FA<br>IgnitionOutputDriver_FA<br>TPS_FA<br>VehicleSpeedSensor_FA<br>5VoltReferenceMAP_OOR_Flt<br>TransmissionEngagedState_FA<br>EngineTorqueEstInaccurate | | |
| | | | | | | | | |

| 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<br><br>Transmission engine speed protection | + 1 from previous $19D message (PTEI3)<br><br>not equal to 2's complement of transmission engine speed request + Transmission alive rolling count | Diagnostic enable bit<br><br><br>Engine run time<br><br><br><br><br><br># of Protect Errors<br><br># of Alive Rolling Errors<br><br>No idle diagnostic 506/507 code<br><br>No Serial communication loss to TCM<br><br>Engine Running<br><br>Power mode | 1<br><br><br>0.50 sec<br><br><br><br><br><br>12 protect errors within the sample period 20<br><br>6 rolling count errors out of 10 samples<br><br>IAC_SystemRPM_FA<br><br>(U0101)<br><br><br>= TRUE<br><br>Run Crank Active | 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. |
|---|---|---|---|---|---|---|---|---|
| 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 B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Cruise Control Switch State Undetermined | P155A | Detects when cruise switch state cannot be determined, such as low voltage conditions | cruise switch state remains undetermined for greater than a calibratable time | | | | fail continuously for greater than 0.5 seconds | 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>1,000 failures out of 1,250 samples<br><br>Current Low -<br><br>1,000 failures out of 1,250 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 <= 125 | | |
| | | | | | | | | |

| 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;<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 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. |
|---|---|---|---|---|---|---|---|---|
| A Rocker Arm Actuator 2 Control Circuit/Open Bank 1 | P16CF | Diagnoses the VVL system driver circuit for open faults. | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. | | System supply voltage <br><br> Ignition switch is in crank or run position | > 11.00 Volts | 100 failures out of 120 samples <br><br> 250 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. |
|---|---|---|---|---|---|---|---|---|
| A Rocker Arm Actuator 2 System Performance /Stuck Off Bank 1 | P16D0 | Detects a Stuck Off Rocker Arm Actuator System by comparing phaser oil pressure signals when switching VVL to high and low lift | This is an intrusive test that changes valve lift states and compares results.<br><br>Sampled oil pressure oscillations are compared to thresholds to determine if the system changes states as commanded. | OCV2_Stuck Off_EWMA Value > **(P16D0_CamTqFailSI H_OCV2)** | VVL hardware must be present<br><br>Diagnostic must be enabled<br><br>Engine RPM<br><br>Commanded torque<br><br>Engine oil pressure<br><br>Engine oil temperature<br><br>Engine speed must be stready state for<br><br>Commanded torque must be steady state for<br><br>Cam position error<br><br>DTC's are NOT active: | VVL hardware is Present<br><br>Diagnostic is Enabled<br><br>> 1,200 AND < 1,800 RPM<br><br>> 40.00 AND < 230.00 Nm<br><br>> 50.00 AND < 1,000.00 kPa<br><br>> 30.00 AND < 130.00 deg C<br><br>>= 1.00 sec<br><br>>= 1.00 sec<br><br>< 3.00 deg<br><br>AnyCamPhaser_TFTKO OilSenDiagBndl_TFTKO | EWMA based diagnostic. Completes once per trip (typically)<br><br>Runs on the engine cycle loop. | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| A Rocker Arm Actuator 2 System Stuck On Bank 1 | P16D1 | Detects a Stuck On Rocker Arm Actuator System by comparing phaser oil pressure signals when switching VVL to high and low lift | This is an intrusive test that changes states and compares results.<br><br>Sampled oil pressure oscillations are compared to thresholds to determine if the system changes states as commanded. | OCV2_Stuck On_EWMA Value < (**P16D1_CamTqFailSl L_OCV2**) | VVL hardware must be present<br><br>Diagnostic must be enabled<br><br>Engine RPM<br><br>Commanded torque<br><br>Engine oil pressure<br><br>Engine oil temperature<br><br>Engine speed must be stready state for<br><br>Commanded torque must be steady state for<br><br>Cam position error<br><br>DTC's are NOT active | VVL hardware is Present<br><br>Diagnostic is Enabled<br><br>> 1,200 AND < 1,800 RPM<br><br>> 40.00 AND < 230.00 Nm<br><br>> 50.00 AND < 1,000.00 kPa<br><br>> 30.00 AND < 130.00 deg C<br><br>>= 1.00 sec<br><br>>= 1.00 sec<br><br>< 3.00 deg<br><br>AnyCamPhaser_TFTKO OilSenDiagBndl_TFTKO | EWMA based diagnostic.<br><br>Completes once per trip (typically)<br><br>Runs on the engine cycle loop. | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| A Rocker Arm Actuator 2 Control Circuit Low Bank 1 | P16D2 | Diagnoses the VVL system driver circuit for short to ground faults. | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. | | System supply voltage<br><br>Ignition switch is in crank or run position | > 11.00 Volts | 100 failures out of 120 samples 250 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. |
|---|---|---|---|---|---|---|---|---|
| A Rocker Arm Actuator 2 Control Circuit High Bank 1 | P16D3 | Diagnoses the VVL system driver circuit for short to power faults. | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. | | System supply voltage<br><br>Output driver is commanded on<br><br>Ignition switch is in crank or run position | > 11.00 Volts | 100 failures out of 120 samples<br><br>250 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. |
|---|---|---|---|---|---|---|---|---|
| Internal Control Module Redundant Memory Performance | P16F3 | Detect Processor Calculation faults due to RAM corruptions, ALU failures and ROM failures | 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 multipier | Type A, 1 Trips |
| | | For all of the following cases: If the individual diagnostic threshold is equal to 2048 ms, this individual 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. | Equivance Ratio torque compensation exceeds threshold | -58.40 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Absolute difference between Equivance Ratio torque compensation and its dual store out of bounds given by threshold | 58.40 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Absolute difference of Accessory torque and its redundant calculation is out of bounds given by threshold range | 58.40 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | Absolute difference of Filtered Air-per-cylinder and its redundant calculation is out of bounds given by threshold range | 61.40 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 | 15.00 degrees | | Engine speed >0rpm | Up/down timer 125 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 | |

# 15 OBDG05 ECM Summary Tables (Initial DTCs)

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | Low Threshold<br><br>0.00<br>Nm | | | multipier | |
| | | | One step ahead calculation of air-per-cylinder and two step ahead is greater than threshold | 80.00<br>mg | | Engine speed > 650 rpm | Up/down timer 428 ms continuous, 0.5 down time multipier | |
| | | | Difference between Unmanaged Spark and PACS Spark is greater than threshold | 15.00<br>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>1,008.80 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>1,008.80 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 | 58.40 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 128 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<br><br>AFM apps only | Up/down timer 128 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:<br><br>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>Low Threshold:<br><br>1.10<br>T/C Range Hi<br><br>0.10<br>T/C Range Lo | | | | |
| | | | Cylinders active greater than commanded | 2 cylinders | | Engine run flag = TRUE > 2.00 s<br>Number of cylinder events since engine run > 24<br><br>No fuel injector faults active | Up/down timer 128 ms continuous, 0.5 down time multipier | |
| | | | Transfer case neutral request from four wheel drive logic does not match | N/A | Ignition State | Accessory, run or crank | 32 / 0 counts; 25.0msec/count | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | with operating conditions | | | Transfer case range valid and not over-ridden<br><br>FWD Apps only | | |
| | | | 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 | |
| | | | Predicted torque for uncorrected zero pedal determination is greater than calculated limit. | Table, f(Engine, Oil Temp).  See supporting tables + 58.40 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 | 57.40 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 Immediate Request Without Motor is greater than its redundant calculation plus threshold | 57.40 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | Positive Torque Offset is greater than its redundant calculation plus threshold OR Positive Torque Offset is less than its redundant calculation minus threshold | 58.40 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | Commanded Predicted Engine Request is greater than its redundant calculation plus threshold | 58.40 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, down time multipier 0.5 | |
| | | | 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 | 4,096.00 | Ignition State | Accessory, run or crank | Up/down timer | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Immediate Crankshaft Request is less than its redundant calculation minus threshold | Nm | | | 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 > 0.00 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. |
|---|---|---|---|---|---|---|---|---|
| | | | Cylinder Spark Delta Correction exceeds the absolute difference as compared to Unadjusted Cylinder Spark Delta | 15.00 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. 58.40 Nm <br><br><br><br> 2. 58.40 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | 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 | |

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

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | 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 | |
| | | | Commanded Immediate Engine Request is greater than its redundant calculation plus threshold | 58.40 Nm | 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 calculation | N/A | | Engine speed greater than 0rpm | Up/down timer 128 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 Speed Lores Intake Firing timing (event based) calculation does not equal its redundant calculation | N/A | | Engine speed greater than 0rpm | Up/down timer 128 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)** + 58.40 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)** + 58.40 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | Difference between Driver Requested Immediate Torque primary path and its secondary exceeds threshold | 1,008.80 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 | 1,008.80 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<br><br>OR<br><br>Commanded Immediate | 1,008.80 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. |
|---|---|---|---|---|---|---|---|---|
| | | | 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 | 126.10 Nm | | Cruise has been engaged for more than 4.00 seconds | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |
| | | | Desired engine torque request greater than | 57.40 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 plus threshold | | | | ms continuous, 0.5 down time multipier | |
| | | | Engine min capacity above threshold | 58.40 Nm | Ignition State | Accessory, run or crank | Up/down timer 138 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 125 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 228 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 | 200 RPM | | Engine speed greater than 0 RPM | Up/down timer 128 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 | |
| | | | Engine oil temperature and its dual store do not match | N/A | Ignition State | Accessory, run or crank | Up/down timer 438 ms continuous, | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | 0.5 down time multipier | |
| | | | Desired throttle position greater than redundant calculation plus threshold | 7.73 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 | 58.40 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 | 58.40 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  29.20 Nm  Low Threshold  -29.20 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 copy do not match | High Threshold  54.75 Nm  Low Threshold | 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | -58.40 Nm<br><br>Rate of change threshold<br><br>3.65 Nm/loop | | | | |
| | | | 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>58.40 Nm<br><br>Low Threshold<br><br>- 58.40 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 its redundant calculation is out of bounds given by threshold range | High Threshold<br><br>0.50 % | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | Low Threshold - 0.50 % | | | multiplier | |
| | | | Difference of torque model coefficients and its redundant calculation is out of bounds given by threshold range | High Threshold 0.0001065 Low Threshold - 0.0001065 | 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 58.40 Nm Low Threshold - 58.40 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>58.40 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>35.00 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>58.40 Nm<br><br>Low Threshold | 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | - 58.40 Nm | | | | |
| | | | Generator friction torque is out of bounds given by threshold range | High Threshold 58.40 Nm Low Threshold 0.00 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Supercharger friction torque is out of bounds given by threshold range | High Threshold 58.40 Nm Low Threshold 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. |
|---|---|---|---|---|---|---|---|---|
| | | | 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>58.40 Nm<br><br>Low Threshold<br><br>-58.40 Nm<br><br>Rate of change threshold<br><br>3.65 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>58.40 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<br><br>6.45 Nm<br><br><br>Low Threshold<br><br>-6.12 Nm | Ignition State | Accessory, run or crank | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | 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 | 1. 57.40 Nm<br><br><br>2. N/A<br><br><br>3. 57.40 Nm<br><br><br>4. 57.40 Nm | 3. & 4.:<br>Ignition State | 1. & 2.:<br>Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 58.40 Nm<br><br><br>3. & 4.:<br>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. |
|---|---|---|---|---|---|---|---|---|
| | | | OR<br><br>4. Reserve engine torque above allowable capacity threshold | | | | | |
| | | | 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 event is greater than threshold | Table, f(Desired Engine Torque). See supporting tables: **Delta MAP Threshold f(Desired Engine Torque)** | | Engine speed >0rpm | Up/down timer 128 ms continuous, 0.5 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 | 1,008.80 | Ignition State | Accessory, run or crank | Up/down timer | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | is greater than its redundant calculation plus threshold<br><br>OR<br><br>Driver Predicted Request is less than its redundant calculation minus threshold | Nm | | | 475 ms continuous, 0.5 down time multipier | |
| | | | 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)** + 58.40 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. |
|---|---|---|---|---|---|---|---|---|
| | | | 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 after React command<br><br>Engine speed >0rpm | Up/down timer 1,988 ms continuous, 0.5 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 | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Difference of minimum spark advance limit and its redundant calculation is out of bounds given by threshold range | 15.00 degrees | Ignition State | Accessory, run or crank | Up/down timer 128 ms continuous, 0.5 down time multipier | |
| | | | Difference of commanded spark advance and adjusted delivered is out of bounds given by threshold range | 15.00 degrees | | Engine speed >0rpm | Up/down timer 125 ms continuous, 0.5 down time multipier | |
| | | | Absolute difference between Estimated Engine Torque and its dual store are above a threshold | 58.40 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 | 58.40 Nm | | Engine speed >0rpm | 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. |
|---|---|---|---|---|---|---|---|---|
| | | | control and its dual store are above a threshold | | | | down time multipier | |
| | | | Difference of desired spark advance for managed torque and its redundant calculation is out of bounds given by threshold range | 15.00 degrees | | Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 58.40 Nm | Up/down timer 428 ms continuous, 0.5 down time multipier | |
| | | | 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 | 58.40 Nm | | Engine speed >0rpm | Up/down timer 175 ms continuous, 0.5 down time multipier | |
| | | | One step ahead calculation of air-per-cylinder greater than two | Threshold: Dynamically calculated based on current | | Engine speed > 650 rpm | Up/down timer 428 ms continuous, | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | step ahead calculation by threshold for time | engine conditions Fault Pending Threshold:<br><br>100 ms | | | 0.5 down time multipier | |
| | | | Rate limited cruise axle torque request and its dual store do not match within a threshold | 126.10 Nm | Ignition State | Accessory, run or crank | Up/down timer 163 ms continuous, 0.5 down time multipier | |
| | | | 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 | 1. 5.00 %<br><br>2. N/A<br><br>3. 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. |
|---|---|---|---|---|---|---|---|---|
| | | | and its dual store do not equal OR 3. Absolute difference of Calculated accelerator pedal position and its dual store do not equal | | | | | |
| | | | Commanded axle torque is greater than its redundant calculation by threshold | 1,008.80 Nm | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Commanded axle torque is less than its redundant calculation by threshold | 1,513.20 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 | N/A | Ignition State | Accessory, run or crank | Up/down timer 128 | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | not equal | | | AFM apps only | ms continuous, 0.5 down time multipier | |
| | | | AC friction torque is greater than commanded by AC control software | 35.00 Nm | Ignition State | Accessory, run or crank | Up/down timer 2,048 ms continuous, 0.5 down time multipier | |
| | | | Engine Speed Lores Intake Firing (time based) calculation does not equal its redundant calculation | N/A | | Engine speed >0rpm | Up/down timer 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 | 15.00 degrees | | Engine speed >0rpm | Up/down timer 128 ms continuous, 0.5 down time multipier | |
| | | | Transmission Torque | N/A | | Run or Crank = TRUE > | 16 / 32 | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | Request cacluations do not equal their dual stores | | | 0.50 s | 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 cacluation is greater than a threshold | 15 mm2 | | | Up/down timer 228 ms continuous, 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 | |
| | | | Pedal learns and their redundant calculation do not equal | | 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. |
|---|---|---|---|---|---|---|---|---|
| | | | Throttle learns and their redundant calculation do not equal | | Ignition State | Accessory, run or crank | Up/down timer 475 ms continuous, 0.5 down time multipier | |
| | | | Desired Throttle Position and its redundant calculation do not equal | | 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. |
|---|---|---|---|---|---|---|---|---|
| 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<br><br>Output driver is commanded on<br><br>Ignition switch is in crank or run position | > 11.00 Volts | 20 failures out of 25 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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<br><br>Open Circuit: ≥ 200 K Ω impedance between signal and controller ground | System supply voltage<br><br>Output driver is commanded on<br><br>Ignition switch is in crank or run position | > 11.00 Volts | 20 failures out of 25 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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<br><br>Output driver is commanded on<br><br>Ignition switch is in crank or run position | > 11.00 Volts | 20 failures out of 25 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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<br><br>Open Circuit: ≥ 200 K Ω impedance between signal and controller ground | System supply voltage<br><br>Output driver is commanded on<br><br>Ignition switch is in crank or run position | > 11.00 Volts | 20 failures out of 25 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| Post Catalyst Fuel Trim System Low Limit Bank 1 (Too Rich) | P2096 | Determines if the post catalyst O2 sensor based fuel control system has utilized all or most of it's low limit authority, indicating a rich emissions/exhaust gas condition.<br><br>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 condition. A perfectly balanced control system (no rich or lean bias required) is represented by an integral offset value of "0" and a post catalyst O2 sensor that is within it's optimal operating range (neither rich nor lean). An integral offset value < 0 is indicative of the control system reacting to a rich post catalyst O2 sensor. If the failure is such that the control system utilizes all or most of its available authority, then P2096 will set. | Rich Fail counter<br><br>High Vapor Feature:<br>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 >= 15 % for >= 5.0 seconds.<br><br>Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 11 % for >= 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary. | >= 300 counts per 375 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:<br>Deceleration<br>Idle<br>Cruise<br>Light Acceleration<br>Heavy Acceleration<br><br>Ambient Air Pressure<br>Engine AirFlow<br>Intake Manifold Pressure<br>Induction Air Temperature<br>Start-up Coolant Temp.<br>PTO<br>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: | <br><br>No<br>No<br>Yes<br>Yes<br>Yes<br><br>>= 70 kPa<br>>= 0.0 g/s <= 10,000.0<br>>= 0 kPa <= 200<br>>= -20 deg. C <= 200<br>>= -20 deg. C<br>Not Active<br>Not Active<br><br><br><br><br><br>Not Present<br><br>AmbientAirDefault<br>AIR System FA<br>Ethanol Composition Sensor FA<br>ECT_Sensor_FA<br>EGRValveCircuit_FA<br>EGRValvePerformance_FA<br>IAT_SensorFA<br>CamSensorAnyLocationFA<br>EvapEmissionSystem_FA<br>EvapFlowDuringNonPurge_FA<br>FuelTankPressureSnsrCkt_FA | Frequency: Continuous Monitoring in 100ms loop.<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | EvapPurgeSolenoidCircuit _FA<br>EvapSmallLeak_FA<br>EvapVentSolenoidCircuit_ FA<br>FuelInjectorCircuit_FA<br>MAF_SensorFA<br>MAF_SensorTFTKO<br>MAP_SensorFA<br>MAP_EngineVacuumStat us<br>EngineMisfireDetected_F A<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: | > 0.0 seconds | | |
| | | | | | Minimum accumulated counts in each cell required before counters will increment for that cell:<br>Deceleration<br>Idle<br>Cruise<br>Light Acceleration<br>Heavy Acceleration | <br><br><br><br>0<br>0<br>0<br>0<br>0 | | |
| | | | | | (Note: A value in any of the above operating "cells" that is an order of magnitude (or more) higher than other cells is an indication that the diagnostic is not capable of diagnosing in that cell).<br><br>For the cells identified as | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | enabled (i.e. those containing a "Yes" at the beginning of the Enable Conditions column), the fail counter will increment if the 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 (Note: A value in any of the above operating "cells" that is greater than 900mV is an indication that the diagnostic is not capable of diagnosing in that cell). | <= 10 (control min.=0) 10 (control min.=0) -490 (control min.=-500) -490 (control min.=-500) -490 (control min.=-500) > 790 mV 790 mV 790 mV 790 mV 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 utilized all or most of 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 condition. A perfectly balanced control system (no rich or lean bias required) is represented by an integral offset value of "0" and a post catalyst O2 sensor that is within it's optimal operating range (neither rich nor lean). An integral offset value > 0 is indicative of the control system reacting to a lean post catalyst O2 sensor. If the failure is such that the control system utilizes all or most of its available authority, then P2097 will set. | 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 >= 15 % for >= 5.0 seconds.<br><br>Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 11 % for >= 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary. | >= 300 counts per 375 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>For the cells identified as enabled (i.e. those containing a "Yes" at the beginning of the Enable Conditions for P2096), the fail counter will increment if the 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><br>(Note: A value in any of the above operating "cells" that is less than 100mV is an indication that the diagnostic is not capable of diagnosing in that cell). | >= -10 (control max.= 0 ) -10 (control max.= 0 ) 690 (control max.= 700 ) 690 (control max.= 700 ) 690 (control max.= 700 )<br><br>< 690 mV 690 mV 690 mV 690 mV 690 mV | Frequency: Continuous Monitoring in 100ms loop.<br><br>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 > | 7.73 percent   7.73 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 > 8.41 ) | 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. |
|---|---|---|---|---|---|---|---|---|
| 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>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>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>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  No TPS sensor faults (P0122, P0123, P0222, P0223)  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  No TPS sensor faults (P0122, P0123, P0222, P0223)  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<br><br>No APP sensor faults (P2122, P2123,P2127, P2128)<br><br>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<br><br>No APP sensor faults (P2122, P2123,P2127, P2128)<br><br>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<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 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 >= 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 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  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 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<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 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 >= 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 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<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 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  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. |
|---|---|---|---|---|---|---|---|---|
| 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><br> 10 counts | | Run/Crank voltage > 6.41 <br><br> TPS minimum learn is active <br><br> No previous TPS min learn values stored in long term memory | 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. |
|---|---|---|---|---|---|---|---|---|
| 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 |

# 15 OBDG05 ECM Summary Tables (Initial DTCs)

| 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 > <br><br>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.<br><br>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.<br><br>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 | 0.49 <br><br>If the diagnostic has reported a failure on the prior trip, the Filtered Ratio must fall below 0.37 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 0.49 . | System Voltage<br><br><br>Fuel Level<br><br>Engine Coolant Temperature<br><br>Cumulative engine run time<br><br>Diagnostic enabled at Idle (regardless of other operating conditions)<br><br>Engine speed range<br><br>Engine speed delta during a short term sample period<br><br>Mass Airflow (MAF) range<br><br>Cumulative delta MAF during a short term sample period<br><br>Filtered MAF delta between samples<br>Note: first order lag filter coefficient applied to MAF = 0.050<br><br>Air Per Cylinder (APC)<br><br>APC delta during short term sample period<br><br>Filtered APC delta between samples | no lower than 11.0 Volts for more than 0.2 seconds<br><br>> 10.0 percent AND no fuel level sensor fault<br><br>> -20 degrees C<br><br>> 30.0 seconds<br><br><br>No<br><br>1,200 to 4,000 RPM<br><br>< 150 RPM<br><br><br>0 to 100 g/s<br><br>< 2 g/s<br><br><br>< 0.40 g/s<br><br><br><br>100 to 600 mg/cylinder<br><br>< 40 mg/cylinder<br><br>< 3.00 percent | Minimum of 1 test per trip, up to 4 tests per trip during RSR or FIR.<br><br>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 | 5 to 55 degrees<br><br>7 to 200 percent<br><br>0 to 35 degrees<br><br>0 to 35 degrees<br><br>>= 0.99<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 O2 Learned htr resistance<br><br>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>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>No Fault Active for: | = Valid (the O2 heater resistance has learned since NVM reset)<br><br><br>>= 0.49<br><br>>= 0.20<br><br><br>0.00<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 FuelTrimSystemB1_FA | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | O2S_Bank_1_Sensor_1_ FA<br>O2S_Bank_1_Sensor_2_ FA<br>WRAF_Bank_1_FA | | |
| | | | | | | | | |

| 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 | No Active DTCs: | 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>No Pending DTCs: | > 409.6 seconds<br><br><br><br>EngineModeNotRunTimer Error MAP_SensorCircuitFA AAP_SnsrCktFA<br><br>MAP_SensorCircuitFP AAP_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) | | | 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) | | | 320 failures out of 400 samples<br><br>1 sample every 12.5 msec | Type B, 2 Trips |

## 15 OBDG05 ECM Summary Tables (Initial DTCs)

| 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 | | | 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>> 61 grams | No Active DTC's<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>Low Fuel Condition Diag<br>Pedal position<br><br>Engine Airflow<br><br>Closed loop integral<br>Closed Loop Active<br>Evap<br>Ethanol | 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><br><br><br>10.0 < Volts<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>3 ≤ gps ≤ 11<br><br>0.85 ≤ C/L Int ≤ 1.07<br>= TRUE<br>not in control of purge<br>not in estimate mode | 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Post fuel cell (Decel) Crankshaft Torque | = enabled < 100.0 Nm | | |
| | | | | | EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on Time | = not active = not active ≥ 60.0 sec | | |
| | | | | | Predicted Catalyst temp Fuel State | 600 ≤ ºC ≤ 850 = DFCO possible | | |
| | | | | | ================= All of the above met for at least 0.0 seconds, and then check the following | ================== | | |
| | | | | | Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled) | 1,150 ≤ RPM ≤ 2,300 1,050 ≤ RPM ≤ 2,450 | | |
| | | | | | Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after initially enabled) | 34.2 ≤ MPH ≤ 74.6 31.7 ≤ MPH ≤ 82.0 | | |
| | | | | | ================= All of the above met for at least 4.0 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: Commanded Fuel Crankshaft Torque | 0.96 ≤ EQR ≤ 1.01 < 110.0 Nm | | |

| 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   > 25.0 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 | 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 = 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  1,150 ≤ RPM ≤ 2,300 3 ≤ gps ≤ 11 34.2 ≤ MPH ≤ 74.6 0.85 ≤ C/L Int ≤ 1.07 = TRUE  not in control of purge not in estimate mode | 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>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>$\geq 60.0$ sec<br><br>$600 \leq {}^{\circ}C \leq 850$<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 | >= 4.00 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<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<br>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 - 1,000 0 failures out of 1,250 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<br><br>Barometric Pressure<br>Inlet Air Temp<br>Fuel Temp | <br><br><br><br><br><br>>= 70.0 KPA<br>>= -20.0 degC<br>-20 <=Temp degC <= 125 | | |
| | | | | | | | | |

| 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 | <= -4.00 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_PumpCntrlEngRunThrsh (see supporting tables)<br><br>Enabled when a code clear is not active or not exiting device control<br>Engine is not cranking | Pressure Error - 1,000 failures out of 1,250 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 | | | |
| | | | | | Barometric Pressure Inlet Air Temp Fuel Temp | >= 70.0 KPA >= -20.0 DegC -20 <= Temp degC <= 125 | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| IGNITION CONTROL #1 CIRCUIT Low | P2300 | Diagnoses Cylinder #1 Ignition Control (EST) output driver circuit for a Short to Ground fault | 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 high state (indicates short-to-ground) | ≤ 100 Ω 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 |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| IGNITION CONTROL #1 CIRCUIT High | P2301 | Diagnoses Cylinder #1 Ignition Control (EST) output driver circuit for a Short to Power fault | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.<br><br>Voltage high during driver low state (indicates short-to-power) | ≤ 100 Ω impedance between signal and controller power | Engine running<br><br>Ignition Voltage | > 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 Low | P2303 | Diagnoses Cylinder #2 Ignition Control (EST) output driver circuit for a Short to Ground fault | 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 high state (indicates short-to-ground) | ≤ 100 Ω 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 |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| IGNITION CONTROL #2 CIRCUIT High | P2304 | Diagnoses Cylinder #2 Ignition Control (EST) output driver circuit for a Short to Power fault | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.<br><br>Voltage high during driver low state (indicates short-to-power) | ≤ 100 Ω impedance between signal and controller power | Engine running<br><br>Ignition Voltage | > 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 #3 CIRCUIT Low | P2306 | Diagnoses Cylinder #3 Ignition Control (EST) output driver circuit for a Short to Ground fault | 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 high state (indicates short-to-ground) | ≤ 100 Ω 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 |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| IGNITION CONTROL #3 CIRCUIT High | P2307 | Diagnoses Cylinder #3 Ignition Control (EST) output driver circuit for a Short to Power fault | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.<br><br>Voltage high during driver low state (indicates short-to-power) | ≤ 100 Ω impedance between signal and controller power | Engine running<br><br>Ignition Voltage | > 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 #4 CIRCUIT Low | P2309 | Diagnoses Cylinder #4 Ignition Control (EST) output driver circuit for a Short to Ground fault | 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 high state (indicates short-to-ground) | ≤ 100 Ω 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 |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| IGNITION CONTROL #4 CIRCUIT High | P2310 | Diagnoses Cylinder #4 Ignition Control (EST) output driver circuit for a Short to Power fault | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.<br><br>Voltage high during driver low state (indicates short-to-power) | ≤ 100 Ω impedance between signal and controller power | Engine running<br><br>Ignition Voltage | > 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. |
|---|---|---|---|---|---|---|---|---|
| Transmission Control Torque Request Circuit | P2544 | Determines if the torque request from the TCM is valid | Protect error - Serial Communication message 2's complement not equal ($189/$199)<br><br>OR<br>Rolling count error - Serial Communication message ($189/$199) rolling count index value<br><br>OR<br><br>Range Error - Serial Communication message - ($189/$199) TCM Requested Torque Increase<br><br>OR<br><br>Multi-transition error - Trans torque intervention type request change | Message <> two's complement of message<br><br><br><br>Message <> previous message rolling count value + one<br><br><br><br>> 350 Nm<br><br><br><br>Requested torque intervention type toggles from not increasing request to increasing request | Diagnostic Status<br><br><br>Power Mode<br><br>Ignition Voltage<br><br><br>Engine Running<br><br>Run/Crank Active<br><br><br>No Serial communication loss to TCM (U0101) | Enabled<br><br><br>= Run<br><br>> 6.41 volts<br><br><br>= True<br><br>> 0.50 Sec<br><br><br>No loss of communication | >= 10 failures out of 20 samples.<br><br>Performed on every received message<br><br>>= 6 Rolling count errors out of 10 samples.<br><br>Performed on every received message<br><br>>= 6 range errors out of 10 samples.<br><br>Performed on every received message<br><br>>= 3 multi-transitions out of 5 samples. Performed every 200 msec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Engine Hood Switch Performance | P257D | This DTC monitors the hood switch rationality | Hood Switch position is in an invalid position.<br><br>Type of Switch: CeHSWR_e_Resistance<br><br>With a discrete type switch the hood switch reading is invalid when | | The diagnostic is enabled<br><br>Enabled when Run/Crank is active only, otherwise Run/Crank is not used as an enable | = 1 (1 indicates enabled)<br><br>= 1 (1 indicates Run/ Crank active enabled) | 3 failed samples within 10 total samples<br><br>Diagnostic runs in the 12.5 ms loop | Type B, 2 Trips |
| | | | | Hood Switch 1 and Hood Switch 2 are in the same state (States not equal is proper function) | | | | |
| | | | With a percentage type switch the hood switch reading is invalid in these ranges | 82.70 % to 93.00 % or 52.80 % to 70.70 % or 16.70 % to 27.00 % | | | | |
| | | | With a resistance type switch the hood switch reading is invalid in these ranges | 6,775.00 Ohms to 6,775.00 Ohms or 1,400.00 Ohms to 1,400.00 Ohms or 300.00 Ohms to 300.00 Ohms | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Engine Hood Switch Short to Ground / Low Voltage | P257E | This DTC monitors the hood switch for a short to ground or low voltage condition | Hood Switch position reading is outside an expected bounds for<br><br>Type of Switch: CeHSWR_e_Resistance<br><br>With a discrete type switch the bounds are<br><br><br><br>With a percentage type switch the bound is hood switch reading<br><br>With a resistance type switch the bound is hood switch reading | Hood Switch 1 and Hood Switch 2 are in the same state (States not equal is proper function)<br><br>>= 93.00 %<br><br>>= 6,775.00 Ohms | The diagnostic is enabled<br><br>Enabled when Run/Crank is active only, otherwise Run/Crank is not used as an enable | = 1 (1 indicates enabled)<br><br>= 1 (1 indicates Run/ Crank active enabled) | 8 failed samples within 10 total samples<br><br>Diagnostic runs in the 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. |
|---|---|---|---|---|---|---|---|---|
| Engine Hood Switch Short to Voltage / High Voltage | P257F | This DTC monitors the hood switch for a short to voltage or high voltage condition | Hood Switch position reading is outside an expected bounds for<br><br>Type of Switch: CeHSWR_e_Resistance<br><br>With a discrete type switch the bounds are<br><br><br>With a percentage type switch the bound is hood switch reading<br><br>With a resistance type switch the bound is hood switch reading | Hood Switch 1 and Hood Switch 2 are in the same state (States not equal is proper function)<br><br><br><= 16.70 %<br><br><br><= 300.00 Ohms | The diagnostic is enabled<br><br>Enabled when Run/Crank is active only, otherwise Run/Crank is not used as an enable | = 1 (1 indicates enabled)<br><br>= 1 (1 indicates Run/ Crank active enabled) | 8 failed samples within 10 total samples<br><br>Diagnostic runs in the 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 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><br><br>> 24.87 %. | | | 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><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 ( see Supporting Calibration tab)<br><br>OR<br><br>>= High Threshold ( see Supporting Calibration tab)<br><br>( tabulated result: function of desired fuel rail pressure and fuel flow rate) | a] Fu Rail Pres Snsr Circuit Low Fault Active (DTC P018C)<br><br>b] Fu Rail Pres Snsr Circuit High Fault Active (DTC P018D)<br><br>c] Fu Rail Pres Snsr Perf Fault Active ( DTC P018B)<br><br>d] Fu Pump Circuit Low Fault Active ( DTC P0231)<br><br>e] Fu Pump Circuit High Fault Active ( DTC P0232)<br><br>f] Fu Pump Circuit Open Fault Active (DTC P023F)<br><br>g] Reference Voltage Fault Status (DTC P0641)<br><br>h] Fu Pump Driver Control Module Overtemperature Fault Active (DTC P1255)<br><br>j] Barometric Pressure Signal Valid (PPEI $4C1)<br><br>k] Engine run time<br><br>l] Emissions Fuel Level Low (PPEI $3FB)<br><br>m] Fu Pump Control Enabled | a] <> TRUE<br><br>b] <> TRUE<br><br>c] <> TRUE<br><br>d] <> TRUE<br><br>e] <> TRUE<br><br>f] <> TRUE<br><br>g] <> Active This Key<br><br>h] <> TRUE<br><br>j] == TRUE (for absolute fuel pressure sensor)<br><br>k] >= 30 sec<br><br>l] <> TRUE<br><br>m] == TRUE | 1 sample / 12.5 millisec | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | n] Fu Pump Control state | n] == Normal | | |
| | | | | | p] System Voltage | p] 11V< System V <32V | | |
| | | | | | q] Fuel flow rate | q1] > 0.047 gram/sec AND<br>q2] <= Max allowed fuel flow rate (function of desired pressure and system voltage)(typically 11-50 gram/sec) | | |
| | | | | | r] Fuel Pressure Control System | r1] Not responding to overperformance due to pressure buildup during Deceleration Fuel Cut Off OR<br>r2] Not responding to a decreasing desired fuel pres commnad | | |

| 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 | 50 failures out of 63 samples<br><br>50 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. |
|---|---|---|---|---|---|---|---|---|
| Malfunction Indicator Lamp (MIL) Control Circuit (ODM) High | P263B | Diagnoses the malfunction indicator lamp 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<br><br>Remote Vehicle Start is not active | Voltage ≥ 11 volts | 4 failures out of 5 samples<br><br>50 ms / sample | Type B, No MIL<br><br>NO MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| "A" Rocker Arm Actuator Control Circuit/Open Bank 1 | P2645 | Diagnoses the VVL system driver circuit for open faults. | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. | | System supply voltage<br><br>Ignition switch is in crank or run position | > 11.00 Volts | 100 failures out of 120 samples<br><br>250 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. |
|---|---|---|---|---|---|---|---|---|
| A Rocker Arm Actuator System Performance or Stuck Off Bank 1 | P2646 | Detects a Stuck Off Rocker Arm Actuator System by comparing phaser oil pressure signals when switching VVL to high and low lift | This is an intrusive test that changes valve lift states and compares results. Sampled oil pressure oscillations are compared to thresholds to determine if the system changes states as commanded. | OCV1_Stuck Off_EWMA Value > (**P2646_CamTqFailSl H_OCV1**) | VVL hardware must be present<br><br>Diagnostic must be enabled<br><br>Engine RPM<br><br>Commanded torque<br><br>Engine oil pressure<br><br>Engine oil temperature<br><br>Engine speed must be stready state for<br><br>Commanded torque must be steady state for<br><br>Cam position error<br><br>DTC's are NOT active: | VVL hardware is Present<br><br>Diagnostic is Enabled<br><br>> 1,200 AND < 1,800 RPM<br><br>> 40.00 AND < 230.00 Nm<br><br>> 50.00 AND < 1,000.00 kPa<br><br>> 30.00 AND < 130.00 deg C<br><br>>= 1.00 sec<br><br>>= 1.00 sec<br><br>< 3.00 deg<br><br>AnyCamPhaser_TFTKO OilSenDiagBndl_TFTKO | EWMA based diagnostic. Completes once per trip (typically)<br><br>Runs on the engine cycle loop. | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| A Rocker Arm Actuator System Stuck On Bank 1 | P2647 | Detects a Stuck On Rocker Arm Actuator System by comparing phaser oil pressure signals when switching VVL to high and low lift | This is an intrusive test that changes states and compares results. Sampled oil pressure oscillations are compared to thresholds to determine if the system changes states as commanded. | OCV1_Stuck_On_EWMA Value < **(P2647_CamTqFailSlL_OCV1)** | VVL hardware must be present<br><br>Diagnostic must be enabled<br><br>Engine RPM<br><br>Commanded torque<br><br>Engine oil pressure<br><br>Engine oil temperature<br><br>Engine speed must be stready state for<br><br>Commanded torque must be steady state for<br><br>Cam position error<br><br>DTC's are NOT active: | VVL hardware is Present<br><br>Diagnostic is Enabled<br><br>> 1,200 AND < 1,800 RPM<br><br>> 40.00 AND < 230.00 Nm<br><br>> 50.00 AND < 1,000.00 kPa<br><br>> 30.00 AND < 130.00 deg C<br><br>>= 1.00 sec<br><br>>= 1.00 sec<br><br>< 3.00 deg<br><br>AnyCamPhaser_TFTKO OilSenDiagBndl_TFTKO | EWMA based diagnostic. Completes once per trip (typically)<br><br>Runs on the engine cycle loop. | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| A Rocker Arm Actuator Control Circuit Low Bank 1 | P2648 | Diagnoses the VVL system driver circuit for short to ground faults. | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. | | System supply voltage<br><br>Ignition switch is in crank or run position | > 11.00 Volts | 100 failures out of 120 samples<br><br>250 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. |
|---|---|---|---|---|---|---|---|---|
| A Rocker Arm Actuator Control Circuit High Bank 1 | P2649 | Diagnoses the VVL system driver circuit for short to power faults. | The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. | | System supply voltage<br><br>Output driver is commanded on<br><br>Ignition switch is in crank or run position | > 11.00 Volts | 100 failures out of 120 samples<br><br>250 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. |
|---|---|---|---|---|---|---|---|---|
| Chassis Control Module 1 Requested MIL Illumination | P26C8 | Monitors the Chassis Contol Module 1 MIL request line to determine when the Chassis Control Module 1 has detected a MIL illuminating fault. | Chassis Control Module 1 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. |
|---|---|---|---|---|---|---|---|---|
| Auxiliary Transmission Fluid Pump Performance | P2797 | Detects when the auxiliary transmission fluid pump system is not capable of maintaining adaquate hydraulic pressure. The diagnostic will monitor transmission clutch slip during the autostart event as the primary malfunction criteria. | Transmission turbine speed is greater than predicted turbine speed during autostart event | **P171D Predicted ≥turbine speed error** Refer to "Transmission Supporting Tables" for details | PRNDL state defaulted<br><br>Transmission shift lever position<br><br>Propulsion system active<br><br>Ignition voltage<br>Ignition voltage<br><br>Transmission fluid temp<br>Transmission fluid temp<br><br>Hybrid state<br>AutoStop duration min<br><br>During autostop Engine speed was<br><br>***************************<br>If above conditions are met then the following must occur:<br><br>Turbine speed<br><br>Engine speed<br><br>Hydraulic pressure delay time<br><br><br><br><br>If above conditions are met then increment time-out timer.<br>Time-out timer<br><br>Note: The initial fail | = False<br><br>= Forward range A (Drive6)<br><br>= True<br><br>≥ 9.00 volts<br>≤ 31.99 volts<br><br>≥ 0.00 °C<br>≤ 110.00 °C<br><br>= Engine off<br>≥ 1.20 seconds<br><br>≤ 5.00 rpm<br><br><br><br><br><br>≥ 13.00 rpm<br><br>≥ 450.00 rpm<br><br>**P171D Hydraulic ≥pressure delay** Refer to "Transmission Supporting Tables" for details<br><br><br><br>≤ 0.38 seconds | ≥ 10.00 counts (initial fail count) Frequency =12.5ms<br><br>Once the above counts are achieved then increment the final fail counter once. The final fail counter can only increment once per autostart event<br><br>≥ 7.00 counts (final fail counter)<br><br>If above counter is greater than threshold then report DTC failed.<br><br>Frequency = 12.5ms | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | counter must achieve it's fail threshold in less than the time-out time.<br><br>*****************************<br>If vehicle is launched then:<br><br>Transmission Ratio<br><br><br><br>Trans Ratio band (1st gr)<br>Trans Ratio band (1st gr)<br><br>Trans Ratio band (2-6)<br>Trans Ratio band (2-6)<br><br>Valid transmission ratio achieved time<br><br>OR<br><br>If vehicle is not launched but autostart occurs then:<br><br>Turbine speed<br><br>Turbine speed less then above threshold for<br><br>Note: During an autostart event the lack of hydraulic pressure will result in momentary clutch slip in the C1234 clutch.  After the clutch slip event, the main transmission pump and clutch will gain capacity, clutch slip will go | **P171D Transmission =forward gear ratios** Refer to "Transmission Supporting Tables" for details<br><br>≤ 1.12 pct<br>≥ 0.88 pct<br><br>≤ 1.07 pct<br>≥ 0.93 pct<br><br>≥ 0.50 seconds<br><br><br><br><br>≤ 5.00 rpm<br><br>≥ 0.50 seconds | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | to zero. If the vehicle is launching (moving) then a valid transmission ratio can be achieved. Or if the brake is continually applied and an autostart occurs naturally, then no ratio can be measured. In this case turbine speed will return to near zero rpm.<br>*****************************<br><br>DTCs not set | CrankSensor_FA Transmission Output Shaft Angular Velocity Validity Transmission Turbine Angular Velocity Validity Transmission Oil Temperature Validity P0B09 U0101 P182E P1915 | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Dual Battery Control Module Performance | P305F | Determines that the Dual Battery Control Module is functioning properly by detecting whether the battery voltage, as directly measured by ECM, fell below a threshold for n consecutive auto-start events, where each auto-start event had the threshold exceeded for m number of samples. | ECM measured battery voltage is less than threshold for present auto-start event. | 8.90 Volt | Diagnostic Enabled<br><br>Hybrid Starter Status | TRUE<br><br>= Engine Starting for 0.00 counts | 5.00 failures out of 10.00 samples taken during auto-start event.<br><br>6.25 ms/sample | Type A, 1 Trips |
| | | | Exceeded consecutive number of auto-start events where Present Auto-Start Event malfunction criteria was met. | 2.00 auto-start events | Diagnostic Enabled | TRUE | 2.00 auto-start events out of 3.00 | |

# 15 OBDG05 ECM Summary Tables (Initial DTCs)

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Control Module Communication Bus A Off | U0073 | This DTC monitors for a BUS A off condition | Bus off failures 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>Power Mode<br><br><br>Off Cycle Enable Criteria:<br><br>KeCAND_b_OffKeyCycle DiagEnbl<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>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>= 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>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><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><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. |
|---|---|---|---|---|---|---|---|---|
| Lost Communicati on 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><br>Power Mode<br><br><br>Off Cycle Enable Criteria:<br><br>KeCAND_b_OffKeyCycle DiagEnbl<br><br>Ignition Accessory Line<br> and<br>Battery Voltage<br><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><br>= run<br><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 | | |
| | | | | | 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 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><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><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><br>Not Active on Current Key Cycle<br><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>= 0<br>(1 indicates enabled)<br><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 Chassis Control Module A | U012A | This DTC monitors for a loss of communication with the Chassis Control Module A. | Message is not received from controller for<br><br>Message $4DB | ≥ 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>or<br><br><br>Power Mode<br><br>Off Cycle Enable Criteria:<br><br>KeCAND_b_OffKeyCycle DiagEnbl<br><br><br>Ignition Accessory Line<br><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>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>Not Active<br><br><br><br>>= 11.00<br><br>or<br>>= 6.41<br><br>= run<br><br><br>= 0<br>(1 indicates enabled)<br><br><br>= Active<br><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 | | |
| | | | | | U012A | Not Active on Current Key Cycle | | |
| | | | | | CHCM A | is present on the bus | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Lost Communicati on 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 | <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><br>Power Mode<br><br><br>Off Cycle Enable Criteria:<br><br>KeCAND_b_OffKeyCycle DiagEnbl<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 Network Management is | <br><br><br>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>= 0<br>(1 indicates enabled)<br><br>= Active<br><br>> 11.00<br><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><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><br>>= 11.00 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 | Timer - Fuel System Control message CAN $0D9 not received ( FPPM Received Serial Data Communication Status) | t > 10 s ( Fu Pmp Pwr Mod smart device reports Faulted, Not Faulted or Indeterminate) | 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 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 Cancel Switch Circuit | P056C | | Cruise Control Cancel 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. |
|---|---|---|---|---|---|---|---|---|
| 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. |
|---|---|---|---|---|---|---|---|---|
| Transmission Surge Solenoid Circuit Open | P171A | Detects when the surge accumulator control circuit is failed open | HWIO fault status | = Failed Open | Ignition voltage | ≥ 6.41 volts | ≥ 32.00 fail count out of ≥ 40.00 sample count<br><br>Frequency 12.5ms | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Transmission Surge Solenoid Circuit Low | P171B | Detects when the surge accumulator control circuit is failed short to ground | HWIO fault status | = Failed Short to Ground | Ignition voltage | ≥ 6.41 volts | ≥ 32.00 fail count out of ≥ 40.00 sample count<br><br>Frequency 12.5ms | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Transmission Surge Solenoid Circuit High | P171C | Detects when the surge accumulator control circuit is failed short to power | HWIO fault status | = Failed Short to Power | Ignition voltage | ≥ 6.41 volts | ≥ 6.00 fail count out of ≥ 8.00 sample count<br><br>Frequency 12.5ms | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Transmission Surge Accumulator System Performance | P171D | Detects when the surge accumulator system is not capable of supplying adaquate hydraulic pressure during the autostart. The diagnostic will monitor transmission clutch slip during the autostart event as the primary malfunction criteria. | Transmission turbine speed is greater than predicted turbine speed during autostart event | **P171D Predicted ≥turbine speed error** Refer to "Transmission Supporting Tables" for details | PRNDL state defaulted<br><br>Transmission shift lever position<br><br>Propulsion system active<br><br>Ignition voltage<br>Ignition voltage<br><br>Transmission fluid temp<br>Transmission fluid temp<br><br>Hybrid state<br>AutoStop duration min<br><br>During autostop Engine speed was<br><br>****************************<br>If above conditions are met then the following must occur:<br><br>Turbine speed<br><br>Engine speed<br><br>Hydraulic pressure delay time<br><br><br><br><br>If above conditions are met then increment time-out timer.<br>Time-out timer<br><br>Note: The initial fail | = False<br><br>= Forward range A<br><br><br>= True<br><br>≥ 9.00 volts<br>≤ 31.99 volts<br><br>≥ 0.00 °C<br>≤ 110.00 °C<br><br>= Engine off<br>≥ 1.20 seconds<br><br>≤ 5.00 rpm<br><br><br><br><br><br><br>≥ 13.00 rpm<br><br>≥ 450.00 rpm<br><br>**P171D Hydraulic ≥pressure delay** Refer to "Transmission Supporting Tables" for details<br><br><br>≤ 0.38 seconds | ≥ 10.00 counts (initial fail count) Frequency =12.5ms<br><br>Once the above counts are achieved then increment the final fail counter once. The final fail counter can only increment once per autostart event<br><br>≥ 7.00 counts (final fail counter)<br><br>If above counter is greater than threshold then report DTC failed.<br><br>Frequency = 12.5ms | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | counter must achieve it's fail threshold in less than the time-out time.<br><br>*****************************<br>If vehicle is launched then:<br><br>Transmission Ratio<br><br><br><br>Trans Ratio band (1st gr)<br>Trans Ratio band (1st gr)<br><br>Trans Ratio band (2-6)<br>Trans Ratio band (2-6)<br><br>Valid transmission ratio achieved time<br><br>OR<br><br>If vehicle is not launched but autostart occurs then:<br><br>Turbine speed<br><br>Turbine speed less then above threshold for<br><br>Note: During an autostart event the lack of hydraulic pressure will result in momentary clutch slip in the C1234 clutch. After the clutch slip event, the main transmission pump and clutch will gain capacity, clutch slip will go | **P171D Transmission =forward gear ratios** Refer to "Transmission Supporting Tables" for details<br><br>≤ 1.12 pct<br>≥ 0.88 pct<br><br>≤ 1.07 pct<br>≥ 0.93 pct<br><br>≥ 0.50 seconds<br><br><br><br><br><br>≤ 5.00 rpm<br><br>≥ 0.50 seconds | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | to zero.  If the vehicle is launching (moving) then a valid transmission ratio can be achieved.  Or if the brake is continually applied and an autostart occurs naturally, then no ratio can be measured.  In this case turbine speed will return to near zero rpm. ***************************** <br><br> DTCs not set | CrankSensor_FA Transmission Output Shaft Angular Velocity Validity Transmission Turbine Angular Velocity Validity Transmission Oil Temperature Validity P171A P171B P171C U0101 P182E P1915 | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Lost Communicati on 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 | 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><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. |
|---|---|---|---|---|---|---|---|---|
| Outside Air Temperature (OAT) Sensor Circuit Performance | P0071 | Detects an OAT sensor that has stuck in range by comparing to IAT when conditions are appropriate | OAT-to-IAT engine off equilibrium counter<br><br>(see below for description of this counter)<br><br>If IAT >= OAT:<br>IAT - OAT<br><br>If IAT < OAT:<br>OAT - IAT<br><br>The "OAT-to-IAT engine off equilibrium counter" is a counter that is incremented or decremented based on vehicle speed when the engine is off. When this counter is high enough, the vehicle has reached an equilibrium where IAT and OAT can be compared. The value that is added or subtracted to the counter every 100 msec is contained in table **P0071: OAT Performance Drive Equilibrium Engine Off** | >= 300.0 counts<br><br><br><br>> 15.0 deg C<br><br><br>> 15.0 deg C | Time between current ignition cycle and the last time the engine was running<br><br>Engine is not running<br><br>Vehicle Speed<br><br>Coolant Temperature - IAT<br><br>IAT - Coolant Temperature<br><br>No Active DTCs: | >= 28,800.0 seconds<br><br><br><br>>= 15.5 MPH<br><br><br>< 15.0 deg C<br><br>< 15.0 deg C<br><br>VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_DefaultDetected MAF_SensorFA EngModeNotRunTmErr | Executed every 100 msec | Type B, 2 Trips |
|  |  |  | OAT-to-IAT engine running equilibrium counter<br><br>(see below for description of this counter)<br><br>If IAT >= OAT:<br>IAT - OAT<br><br>If IAT < OAT: | >= 300.0 counts<br><br><br><br>> 15.0 deg C | Engine is running<br><br>Vehicle Speed<br><br>Engine air flow<br><br>No Active DTCs: | >= 15.5 MPH<br><br>>= 10.0 grams/second<br><br>VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_DefaultDetected MAF_SensorFA | Executed every 100 msec |  |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | OAT - IAT<br><br>The "OAT-to-IAT engine running equilibrium counter" is a counter that is incremented or decremented based on vehicle speed and engine air flow when the engine is running. When this counter is high enough, the vehicle has reached an equilibrium where IAT and OAT can be compared. The value that is added or subtracted to the counter every 100 msec is contained in table **P0071: OAT Performance Drive Equilibrium Engine Running** | > 15.0  deg C | | EngModeNotRunTmErr | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Outside Air Temperature (OAT) Sensor Circuit Low | P0072 | Detects a continuous short to ground in the OAT signal circuit or the OAT sensor | Raw OAT Input | <= 52 Ohms (~150 deg C) | Continuous | | 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. |
|---|---|---|---|---|---|---|---|---|
| Outside Air Temperature (OAT) Sensor Circuit High | P0073 | Detects a continuous open circuit in the OAT signal circuit or the OAT sensor | Raw OAT Input | >= 403,672 Ohms (~-60 deg C) | Continuous | | 40 failures out of 50 samples  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. |
|---|---|---|---|---|---|---|---|---|
| Outside Air Temperature (OAT) Sensor Intermittent In-Range | P0074 | Detects a noisy or erratic OAT signal circuit or OAT sensor | String Length<br><br>Where:<br><br>"String Length" = sum of "Diff" calculated over<br><br>And where:<br>"Diff" = ABS(current OAT reading - OAT reading from 100 milliseconds previous) | > 100 deg C<br><br><br>10 consecutive OAT 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. |
|---|---|---|---|---|---|---|---|---|
| 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 AND<br>Engine Coolant Temp | THMR_RCT_Sensor_Ckt _FA<br>THMR_ECT_Sensor_Ckt _FA<br><br>> 300 seconds<br><br>> 99.5 Deg C | 30 failures out of 60 samples<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| 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 controllers 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 controllers P0597 may also set |

# 15 OBDG05 ECM Summary Tables (Unique DTCs)

| 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 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. |
|---|---|---|---|---|---|---|---|---|
| Active Grill Air Shutter A Performance /Stuck OFF | P059F | Compare commanded shutter position to sensed position | Consecutive failed intrusive position performance test count | >= 5.00 | 1. Ignition Run_Crack Active, 2. Ignition Run_Crank AND Ignition Accessory AND ECU Awake, 3. Command Shutter1 Enable | 1. = TRUE, 2. = FALSE AND = FALSE AND = TRUE, 3. = TRUE | 1 sample / 100 millisec | 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 #5 Circuit | P06D2 | Detects a continuous or intermittent short on the 5 volt reference circuit #5 | ECM Vref5 < or ECM Vref5 > or the difference between ECM filtered Vref5 and Vref5 > | 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. |
|---|---|---|---|---|---|---|---|---|
| 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 =**<br>CeECTD_e_ECT_Snsr<br>(Sensor1 is the temp sensor most impacted by the block heater (if equipped))<br><br>**Sensor2 =**<br>CeECTD_e_RCT_Snsr<br><br>**Sensor3 =**<br>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<br>(Sensor1 fast fail) .<br><br>2) Sensor1 power up temp is greater than Sensor2 and Sensor3 in this range:<br>(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><br>≥ 60.0 ºC<br><br><br><br><br><br><br>≥ 15.8 and < 60.0 ºC<br><br><br><br><br><br>≤ 15.8 Deg ºC | No Active DTC's<br><br><br><br><br><br><br><br><br><br><br><br>Engine Off Soak Time<br>Propulsion Off Soak Time<br>Non-volatile memory initization<br><br><br><br>Test complete this trip<br>Test aborted this trip<br>Test disabled this trip<br>Ambient<br>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 | VehicleSpeedSensor_FA<br>IAT_SensorCircuitFA<br>THMR_RCT_Sensor_Ckt_FA<br>ECT_Sensor_Ckt_FA<br>EngModeNotRunTmErr<br>EngineModeNotRunTimer_FA<br>OAT_PtEstFiltFA<br>OAT_PtEstRawFA<br>PSAR_PropSysInactveCrs_FA<br>DRER_DiagSystemDsbl<br><br>> 25,200 seconds<br>> 0 seconds<br><br>= Not occurred<br><br><br>= False<br>= False<br>= False<br>≥ -7 ºC<br>= False<br><br>==================<br><br><br><br><br>≥ 15.8 ºC and < 60.0 ºC<br><br><br>< 10.0 Seconds<br><br>================== | 1 failure to set DTC<br><br>1 sec/ 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. |
|---|---|---|---|---|---|---|---|---|
| | | | Sensor3 by 15.8 °C and the time spent cranking the engine without starting is ≥ 10.0 seconds with the LowFuelConditionDiag | = False | when 1) or 2) occurs.<br><br>1a) IAT monitoring is enabled after the following Vehicle drive constraints<br>1b) Drive time<br><br>1c) Vehicle speed<br><br>1d) Additional Vehicle drive time is provided to 1b when Vehicle speed is below 1c as follows:<br><br>1e) IAT drops from power up IAT<br><br>2a) ECT monitoring is enabled after engine start in the following engine run time window<br><br>2b) Sensor1 temp derivative during the test is:<br><br>2c) Consecutive samples of 2b) 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 | <br><br><br>> 400 Seconds with<br><br>> 14.9 MPH and<br><br><br>0.50 times the seconds with vehicle speed below 1b<br><br>≥ 5.0 °C<br><br><br><br>5.0 <= seconds <= 60.0<br><br><br>< -0.10 °C/sec<br><br>≥ 4 samples<br><br>==================<br><br><br>≥ 1,800 Seconds<br><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: | ≥ 15.8 ºC<br><br>≥ 15.8 ºC | No Active DTC's<br><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>Test complete this trip Test aborted this trip Test disabled this trip Ambient LowFuelCondition Diag | VehicleSpeedSensor_FA IAT_SensorCircuitFA THMR_RCT_Sensor_Ckt _FA ECT_Sensor_Ckt_FA EngineModeNotRunTimer Error EngineModeNotRunTimer _FA OAT_PtEstFiltFA OAT_PtEstRawFA PSAR_PropSysInactveCr s_FA DRER_DiagSystemDsbl<br><br>> 25,200 seconds > 0 seconds<br><br>= Not occurred<br><br><br>= False = False = False ≥ -7 ºC = False | 1 failure to set DTC<br><br>1 sec/ 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. |
|---|---|---|---|---|---|---|---|---|
| Communication Error with Active Grill Air Shutter Module "A" | P151E | This DTC monitors for an internal error or error in communication with the Active Grill Air Shutter Module A | Communication of the Alive Rolling Count from the Shutter Module over LIN bus has ceased or the Shutter Module signals it has an internal error for<br><br>out of total samples | >= 10.00 counts<br><br>>= 10.00 counts | All the following conditions are met for<br><br>Power Mode<br><br>Powertrain Relay Voltage<br><br>Run/Crank Ignition Voltage | >= 3.00 seconds<br><br>= Run<br><br>>= 11.00 Volts<br><br>>= 11.00 Volts | LIN bus communication executes in 500ms loop | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Ignition Voltage Correlation #2 | P16A7 | Detect a continuous or intermittent out of correlation between the Run/Crank Ignition Voltage & the Powertrain Relay Ignition Voltage #2 | \|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 0.175 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. |
|---|---|---|---|---|---|---|---|---|
| Engine Controls Ignition Relay Feedback Circuit 2 High Voltage - (GEN III Controllers ONLY) | P16B3 | Diagnoses ignition feedback circuit 2 high voltage | Engine controls ignition relay feedback circuit 2 high voltage | Relay voltage >= 4.00 | Powertrain relay high diag enable <br><br> Powertrain relay state | = 1.00 <br><br> = INACTIVE | 50.00 failures out of 63.00 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. |
|---|---|---|---|---|---|---|---|---|
| Transfer Case Speed Sensor Output (TCSS) | P2160 | No activity in the TCSS Signal circuit | TCSS Raw Speed | ≤ 50 RPM | Engine Torque | 60.0 ≤ N-M ≤ 8,191.8 | ≥ 5.0 sec | Type B, 2 Trips |
| | | | | | Throttle Position | 8 ≤ % ≤ 99 | | |
| | | | | | Transmission gear | Not in Park or Neutral | | |
| | | | | | Garage Shift | Not active | | |
| | | | | | PTO | Not active<br>Not a hybrid vehicle | | |
| | | | | | EngineTorqureInaccurate | FALSE | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Transfer Case Speed Sensor Output (TCSS) | P2161 | TCSS Circuit Signal Intermittent | TCSS Loop-to-Loop speed decrease OR TCSS Loop-to-Loop speed increase | ≥ 475 RPM<br><br>≥ 225 RPM | Engine Speed<br><br>TCSS Speed<br><br>Transmission gear<br><br>Garage Shift<br><br>PTO<br><br>CrankSensor_FA = FALSE<br><br>P2160 | ≥ 1,000 RPM<br><br>> 0<br><br>Not in Park or Neutral<br><br>Not active<br><br>Not active<br><br><br><br>Not Fault Active | ≥ 4.0 sec | Type B, 2 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) | This diagnostic can be calibrated to fail in one of two methods based on the following calibration. This application has been calibrated as a Type 1 .<br><br>Type 0 - Airflow Method: 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.<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.<br><br>Type 1 - Energy Method: Engine Coolant Temp (ECT) is ≤ commanded temperature minus 18 Deg C and normalized ratio is ≤ than 1.10 . When above is present for more than 5 seconds, fail counts start.<br>== Ratio Definition:=== Current temp difference between ECT and RCT minus PwrUp difference divided by predicted energy. | | No Active DTC's<br><br><br><br><br>Engine not run time<br><br><br>Engine run time<br><br><br>Fuel Condition<br>ECT at Power Up<br>IAT min<br>T-Stat Heater duty cycle commanded<br><br>Type 0: Airflow range to accumulate<br><br>Type 1: Minumum energy to enable | MAF_SensorFA<br>IAT_SensorFA<br>THMR_RCT_Sensor_Ckt _FA<br>THMR_ECT_Sensor_Ckt _FA<br>THMR_AHV_FA<br>≥ 25,200 seconds<br><br><br>90 ≤ 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><br>8.0 ≤ Airflow ≤ 30.0 gps<br><br>500.0 kJ | 30 failures out of 90 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. |
|---|---|---|---|---|---|---|---|---|
| Four Wheel Drive Low Switch Circuit | P2771 | Fail Case 1: Continuous Open (Stuck Off) in the Four Wheel Drive Low Switch CircuitFail Case 2: Ground (Stuck On) in the Four Wheel Drive Low Switch Circuit | 4WD Low Switch Transfer case gear ratio 4WD Low Switch Transfer case gear ratio | = TRUE $\geq 2.400$ and $\leq 2.800$ = FALSE $\geq 0.900$ and $\leq 1.100$ | Engine Torque Engine Speed Ignition voltage Throttle position Transmission Temperature Engine Run time Vehicle Speed TPS_FA VehicleSpeedSensor_FA EngineTorqureInaccurate Transmission gear P0502, P0503, P0722, P0723, P215C, P2160, P2161, U0101 Clutch Transmission Input Speed Signal | $30.0 \leq$ N-M $\leq 8,191.8$ $1,000 \leq$ RPM $\leq 5,500$ $9.0 \leq$ Volts $\leq 32.00$ $3.0 \leq \% \leq 99.0$ $-40.0 \leq$ ºC $\leq 130.0$ $>= 10.0$ Sec $>= 5.00$ Mph False False FALSE Not in Park, Reverse, or Neutral Not Fault Active Engaged (Manual transmission only) Valid (Automatic transmission only) | $\geq$ 2.0 sec$\geq$ 7.0 sec | 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 Transfer Case Control Module | U0102 | This DTC monitors for a loss of communication with the transfer case control module | Message is not received from controller for<br><br>Message $1CB<br><br>Message $1CC | ≥ 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>Run/Crank Ignition voltage<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>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>Not Active<br><br><br>> 6.41 Volts<br><br>= run<br><br><br>= 0<br>(1 indicates enabled)<br><br>= Active<br><br>> 11.00 Volts | Diagnostic runs in 12.5 ms loop | Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | not active for | > 0.4000 seconds | | |
| | | | | | U0102 | Not Active on Current Key Cycle | | |
| | | | | | TCCM | is present on the bus | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Control Module Communicati on LIN Bus 1 Off | U1501 | This DTC monitors for a LIN bus off condition | LIN bus off failures | >= 3.00 counts | The following criteria have been enabled for<br><br>Power Mode<br><br>Run/Crank Voltage | >= 5.00 seconds<br><br>=Run<br><br>>= 11.00 Volts | Dependent on bus loading. | Type B, 2 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| LIN Bus 1 Lost Communication with Device 0 (Shutter 1) | U1510 | This DTC monitors for a loss of communication on the LIN bus with Shutter 1 | ECM has lost communication over the LIN bus with Device 0 / Shutter 1 for | >= 3.00 counts | The following criteria have been enabled for<br><br>Power Mode<br><br>Run/Crank Voltage | >= 5.00 seconds<br><br>=Run<br><br>>= 11.00 Volts | LIN bus communication executes in 500ms loop | 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) | P0502 | No activity in the TOSS circuit | TOSS Raw Speed | ≤ 60 RPM | Engine Torque | 54.0 ≤ N-M ≤ 8,191.8 | ≥ 4.5 sec | Type B, 2 Trips |
| | | | | | Minimum Throttle opening | ≥ 8.0% | | |
| | | | | | Engine Speed | 1,500 ≤ RPM ≤ 6,500 | | |
| | | | | | Ignition voltage | 9.0 ≤ Volts ≤ 32.00 | | |
| | | | | | PTO | not active | | |
| | | | | | EngineTorqureInaccurate | KeETQC_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, | | |
| | | | | | P0503 | Not failed this key cycle | | |

| 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 | > 300 RPM for ≥ 2.0 sec ≤ 150 RPM for ≥ 2.0 sec | ≥ 3.3 sec | Type B, 2 Trips |
| | | | | | Speed changeTime since transfer case range change | ≥ 6.0 sec | | |
| | | | | | Ignition voltage | 9.0 ≤ Volts ≤ 32.00 | | |
| | | | | | Engine Speed | 200 ≤ RPM ≤ 7,500 for ≥ 5.0 seconds | | |
| | | | | | Vehicle Speed | ≤ 511.99 MPH for ≥ 5.0 sec | | |
| | | | | | PTO | not active | | |

| 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><br><br><br>Clutch Pedal Position:<br><br><br><br>OR<br><br><br><br><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>><br>**P0806 EngTorqueThreshold Table**<br>(see Supporting Tables)<br><br><<br>**P0806 ResidualErrEnableLow Table**<br>(see Supporting Tables)<br>><br>**P0806 ResidualErrEnableHigh Table**<br>(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<br><br>for | < 4 % of Vref<br><br>200 counts out of 250 samples | Engine Not Cranking System Voltage | > 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 | > 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 | < 4.6 %<br><br>> 46.8 % | OBD Manufacturer's Enable Counter | = 0 | 250 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. |
|---|---|---|---|---|---|---|---|---|
| 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 0.500 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 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. |
|---|---|---|---|---|---|---|---|---|
| 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 89.000 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 89.000 seconds | MIL: Type C, No MIL |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Analog Mode Switch Circuit Low Voltage | P159F | This DTC will detect a fuel saver switch input that is too low out of range. | Analog Mode Switch % of 5V range<br><br>The normal operating range of the analog mode switch is:<br><br>Switch depressed % of 5V range:<br><br>Switch released % of 5V range: | < 29.0 %<br><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. |
|---|---|---|---|---|---|---|---|---|
| Analog Mode Switch Circuit High Voltage | P15A0 | This DTC will detect an analog mode switch input that is too high out of range. | Analog Mode Switch % of 5V range<br><br>The normal operating range of the analog 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 |

## 15 OBDG05 ECM Summary Tables (Unique DTCs)

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Analog Mode Switch Performance | P15A1 | This DTC will detect an analog mode switch input that is in an indeterminate range. | Analog Mode Switch % of 5V is in an indeterminate range:<br><br>The normal operating range of the analog 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 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><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><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><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<br><br>(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<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 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 |

## 15 OBDG05 ECM Summary Tables (Unique DTCs)

| 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 or or OR the following String Length (SL) Test: Average Pressure Error or or or and the Average String Length or NOTE: Average Pressure Error is the average difference between the predicted pressure and the measured pressure | > 3.5 kPa Bank 1 > 3.5 kPa Bank 2 < -5.0 kPa Bank 1 < -5.0 kPa Bank 2 > 3.5 kPa Bank 1 > 3.5 kPa Bank 2 < -2.8 kPa Bank 1 < -2.8 kPa Bank 2 < **SL Threshold Bank 1 Table** < **SL Threshold Bank 2 Table** | BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not SL Stability time SL RPM range 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 > 4.0 seconds Bank 1 > 4.0 seconds Bank 2 < 4,700 RPM or > 4,900 AIRSystemPressureSensor FA AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFA AmbientAirDefault_NA IAT_SensorFA ECT_Sensor_FA EngineMisfireDetected_FA CatalystSysEfficiencyLoB1_FA CatalystSysEfficiencyLoB2_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA IgnitionOutputDriver_FA FuelInjectorCircuit_FA | Phase 1 Conditional test weight > 7.0 seconds Total 'String Length' accumulation time: > 10.0 sec Bank1 > 10.0 sec Bank2 Frequency: Once per trip when AIR pump commanded On Conditional test weight is calculated by multiplying the following Factors: **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** (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 Open - For 3 DTC implementation only | P0412 | Diagnoses the Secondary AIR Solenoid Control Low Side Driver circuit for circuit faults | Voltage low during driver off state (indicates open circuit) | Open Circuit: >= 200K Ohms impedance between signal and controller ground | Powertrain Relay Voltage | >= 11.00 volts | 20 failures out of 25 samples  250ms / sample | Type B, 2 Trips  Note: In certain controllers P041F may also set (Secondary AIR solenoid control circuit low voltage) |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Secondary AIR Pump Control Circuit Open- For 3 DTC implementation only | P0418 | Diagnoses the Secondary AIR Pump Control Low Side Driver circuit for circuit faults | Voltage low during driver off state (indicates open circuit) | Open Circuit: >= 200K Ohms impedance between signal and controller ground | Powertrain relay Voltage | >= 11.00 volts | 20 failures out of 25 samples  250ms / sample | Type B, 2 Trips  Note: In certain controllers P2257 may also set (Secondary AIR pump control circuit low voltage) |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Secondary AIR Solenoid Control Circuit Low Voltage | P041F | Diagnoses the Secondary AIR Solenoid Control Low Side Driver circuit for circuit faults | Voltage low during driver off state (indicates short-to-ground) | Short to ground: <= 0.5 Ohms impedance between signal and controller ground | Powertrain relay Voltage | >= 11.00 volts | 20 failures out of 25 samples 250ms / sample | Type B, 2 Trips Note: In certain controllers P0412 may also set (Secondary AIR solenoid control circuit Open) |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Secondary AIR Solenoid Control Circuit High Voltage | P044F | Diagnoses the Secondary AIR Solenoid Control Low Side Driver circuit for circuit faults | Voltage high during driver on state (indicates short-to-power) | Short to power: <= 0.5 Ohms impedance between signal and controller power | Powertrain relay Voltage | >= 11.00 volts | 20 failures out of 25 samples  250ms / sample | 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 Low Voltage | P2257 | Diagnoses the Secondary AIR Pump Control Low Side Driver circuit for circuit faults | Voltage low during driver off state (indicates short-to-ground) | Short to ground: <= 0.5 Ohms impedance between signal and controller ground | Powertrain relay Voltage | >= 11.00 volts | 20 failures out of 25 samples 250ms / sample | Type B, 2 Trips Note: In certain controllers P0418 may also set (Secondary AIR pump control circuit open) |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Secondary AIR Pump Control Circuit High Voltage | P2258 | Diagnoses the Secondary AIR Pump Control Low Side Driver circuit for circuit faults | Voltage high during driver on state (indicates short-to-power) | Short to power: <= 0.5 Ohms impedance between signal and controller power | Powertrain relay Voltage | >= 11.00 volts | 20 failures out of 25 samples<br><br>250ms / sample | 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 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><br>Signal Variation | < 0.50 kPa<br><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>AIRSysPressSnsrB1CktHi FA<br>ControllerProcessorPerf_FA<br>5VoltReferenceA_FA<br>5VoltReferenceB_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) | > 10.0 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 5VoltReferenceA_FA 5VoltReferenceB_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 5VoltReferenceA_FA 5VoltReferenceB_FA | 1,000 samples (6.25 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 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 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 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 AIRSysPressSnsrB1CktLoFA 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 < -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 OR < 32.0 Volts < 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 5VoltReferenceA_FA 5VoltReferenceB_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 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: | > 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<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>5VoltReferenceA_FA<br>5VoltReferenceB_FA<br>IgnitionOutputDriver_FA<br>FuelInjectorCircuit_FA | Phase 2 Conditional test weight > 1.5 sec<br><br>Frequency: Once per trip when AIR pump commanded On<br><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<br><br>or | > **Bank 1 Pump Pressure Error** table<br><br>> **Bank 2 Pump 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>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>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>5VoltReferenceA_FA<br>5VoltReferenceB_FA<br>IgnitionOutputDriver_FA<br>FuelInjectorCircuit_FA | Phase 3 Cumlatative test weight > 2.0 sec.<br><br>Frequency: Once per trip when AIR pump is commanded On | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Hybrid Powertrain Control Module (HPC) Requested MIL Illumination | P0AC4 | Monitors the HPC MIL request line to determine when the HPC has detected a MIL illuminating fault. | HPC 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. |
|---|---|---|---|---|---|---|---|---|
| Hybrid Control Torque Request Circuit | P15F2 | Determines if torque request from the HCP is valid | 1. Serial Communication 2's complement not equal for message $181 for Strong Hybrid or Mild Hybrid Applications<br><br>OR<br><br>2. Serial Communication rolling count value shall be + 1 from previous $181 message for Strong Hybrid or Mild Hybrid Applications | Message <> 2's complement of Engine Torque Signal<br><br>and if Mild Hybrid:<br><br>Message <> 2's complement of Motor Torque Signal<br><br>OR<br><br>Message rolling count value <> previous message rolling count value plus one | Secondary High Speed Bus is Present and No Serial communication loss to HCP (U1817)<br><br>Run Crank Active<br><br>No Serial communication loss to HCP (U1817)<br><br>Hybrid Type = Mild or Strong<br><br>If Mild Hybrid Only: Torque source type = Crankshaft Torque | No loss of communication<br><br>>= 0.50 Sec<br><br>> 6.41<br><br>= Mild<br><br>= Crankshaft Torque | 1.<br>>= 10 Protect errors out of 16 samples<br><br><br>OR<br><br>2.<br>>= 10 Rolling count errors out of 16 samples<br><br>Pass diagnostic if samples >= 16<br><br>Performed every received message | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Driver Motor Torque Delivered Circuit | P15F4 | Determines if torque archieved from BCP is valid | 1. Serial Communication 2's complement not equal for message $0BF for Mild Hybrid Applications OR 2. Serial Communication rolling count value shall be + 1 from previous $0BF message for Mild Hybrid Applications | Message <> 2's complement of Motor Torque Signal OR Message rolling count value <> previous message rolling count value plus one | Secondary High Speed Bus is Present and No Serial communication loss to BCP (U1817) Run Crank Active Low Voltage not Present | No loss of Communication >= 0.50 > 6.41 | 1. >= 10 Protect errors out of 16 samples OR 2. >= 10 Rolling count errors out of 16 samples Executes in a 12.5ms loop | Type A, 1 Trip |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Hybrid Control Speed Request Circuit | P15F9 | Determines if torque request from the HCP is valid | 1. Serial Communication 2's complement not equal for message $281<br><br>OR<br><br>2. Serial Communication rolling count value shall be  + 1 from previous $281 message | Message <> 2's complement of message<br><br><br>Message rolling count value <> previous message rolling count value plus one | Secondary High Speed Bus is Present<br><br>No Serial communication loss to HCP (U1817)<br><br><br><br><br><br>Run Crank Active | <br><br><br><br><br><br><br><br><br>>= 0.50  Sec | >= 10.00 Password Protect errors out of  16.00 samples<br><br>OR<br><br>>= 10.00 Rolling count errors out of 16.00 samples<br><br><br>Pass diagnostic if samples >= 16.00<br><br>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. |
|---|---|---|---|---|---|---|---|---|
| Brake Pedal Position Sensor Signal Message Counter Incorrect | P15FB | Detects rolling count or protection value errors in Chassis Brake Pedal Position Emissions Related serial data signal | If x of y rolling count / protection value faults occur, default brake pedal positiion to zero for duration of fault | | Chassis Brake Pedal Position Emissions Related Serial Data Error Diagnostic Enable | 1.00 | 10.00 / 16.00 counts | Type A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Lost Communication With Hybrid Powertrain Control Module | U0293 | This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module. | Message is not received from controller for<br><br>Message $0B4<br><br>Message $0D3<br><br>Message $164<br><br>Message $186<br><br>Message $1DF<br><br>Message $3C1 | <br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 0.5 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><br>Power Mode<br><br>Off Cycle Enable Criteria:<br><br>KeCAND_b_OffKeyCycle DiagEnbl<br><br><br><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 | <br><br><br>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>= 0<br>(1 indicates enabled)<br><br><br><br>= Active<br><br>> 11.00 | Diagnostic runs in 12.5 ms loop | Type A, 1 Trips |

| 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>U0293<br><br>Hybrid Powertrain 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 Hybrid Powertrain Control Module on Bus B | U1817 | This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module on Bus B | Message is not received from controller for<br><br>Message $0A7<br><br>Message $0A9<br><br>Message $181<br><br>Message $1D3<br><br>Message $1D7<br><br>Message $1E3<br><br>Message $281<br><br>Message $291 | ≥ 10.0 seconds<br><br>≥ 10.0 seconds<br><br>≥ 0.5 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>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>Off Cycle Enable Criteria:<br><br>KeCAND_b_OffKeyCycle DiagEnbl<br><br><br><br>Ignition Accessory Line and<br>Battery Voltage<br><br><br><br>General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > | 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><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 A, 1 Trips |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | 3.0000 seconds<br><br>Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for<br><br>U1817<br><br>Hybrid Powertrain 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. |
|---|---|---|---|---|---|---|---|---|
| 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 EnabledPowertrain relay Voltage Ignition run crank voltage Engine is not cranking | 1 >= 11.00 Volts >= 5.00 Volts | 20 failures out of 100 samples 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 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>>=<br>Volts 11.00<br><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 (single turbo) | 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)<br><br>OR<br><br>ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro 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)<br><br>OR<br><br>ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold | > 10.0 kPa<br><br><= 10.0 kPa<br><br><= 10.0 kPa<br><br><br><= 10.0 kPa<br><br><br><br>> 10.0 kPa<br><br><= 10.0 kPa<br><br><br><= 10.0 kPa<br><br><br><= 10.0 kPa<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>Manifold Pressure<br>Manifold Pressure<br>Baro Pressure<br>Baro Pressure<br>Turbocharger Boost Pressure<br>Turbocharger Boost Pressure<br><br>No Active DTCs:<br><br><br><br><br>No Pending DTCs: | <br><br><br>> 10.0 seconds<br><br><br><br><br><br>>= 50.0 kPa<br><= 115.0 kPa<br>>= 50.0 kPa<br><= 115.0 kPa<br><br>>= 50.0 kPa<br><br><= 115.0 kPa<br><br>EngineModeNotRunTimer Error<br>MAP_SensorFA<br>AAP_SnsrFA<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 | 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<br><br>> 10.0 kPa | | | | |
| | | | | | | | | |

| 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) | P00E9 | 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) | <br><br><br><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 | |
| | | | 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 - | <br><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 | 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) | P00EA | 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) | P00EB | 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 | P00EC | 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) | > 80.00 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 |

# 15 OBDG05 ECM Summary Tables (Unique DTCs)

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Mass Air Flow System Performance (single turbo) | 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 | > 20.0 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>< 130 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 AND Measured TIAP - measured Baro - offset as a function of engine speed See table "**TIAP-Baro Correlation Offset**" | > 24.0 kPa | No Active 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 | | |
| | | | 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 | > 1.0 seconds <br><br><br><br> > 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 <br><br><br><br> AND Manifold Pressure <br><br><br><br> AND | > 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**" | | | | |

| 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 | | | | |
| | | | | | | | | |

# 15 OBDG05 ECM Summary Tables (Unique DTCs)

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Manifold Absolute Pressure Sensor Performance (single turbo) | 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><br><br><br>> 20.0 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 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 < 130 Deg C > -20 Deg C < 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<br>AND<br>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><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><br>> 24.0 kPa<br><br><br><br><br><br><br><br>> 1.0 seconds<br><br><br><br>> 1.0 seconds<br><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>No Pending DTCs: | See Residual Weight Factor tables.<br><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 | | |

| 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><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 | | | | |
| | | | Manifold Pressure OR Manifold 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><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><br>No Pending DTCs: | > 10.0 seconds<br><br><br><br>EngineModeNotRunTimer Error MAP_SensorCircuitFA AAP_SnsrCktFA AAP2_SnsrCktFA<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. |
|---|---|---|---|---|---|---|---|---|
| Intake Air Temperature Sensor Circuit Performance (applications with humidity sensor and manifold temperature sensor) | P0111 | Detects an IAT sensor that has stuck in range by comparing to IAT2 and IAT3 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><br>> 25 deg C<br><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 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 - Power Up IAT) > ABS(Power Up IAT2 - Power Up IAT3) | > 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 IAT3 is between Power Up IAT and Power Up IAT2<br><br>AND<br><br>ABS(Power Up IAT - Power Up IAT2)<br><br>AND<br><br>ABS(Power Up IAT3 - | > 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 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 IAT) > ABS(Power Up IAT3 - Power Up IAT2) | | | HumTempSnsrCktFA | | |
| | | | | | | | | |

# 15 OBDG05 ECM Summary Tables (Unique DTCs)

| 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_CntrlDevNegLim - KtBSTD_p_CntrlDevAmbAirCorr)<br><br><br>See Tables in Supporting Tables Sheet | Diagnostic Enabled | 1 | 14 failures out of 15 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 | < 130.0 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 > BasicPressure<br><br>AmbientAirDefault_Snsr<br>BSTR_b_PCA_CktFA<br>BSTR_b_TurboBypassCktFA<br>ECT_Sensor_FAIAT_Sen | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | No Active DTC′s: | 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 | | |
| | | | | | | | | |

## 15 OBDG05 ECM Summary Tables (Unique DTCs)

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Turbocharger Boost Pressure (TIAP) Sensor Performance (single turbo) | 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**" | > 20.0 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>< 130 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. |
|---|---|---|---|---|---|---|---|---|
| | | | 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**"<br><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><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 | > 24.0 kPa<br><br><br><br><br><br><br>> 1.0 seconds<br><br><br><br>> 1.0 seconds<br><br><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><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 | | |

| 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 | | | | |
| | | | Turbocharger Boost Pressure OR Turbocharger Bosst 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: | > 10.0 seconds <br><br> EngineModeNotRunTimer Error MAP_SensorCircuitFA AAP_SnsrCktFA AAP2_SnsrCktFA | 4 failures out of 5 samples <br><br> 1 sample every 12.5 msec | |
| | | | OR ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure) | <= 10.0 kPa <br><br> > 10.0 kPa <br><br> > 10.0 kPa | No Pending DTCs: | MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP | | |
| | | | | | | | | |

| 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 | < 19.4 % of 5 Volt Range (This is equal to 0.97 Volts, or 49.9 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. |
|---|---|---|---|---|---|---|---|---|
| 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><br>See Tables in Supporting Tables Sheet | Diagnostic Enabled<br><br>Engine Speed<br><br>Engine Speed<br><br>Desired Boost Pressure<br><br>Desired Boost Pressure<br><br>Desired Boost Pressure Derivative<br><br>Desired Boost Pressure Derivative<br><br>Ambient Pressure<br><br>Ambient Pressure<br><br>Coolant Temp<br><br>Coolant Temp<br><br>Intake Air Temp<br><br>Intake Air Temp<br><br>Wait for steady state:<br><br><br><br>No Active DTCs: | 1<br><br>> 1,600 rpm<br><br>< 6,000 rpm<br><br>> 140.0 kPa<br><br>< 300.0 kPa<br><br>> -75.0 kPa/s<br><br>< 75.0 kPa/s<br><br>> 60.0 kPa<br><br>< 120.0 kPa<br><br>> -40.0 Deg C<br><br>< 130.0 Deg C<br><br>> -40.0 Deg C<br><br>< 80.0 Deg C<br><br>> KtBSTD_t_CntrlDevEnblDelay  See Table in Supporting Tables Sheet<br><br>Desired Boost Pressure > Basic Pressure<br><br>AmbientAirDefault_Snsr BSTR_b_PCA_CktFA BSTR_b_TurboBypassCktFA ECT_Sensor_FA | 14 failures out of 15 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | 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. |
|---|---|---|---|---|---|---|---|---|
| ColdStrtA_C amPstnB1 | P05CC | Detects a VVT system error during Cold Starts 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)<br><br>Cam Position Error > 6.00 deg. | System Voltage<br><br>Engine Running<br><br>Power Take Off (PTO) active<br><br>CSER Active<br><br>Desired cam position<br><br>Desired AND Measured cam position<br><br>Desired cam position variation<br><br>No Active DTCs<br><br>Bundle: **IntakeVVT_Enabled** | > 11.00 Volts<br><br>= TRUE<br><br>= FALSE<br><br>= TRUE<br><br>> 0 deg<br><br>> 6.00 deg AND < 26.00 deg<br><br>< 3.00 Deg for (**P0011_P05CC_StableP ositionTimeIc1**) sec<br><br>P0010 P2088 P2089<br><br>= TRUE (Reference Supporting Tables: **P0011_P0021_P05CC_P 05CD_HiEngSpdHiDsbII c P0011_P0021_P05CC_P 05CD_HiEngSpdLoEnbII c P0011_P0021_P05CC_P 05CD_LoRpmHiEnbIIc P0011_P0021_P05CC_P 05CD_LoRpmLoDsbIIc P0011_P0021_P05CC_P 05CD_LoPresHiEnbIIc P0011_P0021_P05CC_P 05CD_LoPresLoDsbIIc P0011_P0021_P05CC_P** | 65 failures out of 75 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | **05CD_EngOilPressEnbllc** **P0011_P0021_P05CC_P05CD_P0014_P0024_P05CE_P05CF_ColdStartEngRunning**<br><br>Reference Fault Bundles:<br>**IntakeVVT_Enabled**<br>**CrankIntakeCamCorrFA**<br>**IntakeCamSensorTFTKO**<br>**CrankSensorTFTKO**<br>**CamLctnIntFA**) | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| ColdStrtB_C amPstnB1 | P05CE | Detects a VVT system error during Cold Starts 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)<br><br>Cam Position Error > 6.00 deg. | System Voltage<br><br>Engine Running<br><br>Power Take Off (PTO) active<br><br>CSER Active<br><br>Desired cam position<br><br>Desired AND Measured cam position<br><br>Desired cam position variation<br><br>No Active DTCs<br><br>Bundle:<br>**ExhaustVVT_Enabled** | > 11.00 volts<br><br>= TRUE<br><br>= FALSE<br><br>= TRUE<br><br>> 0 deg<br><br>> 6.00 deg<br>AND<br>< 26.00 deg<br><br>< 3.00 Deg for (**P0014_P05CE_StableP ositionTimeEc1**) sec.<br><br>P0013<br>P2090<br>P2091<br><br>= TRUE<br>(Reference Supporting Tables:<br>**P0014_P0024_P05CE_P 05CF_HiEngSpdHiDsblE c**<br>**P0014_P0024_P05CE_P 05CF_HiEngSpdLoEnbl Ec**<br>**P0014_P0024_P05CE_P 05CF_LoRpmHiEnblEc**<br>**P0014_P0024_P05CE_P 05CF_LoRpmLoDsblEc**<br>**P0014_P0024_P05CE_P 05CF_LoPresHiEnblEc**<br>**P0014_P0024_P05CE_P 05CF_LoPresLoDsblEc**<br>**P0014_P0024_P05CE_P** | 65 failures out of 75 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. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 05CF_EngOilPressEnbl Ec P0011_P0021_P05CC_P 05CD_P0014_P0024_P0 5CE_P05CF_ColdStartE ngRunning<br><br>Reference Fault Bundles: **ExhaustVVT_Enabled CrankExhaustCamCorrF A ExhaustCamSensorTFT KO CrankSensorTFTKO CamLctnExhFA** ) | | |
| | | | | | | | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| Barometric Pressure (BARO) Sensor Performance (single turbo) | 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  OR  Difference between baro sensor reading and estimated baro when distance since last estimated baro update | > 15.0 kPa  <= 0.06 miles    > 20.0 kPa  > 0.06 miles | No Active DTCs: | AmbPresSnsrCktFA ECT_Sensor_Ckt_FA IAT_SensorFA MAF_SensorFA AfterThrottlePressureFA TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA | 320 failures out of 400 samples  1 sample every 12.5 msec | Type B, 2 Trips |
|  |  |  | Barometric Pressure OR Barometric Pressure  OR  ABS(Manifold Pressure - Baro Pressure) AND ABS(Turbocharger Boost Pressure - Manifold Pressure) AND ABS(Turbocharger Boost Pressure - Baro Pressure) | < 50.0 kPa  > 115.0 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  No Active DTCs:    No Pending DTCs: | > 10.0 seconds    EngineModeNotRunTimer Error MAP_SensorCircuitFA AAP_SnsrCktFA AAP2_SnsrCktFA  MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP | 4 failures out of 5 samples  1 sample every 12.5 msec |  |

## 15 OBDG05 ECM Summary Tables (Unique DTCs)

| 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 | < 39.3 % of 5 Volt Range ( 2.0 Volts = 50.0 kPa) | | | 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) | | | 320 failures out of 400 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. |
|---|---|---|---|---|---|---|---|---|
| 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><br>Filtered Boost Pressure | 0.25 Second < Accumulation time < 1.00 Second<br><br><br><br>10.00 Hz<br><br>> 65.000 g/s<br><br><br>> 100.00 kPa | Diagnostic Enabled<br><br>Engine Speed<br><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><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 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 >= 35.0 kPa AND DerivativeMAP <= -250.00 kPa )<br>[ TRUE ]<br><br>> 6.0 percentEnable condition kept true for 0.50 seconds extra<br><br><br><br>TC_BoostPresSnsrFA 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. |
|---|---|---|---|---|---|---|---|---|
| Performance Traction Torque & Speed Request Circuit | P2548 | Determines if torque and/or speed request from the EBTCM is valid | Protection error - Serial Communication message ($1C8) 2's complement not equal<br><br> Torque Request<br><br><br><br><br>Speed Request<br><br><br><br>OR<br><br><br>Rolling count error - Serial Communication message ($1C8) rolling count index value | <br><br><br><br>Message <> two's complement of message<br><br><br><br><br>Message <> two's complement of message<br><br><br><br><br><br>Message <> previous message rolling count value + one | Diagnostic Status<br><br>Run/Crank Active<br><br>Ignition Voltage<br><br><br><br><br>No Serial communication loss to EBTCM (U0121) | Enabled<br><br><br> > 0.50 seconds<br><br> > 6.41 volts<br><br><br><br>No loss of communication | Fail Threshold: >= 10 failures out of 20 samples<br><br><br><br>Pass Threshold: >= 10 samples during key cycle.<br><br><br><br>OR<br><br>Fail Threshold >= 6 Rolling count errors out of 10 samples<br><br>Performed on every received message | Type B, 2 Trips |

| 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 | 100 failures out of 125 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 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 | 100 failures out of 125 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. |
|---|---|---|---|---|---|---|---|---|
| Fuel Composition Sensor Circuit Low | P0178 | Detects Out of Range Low Frequency Signal<br><br>The ethanol sensor is designed to measure ethanol concentrations from E0 (50Hz) to E100 (150Hz), with a specified accuracy of 5% ethanol (i.e. 5Hz). Therefore, values less than 45Hz or greater than 155Hz are considered as faults. | 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 |

## 15 OBDG05 ECM Summary Tables (Unique DTCs)

| 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<br><br>The ethanol sensor is designed to measure ethanol concentrations from E0 (50Hz) to E100 (150Hz), with a specified accuracy of 5% ethanol (i.e. 5Hz). Therefore, values less than 45Hz or greater than 155Hz are considered as faults. | 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 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. High conductivity in the fuel causes a significant upward shift in the sensor's output 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. |
|---|---|---|---|---|---|---|---|---|
| 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. |
|---|---|---|---|---|---|---|---|---|
| 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. |
|---|---|---|---|---|---|---|---|---|
| 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 | ≥ 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 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 | 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 |

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

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

**Engine run time greater than**
**KtFSTA_t_ClosedLoopAutostart** <span style="color:red">**(HYBRID ONLY)**</span>

| 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**

## Initial Supporting table - Multiple DTC Use_Green Sensor Delay Criteria - Airflow

**Description:** This Calibration is the airflow (in gps) above which the green airflow is acculmulated to expire the condition.

**Notes:** Used for: P0133, P013A, P013B, P013C, P013D, P013E, P013F, P014A, P014B, P0153, P015A, P015B, P015C, P015D, P1133, P1153, P2270, P2271, P2272 and P2273. The specific diagnostic (from summary table) will not be enabled until the next ignition cycle after the airflow criteria below (by sensor location) has been met:

| y/x | 1 |
|-----|---|
| 1 | 22 |

| Initial Supporting table - Multiple DTC Use_Green Sensor Delay Criteria - Limit |
|---|

**Description:** This Calibration is the acculmulated airflow (in grams) limit above which the green condition is expired

**Notes:** Used for: P0133, P013A, P013B, P013C, P013D, P013E, P013F, P014A, P014B, P0153, P015A, P015B, P015C, P015D, P1133, P1153, P2270, P2271, P2272 and P2273.  Note: This feature is only enabled when the vehicle is new and cannot be enabled in service

| y/x | CiOXYR_O2_Bank1_Sensor1 | CiOXYR_O2_Bank1_Sensor2 | CiOXYR_O2_Bank2_Sensor1 | CiOXYR_O2_Bank2_Sensor2 |
|---|---|---|---|---|
| 1 | 120,000 | 120,000 | 120,000 | 120,000 |

## Initial Supporting table - P0016_P0017_P0018_P0019 Cam Correlation Oil Temperature Threshold

**Description:** P0016_P0017_P0018_P0019 Cam Correlation Oil Temperature Threshold

**Notes:** KtEPSI_t_RtnHomeDlyLmt

| 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 |

## Initial 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 | 0.022 | 0.034 | 0.046 | 0.058 | 0.070 | 0.082 | 0.094 | 0.105 | 0.117 | 0.129 | 0.141 | 0.153 | 0.165 | 0.177 | 2.000 |

## Initial 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 | 0.037 | 0.050 | 0.063 | 0.077 | 0.090 | 0.104 | 0.117 | 0.130 | 0.144 | 0.157 | 0.170 | 0.184 | 0.197 | 2.000 |

## Initial 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 | 0 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 6 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 7 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 8 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 9 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 11 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 12 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 13 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 14 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 15 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| **Uni ue Supporting table - P00 1: OAT Per or ance Dri e E uilibriu Engine O** |
|---|

**Description:** OAT Performance Diagnostic counter increment for determining OAT-IAT equilibrium for engine off (for hybrid applications)

**Notes:**

| y/x | 0.0 | 5.0 | 10.0 | 15.0 | 20.0 | 25.0 | 30.0 | 50.0 | 80.0 |
|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 0.0 | 1.0 | 2.0 | 3.0 | 4.0 | 5.0 | 6.0 | 7.0 | 8.0 |

| Unique Supporting table - P0001: OAT Performance Drive Equilibrium Engine Running |
|---|

**Description:** OAT Performance Diagnostic counter increment for determining OAT-IAT equilibrium for engine running

**Notes:**

| y/x | 0.0 | 5.0 | 10.0 | 15.0 | 20.0 | 25.0 | 30.0 | 50.0 | 80.0 |
|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 1.0 | 2.0 | 3.0 | 4.0 | 5.0 | 6.0 | 7.0 | 8.0 | 9.0 |
| 5.0 | -5.0 | -2.0 | -1.0 | 0.0 | 1.0 | 2.0 | 3.0 | 4.0 | 5.0 |
| 10.0 | -4.0 | -1.0 | 0.0 | 0.0 | 1.0 | 2.0 | 3.0 | 4.0 | 5.0 |
| 20.0 | -2.0 | -1.0 | 0.0 | 0.0 | 1.0 | 2.0 | 3.0 | 4.0 | 5.0 |
| 30.0 | -1.0 | 0.0 | 0.0 | 1.0 | 2.0 | 3.0 | 4.0 | 5.0 | 6.0 |
| 40.0 | 0.0 | 0.0 | 0.0 | 1.0 | 2.0 | 3.0 | 4.0 | 5.0 | 6.0 |
| 50.0 | 0.0 | 0.0 | 1.0 | 2.0 | 3.0 | 4.0 | 5.0 | 6.0 | 7.0 |
| 60.0 | 0.0 | 1.0 | 2.0 | 3.0 | 4.0 | 5.0 | 6.0 | 7.0 | 8.0 |
| 70.0 | 1.0 | 2.0 | 3.0 | 4.0 | 5.0 | 6.0 | 7.0 | 8.0 | 9.0 |

## Initial 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 |

## Initial Supporting table - P0011_P0021_P05CC_P05CD_EngOilPressEnbllc

**Description:** P0011 P0021 P05CC P05CD Delay time before the oil pressure enable flag is set assuming all the oil pressure enable criteria are met

**Notes:** KtPHSC_t_EngOilPressEnbllc

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10 | 9 | 8 | 6 | 5 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

## Initial Supporting table - P0011_P0021_P05CC_P05CD_HiEngSpdHiDsbIIc

**Description:** P0011 P0021 P05CC P05CD Intake cam is disabled when engine speed exceeds this value

**Notes:** KtPHSC_n_HiEngSpdHiDsbIIc

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 |

## Initial Supporting table - P0011_P0021_P05CC_P05CD_HiEngSpdLoEnbllc

**Description:** P0011 P0021 P05CC P05CD Intake cam is enabled when engine speed remains below this value

**Notes:** KtPHSC_n_HiEngSpdLoEnbllc

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 |

## Initial Supporting table - P0011_P0021_P05CC_P05CD_LoPresHiEnbllc

**Description:** P0011 P0021 P05CC P05CD Intake cam is enabled when oil pressure exceeds this value

**Notes:** KtPHSC_p_LoPresHiEnblEc

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |

## Initial Supporting table - P0011_P0021_P05CC_P05CD_LoPresLoDsbllc

**Description:** P0011 P0021 P05CC P05CD Intake cam is disabled when oil pressure falls below this value

**Notes:** KtPHSC_p_LoPresLoDsbllc

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

| | | |
|---|---|---|
| **Initial Supporting table - P0011_P0021_P05CC_P05CD_LoRpmHiEnbIIc** | | |

**Description:** P0011 P0021 P05CC P05CD Intake cam is enabled when engine speed exceeds this value.

**Notes:** KtPHSC_n_LoRpmHiEnbIIc

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7,600 | 7,600 | 1,350 | 1,100 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 |

| Initial Supporting table - P0011_P0021_P05CC_P05CD_LoRpmLoDsblIc |
|---|

**Description:** P0011 P0021 P05CC P05CD Intake cam is disabled when engine speed is below this value.

**Notes:** KtPHSC_n_LoRpmLoDsblIc

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7,500 | 7,500 | 1,250 | 1,000 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 |

## Initial Supporting table - P0011_P0021_P05CC_P05CD_P0014_P0024_P05CE_P05CF_ColdStartEngRunning

**Description:** P0011 P0021 P05CC P05CD P0014 P0024 P05CE P05C Engine running time must be greater than this threshold during a cold start to enable cam phasing

**Notes:** KtPHSR_t_ColdStartEngRunning

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

## Initial Supporting table - P0011_P05CC_StablePositionTimeIc1

**Description:** P0011 P05CC - 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 |

## Initial 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 |

## Initial 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 |

## Initial Supporting table - P0014_P0024_P05CE_P05CF_EngOilPressEnblEc

**Description:** P0014 P0024 P05CE P05CF Delay time before the oil pressure enable flag is set assuming all the oil pressure enable criteria are met

**Notes:** KtPHSC_t_EngOilPressEnblEc

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|-----|-----|-----|-----|----|---|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|
| 1 | 10 | 9 | 8 | 6 | 5 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

## Initial Supporting table - P0014_P0024_P05CE_P05CF_HiEngSpdHiDsblEc

**Description:** P0014 P0024 P05CE P05CF Exhaust cam is disabled when engine speed exceeds this value

**Notes:** KtPHSC_n_HiEngSpdHiDsblEc

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 |

## Initial Supporting table - P0014_P0024_P05CE_P05CF_HiEngSpdLoEnblEc

**Description:** P0014 P0024 P05CE P05CF Exhaust cam is enabled when engine speed remains below this value

**Notes:** KtPHSC_n_HiEngSpdLoEnblEc

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 | 7,800 |

## Initial Supporting table - P0014_P0024_P05CE_P05CF_LoPresHiEnblEc

**Description:** P0014 P0024 P05CE P05CF Exhaust cam is enabled when oil pressure exceeds this value

**Notes:** KtPHSC_p_LoPresHiEnblIc

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |

## Initial Supporting table - P0014_P0024_P05CE_P05CF_LoPresLoDsblEc

**Description:** P0014 P0024 P05CE P05CF Exhaust cam is disabled when oil pressure falls below this value

**Notes:** KtPHSC_p_LoPresLoDsblEc

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

| **Initial Supporting table - P0014_P0024_P05CE_P05CF_LoRpmHiEnblEc** |
|---|

**Description:** P0014 P0024 P05CE P05CF Exhaust cam is enabled when engine speed exceeds this value.

**Notes:** KtPHSC_n_LoRpmHiEnblEc

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7,600 | 7,600 | 1,350 | 1,100 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 |

## Initial Supporting table - P0014_P0024_P05CE_P05CF_LoRpmLoDsblEc

**Description:** P0014 P0024 P05CE P05CF Exhaust cam is disabled when engine speed is below this value.

**Notes:** KtPHSC_n_LoRpmLoDsblEc

| y/x | -40 | -28 | -16 | -4 | 8 | 20 | 32 | 44 | 56 | 68 | 80 | 92 | 104 | 116 | 128 | 140 | 152 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7,500 | 7,500 | 1,250 | 1,000 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 |

**Initial Supporting table - P0014_P05CE_StablePositionTimeEc1**

**Description:** P0014 P05CE - 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 |

## Initial 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 |

## Initial 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 | 11.99 | 17.92 | 17.83 | 18.82 | 24.48 | 32.66 | 84.16 | 255.00 | 255.00 |

## Initial 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 | 25.91 | 37.53 | 34.70 | 28.54 | 27.34 | 25.58 | 36.33 | 255.00 | 255.00 |

## Initial 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 |

## Initial 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 |

**Initial Supporting table - P0101_P0106_P010B_P0121_P012B_P0236_P1101 MAF1 Residual Weight Factor based on MAF Est**

Description: P0101_P0106_P010B_P0121_P012B_P0236_P1101 MAF1 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 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 1   | 1   | 1   | 1   | 1   | 1   |

## Initial Supporting table - P0101_P0106_P010B_P0121_P012B_P0236_P1101 MAF1 Residual Weight Factor based on RPM

**Description:** P0101_P0106_P010B_P0121_P012B_P0236_P1101 MAF1 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 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| Initial 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 |

## Initial Supporting table - P0128_Maximum Accumulated Energy for Start-up ECT conditions - Alternate

**Description:** KtECTR_E_CTR_WrmUpEnrgyLimTest1

**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 | -7 | 10 | 20 | 55 | 71 | 86 |
|---|---|---|---|---|---|---|---|
| 1 | 14,910 | 10,991 | 8,972 | 7,784 | 3,627 | 3,627 | 3,627 |

**Initial Supporting table - P0128_Maximum Accumulated Energy for Start-up ECT conditions - Primary**

**Description:** KtECTR_E_CTR_WrmUpEnrgyLimTest0

**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 | -7 | 10 | 20 | 55 | 71 | 86 |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 19,244 | 14,295 | 11,745 | 10,246 | 4,996 | 2,597 | 2,597 |

| Initial 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 |

## Initial 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 | 6,700 | 6,700 | 6,700 | 6,700 | 6,700 | 6,700 | 6,700 |

**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 | 6,700 | 4,000 | 6,700 | 4,000 | 6,700 | 6,700 | |

## Initial 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 |

## Initial 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 |

## Initial Supporting table - P0300_1st_FireAftrMisfr_Acel

**Description:** Multiplier for establishing the expected acceleration of the cylinder after the misfire

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_dt_CylAftMsfr

| y/x | 800 | 1,400 | 2,400 | 3,500 | 6,000 |
|-----|------|-------|-------|-------|-------|
| 8 | 1.00 | 1.33 | 0.55 | 0.60 | 0.70 |
| 14 | 1.55 | 0.76 | 0.56 | 0.60 | 0.70 |
| 20 | 1.28 | 0.59 | 0.45 | 0.60 | 0.75 |
| 26 | 1.00 | 0.30 | 0.50 | 0.55 | 0.90 |
| 60 | 1.00 | 0.00 | 0.50 | 0.50 | 0.81 |

### Initial Supporting table - P0300_1st_FireAftrMisfr_Jerk

**Description:** Multiplier for establishing the expected Jerk of the cylinder after the misfire

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_ddt_CylAftMsfr

| y/x | 800 | 1,400 | 2,400 | 3,500 | 6,000 |
|-----|-------|-------|-------|-------|-------|
| 8 | -0.65 | -0.68 | -0.45 | -0.60 | -0.55 |
| 14 | -0.60 | -1.12 | -0.85 | -0.74 | -0.65 |
| 20 | -0.75 | -1.20 | -1.10 | -0.81 | -0.63 |
| 26 | -0.80 | -1.12 | -1.12 | -1.07 | -0.55 |
| 60 | -0.90 | -1.07 | -1.12 | -1.13 | -0.63 |

| Initial 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 |

## Initial 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 |

| Initial 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 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Initial Supporting table - P0300_Bank_SCD_Decel** |

**Description:** Mulitplier to SCD decel to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_dt_MEDRES_Bank

| y/x | 400 | 550 | 700 | 800 | 900 | 1,000 | 1,200 | 1,400 | 1,600 |
|---|---|---|---|---|---|---|---|---|---|
| 5 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 10 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 20 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 30 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 40 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 50 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 60 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 80 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 100 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |

## Initial Supporting table - P0300_Bank_SCD_Jerk

**Description:** Mulitplier to Medres SCD jerk to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_ddt_MEDRES_Bank

| y/x | 400 | 550 | 700 | 800 | 900 | 1,000 | 1,200 | 1,400 | 1,600 |
|-----|------|------|------|------|------|------|------|------|------|
| 5 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 10 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 20 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 30 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 40 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 50 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 60 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 80 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 100 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |

## Initial Supporting table - P0300_BankCylModeDecel

**Description:** Mulitplier to Lores Decel to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_dt_LORES_Bank

| y/x | 700 | 900 | 1,200 | 1,600 | 2,000 | 2,400 | 2,800 | 4,000 | 6,500 |
|-----|------|------|------|------|------|------|------|------|------|
| 5 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 10 | 6.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 20 | 6.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 30 | 6.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 40 | 6.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 50 | 6.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 60 | 6.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 80 | 6.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 100 | 6.00 | 7.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |

## Initial Supporting table - P0300_BankCylModeJerk

**Description:** Mulitplier to Lores Jerk to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_ddt_LORES_Bank

| y/x | 700 | 900 | 1,200 | 1,600 | 2,000 | 2,400 | 2,800 | 4,000 | 6,500 |
|-----|------|------|-------|-------|-------|-------|-------|-------|-------|
| 5   | 4.00 | 9.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| 10  | 3.50 | 9.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| 20  | 3.00 | 8.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| 30  | 3.00 | 5.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| 40  | 3.00 | 4.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| 50  | 3.00 | 4.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| 60  | 3.00 | 4.00 | 6.00  | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| 80  | 3.00 | 4.00 | 6.00  | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| 100 | 2.80 | 3.60 | 6.00  | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |

| Initial 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 | 22.1 | 16.6 | 11.1 | 10.0 | 4.6 |
| 10 | 22.1 | 22.1 | 19.6 | 19.6 | 11.1 | 10.0 | 4.6 | 4.6 |
| 20 | 22.1 | 19.6 | 19.6 | 16.6 | 10.0 | 8.3 | 4.6 | 4.6 |
| 30 | 19.6 | 19.6 | 16.6 | 10.0 | 6.3 | 4.6 | 4.6 | 4.6 |
| 40 | 19.6 | 16.6 | 11.1 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| 50 | 16.6 | 11.1 | 6.3 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| 60 | 11.1 | 6.3 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| 70 | 6.3 | 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 |

## Initial Supporting table - P0300_ClyAfterAFM_Decel

**Description:** Mulitplier to Lores decel to account for different pattern of misfire after a deactivated cylider.   Similar to the second cylinder of consecutive cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_dt_LORES_PostDeac

| y/x | 800 | 1,000 | 1,200 | 1,600 | 2,000 | 2,400 | 2,600 | 3,000 | 3,500 |
|-----|------|------|------|------|------|------|------|------|------|
| 5 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 10 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 20 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 30 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 40 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 50 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 60 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 80 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 100 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |

## Initial Supporting table - P0300_ClyBeforeAFM_Jerk

**Description:** Mulitplier to Lores decel to account for different pattern of misfire before a deactivated cylider, but after an active cylinder that follows an deactive cylinder on engine that supports cylinder deactivation in non even fire patterns.. Multipliers are a function of engine rpm and % engine Load.

**Notes:** KtMSFD_K_ddt_LORES_PreDeac KtMSFD_K_ddt_LORES_PreDeac

| y/x | 800 | 1,000 | 1,200 | 1,600 | 2,000 | 2,400 | 2,600 | 3,000 | 3,500 |
|-----|------|------|------|------|------|------|------|------|------|
| 5 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 10 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 20 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 30 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 40 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 50 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 60 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 80 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 100 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |

## Initial Supporting table - P0300_ConsecCylModDecel

**Description:** Mulitplier to Lores decel to account for different pattern of the second cylinder of consecutive misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_dt_LORES_Consec

| y/x | 700 | 900 | 1,200 | 1,600 | 2,000 | 2,400 | 2,800 | 4,000 | 6,500 |
|-----|------|------|------|------|------|------|------|------|------|
| 2 | 2.00 | 2.00 | 1.00 | 1.05 | 1.27 | 1.57 | 1.38 | 1.50 | 1.00 |
| 8 | 2.00 | 2.00 | 1.00 | 1.05 | 1.27 | 1.57 | 1.38 | 1.50 | 1.00 |
| 12 | 1.76 | 2.19 | 1.35 | 1.05 | 1.27 | 1.57 | 1.38 | 1.50 | 1.00 |
| 16 | 1.67 | 2.43 | 1.37 | 1.12 | 1.38 | 1.57 | 1.38 | 1.60 | 1.85 |
| 20 | 1.47 | 2.21 | 1.30 | 1.30 | 1.40 | 1.52 | 1.37 | 1.61 | 1.85 |
| 24 | 1.39 | 1.95 | 1.45 | 1.20 | 1.00 | 1.10 | 1.18 | 1.50 | 1.85 |
| 30 | 1.38 | 1.70 | 1.45 | 1.00 | 1.00 | 1.00 | 1.00 | 1.30 | 2.00 |
| 60 | 1.38 | 1.70 | 1.40 | 1.00 | 1.00 | 1.00 | 1.00 | 1.10 | 1.50 |
| 100 | 1.38 | 1.70 | 1.40 | 1.00 | 1.00 | 1.00 | 1.00 | 1.10 | 1.50 |

## Initial Supporting table - P0300_ConsecCylModeJerk

**Description:** Mulitplier to Lores Jerk to account for different pattern of the second cylinder of consecutive misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_ddt_LORES_Consec

| y/x | 700 | 900 | 1,200 | 1,600 | 2,000 | 2,400 | 2,800 | 4,000 | 6,500 |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## Initial Supporting table - P0300_ConsecSCD_Decel

**Description:** Mulitplier to medres decel to account for different pattern of the second cylinder of consecutive misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_dt_MEDRES_Consec

| y/x | 400 | 550 | 700 | 800 | 900 | 1,000 | 1,200 | 1,400 | 1,600 |
|-----|------|------|------|------|------|------|------|------|------|
| 2   | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 8   | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 12  | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 16  | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 20  | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 24  | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 30  | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 60  | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 100 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |

## Initial Supporting table - P0300_ConsecSCD_Jerk

**Description:** Mulitplier to medres Jerk to account for different pattern of the second cylinder of consecutive misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_ddt_MEDRES_Consec

| y/x | 400 | 550 | 700 | 800 | 900 | 1,000 | 1,200 | 1,400 | 1,600 |
|-----|------|------|------|------|------|------|------|------|------|
| 2 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 8 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 12 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 16 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 20 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 24 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 30 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 60 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 100 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |

## Initial Supporting table - P0300_CylAfterAFM_Jerk

**Description:** Mulitplier to Lores Jerkl to account for different pattern of misfire after a deactivated cylider.   Similar to the second cylinder of consecutive cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_ddt_LORES_PostDeac

| y/x | 800 | 1,000 | 1,200 | 1,600 | 2,000 | 2,400 | 2,600 | 3,000 | 3,500 |
|-----|-----|-------|-------|-------|-------|-------|-------|-------|-------|
| 5 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 10 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 20 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 30 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 40 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 50 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 60 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 80 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 100 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

## Initial Supporting table - P0300_CylBeforeAFM_Decel

**Description:** Mulitplier to Lores decel to account for different pattern of misfire before a deactivated cylider, but after an active cylinder that follows an deactive cylinder on engine that supports cylinder deactivation in non even fire patterns.. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_dt_LORES_PreDeac

| y/x | 800 | 1,000 | 1,200 | 1,600 | 2,000 | 2,400 | 2,600 | 3,000 | 3,500 |
|-----|------|------|------|------|------|------|------|------|------|
| 5 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 10 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 20 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 30 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 40 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 50 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 60 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 80 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 100 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |

## Initial Supporting table - P0300_CylModeDecel

**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 3,000 | 2,600 | 2,300 | 1,700 | 950 | 580 | 530 | 490 | 350 | 210 | 175 | 120 | 110 | 91 | 60 | 55 | 52 | 50 | 48 | 45 | 43 | 42 | 40 | 38 | 35 | 29 |
| 6 | 3,500 | 3,000 | 2,400 | 1,750 | 1,000 | 640 | 530 | 490 | 320 | 190 | 165 | 110 | 100 | 83 | 55 | 50 | 45 | 43 | 40 | 37 | 32 | 30 | 28 | 27 | 25 | 20 |
| 8 | 4,000 | 3,500 | 2,500 | 1,800 | 1,000 | 640 | 535 | 500 | 320 | 195 | 150 | 100 | 100 | 83 | 55 | 48 | 35 | 24 | 24 | 24 | 23 | 22 | 21 | 20 | 19 | 15 |
| 10 | 4,500 | 4,000 | 3,200 | 1,900 | 1,050 | 640 | 540 | 510 | 330 | 267 | 159 | 120 | 105 | 85 | 60 | 50 | 38 | 26 | 22 | 22 | 20 | 19 | 18 | 17 | 16 | 12 |
| 12 | 5,000 | 4,500 | 3,400 | 2,100 | 1,100 | 640 | 550 | 520 | 340 | 300 | 230 | 135 | 110 | 87 | 62 | 52 | 42 | 28 | 23 | 15 | 14 | 13 | 13 | 12 | 11 | 10 |
| 14 | 5,000 | 4,700 | 3,500 | 2,250 | 1,200 | 650 | 570 | 530 | 400 | 335 | 250 | 155 | 115 | 88 | 63 | 54 | 43 | 33 | 24 | 15 | 12 | 12 | 10 | 10 | 9 | 9 |
| 16 | 5,000 | 5,000 | 3,765 | 2,400 | 1,300 | 700 | 600 | 540 | 410 | 340 | 250 | 176 | 120 | 90 | 65 | 55 | 46 | 35 | 25 | 16 | 12 | 11 | 9 | 9 | 8 | 8 |
| 18 | 5,000 | 5,000 | 4,235 | 2,800 | 1,400 | 800 | 700 | 600 | 420 | 350 | 250 | 182 | 135 | 100 | 70 | 56 | 46 | 37 | 26 | 17 | 12 | 11 | 9 | 8 | 8 | 8 |
| 20 | 5,000 | 5,000 | 4,706 | 3,000 | 1,500 | 950 | 850 | 700 | 430 | 370 | 250 | 203 | 143 | 110 | 75 | 65 | 51 | 38 | 27 | 18 | 13 | 11 | 9 | 8 | 7 | 7 |
| 22 | 5,000 | 5,000 | 4,900 | 3,150 | 1,700 | 1,200 | 1,000 | 780 | 440 | 385 | 260 | 223 | 150 | 120 | 85 | 75 | 56 | 39 | 28 | 19 | 14 | 11 | 9 | 8 | 7 | 7 |
| 24 | 5,000 | 5,000 | 5,000 | 3,300 | 2,000 | 1,500 | 1,150 | 930 | 590 | 400 | 280 | 240 | 160 | 128 | 95 | 76 | 60 | 50 | 29 | 20 | 15 | 12 | 9 | 8 | 7 | 7 |
| 26 | 5,000 | 5,000 | 5,000 | 3,500 | 2,500 | 1,800 | 1,300 | 1,040 | 780 | 450 | 300 | 270 | 165 | 135 | 100 | 80 | 62 | 52 | 35 | 22 | 16 | 12 | 10 | 9 | 7 | 7 |
| 30 | 5,000 | 5,000 | 5,000 | 4,000 | 2,600 | 2,000 | 1,500 | 1,200 | 940 | 600 | 400 | 300 | 200 | 150 | 103 | 84 | 76 | 62 | 35 | 24 | 17 | 12 | 11 | 8 | 7 | 7 |
| 40 | 5,000 | 5,000 | 5,000 | 4,200 | 2,900 | 2,500 | 2,000 | 1,500 | 1,200 | 690 | 600 | 400 | 300 | 170 | 159 | 121 | 99 | 80 | 52 | 38 | 25 | 16 | 11 | 8 | 7 | 8 |
| 60 | 5,000 | 5,000 | 5,000 | 4,400 | 3,400 | 3,000 | 2,500 | 2,000 | 1,500 | 950 | 780 | 600 | 450 | 320 | 266 | 200 | 171 | 141 | 87 | 55 | 35 | 32 | 23 | 17 | 11 | 10 |
| 78 | 5,000 | 5,000 | 5,000 | 4,600 | 4,000 | 3,500 | 3,000 | 2,500 | 1,800 | 1,200 | 1,000 | 800 | 600 | 441 | 344 | 274 | 221 | 182 | 100 | 74 | 45 | 38 | 28 | 18 | 11 | 10 |
| 97 | 5,000 | 5,000 | 5,000 | 5,000 | 4,400 | 4,000 | 3,500 | 3,000 | 2,200 | 1,500 | 1,200 | 1,000 | 750 | 555 | 433 | 344 | 278 | 228 | 140 | 105 | 60 | 55 | 32 | 20 | 11 | 10 |

## Initial Supporting table - P0300_CylModeJerk

**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 5,600 | 5,100 | 4,700 | 2,600 | 1,700 | 900 | 640 | 510 | 430 | 160 | 150 | 130 | 125 | 100 | 80 | 70 | 65 | 60 | 55 | 51 | 48 | 46 | 44 | 42 | 38 | 38 |
| 6 | 5,600 | 5,100 | 4,700 | 2,800 | 1,800 | 1,200 | 664 | 520 | 450 | 180 | 150 | 130 | 125 | 100 | 75 | 60 | 55 | 50 | 45 | 42 | 40 | 38 | 35 | 33 | 30 | 30 |
| 8 | 5,700 | 5,200 | 4,800 | 3,200 | 2,100 | 1,400 | 885 | 650 | 450 | 180 | 170 | 130 | 125 | 110 | 76 | 60 | 50 | 40 | 35 | 33 | 32 | 30 | 28 | 25 | 23 | 23 |
| 10 | 6,900 | 6,400 | 5,900 | 3,600 | 2,500 | 1,526 | 1,000 | 710 | 460 | 280 | 184 | 130 | 135 | 114 | 82 | 60 | 50 | 40 | 30 | 28 | 25 | 22 | 20 | 18 | 16 | 16 |
| 12 | 8,000 | 7,500 | 7,000 | 4,000 | 2,700 | 1,711 | 1,100 | 800 | 480 | 300 | 250 | 175 | 140 | 116 | 89 | 73 | 62 | 45 | 34 | 19 | 18 | 17 | 16 | 15 | 14 | 14 |
| 14 | 8,000 | 8,000 | 8,000 | 4,605 | 3,100 | 1,800 | 1,200 | 880 | 500 | 325 | 280 | 200 | 143 | 118 | 96 | 75 | 65 | 45 | 36 | 23 | 16 | 15 | 13 | 12 | 11 | 11 |
| 16 | 8,000 | 8,000 | 8,000 | 5,000 | 3,500 | 2,000 | 1,400 | 990 | 560 | 370 | 365 | 210 | 148 | 120 | 108 | 76 | 66 | 45 | 40 | 26 | 18 | 13 | 10 | 10 | 10 | 10 |
| 18 | 8,000 | 8,000 | 8,000 | 5,500 | 4,000 | 2,300 | 1,600 | 1,100 | 700 | 470 | 443 | 250 | 160 | 125 | 110 | 82 | 67 | 46 | 43 | 29 | 20 | 15 | 11 | 10 | 10 | 10 |
| 20 | 8,000 | 8,000 | 8,000 | 6,000 | 4,500 | 2,600 | 1,900 | 1,300 | 880 | 570 | 526 | 300 | 170 | 130 | 112 | 84 | 68 | 48 | 45 | 32 | 23 | 16 | 12 | 10 | 10 | 8 |
| 22 | 8,000 | 8,000 | 8,000 | 6,500 | 4,900 | 3,100 | 2,200 | 1,450 | 1,043 | 680 | 579 | 342 | 220 | 172 | 116 | 96 | 85 | 63 | 48 | 35 | 25 | 18 | 14 | 10 | 10 | 8 |
| 24 | 8,000 | 8,000 | 8,000 | 7,000 | 5,500 | 3,700 | 2,654 | 1,700 | 1,300 | 800 | 631 | 400 | 240 | 200 | 152 | 120 | 104 | 71 | 51 | 39 | 27 | 20 | 15 | 11 | 10 | 9 |
| 26 | 8,000 | 8,000 | 8,000 | 7,500 | 6,300 | 4,200 | 2,800 | 2,000 | 1,550 | 950 | 644 | 477 | 270 | 210 | 174 | 150 | 108 | 90 | 57 | 42 | 29 | 21 | 16 | 12 | 10 | 9 |
| 30 | 8,000 | 8,000 | 8,000 | 8,000 | 7,000 | 4,700 | 3,200 | 2,400 | 1,716 | 1,100 | 789 | 550 | 330 | 260 | 190 | 170 | 120 | 98 | 65 | 46 | 34 | 24 | 18 | 14 | 11 | 10 |
| 40 | 8,000 | 8,000 | 8,000 | 8,000 | 7,800 | 5,200 | 3,900 | 3,000 | 2,200 | 1,400 | 1,052 | 600 | 500 | 300 | 290 | 230 | 165 | 145 | 90 | 62 | 45 | 30 | 24 | 19 | 13 | 11 |
| 60 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 6,000 | 4,800 | 3,800 | 2,800 | 1,900 | 1,350 | 800 | 680 | 400 | 350 | 280 | 202 | 190 | 144 | 92 | 56 | 40 | 34 | 24 | 16 | 15 |
| 78 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 6,800 | 5,800 | 4,500 | 3,500 | 2,400 | 1,950 | 1,421 | 900 | 650 | 530 | 460 | 360 | 280 | 186 | 124 | 87 | 63 | 47 | 36 | 28 | 20 |
| 97 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 7,600 | 6,600 | 5,200 | 4,200 | 3,300 | 2,563 | 1,788 | 1,200 | 900 | 640 | 580 | 460 | 370 | 234 | 156 | 109 | 79 | 59 | 45 | 36 | 30 |

| Initial Supporting table - P0300_IdleCyl_Decel |
|---|

**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 3,000 | 2,600 | 2,300 | 1,700 | 950 | 580 | 530 | 490 | 350 | 210 | 175 | 120 | 110 |
| 6 | 3,500 | 3,000 | 2,400 | 1,750 | 1,000 | 640 | 530 | 490 | 320 | 190 | 165 | 110 | 100 |
| 8 | 4,000 | 3,500 | 2,500 | 1,800 | 1,000 | 640 | 535 | 500 | 320 | 195 | 150 | 100 | 100 |
| 10 | 4,500 | 4,000 | 3,200 | 1,900 | 1,050 | 640 | 540 | 459 | 297 | 267 | 159 | 120 | 105 |
| 12 | 5,000 | 4,500 | 3,400 | 2,100 | 1,100 | 640 | 550 | 468 | 306 | 300 | 230 | 130 | 110 |
| 14 | 5,000 | 4,700 | 3,500 | 2,250 | 1,200 | 650 | 570 | 530 | 320 | 268 | 200 | 142 | 115 |
| 16 | 5,000 | 5,000 | 3,765 | 2,400 | 1,300 | 700 | 600 | 540 | 328 | 272 | 200 | 176 | 120 |
| 18 | 5,000 | 5,000 | 4,235 | 2,800 | 1,400 | 800 | 700 | 600 | 336 | 280 | 200 | 182 | 135 |
| 20 | 5,000 | 5,000 | 4,706 | 3,000 | 1,500 | 950 | 850 | 700 | 344 | 296 | 200 | 203 | 143 |
| 22 | 5,000 | 5,000 | 4,900 | 3,150 | 1,700 | 1,200 | 1,000 | 780 | 330 | 289 | 260 | 223 | 150 |
| 24 | 5,000 | 5,000 | 5,000 | 3,300 | 2,000 | 1,500 | 1,150 | 930 | 443 | 300 | 280 | 240 | 160 |
| 26 | 5,000 | 5,000 | 5,000 | 3,500 | 2,500 | 1,800 | 1,300 | 1,040 | 585 | 338 | 300 | 270 | 165 |
| 30 | 5,000 | 5,000 | 5,000 | 4,000 | 2,600 | 2,000 | 1,500 | 1,200 | 705 | 450 | 400 | 300 | 200 |
| 40 | 5,000 | 5,000 | 5,000 | 4,200 | 2,900 | 2,500 | 2,000 | 1,500 | 1,200 | 690 | 600 | 400 | 300 |
| 60 | 5,000 | 5,000 | 5,000 | 4,400 | 3,400 | 3,000 | 2,500 | 2,000 | 1,500 | 950 | 780 | 600 | 450 |
| 78 | 5,000 | 5,000 | 5,000 | 4,600 | 4,000 | 3,500 | 3,000 | 2,500 | 1,800 | 1,200 | 1,000 | 800 | 600 |
| 97 | 5,000 | 5,000 | 5,000 | 5,000 | 4,400 | 4,000 | 3,500 | 3,000 | 2,200 | 1,500 | 1,200 | 1,000 | 750 |

## Initial Supporting table - P0300_IdleCyl_Jerk

**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 5,600 | 5,100 | 4,700 | 2,600 | 1,700 | 900 | 640 | 510 | 430 | 160 | 150 | 130 | 125 |
| 6 | 5,600 | 5,100 | 4,700 | 2,800 | 1,800 | 1,200 | 664 | 520 | 450 | 180 | 150 | 130 | 125 |
| 8 | 5,700 | 5,200 | 4,800 | 3,200 | 2,100 | 1,400 | 885 | 650 | 450 | 180 | 170 | 130 | 125 |
| 10 | 6,900 | 6,400 | 5,900 | 3,600 | 2,500 | 1,221 | 1,000 | 639 | 414 | 280 | 184 | 130 | 135 |
| 12 | 8,000 | 7,500 | 7,000 | 4,000 | 2,700 | 1,369 | 1,100 | 720 | 432 | 300 | 250 | 175 | 140 |
| 14 | 8,000 | 8,000 | 8,000 | 4,605 | 3,100 | 1,440 | 1,200 | 880 | 500 | 325 | 280 | 200 | 143 |
| 16 | 8,000 | 8,000 | 8,000 | 5,000 | 3,500 | 2,000 | 1,400 | 990 | 420 | 278 | 274 | 210 | 148 |
| 18 | 8,000 | 8,000 | 8,000 | 5,500 | 4,000 | 2,300 | 1,600 | 1,100 | 525 | 353 | 333 | 250 | 160 |
| 20 | 8,000 | 8,000 | 8,000 | 6,000 | 4,500 | 2,600 | 1,900 | 1,300 | 660 | 428 | 394 | 300 | 170 |
| 22 | 8,000 | 8,000 | 8,000 | 6,500 | 4,900 | 3,100 | 2,200 | 1,450 | 730 | 476 | 579 | 342 | 220 |
| 24 | 8,000 | 8,000 | 8,000 | 7,000 | 5,500 | 3,700 | 2,654 | 1,700 | 910 | 560 | 631 | 400 | 240 |
| 26 | 8,000 | 8,000 | 8,000 | 7,500 | 6,300 | 4,200 | 2,800 | 2,000 | 1,085 | 665 | 644 | 477 | 270 |
| 30 | 8,000 | 8,000 | 8,000 | 8,000 | 7,000 | 4,700 | 3,200 | 2,400 | 1,201 | 770 | 789 | 550 | 330 |
| 40 | 8,000 | 8,000 | 8,000 | 8,000 | 7,800 | 5,200 | 3,900 | 3,000 | 2,200 | 1,400 | 1,052 | 600 | 500 |
| 60 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 6,000 | 4,800 | 3,800 | 2,800 | 1,900 | 1,350 | 800 | 680 |
| 78 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 6,800 | 5,800 | 4,500 | 3,500 | 2,400 | 1,950 | 1,421 | 900 |
| 97 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 7,600 | 6,600 | 5,200 | 4,200 | 3,300 | 2,563 | 1,788 | 1,200 |

## Initial 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 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 |
| 8 | 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 |
| 10 | 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 |
| 14 | 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 |
| 16 | 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 |
| 18 | 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 |
| 20 | 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 |
| 24 | 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 | 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 |
| 30 | 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 | 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 |
| 78 | 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 |
| 97 | 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 |

## Initial 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 |
|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|-------|
| 3 | 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 |
| 8 | 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 |
| 10 | 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 |
| 14 | 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 |
| 16 | 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 |
| 18 | 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 |
| 20 | 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 |
| 24 | 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 | 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 |
| 30 | 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 | 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 |
| 78 | 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 |
| 97 | 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 |

## Initial Supporting table - P0300_Pair_SCD_Decel

**Description:** Mulitplier to P0300_SCD_Decel to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_dt_MEDRES_Opp

| y/x | 400 | 550 | 700 | 800 | 900 | 1,000 | 1,200 | 1,400 | 1,600 |
|-----|------|------|------|------|------|------|------|------|------|
| 2 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 8 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 12 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 16 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 20 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 24 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 30 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 60 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 100 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |

## Initial Supporting table - P0300_Pair_SCD_Jerk

**Description:** Mulitplier to P0300_SCD_Jerk to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_ddt_MEDRES_Opp

| y/x | 400 | 550 | 700 | 800 | 900 | 1,000 | 1,200 | 1,400 | 1,600 |
|-----|------|------|------|------|------|------|------|------|------|
| 2 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 8 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 12 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 16 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 20 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 24 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 30 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 60 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 100 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |

## Initial Supporting table - P0300_PairCylModeDecel

**Description:** Mulitplier to Cyl Mode Deceleration to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_dt_LORES_Opp

| y/x | 700 | 900 | 1,200 | 1,600 | 2,000 | 2,400 | 2,800 | 4,000 | 6,500 |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1.00 | 1.25 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 8 | 0.83 | 1.25 | 0.95 | 0.77 | 0.76 | 1.00 | 1.00 | 1.00 | 1.00 |
| 12 | 0.86 | 1.33 | 0.95 | 0.77 | 0.76 | 0.65 | 0.60 | 0.78 | 0.90 |
| 16 | 0.85 | 1.50 | 1.00 | 0.77 | 0.76 | 0.65 | 0.60 | 0.78 | 0.90 |
| 20 | 0.89 | 1.50 | 1.00 | 0.92 | 0.75 | 0.75 | 0.75 | 0.78 | 0.90 |
| 24 | 0.91 | 1.35 | 1.05 | 0.90 | 0.70 | 0.76 | 0.76 | 0.80 | 0.90 |
| 30 | 1.00 | 1.30 | 0.90 | 0.85 | 0.82 | 0.80 | 0.80 | 0.60 | 0.90 |
| 60 | 1.00 | 1.20 | 0.90 | 0.85 | 0.82 | 0.70 | 0.80 | 0.60 | 0.85 |
| 100 | 1.00 | 1.00 | 0.90 | 0.85 | 0.82 | 0.70 | 0.80 | 0.60 | 0.80 |

## Initial Supporting table - P0300_PairCylModeJerk

**Description:** Mulitplier to P0300_CylModeJerk to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_ddt_LORES_Opp

| y/x | 700 | 900 | 1,200 | 1,600 | 2,000 | 2,400 | 2,800 | 4,000 | 6,500 |
|-----|------|------|------|------|------|------|------|------|------|
| 2 | 1.00 | 0.78 | 1.00 | 1.00 | 1.00 | 0.80 | 0.70 | 0.60 | 0.90 |
| 8 | 1.00 | 1.08 | 1.05 | 1.00 | 1.00 | 0.82 | 0.80 | 0.60 | 0.90 |
| 12 | 0.95 | 1.08 | 1.20 | 0.95 | 1.00 | 0.85 | 0.85 | 0.60 | 0.90 |
| 16 | 0.86 | 1.16 | 1.30 | 0.95 | 1.00 | 0.88 | 0.90 | 0.95 | 1.00 |
| 20 | 0.82 | 1.20 | 1.29 | 0.95 | 0.90 | 0.90 | 0.90 | 0.95 | 1.00 |
| 24 | 0.80 | 1.25 | 1.25 | 0.90 | 0.90 | 0.90 | 0.84 | 0.90 | 1.00 |
| 30 | 0.80 | 0.97 | 1.00 | 0.89 | 0.90 | 0.90 | 0.84 | 0.70 | 0.80 |
| 60 | 0.80 | 0.97 | 1.00 | 0.90 | 0.90 | 0.90 | 0.84 | 0.70 | 0.95 |
| 100 | 0.80 | 0.97 | 1.00 | 0.97 | 0.90 | 0.90 | 0.84 | 0.70 | 0.95 |

## Initial Supporting table - P0300_Random_SCD_Decel

**Description:** Mulitplier to SCD_Decel to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_dt_MEDRES_Emiss

| y/x | 400 | 550 | 700 | 800 | 900 | 1,000 | 1,200 | 1,400 | 1,600 |
|-----|------|------|------|------|------|------|------|------|------|
| 2 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 8 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 12 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 16 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 20 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 24 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 30 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 60 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 100 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |

## Initial Supporting table - P0300_Random_SCD_Jerk

**Description:** Mulitplier to Random_SCD_Jerk to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_ddt_MEDRES_Emiss

| y/x | 400 | 550 | 700 | 800 | 900 | 1,000 | 1,200 | 1,400 | 1,600 |
|-----|------|------|------|------|------|------|------|------|------|
| 2 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 8 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 12 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 16 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 20 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 24 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 30 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 60 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 100 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |

## Initial Supporting table - P0300_RandomAFM_Decl

**Description:** Mulitplier to Cylinder_Decel while in Cylnder Deactivation mode to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_dt_LORES_AFM_Emiss

| y/x | 800 | 1,000 | 1,200 | 1,600 | 2,000 | 2,400 | 2,600 | 3,000 | 3,500 |
|-----|------|------|------|------|------|------|------|------|------|
| 5 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 10 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 20 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 30 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 40 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 50 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 60 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 80 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 100 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |

| Initial Supporting table - P0300_RandomAFM_Jerk |
|---|

**Description:** Mulitplier to Cylinder_Jerk while in Cylnder Deactivation mode to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_ddt_LORES_AFM_Emiss

| y/x | 800 | 1,000 | 1,200 | 1,600 | 2,000 | 2,400 | 2,600 | 3,000 | 3,500 |
|---|---|---|---|---|---|---|---|---|---|
| 5 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 10 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 20 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 30 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 40 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 50 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 60 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 80 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 100 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |

## Initial Supporting table - P0300_RandomCylModDecel

**Description:** Multiplier to P0300_CylMode_Decel.   account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308. Cal Name: KtMSFD_K_dt_LORES_Emiss

| y/x | 700 | 900 | 1,200 | 1,600 | 2,000 | 2,400 | 2,800 | 4,000 | 6,500 |
|-----|------|------|------|------|------|------|------|------|------|
| 2 | 1.65 | 1.81 | 1.50 | 1.30 | 1.38 | 1.32 | 1.43 | 1.50 | 1.30 |
| 8 | 1.90 | 2.00 | 1.30 | 1.30 | 1.38 | 1.32 | 1.43 | 1.50 | 1.30 |
| 12 | 2.43 | 3.00 | 2.05 | 1.30 | 1.38 | 1.32 | 1.43 | 1.60 | 1.30 |
| 16 | 2.00 | 3.00 | 2.10 | 1.40 | 1.58 | 1.55 | 1.43 | 1.70 | 1.30 |
| 20 | 2.00 | 3.00 | 2.10 | 2.00 | 1.64 | 1.60 | 1.56 | 1.94 | 1.30 |
| 24 | 2.00 | 2.50 | 2.00 | 2.28 | 1.64 | 1.79 | 1.75 | 2.18 | 1.43 |
| 30 | 2.00 | 2.20 | 1.90 | 2.00 | 1.85 | 2.15 | 1.89 | 2.17 | 1.57 |
| 60 | 2.00 | 2.00 | 1.90 | 2.00 | 1.85 | 2.10 | 1.87 | 1.82 | 2.00 |
| 100 | 2.00 | 2.00 | 1.90 | 2.00 | 1.85 | 2.08 | 1.87 | 1.82 | 2.00 |

## Initial Supporting table - P0300_RandomCylModJerk

**Description:** Multiplier to P0300_CylMode_Jerk to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_ddt_LORES_Emiss

| y/x | 700 | 900 | 1,200 | 1,600 | 2,000 | 2,400 | 2,800 | 4,000 | 6,500 |
|-----|------|------|------|------|------|------|------|------|------|
| 2 | 1.00 | 1.00 | 1.10 | 1.20 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 8 | 1.00 | 1.00 | 1.16 | 1.20 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 12 | 1.28 | 1.29 | 1.56 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 16 | 1.30 | 1.40 | 1.61 | 1.00 | 1.10 | 1.00 | 1.00 | 1.00 | 1.00 |
| 20 | 1.30 | 1.42 | 1.14 | 1.00 | 1.30 | 1.16 | 1.10 | 1.08 | 1.00 |
| 24 | 1.30 | 1.30 | 1.00 | 1.03 | 1.01 | 1.06 | 1.07 | 1.09 | 1.05 |
| 30 | 1.30 | 1.20 | 1.00 | 1.01 | 1.00 | 1.06 | 1.00 | 1.06 | 1.10 |
| 60 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.20 | 1.10 | 1.21 |
| 100 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.20 | 1.10 | 1.21 |

## Initial Supporting table - P0300_RandomRevModDecl

**Description:** Mulitplier to P0300_RevMode_Decel to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_RevModeEmiss

| y/x | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 7,000 | 8,000 |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 2 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 8 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 12 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 16 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 20 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 24 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 30 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 60 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 100 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |

## Initial Supporting table - P0300_RepetSnapDecayAdjst

**Description:** If misfire is present in consecutive engine cycles, this multiplier is applied to the misfire jerk threshold and compared to a crankshaft snap value after the misfire has taken place.. Table lookup as a function of engine rpm.

**Notes:** Used for P0300 - P0308, Cal Name:KtMSFD_K_dddt_PostCylCnscMsfr

| y/x | 700 | 900 | 1,200 | 1,600 | 2,000 | 2,400 | 2,800 | 4,000 | 6,500 |
|-----|-----|-----|-------|-------|-------|-------|-------|-------|-------|
| 1 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |

## Initial 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 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 |
| 8 | 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 |
| 10 | 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 |
| 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 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 14 | 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 |
| 16 | 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 |
| 18 | 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 |
| 20 | 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 |
| 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 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 24 | 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 |
| 26 | 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 |
| 30 | 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 |
| 40 | 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 |
| 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 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 | 32,767 |
| 78 | 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 |
| 97 | 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 |

## Initial 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 |
|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|-------|
| 3 | 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 |
| 8 | 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 |
| 10 | 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 |
| 14 | 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 |
| 16 | 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 |
| 18 | 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 |
| 20 | 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 |
| 24 | 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 | 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 |
| 30 | 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 | 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 |
| 78 | 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 |
| 97 | 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 |

## Initial 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 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 |
| 8 | 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 |
| 10 | 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 |
| 14 | 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 |
| 16 | 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 |
| 18 | 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 |
| 20 | 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 |
| 24 | 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 | 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 |
| 30 | 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 | 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 |
| 78 | 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 |
| 97 | 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 |

## Initial Supporting table - P0300_SnapDecayAfterMisfire

**Description:** multiplier times the ddt_jerk value used  used to detect misfire at that speed and load to see if size of disturbance has died down as expected of real misfire.  Table lookup as a function of engine rpm and trans gear ratio.

**Notes:** Used for P0300 - P0308, Cal Name: KtMSFD_K_dddt_PostCylAft

| y/x | 700 | 900 | 1,200 | 1,600 | 2,000 | 2,400 | 2,800 | 4,000 | 6,500 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.00 | 2.00 | 1.10 | 1.55 | 2.00 | 2.50 | 2.00 | 2.00 | 2.00 |
| 1 | 2.00 | 2.00 | 0.80 | 0.80 | 1.20 | 1.10 | 1.30 | 1.25 | 1.25 |
| 1 | 2.00 | 2.00 | 1.20 | 1.20 | 1.20 | 1.40 | 1.30 | 1.00 | 2.10 |
| 2 | 2.00 | 2.00 | 2.00 | 1.35 | 1.45 | 1.45 | 1.50 | 2.50 | 3.00 |
| 3 | 1.00 | 1.00 | 1.35 | 1.35 | 1.30 | 1.00 | 1.10 | 1.75 | 2.20 |
| 5 | 2.00 | 1.50 | 1.70 | 1.70 | 2.00 | 1.40 | 1.30 | 1.00 | 1.90 |
| 6 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 7 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 8 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

## Initial 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 |

| Initial 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 |

| Initial 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 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

## Initial 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 |

## Initial 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 | 0.162 | 0.175 | 0.200 | 0.216 | 0.258 | 0.275 | 0.318 | 0.371 | 0.517 | 0.693 | 0.769 | 0.832 | 0.901 | 0.901 | 0.901 | 0.901 | 0.901 |

## Initial 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 | 33.2715 | 32.7617 | 32.5469 | 32.5137 | 32.5430 | 32.5195 | 32.3262 | 31.8496 | 30.9707 | 29.5742 | 27.5430 | 24.7598 | 21.1094 | 21.0000 | 21.0000 | 21.0000 | 21.0000 |

## Initial 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 |

## Initial 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 | 9.8438 | 10.1055 | 10.2793 | 10.3613 | 10.3535 | 10.2578 | 10.0684 | 9.7891 | 9.4219 | 8.9629 | 8.4121 | 7.7734 | 7.0430 | 7.0000 | 7.0000 | 7.0000 | 7.0000 |

## Initial 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 |

## Initial Supporting table - P0325_P0330_OpenMethod_2

**Description:** Defines which Knock Open Circuit Diagnostic method to use.

**Notes:** Used for P0325 and P0330.  Cal name:  KaKNKD_e_OpenMethod.  x-axis =  Engine Speed Index, 500 to 8500 (RPM) by 500 rpm increments.

Selects 1 of 3 available methods:  "20kHz Method", "Normal Noise Method," or "Disabled."  The mode chosen dictates which set of threshold tables are used.  Typically, either: A) the 20 kHz Method is used for all RPM or B) the 20 kHz Method is used for low/medium RPM and the Normal Noise Method is used for high RPM.

**P0325_P0330_OpenMethod_2 - Part 1**

| y/x | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1 | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz |

**P0325_P0330_OpenMethod_2 - Part 2**

| y/x | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|
| 1 | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz |

**P0325_P0330_OpenMethod_2 - Part 3**

| y/x | 12 | 13 | 14 | 15 | 16 | |
|---|---|---|---|---|---|---|
| 1 | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | CeKNKD_e_Open_20KHz | |

## Initial Supporting table - P0442:  Volatility Time as a Function of Estimate of Ambient Temperature

**Description:** Data is Volatility Time (in seconds) and Axis is Estimated Ambient Coolant in Deg C

**Notes:** KtEONV_t_VolatilityTimeMax

| y/x | -10 | -4 | 1 | 7 | 13 | 18 | 24 | 29 | 35 | 41 | 46 | 52 | 58 | 63 | 69 | 74 | 80 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 30 | 30 | 30 | 30 | 60 | 120 | 210 | 325 | 340 | 350 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |

**Initial Supporting table - P0442: Engine Off Time Before Vehicle Off Maximum as a Function of Est"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 |

## Initial 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 |

## Initial 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

**P0461, P2066, P2636: Transfer Pump Enable Time Table - Part 1**

| y/x | 0 | 3 | 6 | 9 | 13 | 16 | 19 | 22 | 25 | 28 | 31 | 34 | 38 | 41 | 44 | 47 | 50 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 85 | 90 | 95 | 135 | 135 | 160 | 160 | 260 |

**P0461, P2066, P2636: Transfer Pump Enable Time Table - Part 2**

| y/x | 53 | 56 | 59 | 63 | 66 | 69 | 72 | 75 | 78 | 81 | 84 | 88 | 91 | 94 | 97 | 100 | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 260 | 360 | 360 | 360 | 360 | 360 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | |

**Initial 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 |

## Initial Supporting table - P0521_LowMinOilPresFail - Two Stage Oil Pump

**Description:** Minimum expected oil presure readings

**Notes:** For P0521: KtLUBD_p_OP_SnsrMinOilPresFail with X Axis is defined by KnLUBD_n_OP_SnsrMinRPMAxs

| y/x | 1,000.0 | 1,500.0 | 2,000.0 | 2,500.0 | 3,000.0 | 3,500.0 | 4,000.0 | 4,500.0 | 5,000.0 |
|-----|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1.0 | 125.1 | 161.0 | 161.0 | 201.0 | 201.0 | 212.0 | 227.0 | 244.4 | 252.0 |

| Initial 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 |

| Initial 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 |

| Initial 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 | 3 |

## Initial 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 |

## Initial 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 | 0.150 | 0.150 | 0.150 | 0.150 | 0.197 | 0.287 | 0.393 | 0.510 | 0.629 | 0.744 | 0.844 | 0.922 | 0.971 | 0.982 | 0.951 | 0.865 | 0.719 |

## Initial 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 | 0.078 | 0.057 | 0.049 | 0.055 | 0.072 | 0.098 | 0.133 | 0.176 | 0.225 | 0.277 | 0.332 | 0.391 | 0.451 | 0.508 | 0.564 | 0.619 | 0.666 |

## Initial Supporting table - P06DD_P06DE_MaxEnableTorque_OP

**Description:** Two Stage Oil Pump Rationality Test Torque Max Enable Threshold

**Notes:** For P06DD and P06DE: KtLUBD_M_OP_InDiagEngTorqMax with X Axis is defined by KnLUBD_n_OP_InDiEngTorqMxRPMAxs

| y/x | 1,000.0 | 1,250.0 | 1,500.0 | 1,750.0 | 2,000.0 | 2,250.0 | 2,500.0 | 2,750.0 | 3,000.0 |
|-----|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1.0 | 0.0 | 0.0 | 180.0 | 180.0 | 180.0 | 180.0 | 180.0 | 0.0 | 0.0 |

## Initial Supporting table - P06DD_P06DE_MaxEnableTorque_OP_Axis

| Description: Engine Speed Axis for Two Stage Oil Pump maximum torque enable threshold |
|---|

| Notes: KnLUBD_n_OP_InDiEngTorqMxRPMAxs X Axis for KtLUBD_M_OP_InDiagEngTorqMax |
|---|

| y/x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,000 | 1,250 | 1,500 | 1,750 | 2,000 | 2,250 | 2,500 | 2,750 | 3,000 |

## Initial Supporting table - P06DD_P06DE_MinEnableTorque_OP

**Description:** Two Stage Oil Pump Rationality Test Torque Min Enable Threshold

**Notes:** For P06DD and P06DE: KtLUBD_M_OP_InDiagEngTorqMin with X Axis is defined by KnLUBD_n_OP_InDiEngTorqMnRPMAxs

| y/x | 1,000.0 | 1,250.0 | 1,500.0 | 1,750.0 | 2,000.0 | 2,250.0 | 2,500.0 | 2,750.0 | 3,000.0 |
|-----|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1.0 | 0.0 | 0.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 0.0 | 0.0 |

## Initial Supporting table - P06DD_P06DE_MinEnableTorque_OP_Axis

**Description:** Engine Speed Axis for Two Stage Oil Pump minimum torque enable threshold

**Notes:** KnLUBD_n_OP_InDiEngTorqMnRPMAxs X Axis for KtLUBD_M_OP_InDiagEngTorqMin

| y/x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 1,000 | 1,250 | 1,500 | 1,750 | 2,000 | 2,250 | 2,500 | 2,750 | 3,000 |

## Initial Supporting table - P06DD_P06DE_MinOilPressThresh

**Description:** Intrusive diagnostic minimum pressure limit that is a function of Engine Speed and Oil Temperature

**Notes:** For P06DD and P06DE: KtLUBD_p_InDiagMinPresThresh with X Axis is defined by KnLUBD_n_OP_OilPresRPMAxs and Y Axis is defined by KnLUBD_T_OP_OilPresTempAxs

| y/x | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 |
|---|---|---|---|---|---|---|---|---|---|
| 1,000 | 125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 |
| 1,500 | 161 | 161 | 161 | 161 | 161 | 161 | 161 | 161 | 161 |
| 2,000 | 161 | 161 | 161 | 161 | 161 | 161 | 161 | 161 | 161 |
| 2,500 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 |
| 3,000 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 |
| 3,500 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 |
| 4,000 | 227 | 227 | 227 | 227 | 227 | 227 | 227 | 227 | 227 |
| 4,500 | 227 | 227 | 227 | 227 | 227 | 227 | 227 | 227 | 227 |
| 5,000 | 252 | 252 | 252 | 252 | 252 | 252 | 252 | 252 | 252 |

## Initial Supporting table - P06DD_P06DE_OP_HiStatePressure

**Description:** Two Stage Oil Pump Oil Pressure in High State

**Notes:** For P06DD and P06DE: KtLUBD_p_OP_OilPresHighState with X Axis is defined by KnLUBD_n_OP_OilPresRPMAxs and Y Axis is defined by KnLUBD_T_OP_OilPresTempAxs

| y/x | 40.0 | 50.0 | 60.0 | 70.0 | 80.0 | 90.0 | 100.0 | 110.0 | 120.0 |
|---|---|---|---|---|---|---|---|---|---|
| 1,000.0 | 501.3 | 469.2 | 432.7 | 391.9 | 346.8 | 297.3 | 243.6 | 185.6 | 123.2 |
| 1,500.0 | 553.8 | 531.8 | 504.9 | 473.3 | 436.9 | 395.7 | 349.7 | 298.8 | 243.2 |
| 2,000.0 | 570.8 | 555.3 | 536.0 | 512.7 | 485.5 | 454.3 | 419.2 | 380.1 | 337.2 |
| 2,500.0 | 594.8 | 579.6 | 561.3 | 540.0 | 515.6 | 488.1 | 457.6 | 423.9 | 387.3 |
| 3,000.0 | 605.0 | 591.9 | 576.1 | 557.6 | 536.5 | 512.7 | 486.2 | 457.1 | 425.2 |
| 3,500.0 | 594.4 | 586.3 | 575.1 | 560.9 | 543.8 | 523.5 | 500.3 | 474.0 | 444.7 |
| 4,000.0 | 583.9 | 580.8 | 574.2 | 564.3 | 551.0 | 534.3 | 514.3 | 490.9 | 464.2 |
| 4,500.0 | 578.0 | 577.0 | 572.7 | 565.0 | 554.0 | 539.7 | 522.0 | 501.0 | 476.7 |
| 5,000.0 | 572.1 | 573.3 | 571.1 | 565.8 | 557.0 | 545.0 | 529.7 | 511.1 | 489.2 |

## Initial Supporting table - P06DD_P06DE_OP_LoStatePressure

**Description:** Two Stage Oil Pump Oil Pressure in Low State

**Notes:** For P06DD and P06DE: KtLUBD_p_OP_OilPresLowState with X Axis is defined by KnLUBD_n_OP_OilPresRPMAxs and Y Axis is defined by KnLUBD_T_OP_OilPresTempAxs

| y/x | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 |
|---|---|---|---|---|---|---|---|---|---|
| 1,000 | 333 | 318 | 303 | 286 | 269 | 252 | 234 | 216 | 197 |
| 1,500 | 362 | 350 | 337 | 322 | 306 | 290 | 265 | 249 | 227 |
| 2,000 | 373 | 363 | 353 | 340 | 326 | 311 | 295 | 269 | 255 |
| 2,500 | 378 | 371 | 362 | 353 | 341 | 328 | 314 | 298 | 280 |
| 3,000 | 380 | 375 | 368 | 360 | 351 | 341 | 329 | 316 | 302 |
| 3,500 | 378 | 373 | 368 | 361 | 354 | 346 | 337 | 327 | 317 |
| 4,000 | 376 | 372 | 367 | 362 | 357 | 351 | 345 | 339 | 332 |
| 4,500 | 401 | 396 | 392 | 387 | 382 | 376 | 370 | 364 | 358 |
| 5,000 | 425 | 420 | 416 | 411 | 406 | 401 | 396 | 390 | 384 |

## Initial Supporting table - P06DD_P06DE_OP_PressureRPMAxis

**Description:** Engine Speed Axis for Two Stage Oil Pump Pressure estimate

**Notes:** KnLUBD_n_OP_OilPresRPMAxs X Axis for KtLUBD_p_OP_OilPresHighState X Axis

| y/x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 1,000 | 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 | 4,500 | 5,000 |

## Initial Supporting table - P06DD_P06DE_OP_PressureTempAxis

**Description:** Oil Temperature Axis for Two Stage Oil Pump Pressure estimate

**Notes:** KnLUBD_T_OP_OilPresTempAxs Y Axis for KtLUBD_p_OP_OilPresHighState

| y/x | 1.0 | 2.0 | 3.0 | 4.0 | 5.0 | 6.0 | 7.0 | 8.0 | 9.0 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1.0 | 40.0 | 50.0 | 60.0 | 70.0 | 80.0 | 90.0 | 100.0 | 110.0 | 120.0 |

## Initial Supporting table - P06DD_P06DE_OP_StateChangeMin

**Description:** Minimum allowed pressure change on a Two Stage Oil Pump state change

**Notes:** For P06DD and P06DE: KtLUBD_p_OP_StateChangeMin with X Axis is defined by KnLUBD_n_OP_OilPresRPMAxs and Y Axis is defined by KnLUBD_T_OP_OilPresTempAxs

| y/x | 40.0 | 50.0 | 60.0 | 70.0 | 80.0 | 90.0 | 100.0 | 110.0 | 120.0 |
|---|---|---|---|---|---|---|---|---|---|
| 1,000.0 | 67.2 | 60.4 | 52.1 | 42.3 | 30.9 | 18.1 | 3.8 | 0.0 | 0.0 |
| 1,500.0 | 76.7 | 72.7 | 65.0 | 58.0 | 51.0 | 43.1 | 32.3 | 20.1 | 6.5 |
| 2,000.0 | 79.2 | 76.8 | 73.4 | 69.1 | 63.8 | 57.5 | 50.3 | 42.2 | 33.1 |
| 2,500.0 | 86.9 | 83.5 | 79.6 | 75.0 | 69.8 | 64.0 | 57.6 | 50.5 | 42.9 |
| 3,000.0 | 90.1 | 86.9 | 83.2 | 78.9 | 74.1 | 68.8 | 62.9 | 56.4 | 49.4 |
| 3,500.0 | 86.6 | 85.2 | 82.9 | 79.8 | 75.8 | 71.0 | 65.3 | 58.6 | 51.2 |
| 4,000.0 | 83.0 | 83.4 | 82.7 | 80.8 | 77.6 | 73.2 | 67.6 | 60.9 | 52.9 |
| 4,500.0 | 71.0 | 72.3 | 72.4 | 71.3 | 68.9 | 65.4 | 60.6 | 54.7 | 47.5 |
| 5,000.0 | 59.0 | 61.2 | 62.1 | 61.8 | 60.3 | 57.6 | 53.6 | 48.4 | 42.1 |

| Initial 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 |

**Initial Supporting table - P16D0_CamTqFailSIH_OCV2**

| Description: | | | | | | | | |
|---|---|---|---|---|---|---|---|---|

| Notes: | | | | | | | | |
|---|---|---|---|---|---|---|---|---|

| y/x | 0 | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 |
|---|---|---|---|---|---|---|---|---|---|
| 600 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 800 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 1,000 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 1,200 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 1,400 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 1,600 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 1,800 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 2,000 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 2,200 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |

## Initial Supporting table - P16D1_CamTqFailSIL_OCV2

| Description: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Notes:** | | | | | | | | | |

| y/x | 0 | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 |
|---|---|---|---|---|---|---|---|---|---|
| 600 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |
| 800 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |
| 1,000 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |
| 1,200 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |
| 1,400 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |
| 1,600 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |
| 1,800 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |
| 2,000 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |
| 2,200 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |

| Initial 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 | 25.58 | 25.58 | 25.58 | 25.58 | 25.58 | 25.58 |

## Initial 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 | 50.92 | 37.77 | 33.23 | 37.14 | 39.31 | 28.02 | 25.08 | 22.41 | 22.67 | 23.66 | 23.08 | 20.09 | 17.13 | 17.42 | 17.42 | 17.42 |
| 160.00 | 125.00 | 40.31 | 31.53 | 32.13 | 31.14 | 29.30 | 23.28 | 22.08 | 20.17 | 20.38 | 21.08 | 20.50 | 17.91 | 15.31 | 15.58 | 15.58 | 15.58 |
| 240.00 | 125.00 | 32.94 | 24.13 | 24.05 | 24.69 | 22.83 | 19.64 | 18.88 | 17.98 | 17.88 | 17.95 | 17.53 | 16.33 | 15.13 | 15.25 | 15.25 | 15.25 |
| 320.00 | 125.00 | 26.61 | 18.89 | 19.14 | 20.45 | 18.58 | 16.11 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| 400.00 | 125.00 | 21.95 | 15.52 | 15.89 | 17.45 | 15.89 | 15.28 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| 480.00 | 125.00 | 19.22 | 15.00 | 15.00 | 15.30 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| 560.00 | 125.00 | 17.63 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| 640.00 | 125.00 | 16.41 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| 720.00 | 125.00 | 15.42 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| 800.00 | 125.00 | 15.20 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| 880.00 | 125.00 | 15.20 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| 960.00 | 125.00 | 15.20 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| 1,040.00 | 125.00 | 15.20 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| 1,120.00 | 125.00 | 15.20 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| 1,200.00 | 125.00 | 15.20 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| 1,280.00 | 125.00 | 15.20 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| 1,360.00 | 125.00 | 15.20 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |

## Initial 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 | 110.56 | 108.81 | 128.62 | 120.49 | 52.44 | 22.59 |
| 700.00 | 109.83 | 105.70 | 123.77 | 116.08 | 50.86 | 14.95 |
| 800.00 | 108.58 | 102.60 | 117.94 | 105.04 | 54.75 | 6.38 |
| 900.00 | 107.47 | 103.00 | 115.95 | 90.89 | 44.98 | 7.15 |
| 1,000.00 | 107.92 | 103.74 | 112.79 | 78.29 | 35.09 | 5.48 |
| 1,100.00 | 105.71 | 97.73 | 98.76 | 75.13 | 33.85 | 5.24 |
| 1,300.00 | 77.26 | 71.52 | 77.31 | 71.48 | 31.33 | 4.90 |
| 1,500.00 | 68.30 | 63.71 | 70.04 | 67.97 | 28.99 | 3.49 |
| 2,000.00 | 53.60 | 49.98 | 57.31 | 57.64 | 20.68 | -3.19 |
| 2,500.00 | 5.20 | 2.56 | 11.03 | 12.60 | -8.98 | -27.46 |
| 3,000.00 | 0.41 | -2.33 | 5.98 | 8.31 | -13.27 | -31.00 |
| 3,500.00 | -3.30 | -5.86 | 2.72 | 4.68 | -16.90 | -35.03 |
| 4,500.00 | -12.44 | -15.21 | -6.92 | -5.47 | -27.05 | -40.00 |
| 5,500.00 | -23.20 | -25.95 | -17.63 | -16.07 | -37.66 | -45.00 |
| 7,200.00 | -34.99 | -37.46 | -39.00 | -43.00 | -45.00 | -48.00 |

## Initial 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 |

## Initial 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 | 1.00 | 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 | 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 |
| 560 | 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 |
| 640 | 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 |
| 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 |

## Initial 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 |

**Initial Supporting table - P2646_CamTqFailSIH_OCV1**

| Description: |
|---|

| Notes: |
|---|

| y/x | 0 | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 |
|---|---|---|---|---|---|---|---|---|---|
| 600 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 800 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 1,000 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 1,200 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 1,400 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 1,600 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 1,800 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 2,000 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 2,200 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

## Initial Supporting table - P2647_CamTqFailSIL_OCV1

**Description:**

**Notes:**

| y/x | 0 | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 |
|---|---|---|---|---|---|---|---|---|---|
| 600 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |
| 800 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |
| 1,000 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |
| 1,200 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |
| 1,400 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |
| 1,600 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |
| 1,800 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |
| 2,000 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |
| 2,200 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 | -9 |

## Initial Supporting table - P2797 Hydraulic pressure delay

**Description:** Time to delay the initial x of y counter due to hydraulic transients.  Thresholds are a function of transmission oil temperature.  Units are seconds.

**Notes:** KtTAPD_t_PERF_HydPresDelayTmr

| y/x | -40 | 0 | 20 | 30 | 40 | 50 | 60 |
|-----|-----|---|----|----|----|----|----|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## Initial Supporting table - P2797 Predicted turbine speed error

**Description:** Predicted turbine speed vs actual turbine speed error.  Thresholds are a function of engine speed and transmission oil temperature.  Diagnostic is considered failing above these values.  Units are RPM.

**Notes:** KtTAPD_n_PERF_TurbSpdFailThsh

| y/x | -40 | 0 | 10 | 20 | 40 |
|---|---|---|---|---|---|
| 0 | 350 | 350 | 350 | 350 | 350 |
| 500 | 350 | 350 | 350 | 350 | 350 |
| 1,100 | 350 | 350 | 350 | 350 | 350 |
| 1,500 | 350 | 350 | 350 | 350 | 350 |
| 2,500 | 350 | 350 | 350 | 350 | 350 |

| Initial Supporting table - P2797 Transmission forward gear ratios |
|---|

**Description:** Transmission Forward Gear Ratio's (1-6).  These values represent the nominal forward gear ratios.  These values are used along with the following calibrations to define the valid ratio bands.  Units are ratio.

KeTAPD_pct_RVT_1stHighMult
KeTAPD_pct_RVT_1stLowMult
KeTAPD_pct_RVT_HighMult
KeTAPD_pct_RVT_LowMult

**Notes:** KaTAPD_r_TransRatios

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

| Unique Supporting table - P16A7_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:** P16A7, KtLVTR_U_PT_RelayPullInEnbl

| y/x | 23.0 | 85.0 | 95.0 | 105.0 | 125.0 |
|---|---|---|---|---|---|
| 1 | 7.000 | 8.699 | 9.000 | 9.199 | 10.000 |

**Initial 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 |

| **Initial 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 |

| Initial 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 |

| Initial 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 |

| Initial 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 |

## Initial 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 |

**Initial 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 | 125 |

## Initial 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 |

## Initial 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 |

| Initial 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 |

## Initial 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 |

## Initial 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 |

## Initial 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 |

## Initial 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

### Initial 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 | 200.0 | 180.0 | 120.0 | 70.0 | 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 |

| Initial 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 | 60.0 | 60.0 | 60.0 | 20.0 | 20.0 | 20.0 | 40.0 | 60.0 | 60.0 |

## Initial 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 |

## Initial 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 |

## Initial 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 |

## Initial 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 |

## Initial 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 |

## Initial 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 |

## Initial Supporting table - P0420_BestFailingOSCTableB1

**Description:** This table is a 9x17 table of baseline Best Failing (e.g. threshold converter) OSC times for catalyst Bank 1. The axis' for this table include the average airflow and the catalyst temperature. After OSC is measured for a specific temp and airflow,the BestFailing OSC value is found within this table for the measured temp and airflow and is used along with the OSC_TimeRaw (and the WorstPassing value) to calculate the Normalized Ratio for that specific test. The values in this table are based on the measured OSC for the identified BPU converter that is used for MIL illumination across the specific temp and airflow range for a given program.

**Notes:** KtCATD_t_1_OSC_BestFailing - Used for norm ratio calculation for P0420

| y/x | 2.00 | 2.40 | 2.80 | 3.20 | 3.60 | 4.00 | 4.40 | 4.80 | 5.20 | 5.60 | 6.00 | 6.40 | 6.80 | 7.20 | 7.60 | 8.00 | 8.40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 550.00 | 1.89 | 1.77 | 1.63 | 1.47 | 1.34 | 1.21 | 1.09 | 1.01 | 0.95 | 0.89 | 0.84 | 0.78 | 0.72 | 0.69 | 0.67 | 0.66 | 0.64 |
| 600.00 | 1.93 | 1.81 | 1.67 | 1.50 | 1.37 | 1.25 | 1.12 | 1.04 | 0.97 | 0.91 | 0.86 | 0.79 | 0.74 | 0.71 | 0.68 | 0.67 | 0.65 |
| 650.00 | 1.99 | 1.87 | 1.73 | 1.55 | 1.41 | 1.28 | 1.15 | 1.06 | 0.99 | 0.93 | 0.87 | 0.81 | 0.76 | 0.72 | 0.70 | 0.68 | 0.67 |
| 700.00 | 2.05 | 1.93 | 1.79 | 1.59 | 1.44 | 1.32 | 1.18 | 1.09 | 1.01 | 0.96 | 0.89 | 0.83 | 0.78 | 0.75 | 0.72 | 0.70 | 0.69 |
| 750.00 | 2.13 | 1.99 | 1.84 | 1.63 | 1.48 | 1.35 | 1.21 | 1.12 | 1.04 | 0.98 | 0.92 | 0.85 | 0.81 | 0.77 | 0.75 | 0.73 | 0.71 |
| 800.00 | 2.20 | 2.05 | 1.90 | 1.68 | 1.53 | 1.38 | 1.25 | 1.16 | 1.07 | 1.01 | 0.94 | 0.88 | 0.83 | 0.80 | 0.77 | 0.75 | 0.73 |
| 850.00 | 2.27 | 2.12 | 1.96 | 1.74 | 1.58 | 1.42 | 1.29 | 1.19 | 1.10 | 1.04 | 0.97 | 0.91 | 0.86 | 0.83 | 0.80 | 0.79 | 0.76 |
| 900.00 | 2.34 | 2.19 | 2.03 | 1.81 | 1.64 | 1.47 | 1.33 | 1.23 | 1.14 | 1.08 | 1.00 | 0.94 | 0.89 | 0.86 | 0.84 | 0.82 | 0.79 |
| 950.00 | 2.42 | 2.26 | 2.09 | 1.88 | 1.70 | 1.52 | 1.38 | 1.27 | 1.18 | 1.12 | 1.04 | 0.97 | 0.93 | 0.90 | 0.87 | 0.85 | 0.83 |

## Initial Supporting table - P0420_WorstPassingOSCTableB1

**Description:** This table is a 9x17 table of WorstPassing (e.g. 120k) OSC times for catalyst Bank 1. The axis' for this table include the average airflow and the catalyst temperature. After OSC is measured for a specific temp and airflow, the WorstPassing OSC value is found within this table for the measured temp and airflow and is used along with the OSC_TimeRaw (and the BestFailing OSC value) to calculate the Normalized Ratio for that specific test.The values in this table are based on the measured OSC for the WPA part across the temp and airflow range.

**Notes:** KtCATD_t_1_OSC_WorstPassing - Used for NormRatio calculation for P0420

| y/x | 2.00 | 2.40 | 2.80 | 3.20 | 3.60 | 4.00 | 4.40 | 4.80 | 5.20 | 5.60 | 6.00 | 6.40 | 6.80 | 7.20 | 7.60 | 8.00 | 8.40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 550.00 | 3.28 | 3.04 | 2.77 | 2.40 | 2.16 | 1.94 | 1.77 | 1.65 | 1.53 | 1.46 | 1.38 | 1.26 | 1.18 | 1.15 | 1.13 | 1.12 | 1.11 |
| 600.00 | 3.31 | 3.09 | 2.80 | 2.42 | 2.18 | 1.96 | 1.78 | 1.66 | 1.55 | 1.48 | 1.39 | 1.28 | 1.20 | 1.17 | 1.14 | 1.13 | 1.12 |
| 650.00 | 3.37 | 3.14 | 2.85 | 2.44 | 2.20 | 1.97 | 1.80 | 1.67 | 1.56 | 1.49 | 1.40 | 1.29 | 1.21 | 1.18 | 1.16 | 1.15 | 1.13 |
| 700.00 | 3.45 | 3.20 | 2.92 | 2.48 | 2.22 | 1.99 | 1.82 | 1.70 | 1.58 | 1.51 | 1.42 | 1.30 | 1.23 | 1.20 | 1.18 | 1.17 | 1.16 |
| 750.00 | 3.52 | 3.27 | 2.97 | 2.52 | 2.25 | 2.02 | 1.84 | 1.72 | 1.61 | 1.54 | 1.44 | 1.32 | 1.25 | 1.22 | 1.20 | 1.19 | 1.18 |
| 800.00 | 3.61 | 3.33 | 3.03 | 2.58 | 2.30 | 2.07 | 1.88 | 1.76 | 1.64 | 1.57 | 1.46 | 1.35 | 1.29 | 1.26 | 1.23 | 1.22 | 1.21 |
| 850.00 | 3.68 | 3.41 | 3.11 | 2.66 | 2.37 | 2.13 | 1.94 | 1.81 | 1.68 | 1.62 | 1.50 | 1.39 | 1.33 | 1.29 | 1.27 | 1.26 | 1.25 |
| 900.00 | 3.76 | 3.49 | 3.19 | 2.76 | 2.45 | 2.20 | 2.00 | 1.86 | 1.74 | 1.67 | 1.54 | 1.43 | 1.37 | 1.34 | 1.31 | 1.29 | 1.27 |
| 950.00 | 3.85 | 3.56 | 3.28 | 2.87 | 2.54 | 2.28 | 2.06 | 1.93 | 1.79 | 1.72 | 1.57 | 1.46 | 1.41 | 1.38 | 1.35 | 1.33 | 1.31 |

## Initial 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 |

## Initial 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 | 2 | 2 | 4 | 5 | 10 | 15 | 20 | 30 |
|-----|---|---|---|---|---|----|----|----|----|
| 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| Initial 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 | 2 | 2 | 4 | 5 | 10 | 15 | 20 | 30 |

## Initial Supporting table - P1400_EngineSpeedResidual_Axis

**Description:** This calibration is used as the x-axis for KtCSED_dm_Exh. An engine speed value will be chosen from this axis based on the value of VeSPDR_n_EngDsrd or actual engine speed. Subsequently, the engine speed value chosen from KnCSED_n_Exh determines the appropriate exhaust airflow value from the KtCSED_dm_Exh calibration table.

**Notes:** KnCSED_n_Exh - This is used for P1400

| y/x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|
| 1 | 0 | 300 | 500 | 900 | 965 | 1,000 | 1,150 | 1,200 | 1,350 | 1,400 | 1,500 | 1,600 | 1,700 | 1,850 | 2,000 | 2,300 | 2,500 |

## Initial Supporting table - P1400_EngineSpeedResidual_Table

**Description:** This 1x17 table of engine exhaust flow values is used to calculate both the desired and the actual engine exhaust flow based on desired and actual engine speed. The desired engine exhaust flow is gathered from the desired engine speed (VeSPDR_n_EngDsrd). The value used for the actual engine exhaust flow is based on the actual engine RPM value.

**Notes:** KtCSED_dm_Exh - This is used for P1400

| y/x | 0 | 300 | 500 | 900 | 965 | 1,000 | 1,150 | 1,200 | 1,350 | 1,400 | 1,500 | 1,600 | 1,700 | 1,850 | 2,000 | 2,300 | 2,500 |
|-----|---|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 0 | 3 | 4 | 4 | 12 | 12 | 12 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 19 | 25 | 30 |

## Initial Supporting table - P1400_SparkResidual_Axis

**Description:** Calibratible axis into KtCSED_E_ExhEngyPerUnitMass.    This is a table of spark values.  Spark value used for desired spark is the desired spark during cat light off.  Actual spark value used is the final commanded spark.

**Notes:** KnCSED_phi_ExhEngyPerUnitMass - Used for P1400

| y/x | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | 7.00 | 8.00 | 9.00 |
|-----|------|------|------|------|------|------|------|------|------|
| 1 | -8 | -4 | 0 | 2 | 5 | 8 | 10 | 11 | 15 |

## Initial Supporting table - P1400_SparkResidual_Table

**Description:** Predicted engine-out energy potential based on either the desired cold start spark advance value or the actual spark advance value.  ExhEngyPerUnitMass      calibration is used to calculate both desired exhaust energy and actual energy.  The desired and actual exhaust energy per unit mass values are
used in part to calculate the desired exhaust energy per unit time and actual exhaust energy per unit time.  Both desired and actual go into the residual exhaust
  energy per unit time calculation.

**Notes:** KtCSED_E_ExhEngyPerUnitMass

| y/x | -8 | -4 | 0 | 2 | 5 | 8 | 10 | 11 | 15 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 1.00 | 1.00 | 1.00 | 0.80 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |

## Initial Supporting table - P057B KtBRKI_K_CmpltTestPointWeight

| Description: |
| --- |

| Notes: |
| --- |

| y/x | 0.000 | 0.050 | 0.080 | 0.250 | 0.350 | 0.450 | 0.550 | 0.750 | 1.000 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

## Initial Supporting table - P057B KtBRKI_K_FastTestPointWeight

| Description: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Notes: | | | | | | | | | |
| y/x | 0.000 | 0.050 | 0.080 | 0.250 | 0.350 | 0.450 | 0.550 | 0.750 | 1.000 |
| 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

## Initial Supporting table - P2635 Max Fuel Flow

**Description:** P2635 Max Fuel Flow allowed  -- diagnostic is disabled above this value

**Notes:**

| y/x | 200.0000 | 250.0000 | 300.0000 | 350.0000 | 400.0000 | 450.0000 | 500.0000 | 550.0000 | 600.0000 |
|---|---|---|---|---|---|---|---|---|---|
| 4.5000 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 |
| 6.0000 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 |
| 7.5000 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 |
| 9.0000 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 |
| 10.5000 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 |
| 12.0000 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 |
| 13.5000 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 |
| 15.0000 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 |
| 16.5000 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 |
| 18.0000 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 |
| 19.5000 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 |
| 21.0000 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 |
| 22.5000 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 |
| 24.0000 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 |
| 25.5000 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 |
| 27.0000 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 |
| 28.5000 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 | 14.4609 |

## Initial Supporting table - P2635 Threshold High

**Description:** P2635 Threshold - Under performing

**Notes:** Measured value = instantaneous Filtered Fuel Pressure Error

| y/x | 200.0 | 250.0 | 300.0 | 350.0 | 400.0 | 450.0 | 500.0 | 550.0 | 600.0 |
|------|------|------|------|------|------|------|------|------|------|
| 0.0  | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 1.5  | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 3.0  | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 4.5  | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 6.0  | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 7.5  | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 9.0  | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 10.5 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 12.0 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 13.5 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 15.0 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 16.5 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 18.0 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 19.5 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 21.0 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 22.5 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 24.0 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 25.5 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 27.0 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 28.5 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 30.0 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 31.5 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 33.0 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 34.5 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 36.0 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 37.5 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 39.0 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 40.5 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 42.0 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 43.5 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 45.0 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 46.5 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |
| 48.0 | 30.0 | 37.5 | 45.0 | 52.5 | 60.0 | 67.5 | 75.0 | 82.5 | 90.0 |

## Initial Supporting table - P2635 Threshold High RePass

**Description:** P2635 Threshold Hysterisis - Under performing

**Notes:** Measured value = instantaneous Filtered Fuel Pressure Error

| y/x | 200.0 | 250.0 | 300.0 | 350.0 | 400.0 | 450.0 | 500.0 | 550.0 | 600.0 |
|------|------|------|------|------|------|------|------|------|------|
| 0.0 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 1.5 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 3.0 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 4.5 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 6.0 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 7.5 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 9.0 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 10.5 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 12.0 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 13.5 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 15.0 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 16.5 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 18.0 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 19.5 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 21.0 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 22.5 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 24.0 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 25.5 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 27.0 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 28.5 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 30.0 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 31.5 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 33.0 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 34.5 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 36.0 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 37.5 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 39.0 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 40.5 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 42.0 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 43.5 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 45.0 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 46.5 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |
| 48.0 | 25.5 | 31.9 | 38.3 | 44.6 | 51.0 | 57.4 | 63.8 | 70.1 | 76.5 |

## Initial Supporting table - P2635 Threshold Low

**Description:** P2635 Threshold - Over performing

**Notes:** Measured value = instantaneous Filtered Fuel Pressure Error

| y/x | 200.0 | 250.0 | 300.0 | 350.0 | 400.0 | 450.0 | 500.0 | 550.0 | 600.0 |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | -260.0 | -210.0 | -160.0 | -110.0 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 1.5 | -145.0 | -125.0 | -102.5 | -81.3 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 3.0 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 4.5 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 6.0 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 7.5 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 9.0 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 10.5 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 12.0 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 13.5 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 15.0 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 16.5 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 18.0 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 19.5 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 21.0 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 22.5 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 24.0 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 25.5 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 27.0 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 28.5 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 30.0 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 31.5 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 33.0 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 34.5 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 36.0 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 37.5 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 39.0 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 40.5 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 42.0 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 43.5 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 45.0 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 46.5 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |
| 48.0 | -30.0 | -37.5 | -45.0 | -52.5 | -60.0 | -67.5 | -75.0 | -82.5 | -90.0 |

## Initial Supporting table - P2635 Threshold Low RePass

**Description:** P2635 Threshold Hysterisis - Over performing

**Notes:** Measured value = instantaneous Filtered Fuel Pressure Error

| y/x | 200.0 | 250.0 | 300.0 | 350.0 | 400.0 | 450.0 | 500.0 | 550.0 | 600.0 |
|------|--------|--------|--------|-------|-------|-------|-------|-------|-------|
| 0.0 | -221.0 | -178.5 | -136.0 | -93.5 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 1.5 | -123.3 | -106.3 | -87.1 | -69.1 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 3.0 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 4.5 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 6.0 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 7.5 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 9.0 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 10.5 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 12.0 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 13.5 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 15.0 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 16.5 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 18.0 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 19.5 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 21.0 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 22.5 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 24.0 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 25.5 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 27.0 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 28.5 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 30.0 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 31.5 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 33.0 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 34.5 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 36.0 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 37.5 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 39.0 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 40.5 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 42.0 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 43.5 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 45.0 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 46.5 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |
| 48.0 | -25.5 | -31.9 | -38.3 | -44.6 | -51.0 | -57.4 | -63.8 | -70.1 | -76.5 |

| |
|---|
| **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_SnsrCktFA |
| Naturally aspirated: P2228,  P2229.  Turbocharged: P0237,  P0238 |
| **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_SnsrCktFA |
| P2228, P2229 |
| **Bundle Name:** AAP2_SnsrCktFP |
| P2228, P2229 |
| **Bundle Name:** AAP2_SnsrFA |
| P2227, P2228, P2229, P2230 |
| **Bundle Name:** AAP2_SnsrTFTKO |
| P2227, P2228, P2229, P2230 |
| **Bundle Name:** AAP3_SnsrCktFA |
| P222C, P222D |
| **Bundle Name:** AAP3_SnsrCktFP |
| P222C, P222D |
| **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 |

# 15 OBDG05 ECM Fault Bundle Definitions

| | |
|---|---|
| **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. | |
| **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,  P2257,  P2258 | |
| **Bundle Name:** AIRSystemPressureSensor FA | |
| P2430, P2431, P2432, P2433, P2435, P2436, P2437, P2438 | |
| **Bundle Name:** AIRValveControlCircuit FA | |
| P0412,  P041F,  P044F | |
| **Bundle Name:** AllTwoStepDrvr_TFTKO | |
| P16CF,  P16D2,  P16D3,  P2645,  P2648,  P2649 | |
| **Bundle Name:** AllVCE_Driver_TFTKO | |
| P16CF,  P16D2,  P16D3,  P2645,  P2648,  P2649 | |
| **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:** AmbPresSnsr2_CktFA | |
| P222C, P222D | |
| **Bundle Name:** AmbPresSnsrCktFA | |
| P2228, P2229 | |
| **Bundle Name:** AmbPresSnsrCktFP | |
| P2228, P2229 | |
| **Bundle Name:** AnyCamPhaser_FA | |
| P0010, P0011, P0013, P0014, P0020, P0021, P0023, P0024, P2088, P2089, P2090, P2091, P2092, P2093, P2094, P2095, P05CC, P05CD, P05CE, P05CF, P25CA, P25CB, P25CC, P25CD, P25CE, P25CF | |

| |
|---|
| **Bundle Name:** AnyCamPhaser_TFTKO |
| P0010, P0011, P0013, P0014, P0020, P0021, P0023, P0024, P2088, P2089, P2090, P2091, P2092, P2093, P2094, P2095, P05CC, P05CD, P05CE, P05CF, P25CA, P25CB, P25CC, P25CD, P25CE, P25CF |
| **Bundle Name:** BrakeBoosterSensorCktFA |
| P0557, P0558 |
| **Bundle Name:** BrakeBoosterSensorFA |
| P0556, P0557, P0558 |
| **Bundle Name:** BrakeBoosterVacuumValid |
| P0556, P0557, P0558 |
| **Bundle Name:** BSTR_b_BoostSnsrFA |
| P0236,  P0237,  P0238 |
| **Bundle Name:** BSTR_b_ExcsvBstFA |
| P226B |
| **Bundle Name:** BSTR_b_ExcsvBstTFTKO |
| P226B |
| **Bundle Name:** BSTR_b_IC_Pmp_EffPerfTFTKO |
| P026A |
| **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 |
| 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_TurboBypassA_StkFA |
| P2261 |
| **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 |
| 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:** Catalyst Warmup Enabled |
| N/A |

**Catalyst Warmup Enabled - Other Definitions:**
To enable the Cold Start Emission Reduction Strategy:

Catalyst Temperature <  500.00 degC
AND
Engine Coolant >  -12.00 degC
AND
Engine Coolant <=  56.00 degC
AND
Barometric Pressure>=  75.00 KPa
AND

DTC's Not Set:

ECT_Sensor_FA
MAP_SensorFA

The Cold Start Emission Reduction Strategy will remain active until:

Engine Run Time > **P050D_P1400_CatalystLightOffExtendedEngineRunTimeExit** This Extended Engine run time exit is a function of percent ethanol and Catmons NormRatioEWMA.
Refer to "Supporting Tables" for details.

OR

Catalyst Temperature >=  1,000.00 degC
AND
Engine Run Time >=  17.50 seconds

OR

Barometric Pressure <  75.00 KPa

| |
|---|
| **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:** CommBusAOff_VICM_FA |
| U0073 |
| **Bundle Name:** CommBusBOff_VICM_FA |
| U0074 |
| **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 |
| 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:** CylDeacAllDriverFault |
| P3401, P03403, P03404, P3409, P03411, P03412, P3417, P3419, P3420, P3425, P3427, P3428, P3433, P3435, P3436, P3441, P3443, P3444, P3449, P3451, P3452, P3457, P3459, P3460 |
| **Bundle Name:** CylDeacDriverFault |
| P3401, P03403, P03404, P3409, P03411, P03412, P3417, P3419, P3420, P3425, P3427, P3428, P3433, P3435, P3436, P3441, P3443, P3444, P3449, P3451, P3452, P3457, P3459, P3460 |

| |
|---|
| **Bundle Name:** CylDeacSystemTFTKO |
| P3400 |
| **Bundle Name:** ECT_Sensor_Ckt_FA |
| P0117, P0118 |
| **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 |
| **Bundle Name:** ECT_Sensor_Ckt_TPTKO |
| P0117, P0118 |
| **Bundle Name:** ECT_Sensor_DefaultDetected |
| P0116, P0117, P0118, P0119, P111E |
| **Bundle Name:** ECT_Sensor_FA |
| P0116, P0117, P0118, P0119, P0128, P111E |
| **Bundle Name:** ECT_Sensor_Perf_FA |
| P0116, P111E |
| **Bundle Name:** ECT_Sensor_TFTKO |
| P0116, P0117, P0118, P0119, P0128, P111E |
| **ECT_Sensor_TFTKO - Other Definitions:** |
| |
| **Bundle Name:** EGRValve_FP |
| P0405, P0406, P042E |
| **Bundle Name:** EGRValveCircuit_FA |
| P0403, P0404, P0405, P0406, P0489, P0490, P042E |
| **Bundle Name:** EGRValveCircuit_TFTKO |
| P0403, P0404, P0405, P0406, P0489, P0490 |
| **Bundle Name:** EGRValvePerformance_FA |
| P0404, P042E |
| **Bundle Name:** EGRValvePerformance_TFTKO |
| P0404, P042E |
| **Bundle Name:** ELCP_PumpCircuit_FA |
| P2400, P2401, P2402 |
| **Bundle Name:** ELCP_SwitchCircuit_FA |
| P2418, P2419, P2420 |

| |
|---|
| **Bundle Name:** ELCPCircuit_FA |
| P24BA, P24BB |
| **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 |
| P262B |
| **Bundle Name:** EngineModeNotRunTimerError |
| P262B |
| **Bundle Name:** EnginePowerLimited |
| P0068, P00C8, P00C9, P00CA, P0090, P0091, P0092, P0122, P0123, P0191, P0192, P0193, P0222, P0223, P0601, P0604, P0606, P0697, P06A3, P06DB, P06DE, P0A1D, P1104, P127A, P127C, P127D, P15F2, P160D, P160E, P1682, P16A0, P16A1, P16A2, P16F3, P2100, P2101, P2102, P2103, P2122, P2123, P2127, P2128, P2135, P2138, P215B, P2176, P228C, P228D, U0073, U0074, U0293, U1817 |
| **Bundle Name:** EngineTorqueEstInaccurate |
| EngineMisfireDetected_FA, FuelInjedtorCircuit_FA, FuelInjedtorCircuit_TFTKO, FuelTrimSystemB1_FA, FuelTrimSystemB2_FA, MAF_SensorTFTKO, MAP_SensorTFTKO, EGRValuePerforamnce_FA,  P16F3 |
| **EngineTorqueEstInaccurate - Other Definitions:**<br>P16F3 with GetXOYR_b_SecurityFlt (CeXOYR_e_MAPR_AfterThrotPresFlt, CeXOYR_e_MAPR_EngineVacuumFlt, CeXOYR_e_MAPR_IntkMnfdPresFlt, CeXOYR_e_MAFR_Ahead1vs2FinalFlt) |
| **Bundle Name:** EngModeNotRunTmErr |
| P262B |
| **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) |
| **Bundle Name:** EngOilTempSensorCircuitFA |
| P0197, P0198 |
| **Bundle Name:** Ethanol Composition Sensor FA |
| P0178, P0179, P2269 |
| **Bundle Name:** EvapEmissionSystem_FA |

| |
|---|
| P0455, P0446 |
| **Bundle Name:** EvapExcessPurgePsbl_FA |
| ELCP sealed/vented fuel system, P0442, P0455, P0458 OR Conventional fuel system, P0442, P0455, P0458, P0496 |
| **Bundle Name:** EvapFlowDuringNonPurge_FA |
| P0496 |
| **Bundle Name:** EvapPurgeSolenoidCircuit_FA |
| P0443, P0458, P0459 |
| **Bundle Name:** EvapReducedPurgePsbl_FA |
| ELCP sealed/vented fuel system, P0443, P0446, P0449, P0459, P0497, P0499, P1463, P2419, P2422 OR Conventional fuel system, P0443, P0446, P0455, P0459, P0498 |
| **Bundle Name:** EvapSmallLeak_FA |
| P0442 |
| **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:** ExhaustVVT_Enabled |
| |

**ExhaustVVT_Enabled - Other Definitions:**
**ExhaustVVT_Enabled**= TRUE if:

DTCs not set:
CrankSensor_TFTKO
ExhaustCamSensorTFTKO
CamLctnExhFA

AND

CrankExhaustCamCorrelationFA diagnostic has executed and passed

AND

Cam Edge Locations have been learned

AND

IntakeVVT_Enabled = TRUE

OR
Intake Park Position is Retarded ( CePHSR_e_Advanced )

AND

[**Catalyst Warmup Enabled** is TRUE   AND
Engine Speed > 900.00    AND
Engine Run Time > **P0011_P0021_P05CC_P05CD_P0014_P0024_P05CE_P05CF_ColdStartEngRunning**]

OR

[Engine is running                          AND
Engine power is requested              AND
ExhEngineSpeed is Enabled (see below)     AND
ExhOilPressure is Enabled (see below)     AND
ExhEngineOilTemp is Enabled (see below)    ]


\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*
**ExhEngineSpeed** is Enabled if:
**P0014_P0024_P05CE_P05CF_LoRpmHiEnblEc** < Engine RPM < **P0014_P0024_P05CE_P05CF_HiEngSpdLoEnblEc**

**ExhEngineSpeed** Disables if:
Engine RPM < **P0014_P0024_P05CE_P05CF_LoRpmLoDsblEc**
        OR
Engine RPM > **P0014_P0024_P05CE_P05CF_HiEngSpdHiDsblEc**

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*
**ExhOilPressure** is Enabled if:
(Oil Pressure Sensor In Use ( 1.00 ) = 1.00   (Note: 1.00 equals TRUE)   AND
Oil Pressure Sensor Present ( 1.00 ) = 1.00  (Note: 1.00 equals Present) AND
Oil Pressure > **P0014_P0024_P05CE_P05CF_LoPresHiEnblEc**
 for **P0014_P0024_P05CE_P05CF_EngOilPressEnblEc** sec)
        OR
(Engine RPM > **P0014_P0024_P05CE_P05CF_LoRpmHiEnblEc** for
**P0014_P0024_P05CE_P05CF_EngOilPressEnblEc** sec)

**ExhOilPressure** Disables if:
(Oil Pressure Sensor In Use ( 1.00 ) = 1.00   (Note: 1.00 equals TRUE)    AND
Oil Pressure Sensor Present ( 1.00 ) = 1.00  (Note: 1.00 equals Present) AND
Oil Pressure < **P0014_P0024_P05CE_P05CF_LoPresLoDsblEc )**


\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*
**ExhEngineOilTemp** is Enabled if:
-10.00  < Engine Oil Temp < 135.00

**ExhEngineOilTemp** Disables  if:

Engine Oil Temp <  -13.00
   OR
Engine Oil Temp >  140.00

| |
|---|
| **Bundle Name:** FanOutputDriver_FA |
| P0480, P0481, P0482, P0691, P0692, P0693, P0694, P0695, P0696,  P1485 (EREV),  P1486 (EREV),  P1487 (EREV) |
| **Bundle Name:** FHPD_b_FRP_SnsrCkt_FP |
| P0192,  P0193,  P16E4,  P16E5,  P128F,  P128A |
| **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 |
| **Bundle Name:** FHPR_b_FRP_SnsrCkt_FA |
| P0192,  P0193,  P127C,  P127D,  P16E4,  P16E5,  P128F,  P128A,  P128B |
| **Bundle Name:** FHPR_b_FRP_SnsrCkt_TFTKO |
| P0192,  P0193,  ,  P127C,  P127D,  P16E4,  P16E5,  P128F,  P128A,  P128B |
| **Bundle Name:** FHPR_b_FRP_SnsrPerfDiag_FA |
| P0191,  P127A |
| **Bundle Name:** FHPR_b_FRP_SnsrPerfDiag_TFTKO |
| P0191,  P127A |
| **Bundle Name:** FHPR_b_PumpCkt_FA |
| P0090,  P0091,  P0092,  P00C8,  P00C9,  P00CA |
| **Bundle Name:** FHPR_b_PumpCkt_FP |
| P0090,  P0091,  P0092,  P00C8,  P00C9,  P00CA |
| **Bundle Name:** FHPR_b_PumpCkt_TFTKO |
| P0090,  P0091,  P0092,  P00C8,  P00C9,  P00CA |
| **Bundle Name:** FourWheelDriveLowStateInvalid |

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| P2771 |
| **Bundle Name:** FPSR_b_SENT_WaveForm_FPBndl |
| P128F, P16E4, P16E5 |
| **Bundle Name:** FTP_SensorCircuit_FA |
| P0452, P0453 |
| **Bundle Name:** FuelInjectorCircuit_FA |
| PFI: P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0261, P0264, P0267, P0270, P0273, P0276, P0279, P0282, P0262, P0265, P0268, P0271, P0274, P0277, P0280, P0283 SIDI: P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0261, P0264, P0267, P0270, P0273, P0276, P0279, P0282, P0262, P0265, P0268, P0271, P0274, P0277, P0280, P0283, P2147, P2150, P2153, P2156, P216B, P216E, P217B, P217E, P2148, P2151, P2154, P2157, P216C, P216F, P217C, P217F, P1248, P1249, P124A, P124B, P124C, P124D, P124E, P124F |
| **Bundle Name:** FuelInjectorCircuit_TFTKO |
| PFI: P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0261, P0264, P0267, P0270, P0273, P0276, P0279, P0282, P0262, P0265, P0268, P0271, P0274, P0277, P0280, P0283 SIDI: P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0261, P0264, P0267, P0270, P0273, P0276, P0279, P0282, P0262, P0265, P0268, P0271, P0274, P0277, P0280, P0283, P2147, P2150, P2153, P2156, P216B, P216E, P217B, P217E, P2148, P2151, P2154, P2157, P216C, P216F, P217C, P217F, P1248, P1249, P124A, P124B, P124C, P124D, P124E, P124F |
| **Bundle Name:** FuelLevelDataFault |
| P0461, P0462, P0463, P2066, P2067, P2068 |
| **Bundle Name:** FuelPumpRlyCktFA |
| P0627, P0628, P0629 |
| **Bundle Name:** FuelTankPressureSnsrCkt_FA |
| P0452, P0453 |
| **Bundle Name:** FuelTrimSystemB1_FA |
| P0171, P0172, P11E9 , P11EA |
| **Bundle Name:** FuelTrimSystemB1_TFTKO |
| P0171, P0172, P11E9, P11EA |
| **Bundle Name:** FuelTrimSystemB2_FA |
| P0174, P0175, P11EB, P11EC |
| **Bundle Name:** FuelTrimSystemB2_TFTKO |
| P0174, P0175, P11EB, P11EC |
| **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 |
| P0506, P0507 |

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| **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 |
| P262B |
| **Bundle Name:** IgnitionOffTimeValid |
| P262B |
| **Bundle Name:** IgnitionOutputDriver_FA |
| P0351, P0352, P0353, P0354, P0355, P0356, P0357, P0358, P2300, P2301, P2303, P2304, P2306, P2307, P2309, P2310, P2312, P2313, P2315, P2316, P2318, P2319, P2321, P2322 |
| **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:** IntakeVVT_Enabled |
| |
| **IntakeVVT_Enabled - Other Definitions:**<br>**IntakeVVT_Enabled** = TRUE if:<br><br>DTCs not set:<br>CrankSensor_TFTKO<br>IntakeCamSensor_TFTKO<br>CamLctnIntFA<br><br>AND<br><br>CrankExhaustCamCorrelationFA diagnostic has executed and passed |

AND

Cam Edge Locations have been learned

AND

[**Catalyst Warmup Enabled** = TRUE   AND
Engine Speed > 900.00            AND
Engine Run Time > **P0011_P0021_P05CC_P05CD_P0014_P0024_P05CE_P05CF_ColdStartEngRunning**]

OR

[Engine is running                          AND
Engine power is requested                AND
IntEngineSpeed is Enabled (see below)      AND
IntOilPressure is Enabled (see below)      AND
IntEngineOilTemp is Enabled (see below)    ]


\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*
**IntEngineSpeed** is Enabled if:
**P0011_P0021_P05CC_P05CD_LoRpmHiEnbllc** < Engine RPM < **P0011_P0021_P05CC_P05CD_HiEngSpdLoEnbllc**

**IntEngineSpeed** Disables if:
Engine RPM < **P0011_P0021_P05CC_P05CD_LoRpmLoDsbllc**
        OR
Engine RPM > **P0011_P0021_P05CC_P05CD_HiEngSpdHiDsbllc**


\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*
**IntOilPressure** is Enabled if:
(Oil Pressure Sensor In Use ( 1.00 ) = 1.00   (Note: 1.00 equals TRUE)     AND
Oil Pressure Sensor Present ( 1.00 ) = 1.00  (Note: 1.00 equals Present) AND
Oil Pressure > **P0011_P0021_P05CC_P05CD_LoPresHiEnbllc** for **P0011_P0021_P05CC_P05CD_EngOilPressEnbllc** sec)
        OR
(Engine RPM > **P0011_P0021_P05CC_P05CD_LoRpmHiEnbllc** for **P0011_P0021_P05CC_P05CD_EngOilPressEnbllc** sec)

**IntOilPressure** Disables if:
(Oil Pressure Sensor In Use ( 1.00 ) = 1.00   (Note: 1.00 equals TRUE)     AND
Oil Pressure Sensor Present ( 1.00 ) = 1.00  (Note: 1.00 equals Present) AND
Oil Pressure < **P0011_P0021_P05CC_P05CD_LoPresLoDsbllc**)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*
**IntEngineOilTemp** is Enabled if:
-10.00 < Engine Oil Temp < 135.00

**IntEngineOilTemp** Disables if:
Engine Oil Temp < -13.00
        OR

| |
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| Engine Oil Temp > 140.00 |
| **Bundle Name:** IntkCamPhaser_FA |
| P0010, P0011, P0020, P0021, P05CC, P05CD, P2088, P2089, P2092, P2093, P25CA, P25CB, P25CC, P25CD, P25CE, P25CF |
| **Bundle Name:** KS_Ckt_Perf_B1B2_FA |
| P0324, P0325, P0326, P0327, P0328, P0330, P0332, P0333, P06B6, P06B7 |
| **Bundle Name:** LostCommBCM_FA |
| U0140 |
| **Bundle Name:** LostCommBusB_VICM_FA |
| U182D |
| **Bundle Name:** LowFuelConditionDiagnostic |
| |
| **LowFuelConditionDiagnostic - Other Definitions:**<br>Flag set to TRUE if the fuel level < 10.0 % AND<br>No Active DTCs: FuelLevelDataFault, P0462, P0463 for at least 30.0 seconds |
| **Bundle Name:** MAF_SensorCircuitFA |
| P0102, P0103, P010C, P010D |
| **Bundle Name:** MAF_SensorCircuitTFTKO |
| P0102, P0103, P010C, P010D |
| **Bundle Name:** MAF_SensorFA |
| P0101, P0102, P0103, P010B, 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, P010B, P010C, P010D |
| **Bundle Name:** MAF_Snsr1_FA |
| P0101, P0102, P0103 |
| **Bundle Name:** MAF_Snsr2_FA |
| P010B, P010C, P010D |
| **Bundle Name:** MAF_SnsrCktFA |
| P0102, P0103, P010C, P010D |
| **Bundle Name:** MAF_SnsrCktTFTKO |
| P0102, P0103, P010C, P010D |
| **Bundle Name:** MAP_EngineVacuumStatus |
| P0106, P0107, P0108 Fault Active OR P0107, P0108 Fault Pending |

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| **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. |
| **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 |
| P262B |
| **Bundle Name:** ModuleOffTimeErr |
| P262B |
| **Bundle Name:** O2S_Bank_ 1_TFTKO |
| P0131, P0132, P0134, P2A00 |
| **Bundle Name:** O2S_Bank_ 2_TFTKO |
| P0151, P0152, P0154, P2A03 |
| **Bundle Name:** O2S_Bank_1_Sensor_1_FA |
| P2A00, P0131, P0132, P0133, P0134, P0135, P0053, P1133, P015A, P015B, P0030 |
| **Bundle Name:** O2S_Bank_1_Sensor_2_FA |
| P013A, P013B, P013E, P013F, P2270, P2271, P0137, P0138, P0140, P0141, P0054, P0036 |
| **Bundle Name:** O2S_Bank_2_Sensor_1_FA |
| P2A03, P0151, P0152, P0153, P0154, P0155, P0059, P1153, P015C, P015D, P0050 |

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| **Bundle Name:** O2S_Bank_2_Sensor_2_FA |
| P013C, P013D, P014A, P014B, P2272, P2273, P0157, P0158, P0160, P0161, P0060, P0056 |
| **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_EstAmbTemp_FA |
| ELCP sealed/vented fuel system, P0071, P0072, P0073, P0502, P0503, P0722, P0723 OR Conventional fuel system, P0071, P0072, P0073, P0074, P262B |
| **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:**<br>Output Driver Codes |
| **Bundle Name:** OilPmpFA |
| P06DA, P06DB, P06DC, P06DD, P06DE |
| **OilPmpFA - Other Definitions:**<br>FA only for Output Driver and rationality |
| **Bundle Name:** OilPmpStuckHigh |
| P06DA, P06DB, P06DD |
| **OilPmpStuckHigh - Other Definitions:**<br>TFTKO and FA |
| **Bundle Name:** OilPmpStuckLow |
| P06DC, P06DE |
| **OilPmpStuckLow - Other Definitions:**<br>TFTKO and FA |
| **Bundle Name:** OilPmpTFTKO |
| P06DA, P06DB, P06DC, P06DD, P06DE |
| **OilPmpTFTKO - Other Definitions:**<br>TFTKO only for Output Driver and rationality |
| **Bundle Name:** OilSenDiagBndl_TFTKO |
| P055B, P055C, P055D |
| **Bundle Name:** PO2S_Bank_1_Snsr_2_FA |

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| P0137, P0138, P0140, P0036, P0054, P0141, P2270, P2271 |
| **Bundle Name:** PO2S_Bank_2_Snsr_2_FA |
| P0157, P0158, P0160, P0056, P0060, P0161, P2272, P2273 |
| **Bundle Name:** PostCatAltFuelTrimHiB1_TFTKO |
| P11F0 |
| **Bundle Name:** PostCatAltFuelTrimHiB2_TFTKO |
| P11F2 |
| **Bundle Name:** PostCatAltFuelTrimLoB1_TFTKO |
| P11EF |
| **Bundle Name:** PostCatAltFuelTrimLoB2_TFTKO |
| P11F1 |
| **Bundle Name:** PostCatFuelTrimB1_TFTKO |
| P11EF, P11F0, P2096, P2097 |
| **Bundle Name:** PostCatFuelTrimB2_TFTKO |
| P11F1, P11F2, P2098, P2099 |
| **Bundle Name:** PostCatFuelTrimHiB1 |
| P2097, P11F0 |
| **Bundle Name:** PostCatFuelTrimHiB1_TFTKO |
| P2097 |
| **Bundle Name:** PostCatFuelTrimHiB2 |
| P2099, P11F2 |
| **Bundle Name:** PostCatFuelTrimHiB2_TFTKO |
| P2099 |
| **Bundle Name:** PostCatFuelTrimLoB1 |
| P2096, P11E9 |
| **Bundle Name:** PostCatFuelTrimLoB1_TFTKO |
| P2096 |
| **Bundle Name:** PostCatFuelTrimLoB2 |
| P2098, P11F1 |
| **Bundle Name:** PostCatFuelTrimLoB2_TFTKO |
| P2098 |
| **Bundle Name:** PowertrainRelayFault |
| P1682 |
| **Bundle Name:** PowertrainRelayStateOn_Error |
| P0685 |
| **Bundle Name:** PowertrainRelayStateOn_FA |
| P0685 |
| **Bundle Name:** PPS1_OutOfRange |

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| 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 |
| P0237, P0238 |
| **Bundle Name:** TC_BoostPresSnsrFA |
| P0236, P0237, P0238 |
| **Bundle Name:** TCM_EngSpdReqCkt |
| P150C |
| **Bundle Name:** THMR_AHV_FA |
| P2681, P26A3, P26A6, P26A7, P26A9 |
| **THMR_AHV_FA - Other Definitions:** |
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| **Bundle Name:** THMR_AWP_AuxPumpFA |
| B269A, B269C, B269D |
| **Bundle Name:** THMR_ECT_Sensor_Ckt_FA |

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| P0116, P0117, P0118, P0119, P111E |
| **Bundle Name:** THMR_Insuff_Flow_FA |
| P00B7 |
| **Bundle Name:** THMR_RCT_Sensor_Ckt_FA |
| P00B3, P00B4 |
| **Bundle Name:** THMR_SWP_Control_FA |
| P261A, P261D, P261C |
| **Bundle Name:** THMR_SWP_FlowStuckOn_FA |
| P261A, P261D, P261E |
| **Bundle Name:** THMR_SWP_NoFlow_FA |
| P261B, 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, P16A0, P16A1, P16A2, P2135 |
| **Bundle Name:** TPS_FaultPending |
| P0122, P0123, P0222, P0223, P16A0, P16A1, P16A2, P2135 |
| **Bundle Name:** TPS_Performance_FA |
| P0068, P0121, P1104, P2100, P2101, P2102, P2103 |
| **Bundle Name:** TPS_Performance_TFTKO |
| P0068, P0121, P1104, P2100, P2101, P2102, P2103 |
| **Bundle Name:** TPS_TFTKO |
| P0122, P0123, P0222, P0223, P16A0, P16A1, P16A2, P2135 |
| **Bundle Name:** TPS_ThrottleAuthorityDefaulted |
| P0068, P0122, P0123, P0222, P0223, P16F3, P16A0, P16A1, P16A2, P1104, P2100, P2101, P2102, P2103, P2135 |
| **Bundle Name:** TPS1_OutOfRange_Composite |

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| P0122, P0123, P06A3, P16A0, P16A1, P16A2 |
| **Bundle Name:** TPS2_OutOfRange_Composite |
| P0222, P0223, P06A3, P16A0, P16A1, P16A2 |
| **Bundle Name:** Trans Output Rotations Rolling Count Validity |
| P0722, P0723, P077C, P077D |
| **Bundle Name:** TransActualGearValidity |
| P182E, P1915 |
| **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 |
| P182E, P1915 |
| **Bundle Name:** Transmission Engaged State Validity |
| P182E, P1915 |
| **Bundle Name:** Transmission Estimated Gear Validity |
| P182E, P1915 |
| **Bundle Name:** Transmission Gear Ratio Validity |
| P0716, P0717, P0722, P0723, P077C, P077D, P07BF, P07C0 |
| **Bundle Name:** Transmission Gear Selector Position Validity |
| P182E, P1915 |
| **Bundle Name:** Transmission Oil Temperature Validity |
| P0667, P0668, P0669, P0711, P0712, P0713 |
| **Bundle Name:** Transmission Output Shaft Angular Velocity Validity |
| P0722, P0723, P077C, P077D |
| **Bundle Name:** Transmission Overall Actual Torque Ratio Validity |
| P0716, P0717, P0722, P0723, P077C, P077D, P07BF, P07C0, P182E, P1915 |
| **Bundle Name:** Transmission Overall Estimated Torque Ratio Validity |
| P0716, P0717, P0722, P0723, P077C, P077D, P07BF, P07C0, P182E, P1915 |
| **Bundle Name:** Transmission Shift Lever Position Validity |
| P182E, P1915 |
| **Bundle Name:** Transmission Turbine Angular Velocity Validity |
| P0716, P0717, P07BF, P07C0 |
| **Bundle Name:** TransmissionEngagedState_FA |

| |
|---|
| P182E, P1915 |
| **Bundle Name:** TransmissionGearDefaulted |
| P182E, P1915 |
| **Bundle Name:** TransmissionOutputRotationalStatusValidity |
| P0722, P0723, P077C, P077D |
| **Bundle Name:** TransmissionRatioControlSystemFault |
| P0751, P0752, P0756, P0757, P0973, P0974, P0976, P0977 |
| **Bundle Name:** TwoStepMechBndl_FA |
| P2646, P2647, P16D0, P16D1 |
| **Bundle Name:** TwoStepMechBndl_TFTKO |
| P2646, P2647, P16D0, P16D1 |
| **Bundle Name:** VCER_TorqueSecurity |
| P16F3 |
| **VCER_TorqueSecurity - Other Definitions:**<br>P16F3 with GetXOYR_b_SecurityFlt(CeXOYR_e_AFM_PreloadAreaFlt, CeXOYR_e_AFM_PreloadTimerFlt, CeXOYR_e_AFM_DualPreloadAreaFlt, CeXOYR_e_CDAR_SecurityFlt) |
| **Bundle Name:** VehicleSpeedSensor_FA |
| P0502, P0503, P0722, P0723 |
| **Bundle Name:** VehicleSpeedSensorError |
| P0502, P0503, P0722, P0723 |
| **Bundle Name:** VentCircuit_FA |
| ELCP sealed/vented fuel system, P0449, P0498, P0499 |
| **Bundle Name:** VICM_WakeupDiag_FA |
| P06E4 |
| **Bundle Name:** VICM_WakeupDiag_TFTKO |
| P06E4 |
| **Bundle Name:** VITR_LVT_FltBndl |
| P058B, P058D, P118C, P118D |

| 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><br><br>Engine run time<br><br><br><br><br><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 | <br><br><br><br><br><br><br><br>< 1.24 MPH<br><br>> 1,100  RPM for a minimum of  25 seconds since end of last idle period.<br><br><br>> **CatmonMinEngineRunTimeToEnable** This is a function of Coolant Temperature, please see "Supporting Tables" for details.<br><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)<br><br>Normalized Ratio Calculation = (1-2) / (3-2)<br><br>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.<br><br>Refer to the **P0420_WorstPassing OSCTableB1** and **P0420_BestFailingOS CTableB1** table in the **Supporting Tables** tab for details | | | Criteria met, as well as:<br><br>Green Converter Delay<br><br>Induction Air<br><br><br>Intrusive test(s):<br>Fueltrim<br>Post O2<br>EVAP<br>EGROther vehicle functions:<br><br>Power Take Off<br>RunCrank Voltage<br>Ethanol Estimation<br><br><br>ECT<br><br><br>Barometric Pressure<br><br>Idle Time before going intrusive is<br><br>Idle time is incremented if Vehicle speed<br><br><br>Short Term Fuel Trim | Not Active<br><br>> -20 ° C<br>< 250 ° C<br><br>Not Active<br><br><br><br><br><br>Not Active<br>> 10.90 Volts<br>NOT in Progress<br><br><br>> 50 ° C<br>< 130° C<br><br><br>> 70 KPA<br><br>< 50 Seconds<br><br>< 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.<br><br>> 0.90<br>< 1.30 | | |

| Component/ System | Fault Code | Monitor Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illum. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Predicted catalyst temp | > 600.00 degC | | |
| | | | | | AND | | | |
| | | | | | Engine Airflow | > **CatmonMinAirflowForWarmCatalystDetermination** table (g/s) (refer to "Supporting Tables" tab) (Based on engine coolant at the time the WarmedUpEvents counter resets to 0.) | | |
| | | | | | for at least | 28 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 | < 900 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:<br><br>If the difference between current EWMA value and the current OSC Normalized Ratio value is | > 0.46 | | |
| | | | | | 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<br>This is part of the check for the Catalyst Idle Conditions Met Criteria section<br><br>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<br>DTC's Not Set | MAF_SensorFA<br>MAF_SensorTFTKO<br>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 | | |
| | | | | | | | | |

## Initial Supporting table - P0420_BestFailingOSCTableB1 (Unique Algorithm)

**Description:** This table is a 9x17 table of baseline Best Failing (e.g. threshold converter) OSC times for catalyst Bank 1. The axis' for this table include the average airflow and the catalyst temperature. After OSC is measured for a specific temp and airflow,the BestFailing OSC value is found within this table for the measured temp and airflow and is used along with the OSC_TimeRaw (and the WorstPassing value) to calculate the Normalized Ratio for that specific test. The values in this table are based on the measured OSC for the identified BPU converter that is used for MIL illumination across the specific temp and airflow range for a given program.

**Notes:** KtCATD_t_1_OSC_BestFailing - Use for norm ratio calculation for P0420

| y/x | 2.50 | 3.00 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 | 6.00 | 6.50 | 7.00 | 7.50 | 8.00 | 8.50 | 9.00 | 9.50 | 10.00 | 10.50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 500.00 | 2.17 | 1.99 | 1.56 | 1.23 | 1.10 | 1.05 | 0.87 | 0.80 | 0.72 | 0.66 | 0.61 | 0.53 | 0.48 | 0.45 | 0.39 | 0.36 | 0.31 |
| 550.00 | 2.29 | 2.07 | 1.60 | 1.27 | 1.15 | 1.09 | 0.91 | 0.83 | 0.75 | 0.69 | 0.64 | 0.56 | 0.51 | 0.48 | 0.41 | 0.37 | 0.32 |
| 600.00 | 2.41 | 2.15 | 1.64 | 1.33 | 1.20 | 1.13 | 0.95 | 0.86 | 0.78 | 0.71 | 0.66 | 0.59 | 0.54 | 0.50 | 0.44 | 0.40 | 0.34 |
| 650.00 | 2.51 | 2.26 | 1.72 | 1.39 | 1.24 | 1.17 | 0.99 | 0.90 | 0.81 | 0.75 | 0.69 | 0.61 | 0.57 | 0.53 | 0.48 | 0.42 | 0.36 |
| 700.00 | 2.61 | 2.37 | 1.81 | 1.49 | 1.30 | 1.22 | 1.04 | 0.95 | 0.85 | 0.77 | 0.72 | 0.66 | 0.61 | 0.55 | 0.51 | 0.45 | 0.39 |
| 750.00 | 2.70 | 2.48 | 1.90 | 1.59 | 1.37 | 1.27 | 1.09 | 0.99 | 0.91 | 0.82 | 0.75 | 0.69 | 0.64 | 0.59 | 0.54 | 0.48 | 0.41 |
| 800.00 | 2.85 | 2.59 | 2.00 | 1.67 | 1.44 | 1.34 | 1.15 | 1.06 | 0.97 | 0.87 | 0.79 | 0.74 | 0.68 | 0.63 | 0.58 | 0.52 | 0.46 |
| 850.00 | 2.97 | 2.70 | 2.09 | 1.75 | 1.52 | 1.42 | 1.23 | 1.14 | 1.03 | 0.93 | 0.85 | 0.78 | 0.74 | 0.70 | 0.63 | 0.57 | 0.51 |
| 900.00 | 3.10 | 2.81 | 2.24 | 1.85 | 1.61 | 1.49 | 1.32 | 1.25 | 1.12 | 1.00 | 0.91 | 0.84 | 0.80 | 0.75 | 0.68 | 0.62 | 0.56 |

| | | | |
|---|---|---|---|
| **Initial Supporting table - P0420_P0430_CatmonMinAirflowForWarmCatalystDetermination (Unique Algorithm)** | | | |

**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 | |

| **Initial Supporting table - P0420_P0430_CatmonMinEngineRunTimeToEnable (Unique Algorithm)** |
|---|

**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 | 0 | 0 | 0 | 0 | 0 |

## Initial Supporting table - P0420_WorstPassingOSCTableB1(Unique Algorithm)

**Description:** This table is a 9x17 table of WorstPassing (e.g. 120k) OSC times for catalyst Bank 1. The axis' for this table include the average airflow and the catalyst temperature. After OSC is measured for a specific temp and airflow, the WorstPassing OSC value is found within this table for the measured temp and airflow and is used along with the OSC_TimeRaw (and the BestFailing OSC value) to calculate the Normalized Ratio for that specific test.The values in this table are based on the measured OSC for the WPA part across the temp and airflow range.

**Notes:** KtCATD_t_1_OSC_WorstPassing - Use for norm ratio calculation for P0420

| y/x | 2.50 | 3.00 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 | 6.00 | 6.50 | 7.00 | 7.50 | 8.00 | 8.50 | 9.00 | 9.50 | 10.00 | 10.50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 500.00 | 11.64 | 9.89 | 8.27 | 7.26 | 6.37 | 5.07 | 4.29 | 4.10 | 3.92 | 3.74 | 3.51 | 3.27 | 3.03 | 2.70 | 2.50 | 2.28 | 2.14 |
| 550.00 | 11.85 | 9.99 | 8.37 | 7.30 | 6.45 | 5.15 | 4.36 | 4.15 | 3.97 | 3.78 | 3.55 | 3.31 | 3.08 | 2.74 | 2.54 | 2.33 | 2.17 |
| 600.00 | 12.06 | 10.15 | 8.44 | 7.36 | 6.56 | 5.24 | 4.43 | 4.21 | 4.02 | 3.83 | 3.59 | 3.36 | 3.15 | 2.80 | 2.56 | 2.37 | 2.19 |
| 650.00 | 12.34 | 10.32 | 8.57 | 7.53 | 6.73 | 5.41 | 4.52 | 4.30 | 4.10 | 3.91 | 3.66 | 3.44 | 3.22 | 2.90 | 2.64 | 2.41 | 2.23 |
| 700.00 | 12.68 | 10.57 | 8.70 | 7.71 | 6.87 | 5.57 | 4.64 | 4.44 | 4.22 | 4.02 | 3.78 | 3.58 | 3.35 | 3.03 | 2.71 | 2.45 | 2.28 |
| 750.00 | 12.99 | 10.90 | 8.95 | 7.99 | 7.11 | 5.80 | 4.86 | 4.60 | 4.34 | 4.18 | 3.97 | 3.75 | 3.51 | 3.20 | 2.85 | 2.57 | 2.36 |
| 800.00 | 13.23 | 11.18 | 9.28 | 8.37 | 7.34 | 6.03 | 5.11 | 4.81 | 4.54 | 4.33 | 4.16 | 3.94 | 3.70 | 3.38 | 3.02 | 2.76 | 2.48 |
| 850.00 | 13.57 | 11.51 | 9.69 | 8.70 | 7.59 | 6.24 | 5.41 | 5.06 | 4.76 | 4.56 | 4.38 | 4.15 | 3.92 | 3.60 | 3.26 | 3.04 | 2.72 |
| 900.00 | 13.87 | 11.89 | 10.22 | 9.10 | 7.94 | 6.52 | 5.69 | 5.28 | 4.99 | 4.77 | 4.58 | 4.36 | 4.15 | 3.83 | 3.50 | 3.31 | 3.01 |

# 15 OBDG05 CCM Summary Tables

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illumination |
|---|---|---|---|---|---|---|---|---|
| Fuel Rail Pressure (FRP) Sensor Performance (rationality) | P018B | This DTC detects a fuel pressure sensor response stuck within the normal operating range | Absolute value of fuel pressure change as sensed during intrusive test. | <= 30 kPa | | | Frequency: Continuous; 12.5 ms loop. 60 seconds between intrusive tests that pass. Intrusive test requested if fuel system is clamped for >= 5 seconds or fuel pressure error variance <= typically (0.3 to 0.6) (calculated over a 2.5sec period); otherwise report pass | DTC Type B 2 trips |
| | | | | | 1. FRP Circuit Low DTC (P018C) | not active | | |
| | | | | | 2. FRP Circuit High DTC (P018D) | not active | | |
| | | | | | 3. FuelPump Circuit Low DTC (P0231) | | Duration of intrusive test is fueling related (5 to 12 seconds). | |
| | | | | | 4. FuelPump Circuit High DTC (P0232) | not active not active | | |
| | | | | | 5. FuelPump Circuit Open DTC (P023F) | not active | Intrusive test is run when fuel flow is below Max allowed fuel flow rate (Typical values in the range of 11 to 50 g/s) | |
| | | | | | 6. Reference Voltage DTC (P0641) | not active | | |
| | | | | | 7. Fuel Pump Control Module Driver Over-temperature DTC (P064A) | not active | | |
| | | | | | 8. Control Module Internal Performance DTC (P0606) | not active | | |
| | | | | | 9. Engine run time | >=5 seconds | | |
| | | | | | 10. Emissions fuel level (PPEI $3FB) | not low | | |
| | | | | | 11. Fuel pump control | enabled | | |
| | | | | | 12. Fuel pump control state | normal or FRP Rationality control | | |
| | | | | | 13. Engine fuel flow | > 0.047 g/s | | |
| | | | | | 14. ECM fuel control system failure (PPEI $1ED) | failure has not occurred | | |
| Fuel Rail Pressure (FRP) Sensor Circuit Low Voltage | P018C | This DTC detects if the fuel pressure sensor circuit is shorted low | FRP sensor voltage | < 0.14 V | | | 72 failures out of 80 samples. 1 sample/12.5 ms | DTC Type B 2 trips |
| | | | | | Ignition | Run or Crank | | |

# 15 OBDG05 CCM Summary Tables

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illumination |
|---|---|---|---|---|---|---|---|---|
| Fuel Rail Pressure (FRP) Sensor Circuit High Voltage | P018D | This DTC detects if the fuel pressure sensor circuit is shorted high | FRP sensor voltage | > 4.86 V | Ignition | Run or Crank | 72 failures out of 80 samples<br><br>1 sample/12.5 ms | DTC Type B 2 trips |
| Fuel Pump Control Circuit Low Voltage | P0231 | This DTC detects if the fuel pump control circuit is shorted to low | Fuel Pump Current | > 14.48A | Ignition OR Ignition OR Fuel Pump Control AND Ignition Run/Crank Voltage | Run or Crank Accessory enabled 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 1 trip |
| Fuel Pump Control Circuit High Voltage | P0232 | This DTC detects if the fuel pump control circuit is shorted to high | Voltage measured at fuel pump circuit | > 3.86 V | Commanded fuel pump output<br><br>Fuel pump control enable<br><br>Time that above conditions are met | 0% duty cycle (off)<br><br>False<br><br>>=4.0 seconds | 36 test failures in 40 test samples; 1 sample/12.5ms<br><br>Pass/Fail determination made only once per trip | DTC Type B 2 trips |
| Fuel Pump Control Circuit (Open) | P023F | This DTC detects if the fuel pump control circuit is open | Fuel Pump Current<br><br>AND Fuel Pump Duty Cycle | <=0.5A<br><br>>20% | Ignition OR Ignition OR Fuel Pump Control AND Ignition Run/Crank Voltage | Run or Crank Accessory enabled 9V < voltage < 32V | 72 test failures in 80 test samples; 1 sample/12.5ms | DTC Type A 1 trip |
| Fuel System Control Module Enable Control Circuit | P025A | This DTC detects if there is a fault in the fuel pump control enable circuit | PPEI (PPEI (Powertrain Platform Electrical Interface) Fuel System Request ($1ED) | ≠ Fuel Pump Control Module Enable Control Circuit | Ignition AND PPEI Fuel System Request ($1ED) | Run or Crank valid | 72 failures out of 80 samples<br><br>1 sample/12.5 ms | DTC Type A 1 trip |

# 15 OBDG05 CCM Summary Tables

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illumination |
|---|---|---|---|---|---|---|---|---|
| Active Grill Air Shutter "A" Performance- Stuck/ Off (Functionality) | P059F | Compare commanded shutter position to sensed position | Failure to achieve commanded position | Two (2) consecutive intrusive tests fail to achieve commanded position.<br><br>Intrusive tests are triggered immediately following any failure to achieve a commanded position. | 1. Power mode<br><br><br><br><br><br><br><br><br><br><br><br>2. Shutter Control<br>3. Ignition Run/Crank Voltage | Run/Crank<br><br><br><br><br><br><br><br><br><br><br><br>Enabled<br>11V < voltage < 32V | Frequency:<br>1 sample after every shutter movement.<br><br>Intrusive test requested if shutter movement is commanded and position feedback differs after 19.5 seconds; otherwise report pass.<br><br>Duration of intrusive test is shutter movement related (40 to 120 seconds) | DTC Type B<br>2 trips |
| Control Module Read Only Memory (ROM) | P0601 | This DTC will be stored if any software or calibration check sum is incorrect | Calculated Checksum (CRC16) | ≠ stored checksum for any of the parts (boot, software, application calibration, system calibration) | Ignition<br>OR<br><br><br>Ignition<br>OR<br>Fuel Pump Control | Run or Crank<br><br><br><br>Accessory<br><br>enabled | 1 failure if it occurs during the first ROM test of the ignition cycle, otherwise 5 failures<br>Frequency:<br>Runs continuously in the background | DTC Type A<br>1 trip |
| Control Module Not Programmed | P0602 | Indicates that the FSCM needs to be programmed | This DTC is set via calibration, when<br>KeMEMD_b_NoStartCal = TRUE | | Ignition<br>OR<br>Ignition<br>OR<br>Fuel Pump Control | Run or Crank<br><br>Accessory<br><br>enabled | Runs once at power up | DTC Type A<br>1 trip |
| Control Module Long Term Memory Reset | P0603 | Non-volatile memory checksum error at controller power-up | Checksum at power-up | ≠ checksum at power-down | Ignition<br>OR<br>Ignition<br>OR<br>Fuel Pump Control | Run or Crank<br><br>Accessory<br><br>enabled | 1 failure<br><br>Frequency:<br>Once at power-up | DTC Type A<br>1 trip |

# 15 OBDG05 CCM Summary Tables

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illumination |
|---|---|---|---|---|---|---|---|---|
| Control Module Random Access Memory (RAM) | P0604 | Indicates that control module is unable to correctly write and read data to and from RAM | Data read | ≠ Data written | Ignition OR Ignition OR Fuel Pump Control | Run or Crank Accessory enabled | 1 failure if it occurs during the first RAM test of the ignition cycle, otherwise 5 failures Frequency: Runs continuously in the background. | DTC Type A 1 trip |
| Control Module Internal Performance 1. Main Processor Configuration Register Test 2. Processor clock test 3. External watchdog test | P0606 | This DTC indicates the FSCM has detected an internal processor fault or external watchdog fault (PID 2032 discriminates the source of the fault ) | 1. For all I/O configuration register faults: •Register contents 2. For Processor Clock Fault: •EE latch flag in EEPROM. OR • RAM latch flag. 3. For External Watchdog Fault: • Software control of fuel pump driver | Incorrect value. 0x5A5A 0x5A Control Lost | Ignition OR Ignition OR Fuel Pump Control 1. For all I/O configuration register faults: •KeMEMD_b_ProcFltCfgRegEnbl 2. For Processor Clock Fault: •KeMEMD_b_ProcFltCLKDiagEnbl 3. For External Watchdog Fault: •KeFRPD_b_FPExtWDogDiagEnbl 3. For External Watchdog Fault: •Control Module ROM(P0601) 3. For External Watchdog Fault: •Control Module RAM(P0604) | Run or Crank Accessory enabled TRUE TRUE TRUE not active not active | Tests 1 and 2 1 failure Frequency: Continuously (12.5ms) Test 3 3 failures out of 15 samples 1 sample/12.5 ms | DTC Type A 1 trip |
| Control Module Long Term Memory (EEPROM) Performance | P062F | Indicates that the NVM Error flag has not been cleared | Last EEPROM write | Did not complete | Ignition OR Ignition OR Fuel Pump Control | Run or Crank Accessory enabled | 1 test failure Once on controller power-up | DTC Type B 2 trips |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illumination |
|---|---|---|---|---|---|---|---|---|
| 5Volt Reference Circuit (Short High/Low/Out of Range) | P0641 | Detects continuous short or out of range on the #1 5V sensor reference circuit | Reference voltage AND Output OR Reference voltage AND Output OR Reference voltage    AND Output | >= 0.5V  inactive  >= 5.5V  active  <= 4.5V  active | Ignition | Run or Crank | 15 failures out of 20 samples  1 sample/12.5 ms | DTC Type A 1 trip |
| | | | OR Reference voltage | > 105% nominal (i.e., 5.25V) OR <95% nominal (i.e., 4.75V) | | | | |
| Fuel Pump Control Module - Driver Over-temperature 1 | P064A | This DTC detects if an internal fuel pump driver overtemperature condition exists under normal operating conditions | Pump Driver Temp | > 150C | Ignition OR Ignition OR Fuel Pump Control KeFRPD_b_FPOverTempDiagEnbl Ignition Run/Crank | Run or Crank  Accessory  enabled TRUE 9V<voltage<32V | 3 failures out of 15 samples  1 sample/12.5 ms | DTC Type B 2 trips |
| Active Grille Air Shutter Actuator 1 Signal Message Counter Incorrect | P151E | Detects loss of communication condition has occurred between ECU and device Active Grill Air Shutter "A" actuator | PWM Message | Undetected | 1. Power mode    2. Ignition Run/Crank Voltage | Run/Crank    11V < voltage < 32V | Frequency: 100ms  150 failures out of 167 samples | DTC Type B 2 trips |
| Ignition 1 Switch Circuit Low Voltage | P2534 | This DTC detects if the Ignition1 Switch circuit is shorted to low or open | Ignition 1 voltage | <= 6 V | Engine | Running | 180 failures out of 200 samples  1 sample/25.0 ms | DTC Type A 1 trip |
| Ignition 1 Switch Circuit High Voltage | P2535 | Detects if the Ignition1 Switch circuit is shorted to vehicle supply voltage | Ignition 1 voltage | > 11.7 V | Ignition Run_Crank terminal | Off | 180 failures out of 200 samples  1 sample/25.0 ms | DTC Type A 1 trip |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illumination |
|---|---|---|---|---|---|---|---|---|
| Fuel Pump Flow Performance (rationality) | P2635 | This DTC detects degradation in the performance of the SIDI electronic return-less fuel system | Filtered fuel rail pressure error | <= Low Threshold ( Function of desired fuel rail pressure and fuel flow rate. Margin is 15% of resultant target pressure except at flow <= 1.5g/s and target pressure <= 350kPa where the margin increases continuously at 66.6kPa/g/s as flow decreases)<br><br>OR<br><br>>= High Threshold ( function of desired fuel rail pressure and fuel flow rate. 15% of resultant Target Pressure) | 1. FRP Circuit Low DTC (P018C) | not active | Filtered fuel rail pressure error Time Constant = 12.5 seconds<br><br>Frequency: Continuous 12.5 ms loop | DTC Type B 2 trips |
| | | | | | 2. FRP Circuit High DTC (P018D) | not active . | | |
| | | | | | 3. Fuel Rail Pressure Sensor Performance DTC (P018B) | not active | | |
| | | | | | 4. FuelPump Circuit Low DTC (P0231) | not active | | |
| | | | | | 5. FuelPump Circuit High DTC (P0232) | not active | | |
| | | | | | 6. FuelPump Circuit Open DTC (P023F) | not active | | |
| | | | | | 7. Reference Voltage DTC (P0641) | not active | | |
| | | | | | 8. Fuel Pump Control Module Driver Over-temperature DTC's (P064A) | not active | | |
| | | | | | 9. Control Module Internal Performance DTC (P0606) | not active | | |
| | | | | | 10. An ECM fuel control system failure (PPEI $1ED) | has not occurred | | |
| | | | | | 11. The Barometric pressure (PPEI $4C1) signal | valid (for absolute fuel pressure sensor) | | |
| | | | | | 12. Engine run time | >= 30 seconds | | |
| | | | | | 13. Emissions fuel level (PPEI $3FB) | not low | | |
| | | | | | 14. Fuel pump control | enabled | | |
| | | | | | 15. Fuel pump control state | normal | | |
| | | | | | 16. Battery Voltage | 11V<=voltage=<32V | | |
| | | | | | 17. Fuel flow rate ( See Supporting Tables tab ) | > 0.047 g/s **AND** <= Max allowed fuel flow rate as a function of desired rail pressure & Vbatt (Typical values in the range of 11 to 50 g/s) | | |

| Component/ System | Fault Code | Monitor Strategy Description | Malfunction Criteria | Threshold Value | Secondary Parameters | Enable Conditions | Time Required | MIL Illumination |
|---|---|---|---|---|---|---|---|---|
| | | | | | 18. Fuel Pressure Control System | Is not responding to an over-pressurization due to pressure build during DFCO or a decreasing desired pressure command. | | |
| Control Module Communication Bus "A" Off | U0073 | Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state | Bus Status | Off | Power mode | Run/Crank | 5 failures out of 5 samples ( 5 seconds) | DTC Type B 2 trips |
| Lost Communication With ECM/PCM "A" | U0100 | Detects that CAN serial data communication has been lost with the ECM | Message $0C9 | Undetected | 1. Power mode<br><br>2. Ignition Run/Crank Voltage<br>3. U0073 | Run/Crank<br><br>11V<voltage<32V<br>not active | 12 failures out of 12 samples (12 seconds) | DTC Type B 2 trips |

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

**X-axis= Desired Fuel Pressure ( kiloPascals)**

| | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 |
|---|---|---|---|---|---|---|---|---|---|
| 4.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 14.859 | 11.734 | 8.67188 | 5.66406 |
| 6 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 14.859 | 11.734 | 8.67188 | 5.66406 |
| 7.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 14.859 | 11.734 | 8.67188 | 5.66406 |
| 9 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 14.859 | 11.734 | 8.67188 | 5.66406 |
| 10.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 14.859 | 11.734 | 8.67188 | 5.66406 |
| 12 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 15.8438 | 12.7656 |
| 13.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| 15 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| 16.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| 18 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| 19.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| 21 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| 22.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| 24 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| 25.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| 27 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| 28.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |

**Y-axis= Battery voltage ( volts )**

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

**X-axis= Target Fuel Pressure ( kiloPascals)**

| | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 1.5 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 3 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 4.5 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 6 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 7.5 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 9 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 10.5 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 12 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 13.5 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 15 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 16.5 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 18 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 19.5 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 21 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 22.5 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 24 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 25.5 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 27 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 28.5 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 30 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 31.5 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 33 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 34.5 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 36 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 37.5 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |

**Y-axis= Fuel Flow ( grams / s )**

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

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

| | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 |
|---|---|---|---|---|---|---|---|---|---|
| 39 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 40.5 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 42 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 43.5 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 45 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 46.5 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |
| 48 | 30 | 37.5 | 45 | 52.5 | 60 | 67.5 | 75 | 82.5 | 90 |

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

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

| | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 1.5 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 3 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 4.5 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 6 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 7.5 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 9 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 10.5 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 12 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 13.5 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 15 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 16.5 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |

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

**X-axis= Target Fuel Pressure ( kiloPascals)**

| | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 |
|---|---|---|---|---|---|---|---|---|---|
| 18 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 19.5 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 21 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 22.5 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 24 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 25.5 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 27 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 28.5 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 30 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 31.5 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 33 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 34.5 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 36 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 37.5 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 39 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 40.5 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 42 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 43.5 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 45 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 46.5 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |
| 48 | 25.5 | 31.875 | 38.25 | 44.625 | 51 | 57.375 | 63.75 | 70.125 | 76.5 |

**Y-axis= Fuel Flow ( grams / s )**

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

**X-axis= Target Fuel Pressure ( kiloPascals)**

| | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | -260 | -210 | -160 | -110 | -60 | -67.5 | -75 | -82.5 | -90 |
| 1.5 | -145 | -125 | -102.5 | -81.25 | -60 | -67.5 | -75 | -82.5 | -90 |
| 3 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 4.5 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 6 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 7.5 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 9 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 10.5 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 12 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 13.5 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 15 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 16.5 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 18 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 19.5 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 21 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 22.5 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 24 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 25.5 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 27 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 28.5 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 30 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 31.5 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 33 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 34.5 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 36 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 37.5 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |

Y-axis= Fuel Flow ( grams / s )

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

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

|      | 200 | 250   | 300 | 350   | 400 | 450   | 500 | 550   | 600 |
|------|-----|-------|-----|-------|-----|-------|-----|-------|-----|
| 39   | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 40.5 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 42   | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 43.5 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 45   | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 46.5 | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |
| 48   | -30 | -37.5 | -45 | -52.5 | -60 | -67.5 | -75 | -82.5 | -90 |

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

**X-axis= Target Fuel Pressure ( kiloPascals)**

Y-axis= Fuel Flow ( grams / s )

|      | 200    | 250    | 300    | 350    | 400 | 450    | 500    | 550     | 600   |
|------|--------|--------|--------|--------|-----|--------|--------|---------|-------|
| 0    | -221   | -178.5 | -136   | -93.5  | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 1.5  | -123.3 | -106.3 | -87.13 | -69.06 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 3    | -25.5  | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 4.5  | -25.5  | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 6    | -25.5  | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 7.5  | -25.5  | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 9    | -25.5  | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 10.5 | -25.5  | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 12   | -25.5  | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 13.5 | -25.5  | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 15   | -25.5  | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 16.5 | -25.5  | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 18   | -25.5  | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |

*Y-axis= Fuel Flow ( grams / s )*

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

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

|  | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 |
|---|---|---|---|---|---|---|---|---|---|
| 19.5 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 21 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 22.5 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 24 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 25.5 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 27 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 28.5 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 30 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 31.5 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 33 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 34.5 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 36 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 37.5 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 39 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 40.5 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 42 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 43.5 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 45 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 46.5 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |
| 48 | -25.5 | -31.88 | -38.25 | -44.63 | -51 | -57.38 | -63.75 | -70.125 | -76.5 |