**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Mass Air Flow Sensor Circuit - Range/Rationality | P0101 | 0 kHz - 13 kHz<br>Under conditions when the two should match, the Mass Air Flow reading should match calculated Mass Air Flow ( based on speed density. If delta Mass Air Flow is too large, a faulty Mass Air Flow condition exists, such as a "skewed" sensor. | MAF $\Delta \geq$ a table value determined by the difference between the MAF sensor reading and the speed density calculation. | Engine Running<br>TP sensor DTC's not active.<br>MAP sensor DTC's not active.<br>Evap. DTC's not active<br>EGR DTC P0401 not active<br>MAF sensor high / low DTC's not active.<br>Crank Sensor DTC's not active<br>IAT Sensor DTC's not active<br>System voltage > 11V but < 16V<br>Canister Purge DC $\leq$ 99.6%<br>TP $\Delta \leq$ 3.9%<br>EGR DC $\leq$ 89.8%<br>EGR Pintle Position $\leq$ 89.8%<br>Engine vacuum $\leq$ 75 kPa<br>Throttle Position $\leq$ 89.8%<br>The above must be present for a period of time greater than 2 seconds. | 50 test failures within a 100 test sample.<br><br>Time necessary to complete sample: 10 sec<br><br>The Mass Air Flow reading and Mass Air Flow calculation are performed during the same cylinder event every 100 ms. | DTC Type B |
| Mass Air Flow Sensor Circuit - Low Input | P0102 | 0kHz - 13 kHz<br>This DTC will determine if the MAF frequency is too low. | ***LOW FREQUENCY TEST:***<br>MAF $\leq$ 10 Hz | ***LOW FREQUENCY TEST:***<br>Engine Running<br>Engine Run Time $\geq$ 0.4 seconds<br>Engine Speed $\geq$ 300 RPM<br>System Voltage $\geq$ 8 Volts<br>The above must be present for a period of time greater than 0 seconds. | ***LOW FREQUENCY TEST:***<br>4 test failures within a 16 test sample.<br><br>Time necessary to complete sample:<br>1 sec at 500 RPM<br><br>Test is run at every reading of the Mass Air Flow sensor frequency. | DTC Type B |
| Mass Air Flow Sensor Circuit - High Input | P0103 | 0kHz - 13 kHz<br>This DTC will determine if the MAF frequency is too high | ***HIGH FREQUENCY TEST:***<br>MAF $\geq$ 11000 Hz | ***HIGH FREQUENCY TEST:***<br>Engine Running<br>Engine Run Time $\geq$ 0.4 seconds<br>Engine Speed $\geq$ 300 RPM<br>System Voltage $\geq$ 8 Volts<br>The above must be present for a period of time greater than 0 seconds. | ***HIGH FREQUENCY TEST:***<br>6 test failures within a 16 test sample.<br><br>Time necessary to complete sample:<br>1 sec at 500 RPM<br><br>Test is run at every reading of the Mass Air Flow sensor frequency. | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| MAP Sensor - Range/Rationality | P0106 | .3V to 5.0V<br>Under proper conditions, the MAP value should be within a window (based on throttle position and engine speed). If not, a faulty MAP condition such as a "skewed" sensor exists. | A table defining the minimum acceptable MAP value ≤ MAP ≤ a table defining the maximum acceptable MAP value | TP sensor DTC's not active<br>Engine Running<br>Engine Speed Δ < 75 RPM<br>Throttle Position Δ < 1.5%<br>Idle Air Δ < 4 steps<br>EGR Flow Rate Δ < 2%<br>Brake Switch State = no change<br>Clutch Switch State = no change<br><br>AC Clutch State = no change<br>Above stabilized for 2 seconds<br>EGR DTC's not active<br>Engine Speed ≥ 400 RPM<br>Engine Speed ≤ 5000 RPM | 24 test failures within a 100 test sample.<br><br>Time necessary to complete sample:<br>100 sec<br><br>Continuous | DTC Type B |
| MAP Sensor Circuit - Low Input | P0107 | .3V to 5.0V<br>This DTC detects a continuous short to low or open in either the signal circuit or the MAP sensor. | Raw MAP < 0.04 Volts (3 counts) | TP sensor DTC's not active<br>Engine Running<br>Throttle Position ≥ 0% when Engine speed is ≤ 800 RPM<br>**or**<br>Throttle Position is ≥ 12.5% when Engine speed is > 800 RPM | 40 test failures within a 100 test sample.<br><br>Time necessary to complete sample is based on engine speed. At 1600 RPM, the time would be 1 sec.<br><br>Continuous | DTC Type B |
| MAP Sensor Circuit - High Input | P0108 | .3V to 5.0V This DTC detects an open sensor ground or continuous short to high in either the signal circuit or the MAP sensor. | Raw MAP > 4.4 Volts (222 counts) | Cold Start Run Time - Table value in seconds based on Powerup Coolant Temperature.<br>***Run Test***<br>TP sensor DTC's not active<br>Throttle Position ≤ 0.4% when Engine speed is ≤ 1200 RPM<br>**or**<br>Throttle Position is ≤ 20 % when Engine speed is > 1200 RPM | 40 test failures within a 100 test sample.<br><br>Time necessary to complete sample is based on engine speed. At 1600 RPM, the time would be 1 sec.<br><br>Continuous | DTC Type B |
| Intake Air Temp. Sensor Circuit -Low Input | P0112 | .24V to 5.0V<br>The DTC detects a continuous short to ground in the IAT signal circuit or the IAT sensor | **Low Resistance pull-up**<br>Raw IAT < 0.82 Volts<br>**High Resistance pull-up**<br>Raw IAT < 0.07 Volts | VS sensor DTC's not active<br>Vehicle speed ≥ 2 mph<br>Engine run time > 100 seconds | 40 test failures within a 100 test sample<br><br>Time necessary to complete sample:<br>12.5 sec<br><br>Continuous | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Intake Air Temp. Sensor Circuit - High Input | P0113 | .24V to 5.0V<br>The DTC detects a continuous open or short to high in the IAT signal circuit or the IAT sensor | **Low Resistance pull-up**<br>Raw IAT > 4.9 Volts<br>**High Resistance pull-up**<br>Raw IAT > 4.9 Volts | ECT sensor DTC's not active<br>VS sensor DTC's not active<br>MAF sensor DTC's not active<br>Vehicle speed < 2 mph<br>Mass Air flow < 250 g /s<br>Coolant Temperature > 84.7°C<br>Engine run time > 100 seconds | 40 test failures within a 100 test sample<br><br>Time necessary to complete sample:<br>12.5 sec<br><br>Continuous | DTC Type B |
| Engine Coolant Temp. Sensor Circuit-Low Input | P0117 | .24V to 5.0V<br>The DTC detects a continuous short to ground in the ECT signal circuit or the ECT sensor | **Low Resistance pull-up**<br>Raw ECT < 0.25 Volts<br>**High Resistance pull-up**<br>Raw ECT < 0.25 Volts | Engine run time > 5 seconds | 40 test failures within a 100 test sample<br><br>Time necessary to complete sample:<br>50 sec<br><br>Continuous | DTC Type B |
| Engine Coolant Temp. Sensor Circuit-High Input | P0118 | .24V to 5.0V<br>The DTC detects a continuous short to high or open in the ECT signal circuit or the ECT sensor | **Low Resistance pull-up**<br>Raw ECT > 4.9 Volts<br>**High Resistance pull-up**<br>Raw ECT > 4.9 Volts | Engine run time > 5 seconds | 40 test failures within a 100 test sample<br><br>Time necessary to complete sample:<br>50 sec<br><br>Continuous | DTC Type B |
| Throttle Position Sensor Circuit-Range/Rationality | P0121 | .5V to 5.0V<br>The DTC detects a "skewed" or stuck TP sensor | ***Stuck high test:***<br>The last throttle position value is > predicted throttle position based on engine RPM.<br><br>***Stuck low test:***<br>The last throttle position value is < predicted throttle position based on engine RPM. | ***Test Enable:***<br>No TP sensor short DTC's active<br>No IAC DTC's active<br>No MAP DTC's active<br>Engine running<br>BARO not defaulted<br>TP Δ < 1.9%<br>***Stuck high test:***<br>MAP < 50 kPa<br><br>***Stuck low test:***<br>Stuck high test has passed<br>MAP > 65 kPa<br>IAC > 10 counts but < 340 counts | ***Stuck high test:***<br>50 test failures within a 100 test sample<br><br>***Stuck low test:***<br>50 test failures within a 100 test sample<br><br>Time necessary to complete each sample:<br>10 sec<br><br>Continuous | DTC Type B |
| Throttle Position Sensor Circuit-Low Input | P0122 | .5V to 5.0V<br>This DTC detects a continuous short to low or open in either the signal circuit or the TP sensor. | TP sensor signal voltage < 0.25 volts (13 counts) | Engine running | 5 consecutive test failures within a 10 test sample<br><br>Time necessary to complete sample:<br>1 sec<br><br>Continuous | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Throttle Position Sensor Circuit-High Input | P0123 | .5V to 5.0V<br>This DTC detects a continuous short to high in either the signal circuit or the TP sensor. | TP sensor signal voltage > 4.7 volts (242 counts) | Engine running | 5 consecutive test failures within a 10 test sample<br><br>Time necessary to complete sample:<br>1 sec<br><br>Continuous | DTC Type B |
| Min. Cool. Temp. to Allow C.L. Op. Not Achieved Without Excess. Time | P0125 | .24V to 5.0V<br>The DTC detects if a stabilized minimum closed-loop is reached and maintained after engine start-up. | Minimun stsbilized ECT <20Cabter 480 seconds<br><br>Minimum stabilized ECT < 20°C after 300 seconds.<br><br>Minimum stabilized ECT < 20°C after 120 seconds. | ***Diagnostic Enable***<br>Engine running<br>ECT sensor short tests not failing or DTC's not active<br>IAT sensor DTC's not active<br>IAT> - 40°C<br>ECT > - 40°C<br>Start-up ECT ≤ 40°C<br>*Closed Loop Test:*<br>For a vehicle saturated at -40°C (-40°F)<br>Accumulated air flow since start > 7500 (V6) 9000 (V8)grams<br>Accumulated Idle time < 360 seconds<br><br>For a vehicle saturated at -7°C (20°F)<br>Accumulated air flow since start > 4500(V6) 5500(V8)grams<br>Accumulated Idle time < 225 seconds<br><br>For a vehicle saturated at 10°C (50°F)<br>Accumulated air flow since start > 1600(V6) 2000(V8) grams Accumulated Idle time < 90 seconds | 10 consecutive test failures<br><br>Continuous | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| O2S Circuit-Low Voltage (Bank 1, Sensor 1) | P0131 | .1V to 1.0V<br>This DTC determines if the O2 sensor or circuit is shorted to low by checking for a lean condition during steady state throttle and during power enrichment (PE). | ***Lean test:***<br>O2 sensor voltage < 86 mV<br><br>or<br><br>***PE Lean Test:***<br>O2 sensor voltage < 598 mV | ***O2 Diagnostic Enable****: (the following criteria must be met to enable the O2 lean tests)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>*Test Enable ( Lean test):*<br>Closed loop low MAP not active<br>Closed loop<br>Air/Fuel ratio ≥ 14.5 but ≤ 14.8<br>Throttle position > 3.5% but < 99%<br>Above met for 5 seconds<br>***Test Enable ( PE Lean test):***<br>Closed loop<br>Power Enrichment mode active<br>High speed fuel cutoff not active<br>Time elapsed since test enable ≥ 1 sec. | ***Lean Test:***<br>500 test failures in a 600 test sample<br><br>Time necessary to complete sample:<br>60 sec<br><br>Continuous<br><br>or<br><br>***PE Lean Test***:<br>300 test failures in a 500 test sample.<br><br>Time necessary to complete sample:<br>50 sec | DTC Type B |
| O2S Circuit-High Voltage (Bank 1, Sensor 1) | P0132 | .1V to 1.0V<br>This DTC determines if the O2 sensor or circuit is shorted to high by checking for a rich condition during steady throttle and Decel fuel cutoff ( DFCO) | ***RichTest:***<br>O2 sensor voltage > 976 mV<br><br>or<br><br>***DFCO Rich Test:***<br>O2 sensor voltage > 468 mV | ***O2 Diagnostic Enable****: (the following criteria must be met to enable the O2 rich tests)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>*Test Enable (Rich Test):*<br>Closed loop<br>Air/Fuel ratio ≥ 14.5 but ≤ 14.8<br>Throttle position > 0% but < 50%<br>Above met for 5 seconds<br>***Test Enable ( DFCO Rich Test):***<br>Decel Fuel Cutoff mode active<br>Closed loop<br>Time elapsed since test enable ≥ 2 sec. | ***Rich Test:***<br>400 test failures in a 500 test sample<br><br>Time necessary to complete sample:<br>50 sec<br><br>Continuous<br><br>or<br><br>***DFCO Rich Test:***<br>300 test failures in a 500 test sample<br><br>Time necessary to complete sample:<br>50 sec | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| O2S Circuit-Slow Response (Bank 1, Sensor 1) | P0133 | .1V to 1.0V<br>This DTC determines if the O2 sensor functioning properly by checking its response time. | O2 sensor average transition time:<br>L/R > 125 milliseconds<br>R/L > 125 milliseconds<br>**O2 voltage < 300 mV = lean*<br>**O2 voltage > 600 mV = rich* | ***O2 Diagnostic Enable**: (the following criteria must be met to enable the O2 Response tests)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 9 Volts<br>***Response Test Enable:*** 11.7 but <18 Volts<br>Closed loop low MAP not active<br>DTC's P0131, P0132, P0134 and P0135 not active<br>Closed loop<br>ECT > 57°C<br>Engine run time > 75 seconds<br>Air flow ≥ 15 g/s but ≤ 55 g/s<br>Engine speed ≥ 1100 rpm but ≤ 3000 rpm<br>Canister Purge Duty Cycle ≥ 0%<br>Above present for > 2 seconds | 100 seconds after closed loop enable<br><br>Once per ignition cycle | DTC Type B |
| O2S Circuit- No Activity Detected (Bank 1,Sensor 1) | P0134 | .1V to 1.0V<br>This DTC determines if the O2 sensor or the O2 sensor circuit has developed an open. | O2 sensor > 300 mV but < 600 mV | ***O2 Diagnostic Enable**: (the following criteria must be met to enable the O2 open test)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>Engine Run Time ≥ 120 seconds<br>***O2 Sensor Temperature Test:***<br>Not in DFCO<br>ECT ≥ 58.5°C<br>Air Flow ≥ 13 g/s<br>***O2 sensor Open test enable:***<br>O2 Sensor Temperature Test = True<br>DTC P0135 not active<br>Closed Loop | 800 test failures with in a 1000 test sample<br><br>Time necessary to complete sample:<br>100 sec<br><br>Continuous | DTC Type B |
| O2S Heater Circuit Malfunction (Bank 1, Sensor 1) | P0135 | 11.7 to18 Volts<br>This DTC determines if the O2 sensor heater is functioning properly by monitoring the amount of time necessary for the O2 sensor to become active after start - up. | The elapsed time to obtain ± .150V from the mean O2 bias voltage.<br><br>*Time based on table: Time Vs Average Air Flow | System Voltage > 11.7 but <18 Volts<br>*(NOTE: If voltage remains outside this window for 4 consecutive seconds, the test is void for this cold start.)*<br>Air Flow < 27 g/sec (21 g/s 4.3L M/L only - Denso Sensors; 35 g/s - 5.7L only)<br>Engine run time > 2 seconds<br>ECT < 33°C<br>IAT < 33°C<br>Δ ECT-IAT ≤ 5°C | From cold start to a maximum time of 130 seconds.<br><br>*Time determined by table. | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| O2S Circuit-Low Voltage (Bank 1, Sensor 2)<br><br>⑤⑥⑦⑧⑨ | P0137 | .1V to 1.0V<br>This DTC determines if the O2 sensor or circuit is shorted to low by checking for a lean condition during steady state throttle and during power enrichment (PE). | ***Lean test:***<br>O2 sensor voltage < 26 mV<br><br>or<br><br>***PE Lean Test:***<br>O2 sensor voltage < 399 mV | ***O2 Diagnostic Enable***: *(the following criteria must be met to enable the O2 lean tests)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>***Test Enable ( Lean test):***<br>Closed loop low MAP not active<br>Closed loop<br>Air/Fuel ratio ≥ 14.5 but ≤ 14.8<br>Throttle position > 3.5% but < 99%<br>Above met for 5 seconds<br>***Test Enable ( PE Lean test):***<br>Closed loop<br>Power Enrichment mode active<br>High speed fuel cutoff not active<br>Time elapsed since test enable ≥ 2 sec. | ***Lean Test:***<br>1100 test failures in a 1300 test sample<br><br>Time necessary to complete sample:<br>130 sec<br><br>Continuous<br><br>or<br><br>***PE Lean Test***:<br>400 test failures in a 500 test sample.<br><br>Time necessary to complete sample:<br>50 sec | DTC Type B |
| O2S Circuit-High Voltage (Bank 1, Sensor 2)<br><br>⑤⑥⑦⑧⑨ | P0138 | .1V to 1.0V<br>This DTC determines if the O2 sensor or circuit is shorted to high by checking for a rich condition during steady throttle and Decel fuel cutoff ( DFCO) | ***RichTest:***<br>O2 sensor voltage > 994mV<br><br>or<br><br>***DFCO Rich Test:***<br>O2 sensor voltage > 469 mV | ***O2 Diagnostic Enable***: *(the following criteria must be met to enable the O2 rich tests)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>***Test Enable (Rich Test):***<br>Closed loop<br>Air/Fuel ratio ≥ 14.5 but ≤ 14.8<br>Throttle position > 0% but < 50%<br>Above met for 5 seconds<br>***Test Enable ( DFCO Rich Test):***<br>Decel Fuel Cutoff mode active<br>Closed loop<br>Time elapsed since test enable ≥ 2 sec. | ***Rich Test:***<br>1100 test failures in a 1500 test sample<br><br>Time necessary to complete sample:<br>150 sec<br><br>Continuous<br><br>or<br><br>***DFCO Rich Test:***<br>400 test failures in a 500 test sample<br><br>Time necessary to complete sample:<br>50 sec | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| O2S Circuit- No Activity Detected (Bank 1,Sensor 2)<br><br>⑤⑥⑦⑧⑨ | P0140 | .1V to 1.0V<br>This DTC determines if the O2 sensor or the O2 sensor circuit has developed an open. | O2 sensor > 400 mV but < 473 mV | ***O2 Diagnostic Enable***: *(the following criteria must be met to enable the O2 open test)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>Engine Run Time ≥ 120 seconds<br>***O2 Sensor Temperature Test:***<br>Not in DFCO<br>ECT ≥ 58.5°C<br>Air Flow ≥ 13 g/s<br>***O2 sensor Open test enable:***<br>O2 Sensor Temperature Test = True<br>DTC P0141 not active<br>Closed Loop | 1000 test failures with in a 1200 test sample<br><br>Time necessary to complete sample: 120 sec<br><br>Continuous | DTC Type B |
| O2S Heater Circuit Malfunction (Bank 1, Sensor 2)<br><br>⑤⑥⑦⑧⑨ | P0141 | 11.7 to 18 Volts<br>This DTC determines if the O2 sensor heater is functioning properly by monitoring the amount of time necessary for the O2 sensor to become active after start - up. | The elapsed time to obtain ± .150V from the mean O2 bias voltage.<br><br>*Time based on table: Time Vs Average Air Flow | System Voltage > 11.7 but <18 Volts<br>(NOTE: If voltage remains outside this window for 4 consecutive seconds, the test is void for this cold start.)<br>Air Flow < 35 g/sec (27 g/s 4.3L GMT800)<br>Engine run time > 2 seconds<br>ECT < 33°C<br>IAT < 33°C<br>Δ ECT-IAT ≤ 5°C | From cold start to a maximum time of 245 seconds.<br><br>*Time determined by table. | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| O2S Circuit-Low Voltage (Bank 1, Sensor 3)<br><br>①②③④ | P0143 | .1V to 1.0V<br>This DTC determines if the O2 sensor or circuit is shorted to low by checking for a lean condition during steady state throttle and during power enrichment (PE). | ***Lean test:***<br>O2 sensor voltage < 26 mV<br><br>or<br><br>***PE Lean Test:***<br>O2 sensor voltage < 399 mV | ***O2 Diagnostic Enable***: *(the following criteria must be met to enable the O2 lean tests)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>***Test Enable ( Lean test):***<br>Closed loop low MAP not active<br>Closed loop<br>Air/Fuel ratio ≥ 14.5 but ≤ 14.8<br>Throttle position > 3.5% but < 99%<br>Above met for 5 seconds<br><br>***Test Enable ( PE Lean test):***<br>Closed loop<br>Power Enrichment mode active<br>High speed fuel cutoff not active<br>Time elapsed since test enable ≥ 2 sec. | ***Lean Test:***<br>1100 test failures in a 1300 test sample<br><br>Time necessary to complete sample:<br>130 sec<br><br>Continuous<br><br>or<br><br>***PE Lean Test***:<br>400 test failures in a 500 test sample.<br><br>Time necessary to complete sample:<br>50 sec | DTC Type B |
| O2S Circuit-High Voltage (Bank 1, Sensor 3)<br><br>①②③④ | P0144 | .1V to 1.0V<br>This DTC determines if the O2 sensor or circuit is shorted to high by checking for a rich condition during steady throttle and Decel fuel cutoff (DFCO) | ***RichTest:***<br>O2 sensor voltage > 994mV<br><br>or<br><br>***DFCO Rich Test:***<br>O2 sensor voltage > 469 mV | ***O2 Diagnostic Enable***: *(the following criteria must be met to enable the O2 rich tests)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>***Test Enable (Rich Test):***<br>Closed loop<br>Air/Fuel ratio ≥ 14.5 but ≤ 14.8<br>Throttle position > 0% but < 50%<br>Above met for 5 seconds<br>***Test Enable ( DFCO Rich Test):***<br>Decel Fuel Cutoff mode active<br>Closed loop<br>Time elapsed since test enable ≥ 2 sec. | ***Rich Test:***<br>1100 test failures in a 1500 test sample<br><br>Time necessary to complete sample:<br>150 sec<br><br>Continuous<br><br>or<br><br>***DFCO Rich Test:***<br>400 test failures in a 500 test sample<br><br>Time necessary to complete sample:<br>50 sec | DTC Type B |

# 1999 5.0L (L30) C/K-truck, G-van Light-Duty (GVW <8500) ENGINE DIAGNOSTIC PARAMETERS

## 99t50M_LD_yE.doc

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| O2S Circuit- No Activity Detected (Bank 1,Sensor 3)<br><br>①②③④ | P0146 | .1V to 1.0V<br>This DTC determines if the O2 sensor or the O2 sensor circuit has developed an open. | O2 sensor > 399 mV but < 473 mV | ***O2 Diagnostic Enable***: *(the following criteria must be met to enable the O2 open test)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>Engine Run Time ≥ 120 seconds<br>***O2 Sensor Temperature Test:***<br>Not in DFCO<br>ECT ≥ 58.5°C<br>Air Flow ≥ 13 g/s<br>***O2 sensor Open test enable:***<br>O2 Sensor Temperature Test = True<br>DTC P0147 not active<br>Closed Loop | 1000 test failures with in a 1200 test sample<br><br>Time necessary to complete sample: 120 sec<br><br>Continuous | DTC Type B |
| O2S Heater Circuit Malfunction (Bank 1, Sensor 3)<br><br>①②③④ | P0147 | 11.7 to 18 Volts<br>This DTC determines if the O2 sensor heater is functioning properly by monitoring the amount of time necessary for the O2 sensor to become active after start - up. | The elapsed time to obtain ± .150V from the mean O2 bias voltage.<br><br>*Time based on table: Time Vs Average Air Flow | System Voltage > 11.7 but <18 Volts<br>NOTE: If voltage remains outside this window for 4 consecutive seconds, the test is void for this cold start.)<br>Air Flow < 27 g/sec (21 g/s 4.3L M/L van only - Denso Sensors)<br>Engine run time > 2 seconds<br>ECT < 33°C<br>IAT < 33°C<br>Δ ECT-IAT ≤ 5°C | From cold start to a maximum time of 245 seconds. (270sec 4.3L M/L van only - Denso Sensors)<br><br>*Time determined by table. | DTC Type B |
| O2S Circuit-Low Voltage (Bank 2, Sensor 1) | P0151 | .1V to 1.0V<br>This DTC determines if the O2 sensor or circuit is shorted to low by checking for a lean condition during steady state throttle and during power enrichment (PE). | ***Lean test:***<br>O2 sensor voltage < 86 mV<br><br>or<br><br>***PE Lean Test:***<br>O2 sensor voltage < 598 mV | ***O2 Diagnostic Enable***: *(the following criteria must be met to enable the O2 lean tests)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>***Test Enable ( Lean test):***<br>Closed loop low MAP not active<br>Closed loop<br>Air/Fuel ratio ≥ 14.5 but ≤ 14.8<br>Throttle position > 3.5% but < 99%<br>Above met for 5 seconds<br>***Test Enable ( PE Lean test):***<br>Closed loop<br>Power Enrichment mode active<br>High speed fuel cutoff not active<br>Time elapsed since test enable ≥ 1 sec. | ***Lean Test:***<br>500 test failures in a 600 test sample<br><br>Time necessary to complete sample: 60 sec<br><br>Continuous<br><br>or<br><br>***PE Lean Test***:<br>300 test failures in a 500 test sample.<br><br>Time necessary to complete sample: 50 sec | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| O2S Circuit-High Voltage (Bank 2, Sensor 1) | P0152 | .1V to 1.0V<br>This DTC determines if the O2 sensor or circuit is shorted to high by checking for a rich condition during steady throttle and Decel fuel cutoff ( DFCO) | ***RichTest:***<br>O2 sensor voltage > 976 mV<br><br>or<br><br>***DFCO Rich Test:***<br>O2 sensor voltage > 468 mV | ***O2 Diagnostic Enable***: *(the following criteria must be met to enable the O2 rich tests)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>***Test Enable (Rich Test):***<br>Closed loop<br>Air/Fuel ratio ≥ 14.5 but ≤ 14.8<br>Throttle position > 0% but < 50%<br>Above met for 5 seconds<br>***Test Enable ( DFCO Rich Test):***<br>Decel Fuel Cutoff mode active<br>Closed loop<br>Time elapsed since test enable ≥ 2 sec. | ***Rich Test:***<br>400 test failures in a 500 test sample<br><br>Time necessary to complete sample:<br>50 sec<br><br>Continuous<br><br>or<br><br>***DFCO Rich Test:***<br>300 test failures in a 500 test sample<br><br>Time necessary to complete sample:<br>50 sec | DTC Type B |
| O2S Circuit-Slow Response (Bank 2, Sensor 1) | P0153 | .1V to 1.0V<br>This DTC determines if the O2 sensor functioning properly by checking its response time. | O2 sensor average transition time:<br>L/R > 125 milliseconds<br>R/L > 125 milliseconds<br><br>**O2 voltage < 300 mV = lean*<br>**O2 voltage > 600 mV = rich* | ***O2 Diagnostic Enable***: *(the following criteria must be met to enable the O2 Response tests)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>***Response Test Enable:***<br>Closed loop low MAP not active<br>DTC's P0151, P0152, P0154 and P0155 not active<br>Closed loop<br>ECT > 57°C<br>Engine run time > 75 seconds<br>Air flow ≥ 15 g/s but ≤ 55 g/s<br>Engine speed ≥ 1100 rpm but ≤ 3000 rpm<br>Canister Purge Duty Cycle ≥ 0%<br>Above present > 2 seconds | 100 seconds after closed loop enable<br><br>Once per ignition cycle | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| O2S Circuit- No Activity Detected (Bank 2,Sensor 1) | P0154 | .1V to 1.0V<br>This DTC determines if the O2 sensor or the O2 sensor circuit has developed an open. | O2 sensor > 300 mV but < 600 mV | ***O2 Diagnostic Enable***: *(the following criteria must be met to enable the O2 open test)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>Engine Run Time ≥ 120 seconds<br>***O2 Sensor Temperature Test:***<br>Not in DFCO<br>ECT ≥ 58.5°C<br>Air Flow ≥ 13 g/s<br>***O2 sensor Open test enable:***<br>O2 Sensor Temperature Test = True<br>DTC P0155 not active<br>Closed Loop | 800 test failures with in a 1000 test sample<br><br>Time necessary to complete sample:<br>100 sec<br><br>Continuous | DTC Type B |
| O2S Heater Circuit Malfunction (Bank 2, Sensor 1) | P0155 | 11.7 to 18 Volts<br>This DTC determines if the O2 sensor heater is functioning properly by monitoring the amount of time necessary for the O2 sensor to become active after start - up. | The elapsed time to obtain ± .150V from the mean O2 bias voltage.<br><br>*Time based on table: Time Vs Average Air Flow | System Voltage > 11.7 but <18 Volts<br>*(NOTE: If voltage remains outside this window for 4 consecutive seconds, the test is void for this cold start.)*<br>Air Flow < 27 g/sec (21 g/s 4.3L M/L only - Denso Sensors; 35 g/s - 5.7L only)<br>Engine run time > 2 seconds<br>ECT < 33°C<br>IAT < 33°C<br>Δ ECT-IAT ≤ 5°C | From cold start to a maximum time of 130 seconds.<br><br>*Time determined by table. | DTC Type B |
| O2S Circuit-Low Voltage (Bank 2, Sensor 2)<br><br>⑤⑥⑦⑧⑨ | P0157 | .1V to 1.0V<br>This DTC determines if the O2 sensor or circuit is shorted to low by checking for a lean condition during steady state throttle and during power enrichment (PE). | ***Lean test:***<br>O2 sensor voltage < 26 mV<br><br>or<br><br>***PE Lean Test:***<br>O2 sensor voltage < 399 mV | ***O2 Diagnostic Enable***: *(the following criteria must be met to enable the O2 lean tests)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>***Test Enable ( Lean test):***<br>Closed loop low MAP not active<br>Closed loop<br>Air/Fuel ratio ≥ 14.5 but ≤ 14.8<br>Throttle position > 3.5% but < 99%<br>Above met for 5 seconds<br>***Test Enable ( PE Lean test):***<br>Closed loop<br>Power Enrichment mode active<br>High speed fuel cutoff not active<br>Time elapsed since test enable ≥ 2sec. | ***Lean Test:***<br>1100 test failures in a 1300 test sample<br><br>Time necessary to complete sample:<br>130 sec<br><br>Continuous<br><br>or<br><br>***PE Lean Test***:<br>400 test failures in a 500 test sample.<br><br>Time necessary to complete sample:<br>50 sec | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| O2S Circuit-High Voltage (Bank 2, Sensor 2)<br><br>⑤⑥⑦⑧⑨ | P0158 | .1V to 1.0V<br>This DTC determines if the O2 sensor or circuit is shorted to high by checking for a rich condition during steady throttle and Decel fuel cutoff (DFCO) | ***Rich Test:***<br>O2 sensor voltage > 994 mV<br><br>or<br><br>***DFCO Rich Test:***<br>O2 sensor voltage > 469 mV | ***O2 Diagnostic Enable****: (the following criteria must be met to enable the O2 rich tests)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>***Test Enable (Rich Test):***<br>Closed loop<br>Air/Fuel ratio ≥ 14.5 but ≤ 14.8<br>Throttle position > 0% but < 50%<br>Above met for 5 seconds<br>***Test Enable ( DFCO Rich Test):***<br>Decel Fuel Cutoff mode active<br>Closed loop<br>Time elapsed since test enable ≥ 2 sec. | ***Rich Test:***<br>1100 test failures in a 1500 test sample<br><br>Time necessary to complete sample:<br>150 sec<br><br>Continuous<br><br>or<br><br>***DFCO Rich Test:***<br>400 test failures in a 500 test sample<br><br>Time necessary to complete sample:<br>50 sec | DTC Type B |
| O2S Circuit- No Activity Detected (Bank 2,Sensor 2)<br><br>⑤⑥⑦⑧⑨ | P0160 | .1V to 1.0V<br>This DTC determines if the O2 sensor or the O2 sensor circuit has developed an open. | O2 sensor > 399 mV but < 473 mV | ***O2 Diagnostic Enable****: (the following criteria must be met to enable the O2 open test)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>Engine Run Time ≥ 120 seconds<br>***O2 Sensor Temperature Test:***<br>Engine Running<br>Not in DFCO<br>ECT ≥ 58.5°C<br>Air Flow ≥ 13 g/s<br>***O2 Sensor Open Test Enable:***<br>O2 Sensor Temperature Test = True<br>DTC P0155 not active<br>Closed Loop | 1000 test failures with in a 1200 test sample<br><br>Time necessary to complete sample:<br>120 sec<br><br>Continuous | DTC Type B |
| O2S Heater Circuit Malfunction (Bank 2, Sensor 2)<br><br>⑤⑥⑦⑧⑨ | P0161 | 11.7 to 18 Volts<br>This DTC determines if the O2 sensor heater is functioning properly by monitoring the amount of time necessary for the O2 sensor to become active after start - up. | The elapsed time to obtain ± .150V from the mean O2 bias voltage.<br><br>*Time based on table: Time Vs Average Air Flow | System Voltage > 11.7 but <18 Volts<br>*(NOTE: If voltage remains outside this window for 4 consecutive seconds, the test is void for this cold start.)*<br>Air Flow < 35 g/sec (27 g/s 4.3L GMT800)<br>Engine run time > 2 seconds<br>ECT < 33°C<br>IAT < 33°C<br>Δ ECT-IAT ≤ 5°C | From cold start to a maximum time of 245 seconds.<br><br>*Time determined by table. | DTC Type B |

## 99t50M_LD_yE.doc

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| System Too Lean (Bank 1) | P0171 | Determines if the system is in a lean condition. | The average of short term fuel trim samples ≥ 1.0<br>and<br>The average of adaptive index multiplier samples ≥ 1.20 | ***Test Enable:***<br>O2 sensor DTC's not active<br>TP sensor DTC's not active<br>MAP DTC's not active<br>EGR DTC's not active<br>Evap. DTC's not active<br>ECT DTC's not active<br>MAF DTC's not active<br>IAT DTC's not active<br>VS sensor DTC's not active<br>Misfire DTC's not active<br>Throttle position < 69.9%<br>Engine speed > 500 rpm but < 4000 rpm<br>Baro > 70 kPa<br>ECT > 75°C but < 114°C<br>MAP > 22 kPa but < 85 kPa<br>IAT > -8.25 °C but < 76°C<br>Air flow > 3 g/s < 85g/s<br>Vehicle speed < 85 mph | If lean counter is ≥6 counts<br>1 count ≅ 200 ms<br>Continuous | DTC Type B |
| System Too Rich (Bank 1) | P0172 | Determines if the system is in a rich condition. | The average of short term fuel trim samples ≤ 1.0<br>and<br>If adaptive lag factor < 0.86, then purge valve is commanded closed. If the integrator exceeds 1.023 or the delta integrator during test exceeds 0.16within 10 seconds, the diagnostic is turned OFF for 300 seconds to enable the Evap. canister to purge. If the integrator does not exceed 1.023 or the integrator does not change by 0.16 within 10 seconds, a fault is present. | ***Test Enable:***<br>O2 sensor DTC's not active<br>TP sensor DTC's not active<br>MAP DTC's not active<br>EGR DTC's not active<br>Evap. DTC's not active<br>ECT DTC's not active<br>MAF DTC's not active<br>IAT DTC's not active<br>VS sensor DTC's not active<br>Misfire DTC's not active<br>Throttle position < 69.9%<br>Engine speed > 500 rpm but < 4000 rpm<br>Baro > 70 kPa<br>ECT > 75°C but < 114°C<br>MAP > 22 kPa but < 85 kPa<br>IAT > -8.25°C but < 76°C<br>Air flow > 3 g/s < 85g/s<br>Vehicle speed < 85 mph | If rich counter is ≥6 counts<br>1 count ≅ 200 ms<br>Continuous | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| System Too Lean (Bank 2) | P0174 | Determines if the system is in a lean condition. | The average of short term fuel trim samples ≥ 1.0<br>and<br>The average of adaptive index multiplier samples ≥ 1.20 | ***Test Enable:***<br>O2 sensor DTC's not active<br>TP sensor DTC's not active<br>MAP DTC's not active<br>EGR DTC's not active<br>Evap. DTC's not active<br>ECT DTC's not active<br>MAF DTC's not active<br>IAT DTC's not active<br>VS sensor DTC's not active<br>Misfire DTC's not active<br>Throttle position < 69.9%<br>Engine speed > 500 rpm but < 4000 rpm<br>Baro > 70 kPa<br>ECT > 75°C but < 114°C<br>MAP > 22 kPa but < 85 kPa<br>IAT > -8.25°C but < 76°C<br>Air flow > 3 g/s < 85 g/s<br>Vehicle speed < 85 mph | If lean counter is ≥6 counts<br><br>1 count ≅ 200 ms<br><br>Continuous | DTC Type B |
| System Too Rich (Bank 2) | P0175 | Determines if the system is in a rich condition. | The average of short term fuel trim samples ≤ 1.0<br>and<br>If adaptive lag factor < 0.86, then purge valve is commanded closed. If the integrator exceeds 1.023 or the delta integrator during test exceeds 0.16 within 10 seconds, the diagnostic is turned OFF for 300 seconds to enable the Evap. canister to purge. I f the integrator does not exceed 1.023 or the integrator does not change by 0.16 within 10 seconds, a fault is present. | ***Test Enable:***<br>O2 sensor DTC's not active<br>TP sensor DTC's not active<br>MAP DTC's not active<br>EGR DTC's not active<br>Evap. DTC's not active<br>ECT DTC's not active<br>MAF DTC's not active<br>IAT DTC's not active<br>VS sensor DTC's not active<br>Misfire DTC's not active<br>Throttle position < 69.9%<br>Engine speed > 500 rpm but < 4000 rpm<br>Baro > 70 kPa<br>ECT > 75°C but < 114°C<br>MAP > 22 kPa but < 85kPa<br>IAT > -8.25 °C but < 76°C<br>Air flow > 3 g/s < 85 g/s<br>Vehicle speed < 85 mph | If rich counter is ≥6 counts<br><br>1 count ≅ 200 ms<br><br>Continuous | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Random Misfire Detected | P0300 | This DTC will determine if a misfire is occurring in one or more cylinders in the engine. | Deceleration index<br>Vs<br>Engine Speed<br>Vs<br>Load and Camshaft Position<br><br>FTP Threshold - 1.85%<br>I/M Threshold - 1.85%<br>Catalyst Damage - see speed/load chart | ***TEST Enable:***<br>If start up ECT below -7 C then MFD delayed until ECT is above 21 C. If start upECT ≥is above -7° C then MFT begins after 5 seconds<br>Fuel Level > 10%<br>System voltage ≥ 11 volts but ≤ 16 volts<br>Engine speed ≥ 450 RPM but ≤ 5000 RPM<br>Vehicle speed DTC nt active<br>TP sensor DTC's not active<br>MAF sensor DTC's not active<br>Camshaft position sensor DTC's not active<br>Crank sensor DTC's not active<br>+ Throttle position Δ < 1.9%/100ms<br>- Throttle position Δ < 1.9%/100ms | Emission Level<br>10 failed 200 revolution blocks out of 16<br><br>Catalyst Damaging Level<br>4failed 200 revolution block out of 16<br><br>Continuous | DTC Type B<br>*EMISSION*<br><br>DTC Type A<br>*CATALYST DAMAGING* |
| Knock Sensor 1 Circuit Malfunction | P0325 | 0V - 5V<br>This diagnostic will detect excessive noise on the knock sensor circuit. | ***SNEF STUCK LOW TEST:***<br>Knock is detected for excessive amount of time. | ***SNEF STUCK LOW TEST:***<br>DTC P0327 not active<br>Engine Run Time ≥ 120 seconds<br>System voltage > 10V but ≤ 17.1V | ***SNEF STUCK LOW TEST:***<br>10 test failures within a 100 test sample.<br>Test is run every 500 msec.<br>Time necessary to run test: 50 seconds | DTC Type B |
| Knock Sensor 1 Circuit - Low Input | P0327 | 0V - 5V<br>This diagnostic will detect a lack of noise on the knock sensor circuit. | ***KNOCK SENSOR UPDATE TEST***<br>Learned Minimum noise Value updated with the filtered value every 50 msec.<br><br>***ACTIVE NOISE CHANNEL TEST:***<br>Knock sensor noise ≤ 50 A/D counts or > 200 A/D counts.<br>(ESC noise - Minimum Noise Value) | ***KNOCK SENSOR UPDATE TEST:***<br>Timing retard ≤ 0 °<br>System voltage > 10 V but ≤ 17.1 V<br>ECT ≥ 60° C<br>Engine Run Time ≥ 120 seconds<br>Engine speed > 500 RPM but ≤ 900 RPM<br>Knock sensor delta noise < 3 counts<br><br>***ACTIVE NOISE CHANNEL TEST:***<br>ECT DTC's not active<br>TP sensor DTC's not active<br>Knock sensor update test complete<br>ECT ≥ 60° C<br>Engine speed > 2000 RPM but ≤ 3000 RPM<br>Throttle position ≥ 5.9% | ***Delta Min Noise to Low*** 100 failures per ignition cycle<br><br>Time necessary<br>to complete sample:<br>50 sec<br><br>Continuous<br><br>***ACTIVE NOISE CHANNEL TEST:***<br>Noise counter ≥ 20 counts.<br>1 count ≅ 100 ms | DTC Type B |
| Crankshaft Position Sensor Circuit-Range | P0336 | 3X / 4X Signal<br>This diagnostic will detect a loss of crank sensor signal or long time constant intermittent that would result in a " no start" condition. | Crank Position Sensor Signal missing for a time ≥ .5 seconds. | Engine Cranking<br>4 or more Cam Shaft Position Signals Present | ≥ 3 seconds<br><br>During engine crank. | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Crankshaft Position Sensor Circuit- Low Input | P0337 | 3X / 4X Signal<br>This diagnostic will detect a low duty cycle from the crankshaft position sensor. | Crank sensor duty cycle High Ref/Low Ref < .3125 | Engine speed < 4000 RPM<br>Air Flow ≥ 5 g/second | 15 Ref pulse failures within a 20 sample limit.<br><br>Time necessary to complete sample:<br>Varies with engine speed<br><br>Once every TDC | DTC Type B |
| Crankshaft Position Sensor Circuit- Intermittent Input | P0339 | 3X / 4X Signal<br>This diagnostic will detect an intermittent crankshaft position signal. | The calculated instantaneous engine speed Δ ≥ 1000 RPM<br>or<br>The calculated instantaneous engine speed = 0 RPM and 4 or more cam cycles have occurred for a period of 1 count (2 to 3 seconds) | Air Flow ≥ 5 g/second | 10 test failures within a 400 sample limit.<br><br>Time necessary to complete sample:<br>5 sec | DTC Type B |
| Camshaft Position Sensor Circuit Malfunction | P0340 | 1X Signal<br>This diagnostic will detect if the Cam Sensor signal is present. | Cam Sensor reference pulse is not seen once every 6 cylinders. | Engine Running | If Cam signal is not detected within 1.75 seconds, test has failed.<br>Once every TDC | DTC Type B |
| Camshaft Position Sensor Circuit Range/Rationality | P0341 | 1X Signal<br>This diagnostic will determine if the Cam Sensor is synchronized correctly. | Cam Sensor reference pulse is not detected at the correct interval every 6 cylinders. | Engine Running | 40 failed tests within a 100 test sample.<br><br>Time necessary to complete sample:<br>Varies with engine speed<br><br>Once every TDC | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Exhaust Gas Recirculation - Insufficient Flow Detected | P0401 | This diagnostic will determine if there is a reduction in EGR flow. | With EGR valve open, the peak + MAP Δ is monitored over a time of 2 seconds. This value is compared with a threshold from Engine Speed Vs Baro table and the difference computed. The result is statistically filtered (EWMA) and compared to a decision limit. DTC is set when the filtered result exceeds the decision limit. | ***Test Enable***<br>TP sensor DTC's not active<br>MAP DTC's not active<br>VS sensor DTC's not active<br>IAT sensor DTC's not active<br>ECT sensor DTC's not active<br>IAC DTC's not active<br>Linear EGR Pintle Position DTC not active<br>Misfire DTC's not active<br>ECT > 69.8° C<br>Baro > 70 kPa<br>Vehicle Speed > 27 mph<br>IAC Δ < 8 counts<br>AC clutch status is unchanged<br>Transmission status is unchanged<br>***Start Test***<br>Throttle Position < 1.2%<br>EGR Position < 1%<br>Engine Speed *(Manual Transmission):*<br>> 1000 rpm but < 1900 rpm (4.3L LD & 5.7L)<br>> 900 rpm but < 1800 rpm (5.0L)<br>Engine Speed *(Automatic Transmission)* :<br>> 800 rpm but < 1600 rpm (5.0L & 5.7L LD)<br>> 800 rpm but < 1900 rpm (5.7L HD)<br>> 900 rpm but < 1600 rpm (4.3L LD)<br>> 900 rpm but < 1700 rpm (4.3L HD)<br>MAP Δ < 1 A/D count (.39 kPa)<br>Compensated MAP > 20 kPa but < 38 kPa<br>Not in DFCO (*Automatic Transmission*)<br>No change in DFCO state (*Manual Transmission)*<br>***Run Test***<br>Stabilized MAP (valve closed) recorded and EGR valve "ramped" open over a time interval and peak MAP value recorded and MAP Δ computed.<br>EGR valve closed | 2 seconds<br><br>Once per trip after EGR I/M Flag is set<br><br>Maximum of 9 tests per trip until EGR I/M flag set<br><br>Maximum of 6 tests per trip if a significant deviation from the current EWMA value is detected | DTC Type A |
| EGR Valve Open Pintle Position Error | P0404 | Position error too high | Deviation between actual and desired position > 10% for 10 seconds | Ignition voltage >5V to enable but < 4V to disable | Continuous | DTC Type B |
| EGR Sensor Signal Low | P0405 | Open / Short in pintle feedback system | Pintle position <6 A/D counts for 10 seconds | Ignition voltage > 5V to enable but < 4V to disable | Continuous | DTC Type B |
| Secondary Air Injection System Malfunction<br><br>⑤ | P0410 | Active:<br><br>O2 sensors indicate lean condition present when AIR pump is turned on during closed loop operation. | Active:<br><br>O2 sensor < approx. 222 mv > 1.0 seconds or fuel integrator delta of 21 counts, or 16% when pump turned on during closed loop operation. | Active:<br>No MAF, MAP, IAT, ECT, TPS, O2, VSS, Sys volt, Fuel Trim, misfire, or CCP DTC.<br>Air flow < 25 g/s., engine load < 34 %, PE, DFCO, COT not active. Engine run time after closed loop to enable = 20 seconds in fuel cells 4,5. A/F = 14.7, fuel integrator >= 124 & <= 132, RPM > 550, ECT > 60 C° < 107. Engine load <34 %, ignition volts > 11.7,. Air flow < 25%g/s, IAT > -10°C in fuel cells 5,6. | Active:<br><br>Up to 3.5 seconds.<br>Up to three times per trip. | DTC Type B |

## 99t50M_LD_yE.doc

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Secondary Air Injection System Malfunction<br><br>②a,⑨ | P0410 | Active:<br><br>O2 sensors indicate lean condition present when AIR pump is turned on during closed loop operation. | Active:<br><br>O2 sensor < approx. 222 mv > 1.0 seconds or fuel integrator delta of 25 counts, or 20% when pump turned on during closed loop operation. | Active:<br>No MAF, MAP, IAT, ECT, TPS, O2, VSS, Sys volt, Fuel Trim, misfire, or CCP DTC.<br>Air flow < 25 g/s., engine load < 34 %, PE, DFCO, COT not active. Engine run time after closed loop to enable = 20 seconds in fuel cells 4,5. A/F = 14.7, fuel integrator >= 124 & <= 132, RPM > 550, ECT > 60 C° < 107. ignition volts > 11.7,. | Active:<br><br>Up to 4 seconds.<br>Up to three times per trip. | DTC Type B |
| Catalyst System Low Efficiency (Bank 1)<br><br>① | P0420 | This diagnostic will determine the efficiency (oxygen storage capacity) of the catalytic converter. | OSC Time Difference ≥ 0.0488 sec<br><br>OSC Time Difference = OSC Worst Pass Thresh - OSC Compensation Factor * (Post Cat O2 Resp Time - Pre Cat O2 Resp Time)<br><br>OSC Worst Pass Thresh = 0.975 sec | ***Trip Enable Criteria***<br>No AIR DTC'c failing<br>No CAM DTC's failing<br>No ECT DTC's failing<br>No EGR DTC's failing<br>No Fuel Trim DTC's failing<br>No IAC DTC's failing<br>No IAT DTC's failing<br>No MAF DTC's failing<br>No MAP DTC's failing<br>No Oxygen Sensor DTC's failing<br>No PRNDL/Transmission DTC's failing<br>No Purge System DTC's failing<br>No TPS DTC's failing<br>No VSS DTC's failing<br>No Misfire DTC's failing<br><br>***Valid Idle Period Criteria***<br>Engine Speed ≥ 900 rpm for minimum of 35 sec since end of last idle period.<br>Min engine runtime for stable BLM ≥ 346 sec<br><br>***Test Enable Conditions***<br>Predicted Catalyst Temperature≥475°C<br>Closed loop fuel control<br>Barometric Pressure ≥ 73 kPa<br>-6.75 ≤IAT≤75°C<br>75°C ≤ ECT ≤ 117°C<br>0 < Idle Period ≤ 60 sec<br>Tests Attempted this trip ≤ 18<br>Tests Attempted this idle period =1<br>-105 rpm≤ (Engine Speed - Desired Speed) ≤ 125 rpm<br>Rapid Step Response Enable Criteria<br>OSC Time Difference Step ≥ 0.159 sec<br>OSC Time Difference ≥ 0.000 sec | 1 test attempted per valid idle period<br><br>Maximum of 6 tests per trip until catalyst I/M flag set.<br><br>Maximum of 1 test per trip after catalyst I/M flag set.<br><br>frequency: 12.5 ms continuous | DTC Type A |

## 99t50M_LD_yE.doc

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Catalyst System Low Efficiency (Bank 1)<br><br>② | P0420 | This diagnostic will determine the efficiency (oxygen storage capacity) of the catalytic converter. | OSC Time Difference ≥ 0.116 sec<br><br>OSC Time Difference = OSC Worst Pass Thresh - OSC Compensation Factor * (Post Cat O2 Resp Time - Pre Cat O2 Resp Time)<br><br>OSC Worst Pass Thresh = 1.6 sec | ***Trip Enable Criteria***<br>No AIR DTC'c failing<br>No CAM DTC's failing<br>No ECT DTC's failing<br>No EGR DTC's failing<br>No Fuel Trim DTC's failing<br>No IAC DTC's failing<br>No IAT DTC's failing<br>No MAF DTC's failing<br>No MAP DTC's failing<br>No Oxygen Sensor DTC's failing<br>No PRNDL/Transmission DTC's failing<br>No Purge System DTC's failing<br>No TPS DTC's failing<br>No VSS DTC's failing<br>No Misfire DTC's failing<br><br>***Valid Idle Period Criteria***<br>Engine Speed ≥ 900 rpm for minimum of 35 sec since end of last idle period.<br>Min engine runtime for stable BLM<br>≥ 346 sec<br><br>***Test Enable Conditions***<br>Predicted Catalyst Temperature≥475°C<br>Closed loop fuel control<br>Barometric Pressure ≥ 73 kPa<br>-6.75 ≤IAT≤75°C<br>75°C ≤ ECT ≤ 117°C<br>0 < Idle Period ≤ 60 sec<br>Tests Attempted this trip ≤ 18<br>Tests Attempted this idle period =1<br>-105 rpm ≤ (Engine Speed - Desired Speed) ≤ 125 rpm<br>Rapid Step Response Enable Criteria<br>OSC Time Difference Step ≥ 0.380 sec<br>OSC Time Difference ≥ 0.000 sec | 1 test attempted per valid idle period<br><br>Maximum of 6 tests per trip until catalyst I/M flag set.<br><br>Maximum of 1 test per trip after catalyst I/M flag set.<br><br>frequency: 12.5 ms continuous | DTC Type A |

## 99t50M_LD_yE.doc

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Catalyst System Low Efficiency (Bank 1)<br><br>③ | P0420 | This diagnostic will determine the efficiency (oxygen storage capacity) of the catalytic converter. | OSC Time Difference ≥ 0.110 sec<br><br>OSC Time Difference = OSC Worst Pass Thresh - OSC Compensation Factor * (Post Cat O2 Resp Time - Pre Cat O2 Resp Time)<br><br>OSC Worst Pass Thresh = 1.375 sec | ***Trip Enable Criteria***<br>No AIR DTC'c failing<br>No CAM DTC's failing<br>No ECT DTC's failing<br>No EGR DTC's failing<br>No Fuel Trim DTC's failing<br>No IAC DTC's failing<br>No IAT DTC's failing<br>No MAF DTC's failing<br>No MAP DTC's failing<br>No Oxygen Sensor DTC's failing<br>No PRNDL/Transmission DTC's failing<br>No Purge System DTC's failing<br>No TPS DTC's failing<br>No VSS DTC's failing<br>No Misfire DTC's failing<br><br>***Valid Idle Period Criteria***<br>Engine Speed ≥ 900 rpm for minimum of 35 sec since end of last idle period.<br>Min engine runtime for stable BLM<br>≥ 346 sec<br><br>***Test Enable Conditions***<br>Predicted Catalyst Temperature≥475°C<br>Closed loop fuel control<br>Barometric Pressure ≥ 73 kPa<br>-6.75 ≤IAT≤75°C<br>75°C ≤ ECT ≤ 117°C<br>0 < Idle Period ≤ 60 sec<br>Tests Attempted this trip ≤ 18<br>Tests Attempted this idle period =1<br>-105 rpm≤ (Engine Speed - Desired Speed) ≤ 125 rpm<br>Rapid Step Response Enable Criteria<br>OSC Time Difference Step ≥ 0.362 sec<br>OSC Time Difference ≥ 0.000 sec | 1 test attempted per valid idle period<br><br>Maximum of 6 tests per trip until catalyst I/M flag set.<br><br>Maximum of 1 test per trip after catalyst I/M flag set.<br><br>frequency: 12.5 ms continuous | DTC Type A |

## 99t50M_LD_yE.doc

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Catalyst System Low Efficiency (Bank 1)<br><br>④ | P0420 | This diagnostic will determine the efficiency (oxygen storage capacity) of the catalytic converter. | OSC Time Difference >=<br>0.3 (automatic)<br>0.35 (manual)<br><br>OSC Time Difference = OSC Worst Pass Thresh. - [OSC Compensation Factor * (Post Cat O2 Resp.Time - Pre Cat O2 Resp.Time)]<br><br>OSC Worst Pass Thresh. =<br>1.013 (automatic)<br>1.263 (manual) | ***Trip Enable Criteria:***<br>None of the following DTC's failing:<br>AIR, ECT; Fuel Trim; EST; EGR; CAM; IAC; IAT; MAF; MAP; Oxygen Sensor; Purge System; TPS; VSS; Misfire; PRNDL/Trans.(auto.)<br><br>***Valid Idle Period Criteria***:<br>Engine speed >= 1000 rpm for minimum of 32 sec. (automatics) or 40 sec. (manuals) since end of last idle period.<br>Min. engine run time for stable BLM &INT >= 360 sec.<br>***Test Enable Conditions:***<br>Predicted Catalyst Temperature >= 390°C<br>Closed loop fuel control<br>Barometric Pressure >= 72 kPa<br>-6.75 <= IAT <= 75°C<br>75 <= ECT <= 118°C<br>0 <= Idle period <= 120 seconds<br>Tests Attempted this trip <= 6<br>Tests Attempted this idle period <= 1<br>-110 rpm <= (Engine Speed - Desired Speed) <= 125 rpm | 1 test attempted per valid idle period<br><br>Maximum of 6 tests per trip until catalyst I/M flag set<br><br>Maximum of 1 test per trip after catalyst I/M flag set<br><br>frequency: 12.5 msec.<br>Continuous | DTC Type A |
| Catalyst System Low Efficiency (Bank 1)<br><br>⑤ | P0420 | This diagnostic will determine the efficiency (oxygen storage capacity) of the catalytic converter. | OSC Time Difference >= 0.092<br><br>OSC Time Difference = OSC Worst Pass Thresh. - [OSC Compensation Factor * (Post Cat O2 Resp.Time - Pre Cat O2 Resp.Time)]<br><br>OSC Worst Pass Thresh. = 0.925 | ***Trip Enable Criteria:***<br>None of the following DTC's failing:<br>AIR, ECT; Fuel Trim; EST; EGR; CAM; IAC; IAT; MAF; MAP; Oxygen Sensor; Purge System; TPS; VSS; Misfire; PRNDL/Trans.(auto.)<br><br>***Valid Idle Period Criteria***:<br>Engine speed >= 800 rpm for minimum of 40 sec. since end of last idle period.<br>Min. engine run time for stable BLM &INT >= 360 sec.<br><br>***Test Enable Conditions:***<br>Predicted Catalyst Temperature >= 390°C<br>Closed loop fuel control<br>Barometric Pressure >= 72 kPa<br>-6.75 <= IAT <= 75°C<br>75 <= ECT <= 118°C<br>0 <= Idle period <= 120 seconds<br>Tests Attempted this trip <= 6<br>Tests Attempted this idle period <= 1<br>-110 rpm <= (Engine Speed - Desired Speed) <= 125 rpm | 1 test attempted per valid idle period<br><br>Maximum of 6 tests per trip until catalyst I/M flag set<br><br>Maximum of 1 test per trip after catalyst I/M flag set<br><br>frequency: 12.5 msec.<br>Continuous | DTC Type A |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Catalyst System Low Efficiency (Bank 1)<br><br>⑥ | P0420 | This diagnostic will determine the efficiency (oxygen storage capacity) of the catalytic converter. | OSC Time Difference >=<br>0.1125 (automatic)<br>0.126 (manual)<br><br>OSC Time Difference = OSC Worst Pass Thresh. - [OSC Compensation Factor * (Post Cat O2 Resp.Time - Pre Cat O2 Resp.Time)]<br><br>OSC Worst Pass Thresh. =<br>1.3 (automatic)<br>1.463 (manual) | ***Trip Enable Criteria:***<br>None of the following DTC's failing:<br>AIR, ECT; Fuel Trim; EST; EGR; CAM; IAC; IAT; MAF; MAP; Oxygen Sensor; Purge System; TPS; VSS; Misfire; PRNDL/Trans.(auto.)<br><br>***Valid Idle Period Criteria***:<br>Engine speed >= 1100 rpm for minimum of 43.5 sec. (manuals) or 900 rpm for minimum of 32 sec. (automatics) since end of last idle period.<br>Min. engine run time for stable BLM &INT >= 360 sec.<br><br>***Test Enable Conditions:***<br>Predicted Catalyst Temperature >= 390°C<br>Closed loop fuel control<br>Barometric Pressure >= 72 kPa<br>-6.75 <= IAT <= 75°C<br>75 <= ECT <= 118°C<br>0 <= Idle period <= 120 seconds<br>Tests Attempted this trip <= 6<br>Tests Attempted this idle period <= 1<br>-110 rpm <= (Engine Speed - Desired Speed) <= 125 rpm | 1 test attempted per valid idle period<br><br>Maximum of 6 tests per trip until catalyst I/M flag set<br><br>Maximum of 1 test per trip after catalyst I/M flag set<br><br>frequency: 12.5 msec.<br>Continuous | DTC Type A |
| Catalyst System Low Efficiency (Bank 1)<br><br>⑦ | P0420 | This diagnostic will determine the efficiency (oxygen storage capacity) of the catalytic converter. | OSC Time Difference >= 0.225<br><br>OSC Time Difference = OSC Worst Pass Thresh. - [OSC Compensation Factor * (Post Cat O2 Resp.Time - Pre Cat O2 Resp.Time)]<br><br>OSC Worst Pass Thresh. = 2.6 | ***Trip Enable Criteria:***<br>None of the following DTC's failing:<br>AIR, ECT; Fuel Trim; EST; EGR; CAM; IAC; IAT; MAF; MAP; Oxygen Sensor; Purge System; TPS; VSS; Misfire; PRNDL/Trans.(auto.)<br><br>***Valid Idle Period Criteria***:<br>Engine speed >= 900 rpm for minimum of 42 sec. since end of last idle period.<br>Min. engine run time for stable BLM &INT >= 360 sec.<br><br>***Test Enable Conditions:***<br>Predicted Catalyst Temperature >= 385°C<br>Closed loop fuel control<br>Barometric Pressure >= 72 kPa<br>-6.75 <= IAT <= 75°C<br>75 <= ECT <= 118°C<br>0 <= Idle period <= 120 seconds<br>Tests Attempted this trip <= 6<br>Tests Attempted this idle period <= 1<br>-110 rpm <= (Engine Speed - Desired Speed) <= 125 rpm | 1 test attempted per valid idle period<br><br>Maximum of 6 tests per trip until catalyst I/M flag set<br><br>Maximum of 1 test per trip after catalyst I/M flag set<br><br>frequency: 12.5 msec.<br>Continuous | DTC Type A |

## 99t50M_LD_yE.doc

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Catalyst Low Efficiency Bank 1<br><br>⑧ | P0420 | This diagnostic determines the catalytic converter efficiency as a function of oxygen storage. | OSC Time Difference =<br>OSC Worst Pass Thresh - OSC Compensation Factor * (Post Cat O2 Resp Time<br>- Pre Cat O2 Resp Time)<br><br>AUTO<br>OSC Time Difference ≥ 0.142 sec<br>OSC Worst Pass Thresh = 1.375 sec<br><br>MANUAL<br>OSC Time Difference ≥ 0.147 sec<br>OSC Worst Pass Thresh = 1.36 sec | ***Trip Enable Criteria***<br>No AIR DTC'c failing<br>No CAM DTC's failing<br>No ECT DTC's failing<br>No EGR DTC's failing<br>No ESC DTC's failing<br>No Fuel Trim DTC's failing<br>No IAC DTC's failing<br>No IAT DTC's failing<br>No MAF DTC's failing<br>No MAP DTC's failing<br>No Oxygen Sensor DTC's failing<br>No PRNDL/Transmission DTC's failing<br>No Purge System DTC's failing<br>No TPS DTC's failing<br>No VSS DTC's failing<br>No Misfire DTC's failing<br>***Valid Idle Period Criteria***<br>Engine Speed ≥ 900 rpm for minimum of 34.5 sec since end of last idle period.<br>Min engine runtime for stable BLM<br>≥ 346 sec<br>***Test Enable Conditions***<br>Predicted Catalyst Temperature≥425°C<br>Closed loop fuel control<br>Barometric Pressure ≥ 73 kPa<br>-6.75 ≤IAT≤75°C<br>75°C ≤ ECT ≤ 117°C<br>0 < Idle Period ≤ 60 sec<br>Tests Attempted this trip ≤ 18<br>Tests Attempted this idle period =1<br>-105 rpm≤ (Engine Speed - Desired Speed) ≤ 125 rpm | 1 test attempted per valid idle period<br><br>Maximum of 6 tests per trip until catalyst I/M flag set.<br><br>Maximum of 1 test per trip after catalyst I/M flag set.<br><br>frequency: 12.5 ms continuous | Type A |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Catalyst Low Efficiency Bank 1<br><br>⑨ | P0420 | This diagnostic determines the catalytic converter efficiency as a function of oxygen storage. | OSC Time Difference =<br>OSC Worst Pass Thresh - OSC Compensation Factor * (Post Cat O2 Resp Time<br>- Pre Cat O2 Resp Time)<br><br>AUTO<br>OSC Time Difference ≥ 0.147 sec<br>OSC Worst Pass Thresh = 2.06 sec | ***Trip Enable Criteria***<br>No AIR DTC'c failing<br>No CAM DTC's failing<br>No ECT DTC's failing<br>No EGR DTC's failing<br>No ESC DTC's failing<br>No Fuel Trim DTC's failing<br>No IAC DTC's failing<br>No IAT DTC's failing<br>No MAF DTC's failing<br>No MAP DTC's failing<br>No Oxygen Sensor DTC's failing<br>No PRNDL/Transmission DTC's failing<br>No Purge System DTC's failing<br>No TPS DTC's failing<br>No VSS DTC's failing<br>No Misfire DTC's failing<br>***Valid Idle Period Criteria***<br>Engine Speed ≥ 900 rpm for minimum of 34.5 sec since end of last idle period.<br>Min engine runtime for stable BLM<br>≥ 346 sec<br>***Test Enable Conditions***<br>Predicted Catalyst Temperature≥425°C<br>Closed loop fuel control<br>Barometric Pressure ≥ 73 kPa<br>-6.75 ≤IAT≤75°C<br>75°C ≤ ECT ≤ 117°C<br>0 < Idle Period ≤ 60 sec<br>Tests Attempted this trip ≤ 18<br>Tests Attempted this idle period =1<br>-105 rpm≤ (Engine Speed - Desired Speed) ≤ 125 rpm | 1 test attempted per valid idle period<br><br>Maximum of 6 tests per trip until catalyst I/M flag set.<br><br>Maximum of 1 test per trip after catalyst I/M flag set.<br><br>frequency: 12.5 ms continuous | Type A |
| Catalyst System Low Efficiency<br>(Bank 2)<br><br>⑤ | P0430 | This diagnostic will determine the efficiency (oxygen storage capacity) of the catalytic converter. | OSC Time Difference >= 0.123<br><br>OSC Time Difference = OSC Worst Pass Thresh. - [OSC Compensation Factor * (Post Cat O2 Resp.Time - Pre Cat O2 Resp.Time)]<br><br>OSC Worst Pass Thresh. = 1.263 | ***Trip Enable Criteria***:<br>None of the following DTC's failing:<br>AIR, ECT; Fuel Trim; EST; EGR; CAM; IAC; IAT; MAF; MAP; Oxygen Sensor; Purge System; TPS; VSS; Misfire; PRNDL/Trans.(auto.)<br><br>***Valid Idle Period Criteria***:<br>Engine speed >= 800 rpm for minimum of 40 sec. since end of last idle period.<br>Min. engine run time for stable BLM &INT >= 360 sec.<br><br>***Test Enable Conditions:***<br>Predicted Catalyst Temperature >= 390°C<br>Closed loop fuel control<br>Barometric Pressure >= 72 kPa<br>-6.75 <= IAT <= 75°C<br>75 <= ECT <= 118°C<br>0 <= Idle period <= 120 seconds<br>Tests Attempted this trip <= 6<br>Tests Attempted this idle period <= 1<br>-110 rpm <= (Engine Speed - Desired Speed) <= 125 rpm | 1 test attempted per valid idle period<br><br>Maximum of 6 tests per trip until catalyst I/M flag set<br><br>Maximum of 1 test per trip after catalyst I/M flag set<br><br>frequency: 12.5 msec. Continuous | DTC Type A |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Catalyst System Low Efficiency (Bank 2)<br><br>⑥ | P0430 | This diagnostic will determine the efficiency (oxygen storage capacity) of the catalytic converter. | OSC Time Difference >= 0.1125 (automatic) 0.303 (manual)<br><br>OSC Time Difference = OSC Worst Pass Thresh. - [OSC Compensation Factor * (Post Cat O2 Resp.Time - Pre Cat O2 Resp.Time)]<br><br>OSC Worst Pass Thresh. = 1.313 (automatic) 2.675 (manual) | ***Trip Enable Criteria:***<br>None of the following DTC's failing:<br>AIR, ECT; Fuel Trim; EST; EGR; CAM; IAC; IAT; MAF; MAP; Oxygen Sensor; Purge System; TPS; VSS; Misfire; PRNDL/Trans.(auto.)<br><br>***Valid Idle Period Criteria***:<br>Engine speed >= 1100 rpm for minimum of 43.5 sec. (manuals) or 900 rpm for minimum of 32 sec. (automatics) since end of last idle period.<br>Min. engine run time for stable BLM &INT >= 360 sec.<br><br>***Test Enable Conditions:***<br>Predicted Catalyst Temperature >= 390°C<br>Closed loop fuel control<br>Barometric Pressure >= 72 kPa<br>-6.75 <= IAT <= 75°C<br>75 <= ECT <= 118°C<br>0 <= Idle period <= 120 seconds<br>Tests Attempted this trip <= 6<br>Tests Attempted this idle period <= 1<br>-110 rpm <= (Engine Speed - Desired Speed) <= 125 rpm | 1 test attempted per valid idle period<br><br>Maximum of 6 tests per trip until catalyst I/M flag set<br><br>Maximum of 1 test per trip after catalyst I/M flag set<br><br>frequency: 12.5 msec. Continuous | DTC Type A |
| Catalyst System Low Efficiency (Bank 2)<br><br>⑦ | P0430 | This diagnostic will determine the efficiency (oxygen storage capacity) of the catalytic converter. | OSC Time Difference >= 0.237<br><br>OSC Time Difference = OSC Worst Pass Thresh. - [OSC Compensation Factor * (Post Cat O2 Resp.Time - Pre Cat O2 Resp.Time)]<br><br>OSC Worst Pass Thresh. = 2.3 | ***Trip Enable Criteria:***<br>None of the following DTC's failing:<br>AIR, ECT; Fuel Trim; EST; EGR; CAM; IAC; IAT; MAF; MAP; Oxygen Sensor; Purge System; TPS; VSS; Misfire; PRNDL/Trans.(auto.)<br><br>***Valid Idle Period Criteria***:<br>Engine speed >= 900 rpm for minimum of 42 sec. since end of last idle period.<br>Min. engine run time for stable BLM &INT >= 360 sec.<br><br>***Test Enable Conditions:***<br>Predicted Catalyst Temperature >= 385°C<br>Closed loop fuel control<br>Barometric Pressure >= 72 kPa<br>-6.75 <= IAT <= 75°C<br>75 <= ECT <= 118°C<br>0 <= Idle period <= 120 seconds<br>Tests Attempted this trip <= 6<br>Tests Attempted this idle period <= 1<br>-110 rpm <= (Engine Speed - Desired Speed) <= 125 rpm | 1 test attempted per valid idle period<br><br>Maximum of 6 tests per trip until catalyst I/M flag set<br><br>Maximum of 1 test per trip after catalyst I/M flag set<br><br>frequency: 12.5 msec. Continuous | DTC Type A |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Catalyst Low Efficiency Bank 2<br><br>⑧ | P0430 | This diagnostic determines the catalytic converter efficiency as a function of oxygen storage | OSC Time Difference = OSC Worst Pass Thresh - OSC Compensation Factor * (Post Cat O2 Resp Time - Pre Cat O2 Resp Time)<br><br>AUTO<br>OSC Time Difference ≥ 0.110 sec<br>OSC Worst Pass Thresh = 1.09 sec<br><br>MANUAL<br>OSC Time Difference ≥ 0.114 sec<br>OSC Worst Pass Thresh = 1.13 sec | Trip Enable Criteria<br>No AIR DTC'c failing<br>No CAM DTC's failing<br>No ECT DTC's failing<br>No EGR DTC's failing<br>No ESC DTC's failing<br>No Fuel Trim DTC's failing<br>No IAC DTC's failing<br>No IAT DTC's failing<br>No MAF DTC's failing<br>No MAP DTC's failing<br>No Oxygen Sensor DTC's failing<br>No PRNDL/Transmission DTC's failing<br>No Purge System DTC's failing<br>No TPS DTC's failing<br>No VSS DTC's failing<br>No Misfire DTC's failing<br>Valid Idle Period Criteria<br>Engine Speed ≥ 900 rpm for minimum of 34.5 sec since end of last idle period.<br>Min engine runtime for stable BLM<br>≥ 346 sec<br>Test Enable Conditions<br>Predicted Catalyst Temperature≥425°C<br>Closed loop fuel control<br>Barometric Pressure ≥ 73 kPa<br>-6.75 ≤IAT≤75°C<br>75°C ≤ ECT ≤ 117°C<br>0 < Idle Period ≤ 60 sec<br>Tests Attempted this trip ≤ 18<br>Tests Attempted this idle period =1<br>-105 rpm≤ (Engine Speed - Desired Speed) ≤ 125 rpm | 1 test attempted per valid idle period<br><br>Maximum of 6 tests per trip until catalyst I/M flag set.<br><br>Maximum of 1 test per trip after catalyst I/M flag set.<br><br>frequency: 12.5 ms continuous | Type A |

## 99t50M_LD_yE.doc

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Catalyst Low Efficiency Bank 2<br><br>⑨ | P0430 | This diagnostic determines the catalytic converter efficiency as a function of oxygen storage | OSC Time Difference =<br>OSC Worst Pass Thresh - OSC Compensation Factor * (Post Cat O2 Resp Time<br>- Pre Cat O2 Resp Time)<br><br>AUTO<br>OSC Time Difference ≥ 0.318 sec<br>OSC Worst Pass Thresh = 2.03 sec | ***Trip Enable Criteria***<br>No AIR DTC'c failing<br>No CAM DTC's failing<br>No ECT DTC's failing<br>No EGR DTC's failing<br>No ESC DTC's failing<br>No Fuel Trim DTC's failing<br>No IAC DTC's failing<br>No IAT DTC's failing<br>No MAF DTC's failing<br>No MAP DTC's failing<br>No Oxygen Sensor DTC's failing<br>No PRNDL/Transmission DTC's failing<br>No Purge System DTC's failing<br>No TPS DTC's failing<br>No VSS DTC's failing<br>No Misfire DTC's failing<br>***Valid Idle Period Criteria***<br>Engine Speed ≥ 900 rpm for minimum of 34.5 sec since end of last idle period.<br>Min engine runtime for stable BLM<br>≥ 346 sec<br>***Test Enable Conditions***<br>Predicted Catalyst Temperature≥425°C<br>Closed loop fuel control<br>Barometric Pressure ≥ 73 kPa<br>-6.75 ≤IAT≤75°C<br>75°C ≤ ECT ≤ 117°C<br>0 < Idle Period ≤ 60 sec<br>Tests Attempted this trip ≤ 18<br>Tests Attempted this idle period =1<br>-105 rpm≤ (Engine Speed - Desired Speed) ≤ 125 rpm | 1 test attempted per valid idle period<br><br>Maximum of 6 tests per trip until catalyst I/M flag set.<br><br>Maximum of 1 test per trip after catalyst I/M flag set.<br><br>frequency: 12.5 ms continuous | Type A |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Evap. Emission Control System Malfunction | P0440 | 0.1 V - 4.98V<br>This DTC will detect a weak vacuum condition (large leak or restriction) in the Evap. system. | ***WEAK VACUUM TEST- STAGE I (Cold Test):***<br>Tank Vac. < 13 or 9 in. $H_2O$<br>***depending on application***<br>***WEAK VACUUM TEST- STAGE II (Warm Test):***<br>Stage I test failed previous trip and this trip.<br>Tank Vac. < 11 in. $H_2O$<br><br>OR<br><br>If HC vapor is not present and the SMALL LEAK TEST has failed. | ***TEST ENABLE :***<br>MAP DTC's not active<br>TP Sensor DTC's not active<br>VS Sensor DTC's not active<br>O2 Sensor DTC's not active<br>ECT Sensor DTC's not active<br>DTC P0125 not active<br>IAT Sensor DTC's not active<br>Fuel Level >12.5% but < 87.5%<br>Powerup Vacuum Test Fail = False<br>System Voltage > 10V but < 17V<br>***COLD START TEST:***<br>ECT > 3.75°C but < 30° C<br>IAT > 3.75°C but < 30° C<br>Cold Temperature $\Delta$ ( ECT - IAT):<br>< 1.5°C if IAT > ECT<br>< 8.25 °C if ECT > IAT<br>Baro > 72.5 kPa<br>Fuel Level Input = True<br>Fuel Level Present Test = True | ***WEAK VACUUM TEST- STAGE I (Cold Test):*** Fault present for a time ≥ 30 , 50 or 80 depending on application sec. (Vac. Weighted)<br><br>***WEAK VACUUM TEST- STAGE II (Warm Test):*** Fault present for a time ≥ 1400 sec.<br><br>Once per cold start | DTC Type A<br>(Behaves as a Type B) |
| Evap. Emission Control System Leak Detected (Small Leak) | P0442 | 0.1 V - 4.98V<br>This DTC will detect a small leak in the Evap. system between the fuel fill cap and up to but not including the purge solenoid. | ***SMALL LEAK TEST FAIL:***<br>Vacuum < 7 , 9 or 11" $H_2O$ for a time < 25,30 or 35 sec. Depending on application<br>Vacuum Decay (determined by fuel level and intake temperature) ≥ a value determined by Start Vacuum minus Tank Vacuum for a period ≥ 15 or 12 seconds.<br>Vacuum > 0.1 in. $H_2O$ for a time ≤ 35 , 50,60,80,85seconds.<br>depending on application | ***TEST ENABLE :***<br>MAP DTC's not active<br>TP Sensor DTC's not active<br>VS Sensor DTC's not active<br>O2 Sensor DTC's not active<br>ECT Sensor DTC's not active<br>DTC P0125 not active<br>IAT Sensor DTC's not active<br>Fuel Level >12.5% but < 87.5%<br>***COLD START TEST:***<br>ECT > 3.75°C but < 30° C<br>IAT > 3.75°C but < 30° C<br>Cold Temperature $\Delta$ ( ECT - IAT):<br>< 1.5°C if IAT > ECT<br>< 8.25 °C if ECT > IAT<br>Baro > 72.5 kPa<br>Fuel Level Input = True<br>Fuel Level Present Test = True<br>***FUEL SLOSH TEST:***<br>Tank Vacuum $\Delta \leq$ 0.6 in. $H_2O$ OR<br>Fuel Level $\Delta \leq$ 7.8%<br>***WEAK VACUUM TEST (Stage I)*** :<br>Throttle position < 75%<br>Vehicle speed < 65 mph<br>Tank Vacuum ≥ 9 ,11,13in. $H_2O$ within 30,50,80 dending on app. seconds. | Vacuum Decay ≥ 12 or 15 seconds<br><br>Once per cold start | DTC Type A<br>(Behaves as a Type B) |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Evap. Emission Control System Vent Control Malfunction | P0446 | This DTC will determine if a restriction is present in the vent solenoid, vent filter, vent hose or canister. | ***EXCESS VACUUM TEST - STAGE I :***<br>Vent solenoid **commanded** OPEN<br>Fuel Tank Vacuum ≥ 7 in. $H_2O$ for 2 s econds(monitored during initial purge ramp)<br>**OR**<br>***EXCESS VACUUM TEST - STAGE II :***<br>Vent solenoid **commanded** OPEN during normal purge.<br>Fuel Tank Vacuum ≥ 12.9 in. $H_2O$ for a time ≥ 4 seconds | ***TEST ENABLE :***<br>MAP DTC's not active<br>TP Sensor DTC's not active<br>VS Sensor DTC's not active<br>O2 Sensor DTC's not active<br>ECT Sensor DTC's not active<br>DTC P0125 not active<br>IAT Sensor DTC's not active<br>Fuel Level >12.5% but < 87.5%<br>System Voltage > 10V but < 17V<br>***COLD START TEST:***<br>ECT > 3.75°C but < 30° C<br>IAT > 3.75°C but < 30° C<br>Cold Temperature Δ ( ECT - IAT):<br>< 1.5°C if IAT > ECT<br>< 8.25 °C if ECT > IAT<br>Baro > 72.5 kPa<br>Fuel Level Input = True<br>Fuel Level Present Test = True<br>***FUEL SLOSH TEST:***<br>Tank Vacuum Δ ≥ 0.6 in. $H_2O$<br>OR<br>Fuel Level Δ ≥ 7.8%<br>***PURGE HC PRESENT :***<br>Purge Closed Loop Multiplier ≥ 0.6 for a time ≤ a table value based on coolant temperature<br>***WEAK VACUUM TEST -Stage I***:<br>Tank Vacuum ≥ 9 11 or 13in. $H_2O$ within 30,50,80 seconds. depending on application | ***EXCESS VACUUM TEST - STAGE II :***<br>180 seconds<br><br>Once per cold start at:<br>• Powerup<br>• Excess Vac. Stage I<br>• Excess Vac. Stage II | DTC Type A |
| EVAP Fuel Tank Pressure Sensor Circuit Low Voltage | P0452 | This DTC will detect a vacuum sensor stuck low | tank vacuum raw voltage < 0.1 volt for 5 seconds | ***runs countiously after a 1 second delay for sensor warmup*** | | DTC Type B |
| EVAP Fuel Tank Pressure Sensor Circuit High Voltage | P0453 | This DTC will detect a vacuum sensor stuck hi | tank vacuum raw voltage >4.98 volt for 5 seconds | ***runs countiously after a 1 second delay for sensor warmup*** | | DTC Type B |
| Vehicle Speed (VS) Sensor Signal Missing | P0500 | The DTC detects a missing vehicle speed sensor signal, generally on an overrun or decel condition. | Vehicle Speed <= 1 MPH | MAP sensor DTC's not active<br>MAP < 20 kPa<br>Coolant Temperature >= 60° C<br>Engine > 1400 RPM but < 4400 RPM<br>Throttle Position < 3.125 % | Failing > 5 seconds<br><br>Continuous | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Idle Control System RPM Lower Than Expected | P0506 | This DTC will determine if a low idle is the result of a IAC valve or circuit.<br>A low idle is defined as 75 RPM below the desired idle. | Air flow Δ < 3 g/s | ***Test Enable: (non - intrusive)***<br>TP sensor DTC's not active<br>VS sensor DTC's not active<br>ECT DTC's not active<br>MAP DTC's not active<br>ECT > 50°C<br>System Voltage > 10V but < 16 V<br>IAT > -25°C<br>Engine run time > 30 seconds<br>Baro > 70 kPa<br>TP < 1%<br>VS < 2 MPH<br>Above met for a time > 3 seconds to enable diagnostic.<br>If non-intrusive test fails, intrusive test is run.<br>***Run Test: (intrusive)***<br>Air Flow > 17.5 g/sec but < 50 g/sec<br>VS > 25 MPH but < 85 MPH<br>TP Δ < 1%<br>Engine Speed Δ < 50 RPM<br>IAC motor commanded 10 %/ 100 msec. | 10 seconds<br><br>Continuous after enable | DTC Type B |
| Idle Control System RPM Higher Than Expected | P0507 | This DTC will determine if a high idle is the result of a IAC valve or circuit.<br>A high idle is defined as 100 RPM above the desired idle. | Air flow Δ < 3 g/s | ***Test Enable: (non - intrusive)***<br>TP sensor DTC's not active<br>VS sensor DTC's not active<br>ECT DTC's not active<br>MAP DTC's not active<br>ECT > 50°C<br>System Voltage > 10V but < 16 V<br>IAT > -25°C<br>Engine run time > 30 seconds<br>Baro > 70 kPa<br>TP < 1%<br>VS < 2 MPH<br>Above met for a time > 3 seconds to enable diagnostic.<br>If non-intrusive test fails, intrusive test is run.<br>***Run Test: (intrusive)***<br>Air Flow > 17.5 g/sec but < 50 g/sec<br>VS > 25 MPH but < 85 MPH<br>TP Δ < 1%<br>Engine Speed Δ < 50 RPM<br>IAC motor commanded 10 %/ 100 msec. | 10 seconds<br><br>Continuous after enable | DTC Type B |
| VCM Memory Error - Type 4 (Program Flash) | P0601 | This diagnostic checksums the contents of flash EEPROM and compares it to the expected value. | The calculated checksum does not match the programmed value. | ---------- | Once per trip at controller initialization. | DTC Type A |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| VCM Memory Error - Not Programmed | P0602 | This diagnostic checks the state of the Service Calibration Bit to determine if the controller needs to be programmed. | The Calibrated No Start For Service bit is true in the calibration. | ---------- | Once per trip at controller initialization. | DTC Type A |
| VCM Memory Error - Type 2 (Keep Alive) | P0603 | This diagnostic checks that data stored to the Non-Volatile Keep Alive section of memory is functioning correctly. | The checksum of the data does stored at powerdown does not match the checksum of the data present at powerup, and the data read from memory does not match the data that was stored to check memory function. | ---------- | Once per trip at controller initialization. | DTC Type A |
| VCM Memory Error - Type 1 (Volatile RAM) | P0604 | This diagnostic checks that data stored to the Volatile section of memory is stored correctly. | The data read from the memory location does not match the data that was just stored to that location. | ---------- | Once per trip at controller initialization. | DTC Type A |
| VCM Memory Error - Type 3 (Boot Flash) | P0605 | This diagnostic checks that the checksum of the Boot Flash section of memory matches a predetermined value. | The checksum of the data does not match the expected checksum. | ---------- | Once per trip at controller initialization. | DTC Type A |
| Transmission Clutch Switch Input Malfunction (Manual Trans. Only)<br><br>①③④⑥⑦⑧ | P0704 | This DTC monitors the Transmission Clutch Switch for a transition during accelerations to the calibrated speed and back to 0 MPH. | No clutch switch circuit transitions detected | VS sensor DTC's not active<br>Vehicle Speed is now = 0 mph<br>and Vehicle Speed has been > 40 mph<br>The brake switch is not currently pressed.<br>(The clutch switch is wired in series with the brake switch) | 2 consecutive test failures<br><br>Continuous.<br><br>100 mS | DTC Type B |

## 99t50M_LD_yE.doc

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| O2 Sys. Fault - Too Few O2S R/L or L/R Switches, Insufficient Activity (Bank 1, Sensor 1) | P1133 | .1V to 1.0V<br>This DTC determines if the O2 sensor functioning properly by monitoring the number of L/R and R/L switches. | Number of switches in 100 seconds:<br>L/R switches < 20<br>R/L switches < 20 | ***O2 Diagnostic Enable***: *(the following criteria must be met to enable the O2 Response tests)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>***Response Test Enable:***<br>Closed loop low MAP not active<br>DTC's P0131, P0132, P0134 and P0135 not active<br>Closed loop<br>ECT > 57°C<br>Engine run time > 75 seconds<br>Air flow ≥ 15 g/s but ≤ 55 g/s<br>Engine speed ≥ 1100 rpm but ≤ 3000 rpm<br>Canister Purge Duty Cycle ≥ 0%<br>Above present for > 2 seconds | 100 seconds after closed loop enable<br><br>Once per key cycle | DTC Type B |
| O2S Circuit - Transition Time Ratio Malfunction (Bank 1,Sensor 1) | P1134 | .1V to 1.0V<br>This DTC determines if the O2 sensor functioning properly by checking the ratio of average response time. | Ratio of average response times:<br>Ratio > 5.0 or < 0.375<br><br>**O2 voltage < 300 mV = lean*<br>**O2 voltage > 600 mV = rich* | ***O2 Diagnostic Enable***: *(the following criteria must be met to enable the O2 Response tests)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>***Response Test Enable:***<br>Closed loop low MAP not active<br>DTC's P0131, P0132, P0134 and P0135 not active<br>Closed loop<br>ECT > 57°C<br>Engine run time > 75 seconds<br>Air flow ≥ 15 g/s but ≤ 55 g/s<br>Engine speed ≥ 1100 rpm but ≤ 3000 rpm<br>Canister Purge Duty Cycle ≥ 0%<br>Above present for > 2 seconds | 100 seconds after closed loop enable<br><br>Once per ignition cycle | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| O2 Sys. Fault - Too Few O2S R/L or L/R Switches, Insufficient Activity (Bank 2, Sensor 1) | P1153 | .1V to 1.0V<br>This DTC determines if the O2 sensor functioning properly by monitoring the number of L/R and R/L switches. | Number of switches in 100 seconds:<br>L/R switches < 20<br>R/L switches < 20 | ***O2 Diagnostic Enable***: *(the following criteria must be met to enable the O2 Response tests)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>***Response Test Enable:***<br>Closed loop low MAP not active<br>DTC's P0151, P0152, P0154 and P0155 not active<br>Closed loop<br>ECT > 57°C<br>Engine run time > 75 seconds<br>Air flow ≥ 15 g/s but ≤ 55 g/s<br>Engine speed ≥ 1100 rpm but ≤ 3000 rpm<br>Canister Purge Duty Cycle ≥ 0%<br>Above present for > 2 seconds | 100 seconds after closed loop enable<br><br>Once per key cycle | DTC Type B |
| O2S Circuit - Transition Time Ratio Malfunction (Bank 2,Sensor 1) | P1154 | .1V to 1.0V<br>This DTC determines if the O2 sensor functioning properly by checking the ratio of the average response time. | Ratio of average response times:<br>Ratio > 5.0 or < .375<br><br>**O2 voltage < 300 mV = lean*<br>**O2 voltage > 600 mV = rich* | ***O2 Diagnostic Enable***: *(the following criteria must be met to enable the O2 Response tests)*<br>TP sensor DTC's not active<br>Evap. DTC's not active<br>IAT sensor DTC's not active<br>MAP DTC's not active<br>ECT sensor DTC's not active<br>MAF sensor DTC's not active<br>Misfire DTC's not active<br>No intrusive tests in progress<br>No device controls active<br>System Voltage ≥ 11.7 but <18 Volts<br>***Response Test Enable:***<br>Closed loop low MAP not active<br>DTC's P0151, P0152, P0154 and P0155 not active<br>Closed loop<br>ECT > 57°C<br>Engine run time > 75 seconds<br>Air flow ≥ 15 g/s but ≤ 55 g/s<br>Engine speed ≥ 1100 rpm but ≤ 3000 rpm<br>Canister Purge Duty Cycle ≥ 0%<br>Above present for > 2 seconds | 100 seconds after closed loop enable<br><br>Once per ignition cycle | DTC Type B |
| Crankshaft Position System Variation Not Learned (CASE) | P1336 | This diagnostic will determine if the Crankshaft Position System Variation has been learned | Engine running | Manufactures Enable counter must be zero | Continuous | DTC Type A |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Camshaft Sensor Misinstalled | P1345 | 1X Signal<br>This diagnostic will determine if the Cam sensor and high voltage switch have been installed correctly. | Cam signal falling edge out of phase ±26 degrees from crank falling edge. | ---------- | 30 test failures within a 50 test sample size.<br><br>Time necessary to complete sample:<br>Varies with engine speed<br><br>Every crank fall | DTC Type A |
| EST Output High | P1351 | 0 V-1V<br>This diagnostic will determine if a failure has occurred due to an open circuit. | EST voltage >4.9 V | EST Enabled<br>Engine speed < 250 RPM | 20 test failures<br><br>Time necessary to complete sample:<br>Executed during crank, approximately 3 seconds.<br><br>Once per ignition cycle | DTC Type A |
| EST Not Toggling After Enable | P1361 | 0 V-1V<br>This diagnostic will determine if a failure has occurred due to a grounded circuit. | EST voltage <.04V | EST Enabled<br>Engine speed < 250 RPM | 20 test failures<br><br>Time necessary to complete sample:<br>Executed during crank, approximately 3 seconds.<br><br>Once per ignition cycle | DTC Type A |
| EGR Valve Circuit Performance - actual position greater than commanded | P1404 | Detects a valve that is stuck open when commanded closed. | Pintle position > 10 A/D counts from learned closed position for 10 seconds for 3 subroutines | EGR valve strokes to 100% duty cycle between subroutines. Enable parameters for stroke:<br>80°C < ETC < 120°C<br>IAT < 100°C<br>Desired EGR > 15% | Continuous | DTC Type A |
| Secondary Air Injection System Malfunction (Bank 1)<br><br>②a<br>⑤<br>⑨ | P1415 | Dectects left bank AIR malfunction | Determines if left bank AIR diagnostic failed | Same as P0410. See P0410 | See P0410 diagnostic description. | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Secondary Air Injection System Malfunction (Bank 2)<br>②a<br>⑤<br>⑨ | P1416 | Dectects right bank AIR malfunction | Determines if right bank AIR diagnostic failed. | Same as P0410. See P0410 | See P0410 diagnostic description | DTC Type B |
| Evap. Emission Control System - Continuous Open Purge Flow | P1441 | This DTC will determine if the purge solenoid is leaking. | ***PURGE VALVE LEAK TEST:***<br>Purge Valve closed<br>TP > 0% but < 99.6%<br>Vacuum ≥ 10 KPa<br>Tank Vacuum ≥ 12 in. $H_2O$ for2 sec within ≤ 37.5 seconds after 30 second delay. | ***TEST ENABLE :***<br>MAP DTC's not active<br>TP Sensor DTC's not active<br>VS Sensor DTC's not active<br>O2 Sensor DTC's not active<br>ECT Sensor DTC's not active<br>DTC P0125 not active<br>IAT Sensor DTC's not active<br>Fuel Level >12.5% but < 87.5%<br>System Voltage > 10V but < 17V<br>***COLD START TEST:***<br>ECT > 3.75°C but < 30° C<br>IAT > 3.75°C but < 30° C<br>Cold Temperature Δ ( ECT - IAT):<br>< 1.5°C if IAT > ECT<br>< 8.25 °C if ECT > IAT<br>Baro >72.5 kPa<br>Fuel Level Input = True<br>Fuel Level Present Test = True<br>***EXCESS VACUUM TEST -STAGE I :***<br>Vent solenoid **commanded** OPEN<br>Fuel Tank Vacuum < 7 in. $H_2O$<br>***WEAK VACUUM TEST -Stage I*** :<br>Throttle position < 75%<br>Vehicle speed < 65 mph<br>Tank Vacuum ≥ 9, 11 or 13 in. $H_2O$ within 30 ,50 or 80seconds. | ***PURGE VALVE LEAK TEST:***<br>180seconds Max.<br><br>Once per cold start | DTC Type B |

**99t50M_LD_yE.doc**

| SENSED PARAMETER | FAULT CODE | MONITOR STRATEGY DESCRIPTION | MALFUNCTION CRITERIA AND THRESHOLD VALUE(S) | SECONDARY PARAMETERS AND ENABLE CONDITIONS | TIME LENGTH AND FREQUENCY | MIL ILLUMINATION TYPE |
|---|---|---|---|---|---|---|
| Idle Air Control - Low | P1508 | This DTC will determine if a low idle is the result of an engine mechanical problem.<br>A low idle is defined as 75 RPM below the desired idle. | Air flow Δ > 3 g/s | ***Test Enable: (non - intrusive)***<br>TP sensor DTC's not active<br>VS sensor DTC's not active<br>ECT DTC's not active<br>MAP DTC's not active<br>ECT > 50°C<br>System Voltage > 10V but < 16 V<br>IAT > -25°C<br>Engine run time > 30 seconds<br>Baro > 70 kPa<br>TP < 1%<br>VS < 2 MPH<br>Above met for a time > 3 seconds to enable diagnostic.<br>If non-intrusive test fails, intrusive test is run.<br>***Run Test: (intrusive)***<br>Air Flow > 17.5 g/sec but < 50 g/sec<br>VS > 25 MPH but < 85 MPH<br>TP Δ < 1%<br>Engine Speed Δ < 50 RPM<br>IAC motor commanded 10 %/ 100 msec. | 10 seconds<br><br>Continuous after enable | DTC Type B |
| Idle Air Control - High | P1509 | This DTC will determine if a high idle is the result of an engine mechanical problem.<br>A high idle is defined as 100 RPM above the desired idle. | Air flow Δ > 3 g/s | ***Test Enable: (non - intrusive)***<br>TP sensor DTC's not active<br>VS sensor DTC's not active<br>ECT DTC's not active<br>MAP DTC's not active<br>ECT > 50°C<br>System Voltage > 10V but < 16 V<br>IAT > -25°C<br>Engine run time > 30 seconds<br>Baro > 70 kPa<br>TP < 1%<br>VS < 2 MPH<br>Above met for a time > 3 seconds to enable diagnostic.<br>If non-intrusive test fails, intrusive test is run.<br>***Run Test: (intrusive)***<br>Air Flow > 17.5 g/sec but < 50 g/sec<br>VS > 25 MPH but < 85 MPH<br>TP Δ < 1%<br>Engine Speed Δ < 50 RPM<br>IAC motor commanded 10 %/ 100 msec. | 10 seconds<br><br>Continuous after enable | DTC Type B |