P0121 Throttle Position (TP) Sensor 1 Performance

Circuit Description

The throttle body assembly contains 2 throttle position (TP) sensors. The TP sensors are mounted to the throttle body assembly and are not serviceable. The TP sensors provide a signal voltage that changes relative to throttle blade angle. The engine control module (ECM) supplies the TP sensors with a common 5-volt reference circuit, a common low reference circuit, and 2 independent signal circuits. The TP sensors have opposite functionality. TP sensor 1 signal voltage increases from below 1 volt at idle to above 4 volts at wide open throttle. TP sensor 2 signal voltage decreases from above 4 volts at idle to below 1 volt at wide open throttle. The ECM compares the signal of the TP sensor 1 and TP sensor 2 through the entire range. If the ECM detects a predetermined difference between sensor 1 and sensor 2, or a predetermined difference from the predicted range, this DTC sets.

DTC Descriptor

This diagnostic procedure supports the following DTC. DTC P0121 Throttle Position (TP) Sensor 1 Performance

Conditions for Running the DTC

- The ignition 1 voltage is more than 7 volts.
- The TP sensor 1 voltage is between 0.17–4.6 volts.
- DTC P0121 runs continuously once the above conditions are met.

Conditions for Setting the DTC

- The TP sensor 1 disagrees more than 9 percent from TP sensor 2.
- The TP sensor 1 disagrees more than 9 percent from the predicted value.
- The above conditions are met for less than 1 second.

Action Taken When the DTC Sets

- The control module illuminates the malfunction indicator lamp (MIL) on the second consecutive ignition cycle that the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the control module stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition cycle, the control module records the operating conditions at the time of the failure. The control module writes the operating conditions to the Freeze Frame and updates the Failure Records.

Conditions for Clearing the MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 4 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

Diagnostic Aids

- Use the J 35616-C Connector Test Adapter Kit for any test that requires probing the ECM harness connector or a component harness connector.
- The lower connector of the ECM is connector C1 and the upper connector of the ECM is connector C2. Refer to Engine Controls Component Views.
- If there is a condition with the TP sensors the ECM defaults to reduced power mode for the entire ignition cycle, even if the condition is corrected.
- For an intermittent condition, refer to Intermittent Conditions.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step verifies that a condition exists. If there is a condition with a TP sensor circuit, the scan tool will display Disagree.
5. This step tests for high resistance in the 5-volt reference circuit of the TP sensors. If the DMM does not display more than the specified voltage there is high resistance in the circuit.
8. This step tests for high resistance in the low reference circuit of the TP sensor. The ECM must be completely powered down to obtain an accurate resistance reading. It may take up to 30 minutes for the ECM to power down

after the ignition key is removed. Removal of the ECM/TCM fuse allows the ECM to power down completely.

DTC P0121

Step	Action	Values	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View Reference: Engine Control Module (ECM) Connector End Views or Engine Controls Connector End Views				
1	Did you perform the Diagnostic System Check–Engine Controls?	—	Go to Step 2	Go to Diagnostic System Check -Engine Controls
2	1. Start the engine. 2. Perform the following tests: • Rapidly depress the accelerator pedal from the rest position to the wide open throttle position (WOT) and release pedal. Repeat the procedure several times. • Slowly depress the accelerator pedal to WOT and then slowly return the pedal to closed throttle. Repeat the procedure several times. 3. Observe the TP Sensor 1 and 2 parameter with a scan tool. Does the scan tool display Agree?	—	Go to Step 3	Go to Step 5
3	1. Turn OFF the engine. 2. Turn ON the ignition, with the engine OFF. 3. Observe the TP sensor 1 voltage parameter with a scan tool. Is the voltage within the specified range?	0.40–0.80 V	Go to Step 4	Go to Step 5

Step	Action	Values	Yes	No
4	1. Observe the Freeze Frame/Failure Records for this DTC. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	—	Go to Step 5	Go to Diagnostic Aids
5	1. Turn OFF the ignition. 2. Disconnect the throttle body harness connector. Refer to Throttle Body Assembly Replacement 3. Turn ON the ignition, with the engine OFF. 4. Connect a test lamp between the 5-volt reference circuit of the throttle position (TP) sensor and the engine control module (ECM) housing. 5. Connect a DMM to the probe of the test lamp and the ECM housing. Refer to Measuring Voltage Drop in Wiring Systems. Is the voltage more than the specified value?	4.8 V	Go to Step 6	Go to Step 11
6	1. Connect a 3-amp fused jumper wire between the 5-volt reference circuit of the TP sensor and the signal 1 circuit of the TP sensor. 2. Observe the TP sensor 1 voltage parameter, with a scan tool. Is the voltage more than the specified value?	4.8 V	Go to Step 7	Go to Step 9

Step	Action	Values	Yes	No
7	1. Connect a 3-amp fused jumper wire between the 5-volt reference circuit of the TP sensor and the signal 2 circuit of the TP sensor. 2. Observe the TP sensor 2 voltage parameter with a scan tool. Is the voltage more than the specified value?	4.8 V	Go to Step 8	Go to Step 10
8	1. Turn OFF the ignition. 2. Remove the ECM/TCM fuse from the underhood fuse block. Notice: Do NOT use a test lamp to test the continuity of the circuit. Damage to the control module may occur due to excessive current draw. 3. Measure the resistance from the low reference circuit of the TP sensor to the ECM housing, with a DMM. Is the resistance less than the specified value?	5 W	Go to Step 13	Go to Step 12
9	Test the signal 1 circuit of TP sensor for a high resistance or an open. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 17	Go to Step 14
10	Test the signal 2 circuit of TP sensor for a high resistance or an open. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 17	Go to Step 14

Step	Action	Values	Yes	No
11	Important: The 5-volt reference circuits are internally and externally connected at the controller. Other sensors that share the 5-volt reference circuit may also have DTCs set. Disconnecting a sensor on the shared 5-volt reference circuit may isolate a shorted sensor. Review the electrical schematic and diagnose the shared circuits and sensors. Test the 5-volt reference circuit of the TP sensor and all shared 5-volt reference circuits for a high resistance or an open. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 17	Go to Step 14
12	Test the low reference circuit of the TP sensor for a high resistance or an open. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 17	Go to Step 14
13	Test for shorted terminals and for poor connections at the throttle body. Refer to Testing for Intermittent and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 17	Go to Step 15
14	Test for shorted terminals and for poor connections at the throttle body and at the ECM. Refer to Testing for Intermittent and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 17	Go to Step 16

Step	Action	Values	Yes	No
15	Replace the throttle body assembly. Refer to Throttle Body Assembly Replacement. Did you complete the replacement?	—	Go to Step 17	—
16	Replace the ECM. Refer to Engine Control Module (ECM) Replacement on page 6-1648. Did you complete the replacement?	—	Go to Step 17	—
17	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	—	Go to Step 2	Go to Step 18
18	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List	System OK