

P0222 Throttle Position (TP) Sensor 2 Circuit Low Voltage

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 (WOT). TP sensor 2 signal voltage decreases from above 4 volts at idle to below 1 volt at WOT. If the ECM detects TP sensor 2 signal voltage is too low, this DTC sets.

DTC Descriptor

This diagnostic procedure supports the following DTC. DTC P0222 Throttle Position (TP) Sensor 2 Circuit Low Voltage

Conditions for Running the DTC

- The ignition is ON, with the engine OFF or the engine is operating.
- The ignition 1 voltage is more than 7 volts.
- DTC P0222 runs continuously once the above conditions are met.

Conditions for Setting the DTC

The ECM detects the TP sensor 2 signal voltage is less than 0.16 volts for less than 1 second.

Action Taken When the DTC Sets

- The control module illuminates the malfunction indicator lamp (MIL) when the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Freeze

Frame/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.
4. The TP sensors share a 5-volt reference circuit. If both DTCs P0122 and P0222 set, test for a condition in the 5-volt reference circuit.
5. The ECM produces a measurable steady-state amperage that provides the 5-volt reference to the TP sensors. If the amperage on the 5-volt reference circuit is less than 50 mA, test the 5-volt reference circuit for an open or a high resistance.
6. This step tests the signal 2 circuit of the TP sensor. If the TP sensor 2 voltage parameter is not 4.8–5.2 volts, test for a condition in the signal 2 circuit.

DTC P0222

Step	Action	Values	Yes	No
<p>Schematic Reference: Engine Controls Schematics on page 6-1196 Connector End View Reference: Engine Control Module (ECM) Connector End Views on page 6-1220 or Engine Controls Connector End Views on page 6-1223</p>				
1	Did you perform the Diagnostic System Check—Engine Controls?	—	Go to Step 2	Go to Diagnostic System Check—Engine Controls
2	1. Turn ON the ignition, with the engine OFF. 2. Observe the TP sensor 2 voltage parameter with a scan tool. Is the voltage is less than the specified value?	0.16 V	Go to Step 4	Go to Step 3
3	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 4	Go to Diagnostic Aids
4	Observe the DTC information with a scan tool. Did DTC P0122 also set?	—	Go to Step 5	Go to Step 6

Step	Action	Values	Yes	No
5	<p>1. Turn OFF the ignition.</p> <p>Notice: Refer to Disengaging Connectors Notice on page P-8 in Cautions and Notices.</p> <p>2. Disconnect the throttle body harness connector.</p> <p>Refer to Throttle Body Assembly Replacement on page 6-1664.</p> <p>3. Turn ON the ignition, with the engine OFF.</p> <p>4. Set-up a DMM to test amperage on the 400 mA scale.</p> <p>5. Measure the amperage from the 5-volt reference circuit of the throttle position (TP) sensor to the engine control module (ECM) housing.</p> <p>Is the amperage more than the specified value?</p>	50 mA	Go to Step 9	Go to Step 7
6	<p>1. Turn OFF the ignition.</p> <p>Notice: Refer to Disengaging Connectors Notice on page P-8 in Cautions and Notices.</p> <p>2. Disconnect the throttle body harness connector.</p> <p>Refer to Throttle Body Assembly Replacement on page 6-1664.</p> <p>3. Turn ON the ignition, with the engine OFF.</p> <p>4. 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.</p> <p>5. Observe the TP sensor 2 voltage parameter with a scan tool.</p> <p>Is the voltage within the specified range?</p>	4.8–5.2 V	Go to Step 9	Go to Step 8

Step	Action	Values	Yes	No
7	<p>Important: The 5-volt reference circuits are internally connected within 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 the following:</p> <ul style="list-style-type: none"> • An open • A short to ground • High resistance Refer to Circuit Testing and Wiring Repairs in Wiring Systems. <p>Did you find and correct the condition?</p>	—	Go to Step 13	Go to Step 10
8	<p>Test the signal 2 circuit of the TP sensor for the following:</p> <ul style="list-style-type: none"> • A short to ground • An open • High resistance Refer to Circuit Testing and Wiring Repairs in Wiring Systems. <p>Did you find and correct the condition?</p>	—	Go to Step 13	Go to Step 10
9	<p>Test for an intermittent and for a poor connection at the throttle body assembly. Refer to Testing for Intermittent and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?</p>	—	Go to Step 13	Go to Step 11

Step	Action	Values	Yes	No
10	Test for an intermittent and for a poor connection at the ECM. Refer to Testing for Intermittent and Poor Connections on page 8-1187 and Connector Repairs on page 8-1198 in Wiring Systems. Did you find and correct the condition?	—	Go to Step 13	Go to Step 12
11	Replace the throttle body assembly. Refer to Throttle Body Assembly Replacement on page 6-1664. Did you complete the replacement?	—	Go to Step 13	—
12	Replace the ECM. Refer to Engine Control Module (ECM) Replacement on page 6-1648. Did you complete the replacement?	—	Go to Step 13	—
13	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 14
14	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