

# P0223 Throttle Position (TP) Sensor 2 Circuit High 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 high, this DTC sets.

## DTC Descriptor

This diagnostic procedure supports the following DTC. DTC P0223 Throttle Position (TP) Sensor 2 Circuit High 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 P0223 runs continuously once the above conditions are met.

## Conditions for Setting the DTC

The ECM detects the TP sensor 2 signal voltage is more than 4.8 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 determines if a condition exists.
4. This step tests the signal circuit for a short to voltage. If the scan tool displays a voltage after the TP sensor is disconnected, the circuit is shorted to a voltage.
6. 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.
7. This step tests the low reference circuit for a short to voltage.

## DTC P0223

Step	Action	Values	Yes	No
<b>Schematic Reference: Engine Controls Schematics</b> <b>Connector End View Reference: Engine Control Module (ECM) Connector</b> <b>End Views or Engine Controls Connector End Views</b>				
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 more than the specified value?	4.8 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

Step	Action	Values	Yes	No
4	<p>1. Turn OFF the ignition.</p> <p><b>Notice: Refer to Disengaging Connectors Notice on page P-8 in Cautions and Notices.</b></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. Observe the TP sensor 2 voltage parameter with a scan tool.</p> <p>Is the voltage less than the specified value?</p>	0.1 V	Go to Step 5	Go to Step 8
5	<p>Measure the voltage between the 5-volt reference circuit of the throttle position (TP) sensor and the engine control module (ECM) housing, with a DMM.</p> <p>Is the voltage more than the specified value?</p>	5.2 V	Go to Step 9	Go to Step 6
6	<p>1. Turn OFF the ignition.</p> <p>2. Remove the ECM/TCM fuse from the underhood fuse block.</p> <p><b>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.</b></p> <p>3. Measure the resistance from the low reference circuit of the TP sensor to the ECM housing with a DMM.</p> <p>Is the resistance less than the specified value?</p>	5 W	Go to Step 11	Go to Step 7

Step	Action	Values	Yes	No
7	<p>1. Install the ECM/TCM fuse into the underhood electrical center.</p> <p>2. Turn ON the ignition with the engine OFF.</p> <p>3. Measure the voltage between the low reference circuit of the TP sensor and the ECM housing.</p> <p>Is the voltage more than the specified value?</p>	1.0 V	Go to Step 13	Go to Step 10
8	<p>Test the signal 2 circuit of the TP sensor for a short to voltage. Refer to Circuit Testing and Wiring Repairs in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	—	Go to Step 16	Go to Step 12
9	<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 a short to voltage. Refer to Circuit Testing on page 8-1184 and Wiring Repairs on page 8-1189 in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	—	Go to Step 16	Go to Step 12

Step	Action	Values	Yes	No
10	<p>1. Turn OFF the ignition. 2. Disconnect the ECM. 3. Test the low reference circuit of the TP sensor for an open, or a high resistance. Refer to Circuit Testing and Wiring Repairs in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	—	Go to Step 16	Go to Step 12
11	<p>Test for shorted terminals and for poor connections at the throttle body assembly. Refer to Testing for Intermittent and Poor Connections and Connector Repairs in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	—	Go to Step 16	Go to Step 14
12	<p>Test for shorted terminals and for poor connections at the ECM. Refer to Testing for Intermittent and Poor Connections and Connector Repairs in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	—	Go to Step 16	Go to Step 15
13	<p>Important: The control module and/or the TP sensor may be damaged if the circuit is shorted to battery positive voltage. Repair the short to voltage in the low reference circuit of the TP sensor. Refer to Wiring Repairs in Wiring Systems.</p> <p>Did you complete the repair?</p>	—	Go to Step 16	—
14	<p>Replace the throttle body assembly. Refer to Throttle Body Assembly Replacement.</p> <p>Did you complete the replacement?</p>	—	Go to Step 16	—
15	<p>Replace the ECM. Refer to Engine Control Module (ECM) Replacement.</p> <p>Did you complete the replacement?</p>	—	Go to Step 16	—

Step	Action	Values	Yes	No
16	<ol style="list-style-type: none"><li>1. Clear the DTCs with a scan tool.</li><li>2. Turn OFF the ignition for 30 seconds.</li><li>3. Start the engine.</li><li>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.</li></ol> Did the DTC fail this ignition?	—	Go to Step 2	Go to Step 17
17	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

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