

## DTC P0138

### CIRCUIT DESCRIPTION

Heated oxygen sensors (HO2S) are used for fuel control and post catalyst monitoring. Each HO2S compares the oxygen content of the surrounding air with the oxygen content in the exhaust stream. The HO2S must reach operating temperature to provide an accurate voltage signal. Heating elements inside the HO2S minimize the time required for the sensors to reach operating temperature. The powertrain control module (PCM) supplies the HO2S with a reference, or bias, voltage of about **450 mV**. When the engine is first started the PCM operates in open loop, ignoring the HO2S voltage signal. Once the HO2S reaches operating temperature and closed loop is achieved, the HO2S generates a voltage within a range of **0-1,000 mV** that fluctuates above and below bias voltage. High HO2S voltage indicates a rich exhaust stream; low HO2S voltage indicates a lean exhaust stream. If the PCM detects an HO2S voltage that stays above a specified value, DTC P0138 sets for HO2S bank 1 sensor 2 or DTC P0158 sets for HO2S bank 2 sensor 2.

### DTC DESCRIPTORS

This diagnostic procedure supports the following DTCs:

- DTC P0138 HO2S Circuit High Voltage Bank 1 Sensor 2
- DTC P0158 HO2S Circuit High Voltage Bank 2 Sensor 2

### CONDITIONS FOR RUNNING THE DTC

#### Rich Test Enable:

- DTCs P0068, P0101, P0102, P0103, P0106, P0107, P0108, P0112, P0113, P0116, P0117, P0118, P0120, P0128, P0200, P0220, P0442, P0446, P0452, P0453, P0455, P0496, P1125, P1258, P1516, P2101, P2108, P2135, U0107 are not set.
- The Loop Status parameter is closed.
- The Ignition 1 Signal parameter is between **10-18 volts**.
- The **Fuel Tank** Level Remaining parameter is more than **10 percent**.
- The TP Indicated Angle parameter is between **3-70 percent** more than the value observed at idle.
- The above conditions are met for **2 seconds**.
- This diagnostic runs continuously once the above conditions are met.

#### Decel. Fuel Cutoff Test Enable:

- DTCs P0068, P0101, P0102, P0103, P0106, P0107, P0108, P0112, P0113, P0116, P0117, P0118, P0120, P0128, P0200, P0220, P0442, P0446, P0452, P0453, P0455, P0496, P1125, P1258, P1516, P2101, P2108, P2135, U0107 are not set.
- The Loop Status parameter is closed.
- The Ignition 1 Signal parameter is between **10-18 volts**.
- The **Fuel Tank** Level Remaining parameter is more than **10 percent**.
- The Engine Run Time parameter is more than **30 seconds**.
- The Decel. Fuel Cutoff parameter is active for more than **10 seconds**.
- This diagnostic runs continuously once the above conditions are met.

### CONDITIONS FOR SETTING THE DTC

#### Rich Test

The PCM detects that the affected HO2S voltage parameter is more than **950 mV** for **200 seconds**.

#### Decel. Fuel Cutoff Test

The PCM detects that the affected HO2S voltage parameter is more than **480 mV** for **5 seconds**.

### 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 3 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.

**TEST DESCRIPTION**

Step	Action	Value(s)	Yes	No
1	Did you perform the Diagnostic System Check – Vehicle?	—	Go to Step 2	Go to <a href="#">JIS1031K</a> System Check - Vehicle in Vehicle DTC Information
2	<p><b>Important</b></p> <p>With the engine running, observe the HO2S Bank 1 Sensor 1 and HO2S Bank 2 Sensor 1 voltage parameters with a scan tool. The voltage should vary from below 300 mV to above 600 mV. If the voltage is not varying, refer to DTC <a href="#">P0135</a> or <a href="#">P0136</a>.</p> <ol style="list-style-type: none"> <li>1. Start the engine.</li> <li>2. Allow the engine to reach operating temperature. Refer to Scan Tool Data List</li> <li>3. Operate the engine at 1,500 RPM for 30 seconds.</li> <li>4. While observing the affected HO2S voltage parameter with a scan tool, quickly cycle the throttle from closed throttle to wide open throttle, 3 times.</li> </ol> <p>Did the HO2S voltage parameter change more than the specified value?</p>	200 mV	Go to Step 3	Go to Step 4
3	<ol style="list-style-type: none"> <li>1. Observe the Freeze Frame/Failure Records for this DTC.</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> <p>Did the DTC fail this ignition?</p>	—	Go to Step 4	Go to <a href="#">JIS1031K</a> Conditions
4	<ol style="list-style-type: none"> <li>1. Turn OFF the ignition.</li> <li>2. Disconnect the affected heated oxygen sensor (HO2S).</li> <li>3. Turn ON the ignition, with the engine OFF.</li> <li>4. Observe the HO2S voltage parameter with a scan tool.</li> </ol> <p>Is the HO2S voltage parameter more than the specified value?</p>	800 mV	Go to Step 6	Go to Step 5
5	<p>Measure the voltage from the low signal circuit of the HO2S harness connector on the engine harness side to a good ground with a DMM.</p> <p>Is the voltage more than the specified value?</p>	2 V	Go to Step 7	Go to Step 8
6	<p><b>Important</b></p> <p>The sensor may be damaged if the circuit is shorted to a voltage source.</p> <p>Test the HO2S high signal circuit for a short to voltage.</p> <p>Did you find and correct the condition?</p>	—	Go to Step 17	Go to Step 14
7	<p>Test the HO2S low signal circuit for a short to voltage.</p> <p>Did you find and correct the condition?</p>	—	Go to Step 17	Go to Step 14

#### Steps 1-7

Step	Action	Value(s)	Yes	No
8	<ol style="list-style-type: none"> <li>1. Connect a 3-amp fused jumper wire between the high signal circuit of the HO2S harness connector on the engine harness side and a good ground.</li> <li>2. Observe the HO2S voltage parameter with a scan tool.</li> </ol> <p>Is the HO2S voltage parameter less than the specified value?</p>	100 mV	Go to Step 9	Go to Step 11
9	<ol style="list-style-type: none"> <li>1. Remove the jumper wire from the previous step.</li> <li>2. Connect a 3-amp fused jumper wire between the high signal circuit of the HO2S harness connector on the engine harness side and the low signal circuit of the HO2S harness connector on the engine harness side.</li> <li>3. Observe the HO2S voltage parameter with a scan tool.</li> </ol> <p>Is the HO2S voltage parameter less than the specified value?</p>	100 mV	Go to Step 12	Go to Step 10
10	<p>Test the HO2S low signal circuit for an open or high resistance.</p> <p>Did you find and correct the condition?</p>	—	Go to Step 17	Go to Step 14
11	<p>Test the HO2S high signal circuit for an open or high resistance.</p> <p>Did you find and correct the condition?</p>	—	Go to Step 17	Go to Step 14
12	<ol style="list-style-type: none"> <li>1. The HO2S may be detecting a rich exhaust condition or may be contaminated. Inspect for the following conditions: <ul style="list-style-type: none"> <li>o <b>Notice</b></li> </ul> <p>Refer to Silicon Contamination of Heated Oxygen Sensors Notice in Service Precautions.</p> <p>A silicon contaminated HO2S</p> <ul style="list-style-type: none"> <li>o Any water intrusion into the HO2S connector</li> <li>o Engine oil contaminated with fuel</li> <li>o An evaporative emission (EVAP) canister purge condition</li> <li>o An incorrect fuel pressure—Refer to <a href="#">P0174</a></li> <li>o Any rich fuel injectors—Refer to <a href="#">P0171</a> Injector Balance Test with Tech 2 .</li> <li>o An inaccurate mass air flow (MAF) sensor—Refer to <a href="#">P0171</a> Tool Data List .</li> <li>o An air intake restriction or collapsed air intake duct</li> </ul> </li> <li>2. Repair any of the above or similar engine conditions as necessary.</li> </ol> <p>Did you find and correct the condition?</p>	—	Go to Step 17	Go to Step 13
13	<p>Test for shorted terminals and for poor connections at the HO2S.</p> <p>Did you find and correct the condition?</p>	—	Go to Step 17	Go to Step 15
14	<p>Test for shorted terminals and for poor connections at the powertrain control module (PCM).</p> <p>Did you find and correct the condition?</p>	—	Go to Step 17	Go to Step 16

**Steps 8-14**

Step	Action	Value(s)	Yes	No
15	Replace the affected HO2S. Did you complete the replacement?	—	Go to Step 17	—
16	Replace the PCM. Did you complete the replacement?	—	Go to Step 17	—
17	<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 18
18	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	—	Go to <a href="#">Diagnostic Trouble Code (DTC) List - Vehicle in Vehicle DTC Information</a>	System OK

#### Steps 15-18

The number below refers to the step number on the diagnostic table.

2. If the voltage does not change more than the specified value, the condition is present.