

P0138 or P0158 HO2S Circuit High Voltage

Circuit Description

The engine control module (ECM) supplies a voltage near 450 mV between the heated oxygen sensor (HO2S) high signal circuit and the low reference circuit. The HO2S varies the voltage over a range from about 1,000 mV when the exhaust is rich, down through about 10 mV when the exhaust is lean.

The ECM monitors and stores the HO2S voltage information. The ECM evaluates the HO2S voltage samples in order to determine the amount of time that the HO2S voltage was out of range. The ECM compares the stored HO2S voltage samples taken within each sample period and determines if the majority of the samples are out of the operating range. The ECM monitors the HO2S voltage for being fixed above a predetermined voltage. If the ECM detects the voltage is too high, this DTC sets.

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

- The engine is operating for more than 2 minutes.
- The ignition 1 voltage is more than 10.5 volts.
- The HO2S heater is at operating temperature.
- The calculated exhaust temperature is between 250–800°C (482–1,472°F).
- DTC P0138 and P0158 run continuously once the above conditions are met.

Conditions for Setting the DTC

- The ECM detects that the HO2S signal voltage is more than 1,050 mV.
- The condition exists for more than 5.1 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 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.
- The rear HO₂S will not go into closed loop when the engine is idling. Once the HO₂S are at operating temperature, and the vehicle is moving, the rear HO₂S will go into closed loop.
- 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 the condition exists. If there is an HO₂S circuit condition, the HO₂S voltage will be more than the specified value.
4. This step isolates the condition. If the voltage is more than the specified with

- the engine OFF, this indicates there is a circuit condition.
5. This step isolates if the condition is with the signal circuit or the low reference circuit of the HO2S. If the signal circuit voltage is within the specified range, the low reference circuit is short to a voltage.
 8. This step test for a fuel system that is operating rich.
 9. This step inspects the harness connector for water intrusion. Moisture in a connector may cause voltage to bleed to other circuits.
 10. This step inspects the harness connector for water intrusion. Moisture in a connector may cause voltage to bleed to other circuits.

DTC P0138 or P0158

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	<p>Important: DTC P0138 is for bank 1 sensor 2 and DTC P0158 is for bank 2 sensor 2</p> <ol style="list-style-type: none"> 1. Allow the engine to reach operating temperature. 2. Observe the appropriate HO2S voltage parameter with a scan tool. <p>Is the voltage more than the specified value?</p>	1050 mV	Go to Step 4	Go to Step 3

Step	Action	Values	Yes	No
3	<p>1. Observe the Freeze Frame/Failure Records for this DTC.</p> <p>2. Turn OFF the ignition for 30 seconds.</p> <p>3. Start the engine.</p> <p>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.</p> <p>Did the DTC fail this ignition?</p>	—	Go to Step 4	Go to Diagnostic Aids
4	<p>1. Turn OFF the engine.</p> <p>2. Turn ON the ignition, with the engine OFF.</p> <p>3. Observe the appropriate HO2S voltage parameter with a scan tool.</p> <p>Is the voltage more than the specified value?</p>	1050 mV	Go to Step 5	Go to Step 8
5	<p>1. Disconnect the appropriate heated oxygen sensor (HO2S).</p> <p>2. Measure the voltage from the signal circuit of the HO2S and a good ground.</p> <p>Is the voltage within the specified range?</p>	350–550 mV	Go to Step 6	Go to Step 7
6	<p>Important: The engine control module (ECM) may be damaged if the circuit is shorted to B+. Test the low reference circuit of the HO2S 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 13	Go to Step 10

Step	Action	Values	Yes	No
7	<p>Important: The HO2S may be damaged if the circuit is shorted to B+.</p> <p>Test the signal circuit of the HO2S for a short to voltage. Refer to Circuit Testing and Wiring Repairs on page 8-1189 in Wiring Systems. Did you find and correct the condition?</p>	—	Go to Step 13	Go to Step 10
8	<p>Test or inspect for the following conditions:</p> <ul style="list-style-type: none"> • Evidence of water intrusion into the electrical connector of the HO2S • A fuel pressure that is too high—Refer to Fuel System Diagnosis on page 6-1617. • An injector that is too rich—Refer to Fuel Injector Balance Test with Special Tool on page 6-1623. • An injector that is leaking—Refer to Fuel Injector Balance Test with Special Tool on page 6-1623. <p>Did you find and correct the condition?</p>	—	Go to Step 13	Go to Step 9
9	<p>Test for shorted terminals and poor connections at the HO2S. 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
10	<p>Test for shorted terminals and poor connections at the ECM. 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 12

Step	Action	Values	Yes	No
11	Replace the HO2S. Refer to the appropriate procedure: <ul style="list-style-type: none"> • Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 2 • Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 2 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