

# P0135 or P0155 HO2S Heater Performance

## Circuit Description

The heated oxygen sensor (HO2S) heater reduces the time required for the oxygen sensor to reach operating temperature and maintains the operating temperature during extended idle periods. When the ignition is turned to the ON position, ignition voltage is supplied directly to the sensor heater. The engine control module (ECM) controls the heater operation by first modulating the control circuit to ground when the sensors are cold. This prevents the possibility of thermal shock to the sensor, from condensation build-up on the sensor, by controlling the sensors rate of heating. After a predetermined amount of time, the ECM commands the heaters ON continuously. Once the sensor reaches operating temperature, the ECM may modulate the heater control circuit to ground, to maintain a desired temperature.

The ECM measures the HO2S sensing cell internal resistance. If the ECM detects that the HO2S sensing cell internal resistance is too high, this DTC sets.

## DTC Descriptors

This diagnostic procedure supports the following DTCs.

- DTC P0135 HO2S Heater Performance Bank 1 Sensor 1
- DTC P0155 HO2S Heater Performance Bank 2 Sensor 1

## Conditions for Running the DTC

### Conditions 1

- Before the ECM can report DTC P0135 or P0155 failed, DTCs P0030, P0031, P0032, P0050, P0051, P0052, P0101, P0102, P0103, P0121, P0122, P0123, P0131, P0132, P0151, P0152, P0221, P0222, P0223, P0335, P0336, P0338, P2237, P2240, P2243, P2247, P2251, and P2254 must run and pass.
- DTC P167A or P167B are not set.
- The ignition 1 voltage is between 10.5–18 volts.
- The HO2S is at operating temperature.
- The ECM internal sensing element resistance test is enabled.

- DTC P0135 and P0155 run continuously once the above conditions are met.

### Conditions 2

- Before the ECM can report DTC P0135 or P0155 failed, DTCs P0030, P0031, P0032, P0050, P0051, P0052, P0101, P0102, P0103, P0121, P0122, P0123, P0131, P0132, P0151, P0152, P0221, P0222, P0223, P0335, P0336, P0338, P2237, P2240, P2243, P2247, P2251, and P2254 must run and pass.
- DTC P167A or P167B are not set.
- The ignition 1 voltage is between 10.5–18 volts.
- The ECM internal sensing element resistance test is enabled.
- The fuel injectors are not disabled.
- If the engine is operating and then the ignition is turned Off, the engine must be Off for at least 5 minutes before the next start-up for the diagnostic to run.
- The HO2S is at operating temperature.
- DTC P0135 and P0155 run continuously once the above conditions are met.

## Conditions for Setting the DTC

### Conditions 1

- The internal ECM HO2S sensing element resistance is less than a predetermined threshold.
- The condition exists for more than 15 seconds.

### Conditions 2

- The ECM detects that the calculated HO2S temperature is more than a predetermined threshold.
- The condition exists for more than 1.0 minutes.

### 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 front wide band sensors do not toggle or switch like a switching HO2S. The front HO2S signals will be relatively stable for an idling engine.
- For an intermittent condition, refer to Intermittent Conditions on page 6-1587.
- The following table illustrates the typical voltages for the HO2S circuits:

### HO2S Voltages

• Ignition On, Engine Off • HO2S Disconnected	
HO2S Circuit	Voltage
Heater Control	4.6–5.0 V
Heater Supply Voltage	B+
Reference Voltage	2.6–3.1 V
Low Reference	2.2–2.7 V
Pump Current	Less than 0.5
Input Pump Current	Less than 0.5

### Test Description

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

2. This step determines if the condition exists. If there is an HO2S circuit condition, the ECM commands open loop for the applicable sensor.
4. This step tests for a bias voltage across the reference voltage circuit and the low reference circuit of the HO2S. The bias voltage that you are measuring, is the voltage difference between the reference voltage circuit and the low reference circuit. If there is a condition with the reference voltage circuit or the low reference circuit of the HO2S, the bias voltage will be more than or less than the specified value.
5. This step is testing the ignition 1 voltage circuit of the HO2S for high resistance. If the voltage at the test lamp probe is not B+, there is a high resistance condition with the circuit.
10. This step inspects the harness connector for water intrusion, corrosion, and bent or damaged pins.
11. This step inspects the harness connector for water intrusion, corrosion, and bent or damaged pins.

## DTC P0135 or P0155

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	<b>Important: DTC P0135 is for bank 1 sensor 1 and DTC P0155 is for bank 2 sensor 1</b> 1. Allow the engine to reach operating temperature. 2. Observe the Loop Status Bn. 1 Sen. 1 or Loop Status Bn. 2 Sen. 1 with a scan tool. Does the scan tool display Closed Loop?	—	Go to Step 3	Go to Step 4

Step	Action	Values	Yes	No
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 5 minutes.</li> <li>3. Start the engine.</li> <li>4. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text or as close to the Freeze Frame/Failure Records that you observed.</li> </ol> <p>Does the DTC fail this ignition?</p>	—	Go to Step 4	Go to Intermittent Conditions
4	<ol style="list-style-type: none"> <li>1. Turn OFF the ignition.</li> <li>2. Disconnect the appropriate heated oxygen sensor (HO2S).</li> <li>3. Turn ON the ignition, with the engine OFF.</li> <li>4. Measure the voltage between the reference voltage circuit and the low reference circuit of the HO2S with a DMM.</li> </ol> <p>Is the voltage within the specified range?</p>	350–550 mV	Go to Step 5	Go to Step 7
5	<p><b>Important: Use the J 35616-200 Test Lamp kit for this test.</b> If the J 35616-200 is not available, use a test lamp that measures more than 20 ohms.</p> <ol style="list-style-type: none"> <li>1. Connect a test lamp between the ignition 1 voltage circuit of the HO2S and a good ground.</li> <li>2. Measure the voltage between the probe of the test lamp and a good ground with a DMM. Refer to Measuring Voltage Drop in Wiring Systems.</li> </ol> <p>Is the voltage at the specified value?</p>	B+	Go to Step 6	Go to Step 12

Step	Action	Values	Yes	No
6	Test the heater control circuit of the HO2S for high resistance. Refer to Circuit Testing in Wiring Systems. Did you find and correct the condition?	—	Go to Step 15	Go to Step 11
7	Measure the voltage between the reference voltage circuit of the HO2S and a good ground. Refer to Circuit Testing in Wiring Systems. Is the voltage less than the specified value?	3.5 V	Go to Step 8	Go to Step 9
8	Test the low reference circuit of the HO2S for an open, for high resistance, or for a short to the reference voltage circuit. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 15	Go to Step 10
9	Test the reference voltage circuit of the HO2S for a short to voltage. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 15	Go to Step 11
10	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?	—	Go to Step 15	Go to Step 13
11	Test for shorted terminals and poor connections at the engine control module (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 15	Go to Step 14

Step	Action	Values	Yes	No
12	Repair the high resistance in the ignition 1 voltage circuit of the HO2S. Refer to Wiring Repairs in Wiring Systems. Did you complete the repair?	—	Go to Step 15	—
13	Replace the HO2S. Refer to appropriate procedure: • Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 1 • Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 1 Did you complete the replacement?	—	Go to Step 15	—
14	Replace the ECM. Refer to Engine Control Module (ECM) Replacement on page 6-1648. Did you complete the replacement?	—	Go to Step 15	—
15	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 16
16	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