

DTC	P0037	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)
------------	--------------	---

DTC	P0038	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)
------------	--------------	--

HINT:

Sensor 2 refers to the sensor mounted behind the Three-Way Catalytic Converter (TWC) and located far from the engine assembly.

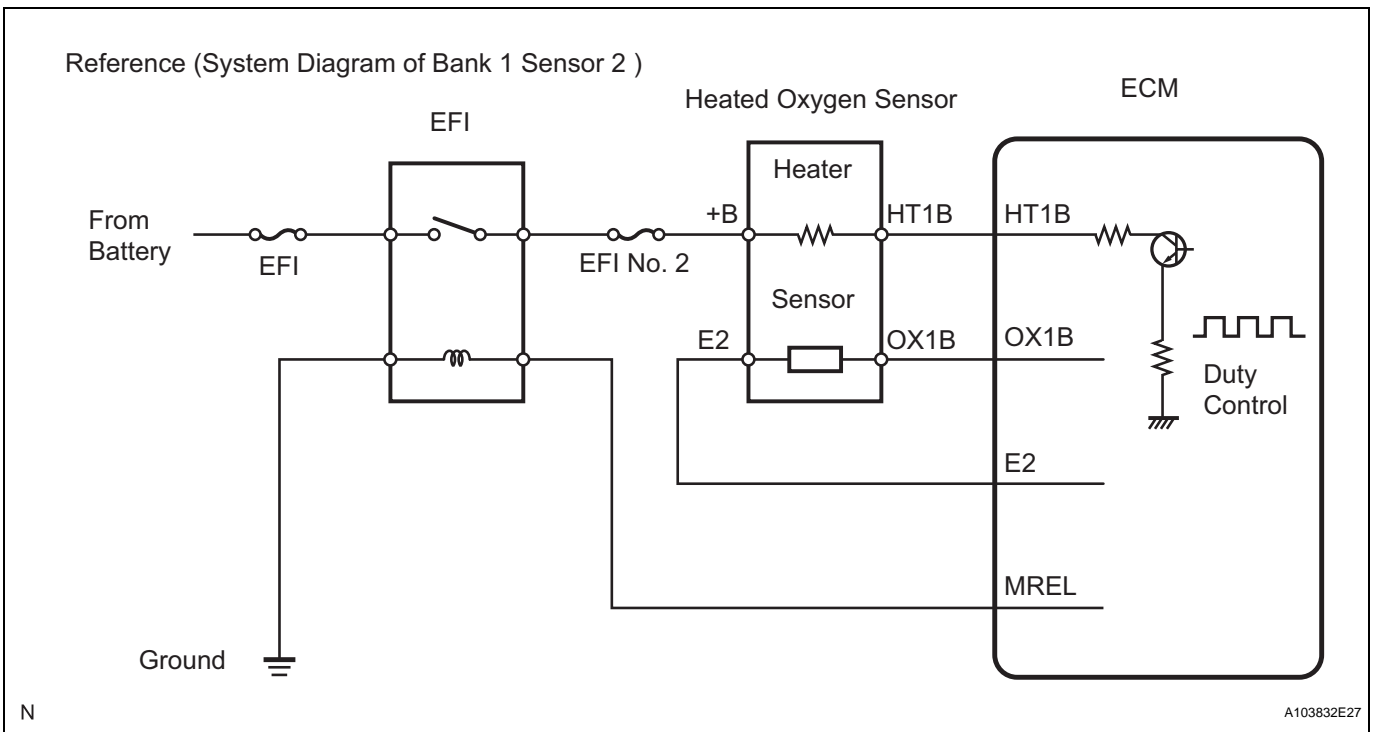
DESCRIPTION

Refer to DTC P0136 (See page [ES-126](#)).

HINT:

- When either of these DTCs are set, the ECM enters fail-safe mode. The ECM turns off the Heated Oxygen (HO₂) sensor heater in fail-safe mode. Fail-safe mode continues until the ignition switch is turned to OFF.
- The ECM provides a pulse width modulated control circuit to adjust the current through the heater. The HO₂ sensor heater circuit uses a relay on the B+ side of the circuit.

ES



DTC No.	DTC Detection Conditions	Trouble Areas
P0037	Heated Oxygen (HO ₂) sensor heater current less than 0.3 A (1 trip detection logic)	<ul style="list-style-type: none"> • Open or short in HO₂ sensor heater circuit • HO₂ sensor heater • EFI relay • ECM
P0038	Heated Oxygen (HO ₂) sensor heater current more than 2 A (1 trip detection logic)	<ul style="list-style-type: none"> • Open or short in HO₂ sensor heater circuit • HO₂ sensor heater • EFI relay • ECM

MONITOR DESCRIPTION

The sensing portion of the Heated Oxygen (HO₂) sensor has a zirconia element which is used to detect the oxygen concentration in the exhaust gas. If the zirconia element is at the appropriate temperature, and the difference between the oxygen concentrations surrounding the inside and outside surfaces of the sensor is large, the zirconia element generates voltage signals. In order to increase the oxygen concentration detecting capacity of the zirconia element, the ECM supplements the heat from the exhaust with heat from a heating element inside the sensor. When the current in the sensor heater is outside the standard operating range, the ECM interprets this as a malfunction in the sensor heater and sets a DTC. Example:

The ECM sets DTC P0038 when the current in the HO₂ sensor heater is more than 2 A. Conversely, when the heater current is less than 0.3 A, DTC P0037 is set.

MONITOR STRATEGY

Related DTCs	P0037: Heated oxygen sensor heater range check (Low current) P0038: Heated oxygen sensor heater range check (High current)
Required Sensors/Components (Main)	Heated oxygen sensor heater
Required Sensors/Components (Related)	Vehicle speed sensor
Frequency of Operation	Continuous
Duration	P0037: 0.5 seconds P0038: 0.3 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

P0037:

Monitor runs whenever following DTCs not present	None
Battery voltage	10.5 V or more
All heaters turned OFF and intrusive heating operated when following conditions met:	(a) and (b)
(a) Heater	ON
(b) Heater current	Less than 0.3 A

P0038 Case 1:

Monitor runs whenever following DTCs not present	None
Battery voltage	10.5 V or more
Engine	Running
Starter	OFF
Intrusive operating	Not operating

P0038 Case 2:

Monitor runs whenever following DTCs not present	None
Battery voltage	10.5 V or more
All heaters turned OFF and intrusive heating operated when following conditions met:	(a) and (b)
(a) Heater	ON
(b) Heater current	More than 2 A

TYPICAL MALFUNCTION THRESHOLDS

P0037:

Heated oxygen sensor heater current during intrusive heating	Less than 0.3 A
--	-----------------

P0038 Case 1:

Heated oxygen sensor heater current	More than 2 A
-------------------------------------	---------------

P0038 Case 2:

Heated oxygen sensor heater current during intrusive heating	2 A or more
--	-------------

COMPONENT OPERATING RANGE

Heated Oxygen (HO2) sensor heater current	0.4 to 1 A (when engine idles, HO2 sensor warmed up and battery voltage 11 to 14 V)
---	---

WIRING DIAGRAM

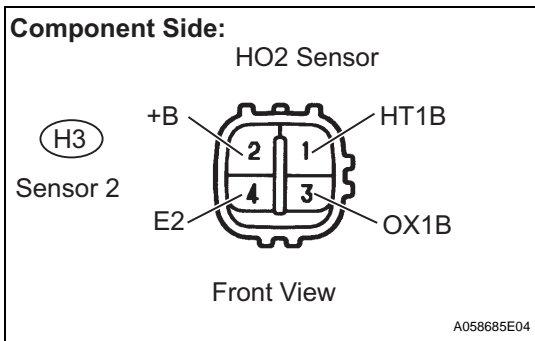
Refer to DTC P0136 (See page [ES-133](#)).

HINT:

- If other DTCs relating to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using a intelligent tester. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data, from the time the malfunction occurred.

ES

1 INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE)



- Disconnect the H3 Heated Oxygen (HO2) sensor connector.
- Measure the resistance between the terminals of the HO2 sensor connector.

Standard Resistance

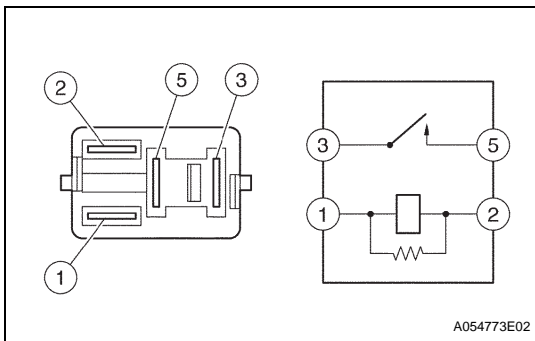
Tester Connections	Specified Conditions
HT1B (1) - +B (2)	11 to 16 Ω at 20°C (68°F)
HT1B (1) - E2 (4)	10 k Ω or higher

- Reconnect the HO2 sensor connector.

NG **REPLACE HEATED OXYGEN SENSOR**

OK

2 INSPECT EFI RELAY



- Remove the EFI relay from the engine room R/B.
- Check the EFI relay resistance.

Standard Resistance

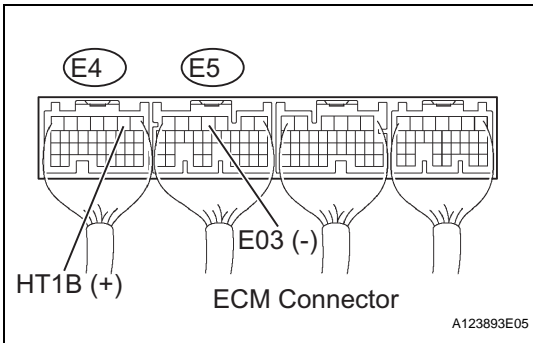
Tester Connections	Specified Conditions
3 - 5	10 k Ω or higher
3 - 5	Below 1 Ω (when battery voltage applied to terminals 1 and 2)

- Reinstall the EFI relay.

NG **REPLACE EFI RELAY**

OK

3 INSPECT ECM (HT1B VOLTAGE)



- (a) Turn the ignition switch to ON.
- (b) Measure the voltage between the terminals of the ECM connectors.

Standard Voltage

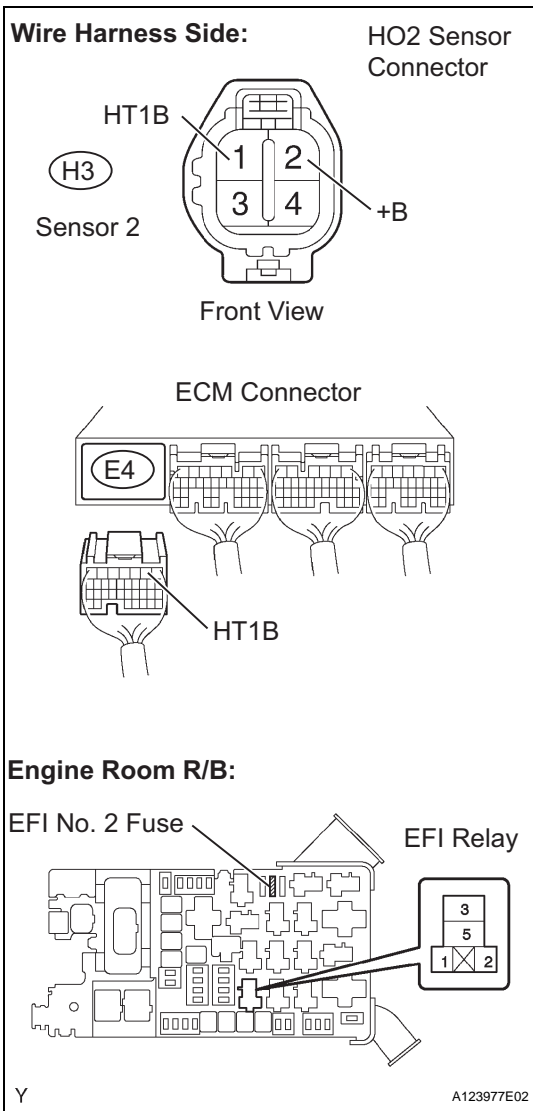
Tester Connections	Specified Conditions
HT1B (E4-2) - E03 (E5-4)	9 to 14 V

OK **REPLACE ECM**

ES

NG

4 CHECK HARNESS AND CONNECTOR (HEATED OXYGEN SENSOR - ECM, HEATED OXYGEN SENSOR - EFI RELAY)



- (a) Check the harness and connectors between the ECM and HO2 sensor.

- (1) Disconnect the H3 HO2 sensor connector.
- (2) Disconnect the E4 ECM connector.
- (3) Check the resistance.

Standard Resistance (Check for open):

Tester Connections	Specified Conditions
HT1B (H3-1) - HT1B (E4-2)	Below 1 Ω

Standard Resistance (Check for short)

Tester Connections	Specified Conditions
HT1B (H3-1) or HT1B (E4-2) - Body ground	10 kΩ or higher

- (4) Reconnect the HO2 sensor connector.
- (5) Reconnect the ECM connector.

- (b) Check the harness and connector between the HO2 sensor and EFI relay.

- (1) Inspect the EFI No. 2 fuse.
 - Remove the EFI No. 2 fuse from the engine room R/B.
 - Check the EFI No. 2 fuse resistance.

Standard Resistance:

Below 1 Ω

- Reinstall the EFI No. 2 fuse.
- (2) Disconnect the H3 HO2 sensor connector.
- (3) Remove the EFI relay from the engine room R/B.
- (4) Check the resistance.

Standard Resistance (Check for open)

Tester Connections	Specified Conditions
+B (H3-2) - EFI relay (3)	Below 1 Ω

Standard Resistance (Check for short)

Tester Connections	Specified Conditions
+B (H3 - 2) or EFI relay (3) - Body ground	10 k Ω or higher

- (5) Reconnect the HO2 sensor connector.
- (6) Reinstall the EFI relay.

NG**REPAIR OR REPLACE HARNESS OR CONNECTOR****OK****REPLACE ECM****ES**