

DTC	P0420	Catalyst System Efficiency Below Threshold (Bank 1)
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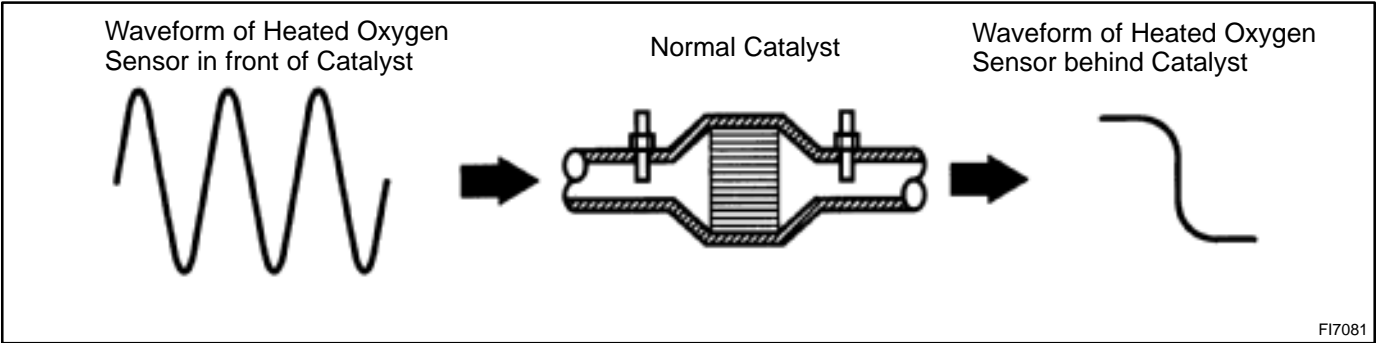
CIRCUIT DESCRIPTION

The ECM compares the waveform of the heated oxygen sensor located in front of the catalyst with the waveform of the heated oxygen sensor located behind the catalyst to determine whether or not catalyst performance has deteriorated.

Air–fuel ratio feedback compensation keeps the waveform of the heated oxygen sensor in front of the catalyst repeatedly changing back and forth from rich to lean.

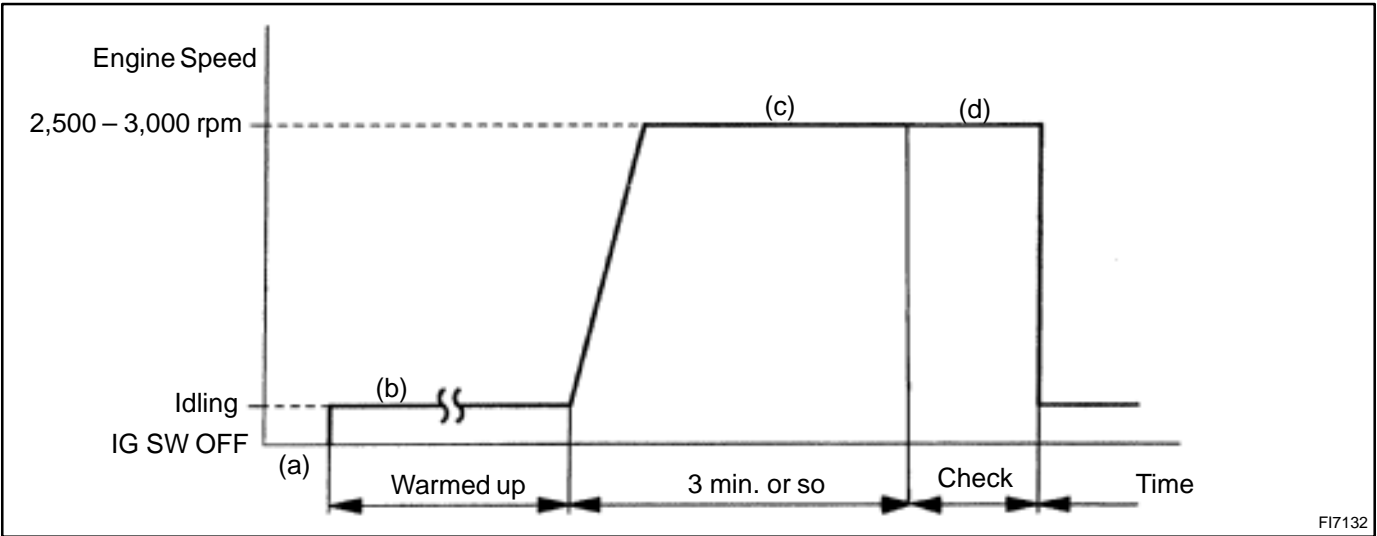
If the catalyst is functioning normally, the waveform of the heated oxygen sensor behind the catalyst switches back and forth between rich and lean much more slowly than the waveform of the heated oxygen sensor in front of the catalyst.

But when both waveforms change at a similar rate, it indicates that catalyst performance has deteriorated.

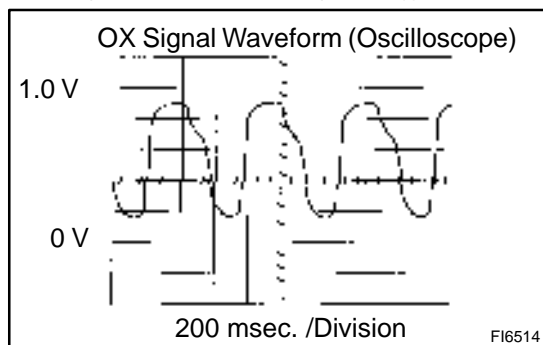


DTC No.	DTC Detection Condition	Trouble Area
P0420	After engine and catalyst are warmed up, and while vehicle is driven within set vehicle and engine speed range, waveforms of oxygen sensors (bank 1 sensor 1 and bank 1 sensor 2) have same amplitude (2 trip detection logic)	<ul style="list-style-type: none"><li>• Gas leakage on exhaust system</li><li>• Heated oxygen sensor</li><li>• Three–way catalytic converter</li></ul>

CONFIRMATION ENGINE RACING PATTERN



- Connect the TOYOTA hand-held tester to the DLC3, or connect the probe of the oscilloscope between terminals OX1A, OX1B, OX2A and E1 of the ECM connector.
- Start the engine and warm it up with all the accessories switched OFF until water temperature is stable.
- Race the engine at 2,500 – 3,000 rpm for about 3 min.
- After confirming that the waveforms of the heated oxygen sensor (bank 1, 2 sensor 1 (OX1A, OX2A)), oscillate around 0.5 V during feedback to the ECM, check the waveform of the heated oxygen sensor (bank 1 sensor 2 (OX1B)).

**HINT:**

- If there is a malfunction in the system, the waveform of the heated oxygen sensor (bank 1 sensor 2 (OX1B)), is almost the same as that of the heated oxygen sensor (bank 1, 2 sensor 1 (OX1A, OX2A)), on the left.
- There are some cases where, even though a malfunction exists, the MIL may either light up or not light up.

**INSPECTION PROCEDURE****HINT:**

Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

**1****Are there any other codes (besides DTC P0420) being output?****YES****Go to relevant DTC chart (See page [DI-14](#)).****NO****2****Check gas leakage on exhaust system.****NG****Repair or replace.****OK****3****Check heated oxygen sensor (bank 1, 2 sensor 1) (See page [DI-47](#)).****NG****Repair or replace.**

OK

4	Check heated oxygen sensor (bank 1 sensor 2) (See page <a href="#">DI-56</a> ).
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NG	Repair or replace.
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OK

Replace three-way catalytic converter.