Catalyst Deterioration Monitor

Ca002–01

Catalyst Deterioration Monitor Description

MODEL YEAR APPLICATION TABLE

Two different catalyst systems have been used in Toyota and Lexus vehicles since the introduction of OBD ll in 1996. Use the table below to determine which system is used on each model.

A: Front and rear heated oxygen sensor equipped

B: Front A/F sensor and rear heated oxygen sensor equipped

Engine Family	1996 MY	1997 MY	1998 MY	1999 MY	2000 MY	2001 MY	2002 MY	2003 MY	2004 MY
4A–FE and 7A–FE	A	A	–	–	–	–	–	–	
1AZ–FE and 2AZ–FE	–	–	–	–	–	B	B	B	
5E–FE	A	A	A	A	–	–	–	–	
1FZ–FE	A	A	–	–	–	–	–	–	
1GR–FE	–	–	–	–	–	–	–	B	
2JZ–GE	A	A	A	A	A	A	A	A	
2JZ–GTE	A	A	A	–	–	–	–	–	
1MZ–FE Avalon	A	A	A (Fed.) B (Calif.)	A (Fed.) B (Calif.)	A (Fed.) B (Calif.)	B	B	B	
1MZ–FE (A/T) Camry	A	A	A (Fed.) B (Calif.)	A (Fed.) B (Calif.)	A (Fed.) B (Calif.)	B	B	B	
1MZ–FE (M/T) Camry	A	A	A	A	A	A	–	–	
1MZ–FE ES300	A	A	A (Fed.) B (Calif.)	B	B	B	B	B	
1MZ–FE Highlander	–	–	–	–	–	B	B	B	
1MZ–FE RX300	–	–	–	B	B	B	B	B	
1MZ–FE Sienna	–	–	A	A (Fed.) B (Calif.)	A (Fed.) B (Calif.)	B	B	B	
1MZ–FE (A/T) Solara	–	–	–	A (Fed.) B (Calif.)	A (Fed.) B (Calif.)	B	B	B	
1MZ–FE (M/T) Solara	–	–	–	A	A	A	A	–	
3MZ–FE	–	–	–	–	–	–	–	–	B
1NZ–FE	–	–	–	–	B	B	B	B	
2RZ–FE and 3RZ–FE	A	A	A	A	A (Fed.) B (Calif.)	B	B	B	
3S–FE	A	A	A (Fed.) B (Calif.)	A (Fed.) B (Calif.)	A (Fed.) B (Calif.)	–	–	–	
5S–FE Camry	A	A (Fed.) B (Calif.)	A (Fed.) B (Calif.)	A (Fed.) B (Calif.)	A (Fed.) B (Calif.)	A (Fed.) B (Calif.)	–	–	
5S–FE Celica	A	A	A	A	–	–	–	–	
5S–FNE Camry CNG	–	–	–	A	A	A	–	–	
2TZ–FZE	A	A	–	–	–	–	–	–	
1UZ–FE	A	A	A	A	A	–	–	–	
2UZ–FE	–	–	A	A	A	A	A	A	
3UZ–FE	–	–	–	–	–	A	A	A	
5VZ–FE 4Runner	A	A	A	A (Fed.) B (Calif.)	A (Fed.) B (Calif.)	B	B	–	
5VZ–FE Others	A	A	A	A	A (Fed.) B (Calif.)	B	B	B	
1ZZ–FE	–	–	A	A	A	A	A	A	
2ZZ–GE	–	–	–	–	A	A	A	A	

MONITOR SUMMARY

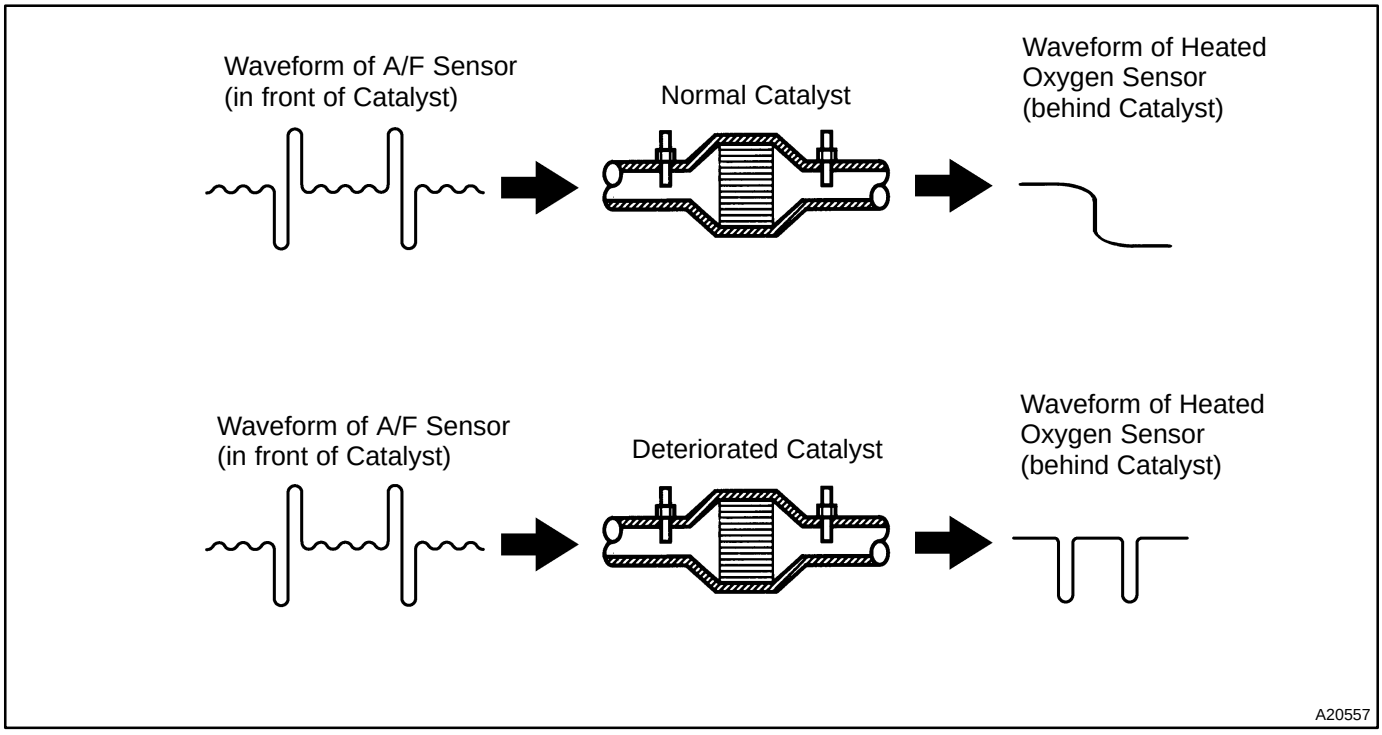
1. Vehicles equipped with an air/fuel ratio (A/F) sensor

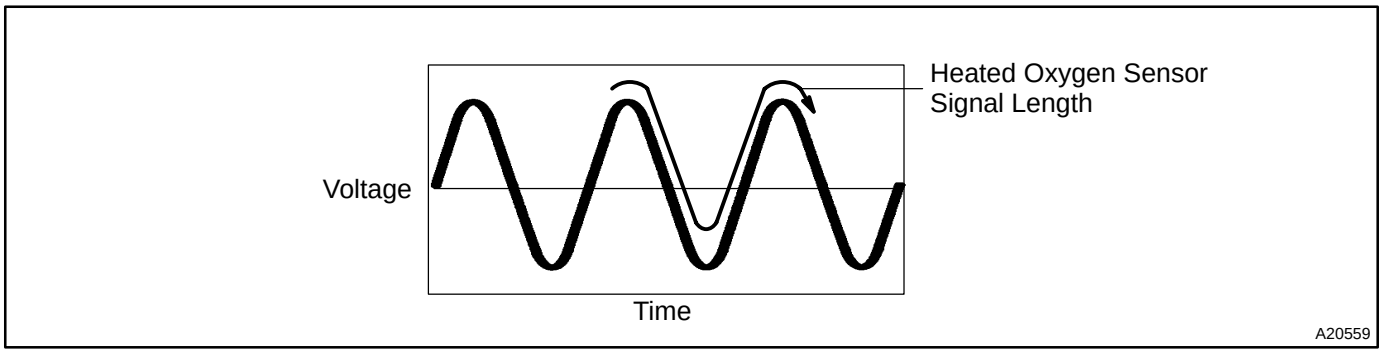
The ECM uses sensors located in front and behind the three–way catalyst (TWC) to monitor its efficiency. The first sensor, an air fuel ratio sensor (A/F sensor 1), sends pre–catalyst A/F ratio information to the ECM. The second sensor, a heated oxygen sensor (O2S) sends post–catalyst information to the ECM. The ECM compares these two signals to judge the efficiency of the catalyst and the catalyst's ability to store oxygen. During normal operation, the TWC stores and releases oxygen as needed. The capacity to store oxygen results in a low variation in the post–TWC exhaust stream as shown below.

If the catalyst is functioning normally, the waveform of the heated oxygen sensor located behind the catalyst slowly switches back and forth between rich and lean.

When the waveform of the heated oxygen sensor located behind the catalyst alternates frequently between rich and lean, it indicates that catalyst performance has deteriorated. As the catalyst efficiency degrades, its ability to store oxygen is reduced and the catalyst output becomes more variable.

When running the monitor, the ECM compares sensor 1 and sensor 2 signals over a defined period time to determine catalyst efficiency. The ECM uses the signal length of rear oxygen sensor output voltage. If the signal length is greater than the failure threshold (which varies with A/F sensor signal length), the ECM interprets this as a fault in the catalyst. The ECM will illuminate the MIL and a DTC will be set.





2. Vehicles equipped with a front heated oxygen sensor

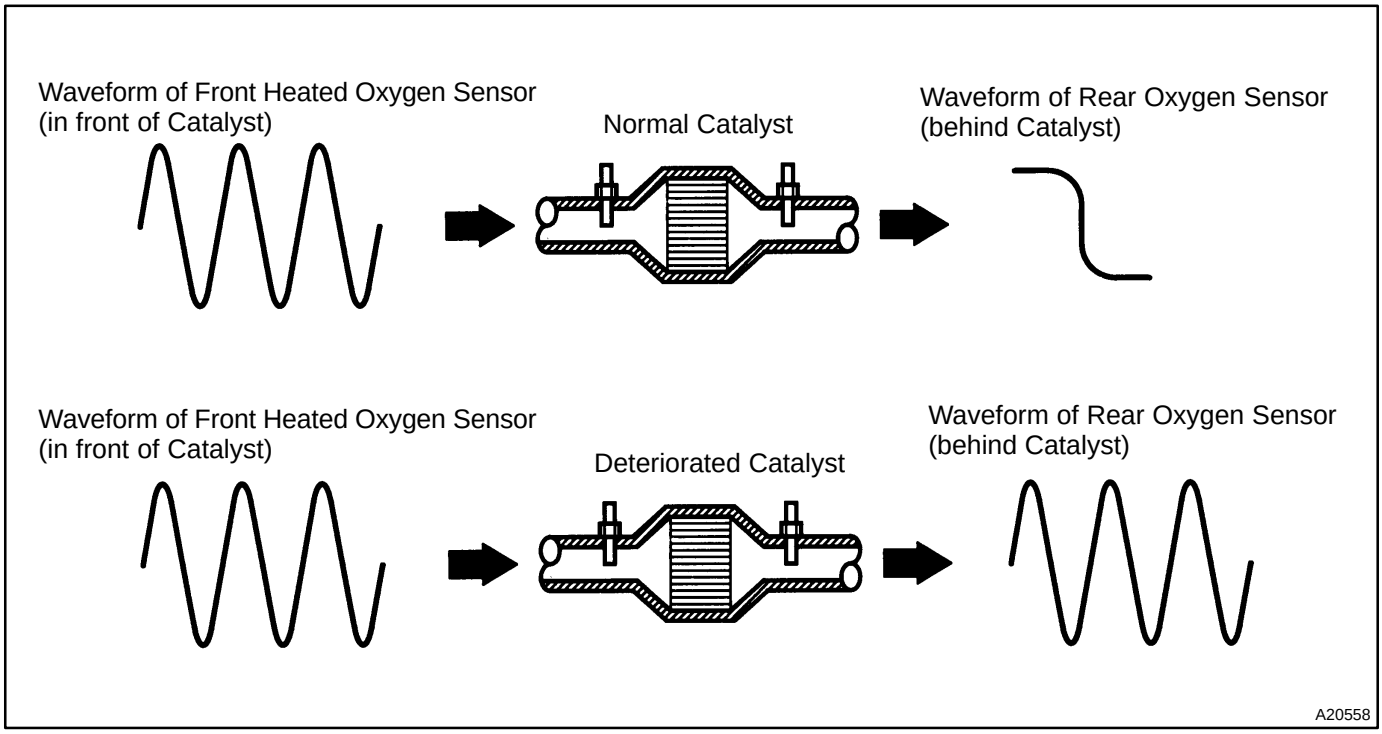
The ECM uses sensors located before and behind the three–way catalyst (TWC) to monitor its efficiency. The first sensor, a front heated oxygen sensor (sensor 1), sends pre–catalyst A/F ratio information to the ECM. The second sensor, a rear heated oxygen sensor (sensor 2), sends post–catalyst information to the ECM. The ECM compares these two signals to judge the efficiency of the catalyst and the catalyst's ability to store oxygen. During normal operation, the TWC stores and releases oxygen as needed. The capacity to store oxygen results in a low variation in the post–TWC exhaust stream as shown below.

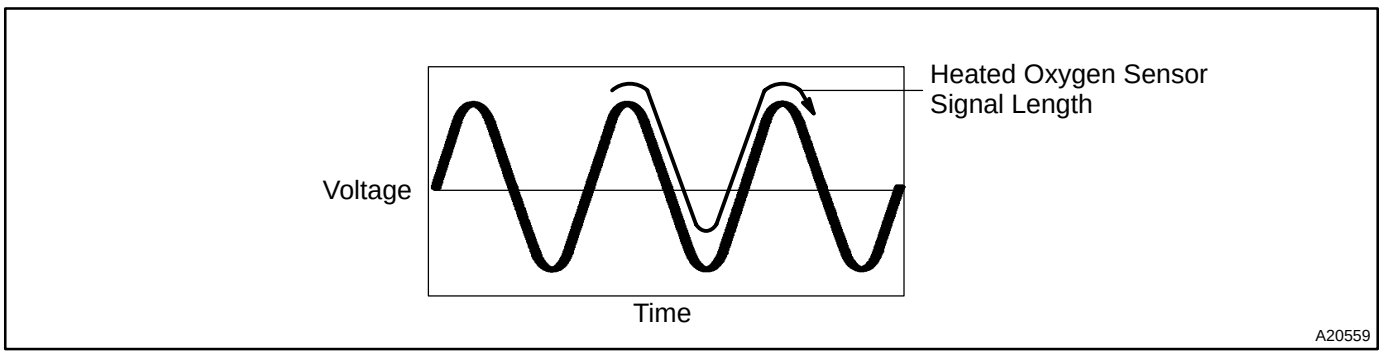
If the catalyst is functioning normally, the waveform of the heated oxygen sensor located behind the catalyst slowly switches back and forth between rich and lean.

When the waveform of the heated oxygen sensor located behind the catalyst alternates frequently between rich and lean, it indicates that catalyst performance has deteriorated. As the catalyst efficiency degrades, its ability to store oxygen is reduced and the catalyst output becomes more variable.

When running the monitor, the ECM compares sensor 1 and sensor 2 signals over a specific time to determine catalyst efficiency. The ECM begins by calculating the signal length for both sensors.

The ECM uses the signal length of front and rear oxygen sensor output voltage. If the signal length ratio of each oxygen sensor is greater than the failure threshold, the ECM interprets this as a fault in the catalyst. The ECM will illuminate the MIL and a DTC will be set.





RELATED DTC

Related DTCs	P0420 (Bank 1)	Catalyst deterioration
	P0430 (Bank 2)	

MODEL YEAR CHART

Model Year	See Page
1996	Ca–5
1997	Ca–8
1998	Ca–11
1999	Ca–15
2000	Ca–20
2001	Ca–26
2002	Ca–31
2003	Ca–37
2004	Ca–42