

Heated Oxygen Sensor Monitor Introduction

Heated Oxygen Sensor Monitor Summary

Ho00Z-01

MODEL YEAR APPLICATION TABLE

Two different heated oxygen sensor systems have been used in Toyota and Lexus vehicles since the introduction of OBD II 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 DTC TABLE

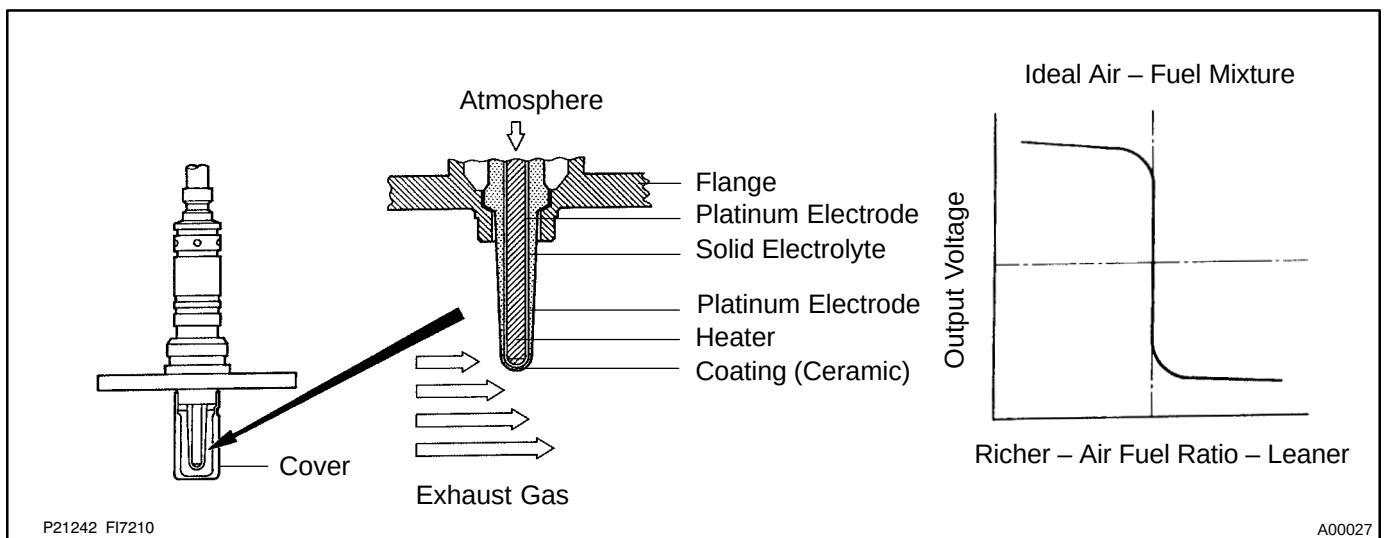
DTC		Document Title	See Page	
Extended Code	Previous Code			
P0031	P0135	Oxygen Sensor Heater Monitor Description	Ho-5	
P0032				
P0037				
P0038	P0141			
P0051				P0155
P0052				
P0057	P0161			
P0058				
P0130	P0130	Front Heated Oxygen Sensor Monitor Description	Ho-7	
P0133	P0133	Front Heated Oxygen Sensor Slow Response Monitor Description	Ho-9	
P0136	P0136	Rear Oxygen Sensor Monitor Description	Ho-12	
P0150	P0150	Front Oxygen Sensor Monitor Description	Ho-7	
P0153	P0153	Front Heated Oxygen Sensor Slow Response Monitor Description	Ho-9	
P0156	P0156	Rear Oxygen Sensor Monitor Description	Ho-12	
P2195	P0130	Front Heated Oxygen Sensor Monitor Description	Ho-7	
P2196				
P2197	P0150			
P2198				
-	P0147	Oxygen Sensor Heater Monitor Description	Ho-5	
	P0167			

GENERAL DESCRIPTION

The engine control module (ECM) uses oxygen sensor information to regulate the air/fuel ratio so that it is close to a stoichiometric ratio. This maximizes the catalytic converter's ability to purify exhaust emissions. The sensor detects oxygen levels in the exhaust emissions and sends a signal to the ECM.

The inner surface of the sensor element is exposed to outside air and the outer surface of the sensor element is exposed to exhaust emissions. The sensor element is made of platinum-coated zirconia and includes an integrated heating element. The oxygen sensor has a characteristic of changing its output voltage suddenly in the relative range of the stoichiometric air-fuel ratio. The heated oxygen sensor outputs voltage between 0 V and 1 V in response to the oxygen concentration in the exhaust emissions. When the output voltage of the heated oxygen sensor is 0.55 V or more, the ECM judges that the air/fuel ratio is RICH. When it is 0.40 V or less, the ECM judges that the air/fuel ratio is LEAN.

The oxygen sensor is equipped with a heater which heats the zirconia element. The heater is controlled by the ECM. When the intake air volume is low (the temperature of the exhaust gas is low), the current flows to the heater to heat the sensor so that the oxygen concentration can be detected accurately.



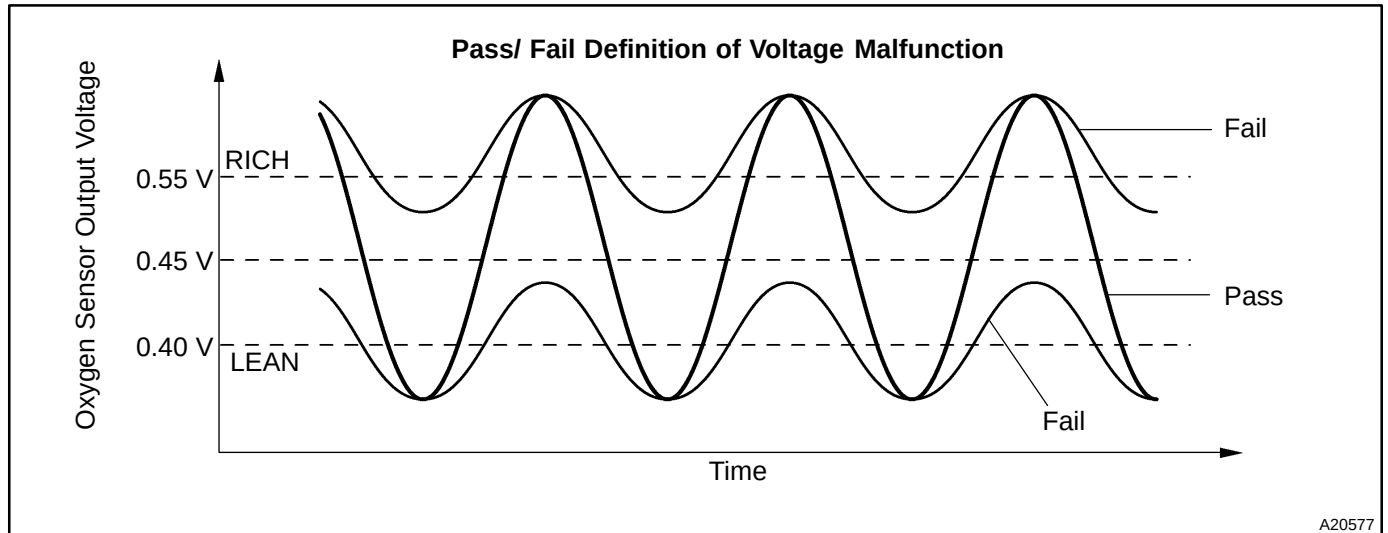
1. Oxygen Sensor Heater Monitor

When the heater current deviates from the normal operating range, the ECM interprets this as a malfunction and sets a DTC.

2. Front Heated Oxygen Sensor Monitor

The oxygen sensor has a characteristic of changing its output voltage suddenly in the relative range of the stoichiometric air–fuel ratio. The heated oxygen sensor outputs voltage between 0 V and 1 V in response to the oxygen concentration in exhaust gas. When the output voltage of the heated oxygen sensor is 0.55 V or more, the ECM judges that the air–fuel ratio is RICH. When it is 0.4 V or less, the ECM judges that the air–fuel ratio is LEAN.

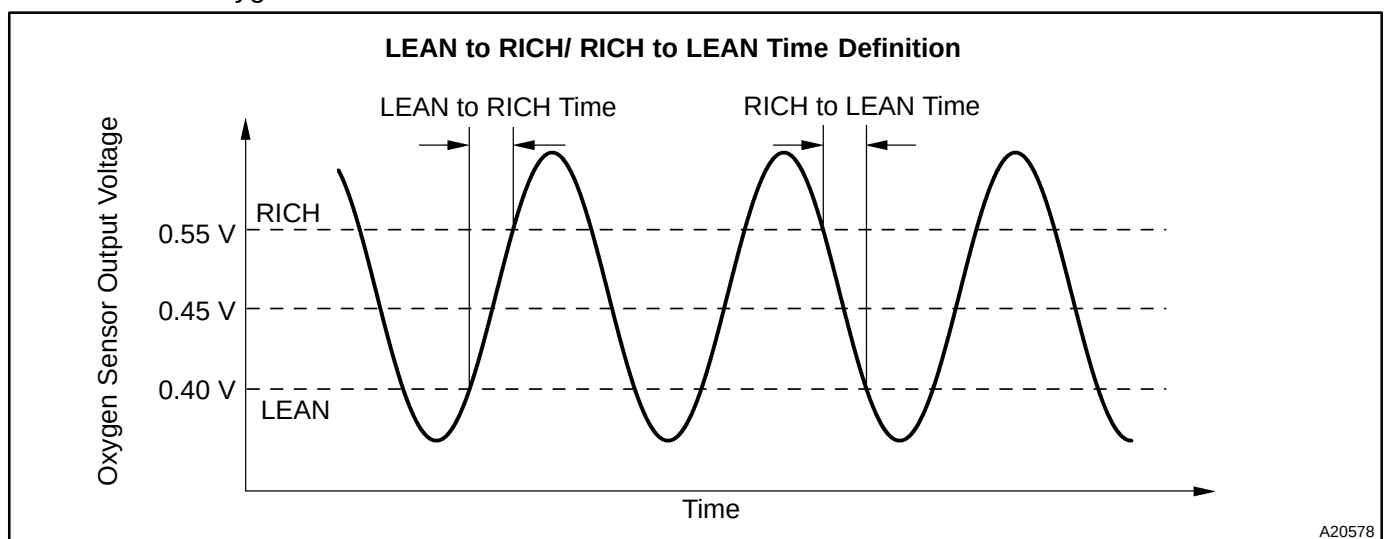
If the oxygen sensor does not output the minimum amount of necessary voltage, the ECM interprets this as a malfunction in the oxygen sensor and sets a DTC.



3. Front Heated Oxygen Sensor Response Monitor

The heated oxygen sensor generates waveforms of a voltage between 0 V and 1 V in response to the oxygen concentration in exhaust gas. When the output voltage of the heated oxygen sensor is 0.55 V or more, the ECM judges that the air–fuel ratio is RICH. When it is 0.40 V or less, the ECM judges that the air–fuel ratio is LEAN.

The ECM monitors the response feature of the oxygen sensor. If the response time of the oxygen sensor output status changes from RICH to LEAN or vice versa becomes longer, the ECM interprets this as a malfunction in the oxygen sensor and sets a DTC.



4. Rear Heated Oxygen Sensor Monitor

If the rear oxygen sensor output does not change between RICH and LEAN during “Stop and Go” driving, the ECM interprets this as a malfunction in the rear oxygen sensor and sets a DTC.