

GENERIC · POWERTRAIN

P223F

OBD-II DIAGNOSTIC TROUBLE CODE (DTC)

P223F

O2 Sensor Reference Resistance Out Of Range (Bank 2)

P223F indicates that the engine control module has detected an out-of-range reference resistance value from the bank 2 oxygen sensor circuit. The computer monitors the sensor's internal heating element and signal return path to verify that the resistance falls within the expected range for proper closed-loop fuel control.

SYSTEM	CODE TYPE	SEVERITY	FIX DIFFICULTY	AREA
Powertrain	Generic (all makes)	Medium	Intermediate	Fuel and air metering (injector circuits)

Symptoms you may notice

- Illumination of the check engine light, often with no other noticeable symptoms
- Slightly reduced fuel economy as the engine may default to open-loop operation
- Rough idle or hesitation during acceleration in some cases
- A failed emissions test due to the stored trouble code
- In rare instances, a noticeable sulfur or rotten egg smell from the exhaust

Common causes, most likely first

- 1 Faulty bank 2 oxygen sensor with an internal resistance fault in the heater circuit
- 2 Corroded, damaged, or disconnected wiring or connector at the bank 2 oxygen sensor
- 3 Open or shorted circuit in the oxygen sensor heater wiring harness
- 4 Poor ground connection for the oxygen sensor heater circuit
- 5 Engine control module internal fault affecting the sensor reference voltage
- 6 Exhaust leaks upstream of the sensor causing abnormal readings



How to diagnose and fix it

- 1 Connect a scan tool and record all stored and pending codes, then clear codes and test-drive to see if P223F returns
- 2 Visually inspect the bank 2 oxygen sensor connector and wiring for corrosion, chafing, or loose pins
- 3 Measure the resistance of the oxygen sensor heater circuit with a digital multimeter and compare to the manufacturer's specification
- 4 Check for continuity and voltage drop on the heater power and ground circuits to rule out wiring faults
- 5 If wiring is intact, replace the bank 2 oxygen sensor with a quality direct-fit unit
- 6 Clear codes and perform a road test to verify the repair and confirm the monitor runs to completion
- 7 If the code persists after sensor replacement, diagnose the engine control module and its reference voltage circuit

What Most Techs Miss on P223F

- A P223F can be set by a perfectly good oxygen sensor if the heater ground circuit has high resistance, so always check grounds before condemning the sensor.
- Some vehicles use a shared reference voltage for multiple sensors, so a fault in one sensor's circuit can affect others and set companion codes.
- The code may appear intermittently due to temperature-related resistance changes in the sensor heater, so a cold-start test is often more revealing than a warm-engine test.
- After replacing the sensor, the ECM may need to relearn the new sensor's resistance range; failing to complete a full drive cycle can leave the code pending.
- Exhaust leaks upstream of the sensor can cause the ECM to see abnormal resistance values because the sensor cannot reach operating temperature correctly.

Can I keep driving with P223F?

You can usually continue driving with P223F, but avoid aggressive acceleration and long trips until the fault is repaired. Prolonged driving may reduce fuel economy and increase emissions, and the vehicle may fail an emissions inspection.

Tools that help

- OBD-II scan tool with live data capability
- Digital multimeter
- Wiring diagram for the specific vehicle
- Socket set and oxygen sensor wrench
- Jack and jack stands or ramps



Reading P223F

- P** Powertrain: engine, transmission and emissions.
- 2** Generic (SAE) code: it means the same thing on every OBD-II vehicle.
- 2** Fuel and air metering (injector circuits).
- 3F** The exact fault within that area.

Often seen with

P0135 O2 Sensor Heater Circuit Malfunction (Bank 1 Sensor 1) · **P0141** O2 Sensor Heater Circuit Malfunction (Bank 1 Sensor 2) · **P0155** O2 Sensor Heater Circuit Malfunction (Bank 2 Sensor 1) · **P0161** O2 Sensor Heater Circuit Malfunction (Bank 2 Sensor 2) · **P2237** O2 Sensor Positive Current Control Circuit/Open (Bank 1 Sens

See it working

Watch the animated explainer [How Push-Button Start Works: Keyless Ignition](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/p223f/>

