

GM · POWERTRAIN

P1601

OBD-II DIAGNOSTIC TROUBLE CODE (DTC)

P1601 · GM

ECM Over-Temperature

P1601 on GM vehicles means the Engine Control Module (ECM) has detected that its internal temperature has exceeded a safe limit, usually due to excessive heat buildup inside the module or its immediate environment. The ECM monitors its own thermal condition and sets this code when the calculated or measured temperature crosses a calibrated threshold, often as a protective measure to prevent permanent circuit damage.

SYSTEM

Powertrain

CODE TYPE

GM specific

SEVERITY

Medium

FIX DIFFICULTY

Intermediate

AREA

**Computer and
output circuits**

Symptoms you may notice

- Check Engine Light (CEL) illuminated, often with no other noticeable symptoms
- Intermittent engine stalling or rough running when the ECM gets hot
- Reduced engine performance or limp-home mode in severe cases
- Hard starting or no-start condition after the vehicle has been driven and heat-soaked
- Erratic transmission shifting on vehicles where the ECM shares data with the Transmission Control Module (TCM)
- Other unrelated codes stored in memory due to ECM overheating affecting multiple circuits

Common causes, most likely first

- 1 Poor airflow or blocked cooling passages around the ECM mounting location
- 2 ECM internal fault causing excessive heat generation, such as a failing power supply circuit
- 3 High ambient temperatures combined with heavy engine load and inadequate underhood ventilation
- 4 Damaged or missing ECM heat shield or insulating cover
- 5 Corroded or loose ECM ground connections causing increased resistance and heat
- 6 Aftermarket accessories or modifications that block airflow to the ECM
- 7 Low battery voltage or charging system issues forcing the ECM to work harder and generate more heat



How to diagnose and fix it

- 1 Inspect the ECM mounting area for debris, leaves, or plastic bags blocking airflow and clean as needed
- 2 Verify the ECM heat shield is present and undamaged; replace if missing or deteriorated
- 3 Check all ECM ground connections for corrosion and tightness; clean and tighten as required
- 4 Test battery and charging system to ensure voltage is within specification and not causing excessive ECM workload
- 5 Use a scan tool to monitor ECM internal temperature (if available) and compare with actual underhood temperature to confirm overheating
- 6 Inspect ECM connectors and wiring for signs of heat damage or melted insulation; repair as needed
- 7 If all external factors are ruled out, replace the ECM and perform programming or relearn procedures as required

Why the ECM overheats without a obvious cause

- A missing or damaged ECM heat shield is a common oversight; many technicians replace the ECM without restoring the shield, leading to repeat failures.
- Corroded ground connections at the ECM can cause increased resistance, which generates heat inside the module and triggers P1601 even when the engine bay temperature seems normal.
- On some GM models, the ECM is mounted near the exhaust manifold or in a tight pocket where radiant heat soak after shutdown can push internal temperatures past the threshold, especially in hot climates.
- P1601 can be set by a failing alternator or weak battery that forces the ECM to compensate with higher current draw, so always check charging system health before condemning the ECM.
- Aftermarket engine covers or accessories that block airflow to the ECM are a frequent cause, and removing them often resolves the code without any parts replacement.

Can I keep driving with P1601?

You can usually drive the vehicle short distances to a repair shop, but avoid heavy loads, towing, or sustained high-speed driving that raises underhood temperatures. If the engine begins to stall or run poorly, pull over safely and arrange a tow to prevent further ECM damage.

Tools that help

- OBD-II scan tool with live data capability
- Infrared thermometer
- Digital multimeter
- Basic hand tools (screwdrivers, socket set)
- Service information for ECM location and wiring diagrams



Reading P1601

- P** Powertrain: engine, transmission and emissions.
- 1** Manufacturer-specific code (GM): its meaning depends on the make.
- 6** Computer and output circuits.
- 01** The exact fault within that area.

Often seen with

P0562 System Voltage Low · **P0563** System Voltage High · **P0601** Internal Control Module Memory Checksum Error · **P0606** PCM Processor Fault · **P0607** Control Module Performance

See it working

Watch the animated explainer [How a Starter Motor Works: Pre-Engaged Starter](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/gm-p1601/>

