

GENERIC · CHASSIS

C0502

OBD-II DIAGNOSTIC TROUBLE CODE (DTC)

C0502

Left Front Wheel Speed Sensor A Circuit Low

C0502 means the anti-lock brake system (ABS) module has detected a low-voltage condition on the left front wheel speed sensor circuit, which is typically a two-wire cable that sends an alternating current signal proportional to wheel rotation. The module monitors the sensor's signal amplitude and circuit integrity, and when the voltage stays below the expected threshold for a calibrated time, it stores this code and may disable ABS and traction control functions.

SYSTEM

Chassis

CODE TYPE

Generic (all makes)

SEVERITY

Medium

FIX DIFFICULTY

Intermediate

AREA

Brakes, steering and suspension

Symptoms you may notice

- ABS warning light illuminated on the dashboard, often accompanied by the traction control and stability control lights
- Traction control and stability control systems may be disabled, reducing grip on slippery surfaces
- A pulsing or dragging sensation through the brake pedal during low-speed stops if the ABS engages unexpectedly
- Speedometer may fluctuate or read zero intermittently if the left front sensor signal is used for vehicle speed
- Often no symptoms besides the warning light, with normal braking performance in dry conditions

Common causes, most likely first

- 1 Damaged or corroded left front wheel speed sensor wiring harness, especially where it flexes near the steering knuckle
- 2 Failed left front wheel speed sensor due to debris accumulation, metallic particles on the sensor tip, or internal electrical failure
- 3 Worn or damaged sensor tone ring (reluctor ring) on the left front hub or CV joint, causing an erratic signal
- 4 Loose, corroded, or water-intruded electrical connector at the sensor or ABS module
- 5 Excessive wheel bearing play or hub runout altering the sensor-to-ring air gap
- 6 ABS control module internal fault on the left front sensor input channel
- 7 Aftermarket or incorrect sensor installed with wrong resistance or output characteristics



How to diagnose and fix it

- 1 Inspect the left front wheel speed sensor wiring and connector for chafing, corrosion, or loose pins, and repair as needed
- 2 Remove the left front wheel and clean the sensor tip and tone ring of metallic debris and rust, then recheck the signal
- 3 Measure the sensor's resistance and compare to the manufacturer's specification, and check for an open or short in the harness
- 4 Use a scan tool to view live left front wheel speed data while spinning the wheel by hand to confirm signal dropout
- 5 Check the tone ring for cracks, missing teeth, or runout, and replace the hub or ring if damaged
- 6 Perform a voltage drop test on the sensor circuit and inspect the ABS module connector for corrosion or water intrusion
- 7 Clear the code and perform a road test to verify the repair, and replace the ABS module only after all other causes are ruled out

Before you replace the ABS module

- A low-voltage code on a wheel speed sensor is frequently caused by a chafed wire near the steering knuckle rather than a failed sensor, so always flex the harness while watching live data.
- Metallic debris or rust buildup on the sensor tip can attenuate the signal enough to set a low-voltage code without any visible damage to the sensor or wiring.
- Aftermarket sensors with incorrect internal resistance are a common cause of repeat C0502 codes, and comparing the signal waveform on an oscilloscope often reveals the mismatch.
- A failing wheel bearing that changes the air gap between the sensor and tone ring can set this code intermittently, especially during cornering or over bumps.
- The ABS module may store C0502 as a historical code after a low battery or jump-start event, so check for a stable charging system before condemning any component.

Can I keep driving with C0502?

The vehicle remains safe to drive in dry conditions because base braking is unaffected, but ABS and traction control may be disabled, so avoid slippery roads and hard braking until the fault is repaired.

Tools that help

- OBD-II scan tool with live ABS data capability
- Digital multimeter
- Oscilloscope (optional for waveform analysis)
- Jack and jack stands or a lift
- Basic hand tools and wire repair kit



Reading C0502

- C** Chassis: brakes, steering and suspension.
- 0** Generic (SAE) code: it means the same thing on every OBD-II vehicle.
- 5** Brakes, steering and suspension.
- 02** The exact fault within that area.

Often seen with

C0035 Left Front Wheel Speed Sensor Circuit Range/Performance · **C0040** Left Rear Wheel Speed Sensor Circuit · **C0501** ESC Active Performance · **C0503** Left Front Wheel Speed Sensor A Circuit High · **P0501** Vehicle Speed Sensor Range/Performance

See it working

Watch the animated explainer [How ABS Works: Anti-Lock Brakes in X-Ray](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/c0502/>

