Your Vehicle: 2008 Chevy Truck Silverado 2500 2WD V8-6.6L DSL Turbo

P0101

DTC P0101

Diagnostic Instructions

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DTC Descriptor

DTC P0101: Mass Air Flow (MAF) Sensor Performance

Diagnostic Fault Information

Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
Ignition 1 Voltage	P0102	P0101	P0102	P2510	P0101
MAF Sensor Signal	P0102	P0102	P0102	P0101, P0102, P0401	P0101
Low Reference	--	--	--	--	--

Zoom Sized for Print

Typical Scan Tool Data

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Engine running at idle, ECT sensor greater than 60°C (140°F) *Parameter Normal Range:* 10-20 g/s *Operating Conditions:* Engine running at idle, ECT sensor less than 60°C (140°F) *Parameter Normal Range:* 30-40 g/s			
Ignition 1 Voltage	0.0 g/s	0.0 g/s	--
MAF Sensor Signal	0.0 g/s	0.0 g/s	0.0 g/s
Low Reference	--	--	--

Zoom Sized for Print

Circuit/System Description

The mass air flow (MAF) sensor is integrated with the intake air temperature (IAT) sensor. The MAF sensor is an air flow meter that measures the amount of air entering the engine. The engine control module (ECM) uses the MAF sensor signal to provide the correct fuel delivery for all engine speeds and loads. A small quantity of air entering the engine indicates a deceleration or idle condition. A large quantity of air entering the engine indicates an acceleration or high load condition. The MAF/IAT sensor has the following circuits:

- A MAF sensor ignition 1 voltage circuit
- A MAF sensor ground circuit
- A MAF sensor signal circuit
- A IAT sensor signal circuit
- A IAT sensor low reference circuit

The ECM applies 5 volts to the MAF sensor on the MAF sensor signal circuit. The sensor uses the voltage to produce a frequency based on the inlet airflow through the sensor bore. The frequency varies in a range depending on engine coolant temperature (ECT) of approximately 2,300 Hertz at idle to near 9,000 Hertz at maximum engine load.

When engine coolant temperatures reach 60°C (140°F) the ECM commands a Rich Idle mode. During Rich Idle the exhaust gas recirculation (EGR) valve is commanded ON, and a lower frequency and g/s value will be indicated on the scan tool.

Conditions for Running the DTC

- DTCs P0102, P0103, P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0642, P0643, P0652, P0653, P0698, P0699, P2228, P2229 are not set.
- The intake air temperature (IAT) is greater than -7°C (+19.4°F).
- The engine coolant temperature (ECT) is less than 99°C (210°F).
- The BARO is greater than 72 kPa.
- The engine speed is greater than 500 RPM.
- The exhaust gas recirculation (EGR) valve is OFF.
- This DTC runs continuously within the enabling conditions.

Conditions for Setting the DTC

The ECM detects that the MAF sensor air flow ratio is not within a predetermined range of the calculated MAF air flow ratio for greater than 16 seconds.

Action Taken When the DTC Sets

- DTC P0101 is a Type A DTC.
- The ECM commands reduced engine power as a remedial action.
- The driver information center (DIC) or indicator may display reduced engine power.
- DPF regeneration is inhibited.

Conditions for Clearing the DTC

DTC P0101 is a Type A DTC.

Diagnostic Aids

- A slight to moderate resistance of 10-20 ohms on the MAF sensor ignition 1 voltage circuit may cause this DTC to set.
- Certain aftermarket air filters may cause this DTC to set.
- Certain aftermarket air induction systems may cause this DTC to set.
- Modifications the air induction system may cause this DTC to set.
- A inaccurate MAF sensor, an intake air flow restriction or any unmetered air that enters the engine downstream of the MAF sensor may cause this DTC to set.
- An aftermarket exhaust system may reduce engine back-pressure excessively and cause this DTC to set.

Circuit/System Verification

Special Tool

- J 38522 Variable Signal Generator

1. Verify that DTCs P0047, P0048, P0102, P0103, P0106, P0403, or P0405 are not set.
    - If any of the DTCs are set, refer to Diagnostic Trouble Code (DTC) List - Vehicle.
2. Ignition ON Engine OFF, observe the scan tool MAP and BARO parameters. The MAP and BARO parameters should be within 4 kPa of each other.
    - If greater than the specified range, replace the MAP Sensor.
3. Verify that restrictions do not exist in the exhaust system.
4. Verify that leaks do not exist in the exhaust system.
5. Engine operating at idle; observe the scan tool MAF Sensor parameter. The reading should be between 10-40 g/s depending on the ECT temperature.
6. A WOT acceleration from a stop should cause the MAF Sensor parameter on the scan tool to increase rapidly. This increase should be from 10-40 g/s at idle to greater than 400 g/s at the time of the 1-2 shift.

7. Operate the vehicle within the Conditions for Running the DTC to verify that the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

Circuit/System Testing

Important:

- You must perform the Circuit/System Verification before proceeding with the circuit/system testing.
- You must perform the Repair Verification after completing the Circuit/System Testing.

1. Verify the integrity of the entire air induction system by inspecting for the following conditions:
    - A dirty or deteriorating air filter element.
    - A leaking, loose, or cracked PCV pipe and seal.
    - A loose or disconnected charge air cooler hose or pipe.
    - A restricted or collapsed air intake duct.
    - A misaligned or damaged air intake duct.
    - Any objects blocking the air inlet probe of the MAF/IAT sensor.
    - Any contamination or debris on the sensing elements in the probe of the MAF/IAT sensor.
    - A cracked or damaged MAF sensor housing.
    - Any water intrusion in the induction system.
    - Any snow or ice build-up at the air cleaner or MAF Sensor.
    - Any snow, ice build-up, or coking at the manifold absolute pressure (MAP) sensor.
    - An intake manifold leak.
    - A MAP sensor seal that is missing or damaged.
    - An Intake Manifold Resonator with a leaking seal, or a cracked or broken housing.
2. Ignition OFF, disconnect the harness connector at the MAF/IAT sensor.
3. Ignition OFF and scan tool disconnected for 90 seconds, test for less than 5 ohms between the MAF low reference circuit terminal 2 and ground.
    - If greater than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the ECM.
4. Ignition OFF and scan tool disconnected for 90 seconds, test for less than 5 ohms between the IAT sensor low reference circuit terminal 4 and ground.
    - If greater than the specified range, test the IAT sensor low reference circuit for an open/high resistance. If the circuit tests normal, replace the ECM.
5. Ignition ON, verify that a test lamp illuminates between the ignition 1 voltage circuit terminal 3 and ground.
    - If the test lamp does not illuminate, test the ignition circuit for a short to ground or an open/high resistance.
6. Ignition ON, test for 4.8-5.2 volts between the signal circuit terminal 1 and ground.
    - If less than the specified range, test the MAF signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the ECM.
    - If greater than the specified range, test the MAF signal circuit for a short to voltage. If the circuit tests normal, replace the ECM.
7. Ignition OFF, connect the harness connector at the MAF/IAT sensor.
8. Engine running at a warm stabilized idle, perform the following:

8.1 Command the EGR solenoid to 0 percent with a scan tool.

8.2 Observe the Airflow Leak Equivalence Ratio parameter for 10 seconds. The value should be between 0.87:1 and 1.15:1.

8.3 Observe the Airflow Leak Equivalence Ratio parameter while slowly increasing the engine speed until reaching wide open throttle (WOT). After 10 seconds, the value should stabilize and be between 0.87:1 and 1.15:1.

- If not within the specified range, test the charge air cooler system and air inlet system for leaks. Perform the Full System Air Leak Test and the Induction System Smoke Test. Refer to Charge Air Cooler Diagnosis. If no air leaks are found, test all of the MAF sensor circuits for high resistance.

9. Remove the Intake Manifold Tube.
10. Visually inspect the EGR valve and verify the valve is in the closed position.
    - If the EGR valve is not in the closed position, replace the EGR valve and gaskets.
11. Ignition OFF, disconnect the harness connector at the MAF/IAT sensor.
12. Ignition OFF, connect the red lead of the J 38522 to the signal circuit terminal 1 at the MAF/IAT sensor harness connector. Connect the battery voltage supply to B+. Connect the black lead to ground.
13. Set the J 38522 signal switch to 5 volts, the frequency to 5K, and the Duty Cycle to Normal.
14. Engine idling, observe the scan tool MAF Sensor parameter. The scan tool MAF Sensor parameter should be between 4.950-5.025 Hz.

- If the MAF Sensor parameter is not within the specified range, replace the ECM.

15. If all circuits test normal, test or replace the MAF/IAT sensor.

Repair Verification

1. Install any components or connectors that have been removed or replaced during diagnosis.
2. Perform any adjustment, programming, or setup procedures that are required when a component or module is removed or replaced.
3. Clear the DTCs.
4. Turn OFF the ignition for 90 seconds.
5. Duplicate the Conditions for Running the DTC and use the freeze Frame/Failure Records, if applicable, in order to verify the DTC does not reset. If the DTC resets or another DTC is present, refer to the Diagnostic Trouble Code (DTC) List - Vehicle and perform the appropriate diagnostic procedure.
6. Perform the Diesel Particulate Filter (DPF) Service Regeneration.