

P0102 Mass Air Flow (MAF) Sensor Circuit Low Voltage

Circuit Description

The mass air flow (MAF) sensor is located in the air intake duct. The MAF sensor is an air flow meter that measures the amount of air that enters the engine. The MAF sensor uses a hot film that is cooled by air flowing past the sensing film as air enters the engine. The amount of cooling is proportional to the amount of the air flow. As the air flow increases, more current is required in order to maintain the hot film at a constant temperature. The engine control module (ECM) uses the MAF sensor in order to provide the correct fuel delivery for all operating conditions. The MAF sensor uses the following circuits in order to operate:

- An ignition 1 voltage circuit
- A 5-volt reference circuit
- A low reference circuit
- A signal circuit

The ECM monitors the MAF sensor signal for being stuck in range, for being too low, or for being too high for a given operating condition. If the ECM detects a MAF sensor signal voltage that is too low, this DTC sets.

DTC Descriptor

This diagnostic procedure supports the following DTC. DTC P0102 Mass Air Flow (MAF) Sensor Circuit Low Voltage

Conditions for Running the DTC

- Before the ECM can report DTC P0102 failed, DTCs P0121, P0122, P0123, P0221, P0222, P0223, P0336, and P0338 must run and pass.
- The engine is operating.
- The ignition 1 voltage is more than 10.5 volts.
- DTC P0102 runs continuously once the above conditions are met.

Conditions for Setting the DTC

- The ECM detects that the MAF sensor signal is less than 11.7 grams per second.
- The condition exists for less than 2 seconds.

Action Taken When the DTC Sets

- The control module illuminates the malfunction indicator lamp (MIL) on the second consecutive ignition cycle that the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the control module stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition cycle, the control module records the operating conditions at the time of the failure. The control module writes the operating conditions to the Freeze Frame and updates the Failure Records.

Conditions for Clearing the MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 4 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

Diagnostic Aids

- Use the J 35616-C Connector Test Adapter Kit for any test that requires probing the ECM harness connector or a component harness connector.
- The lower connector of the ECM is connector C1 and the upper connector of the ECM is connector C2. Refer to Engine Controls Component Views.
- For an intermittent condition, refer to Intermittent Conditions.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4. This step tests the ignition 1 voltage circuit. Repair the open or short to

- ground in the ignition 1 voltage circuit, if the test lamp does not illuminate.
- The ECM produces a measurable steady-state amperage that provides the 5-volt reference to the MAF sensor. If the amperage on the 5-volt reference circuit is less than 80 mA, test the 5-volt reference circuit for a short to ground, an open, or a high resistance.
 - This step tests the signal circuit of the MAF sensor.

DTC P0102

Step	Action	Values	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View Reference: Engine Control Module (ECM) Connector End Views or Engine Controls Connector End Views				
1	Did you perform the Diagnostic System Check–Engine Controls?	—	Go to Step 2	Go to Diagnostic System Check–Engine Controls
2	1. Start the engine. 2. Observe the MAF Sensor g/s parameter with a scan tool. Does the parameter display more than the specified value?	0.0 g/s	Go to Step 3	Go to Step 4
3	1. Observe the Freeze Frame/Failure Records for this DTC. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	—	Go to Step 4	Go to Diagnostic Aids

Step	Action	Values	Yes	No
4	<ol style="list-style-type: none"> 1. Turn OFF the ignition. 2. Disconnect the mass air flow (MAF) sensor. Notice: Do NOT use the low reference circuit in the component harness connector for this test. Damage to the control module may occur due to excessive current draw. 3. Connect a test lamp between the ignition 1 voltage circuit of the MAF sensor and the engine control module (ECM) housing. 4. Turn ON the ignition with the engine OFF. <p>Does the test lamp illuminate?</p>	—	Go to Step 5	Go to Step 11
5	<ol style="list-style-type: none"> 1. Set-up a DMM to test amperage on the 400 mA scale. 2. Measure the amperage from the 5-volt reference circuit of the MAF sensor to the ECM housing. <p>Is the amperage more than the specified value?</p>	80 mA	Go to Step 6	Go to Step 7
6	<ol style="list-style-type: none"> 1. Turn OFF the ignition. 2. Connect a 3-amp fused jumper wire between the signal circuit of the MAF sensor and the 5-volt reference circuit of the MAF sensor. 3. Turn ON the ignition, with the engine OFF. 4. Observe the MAF sensor voltage parameter with a scan tool. <p>Is the voltage within the specified range?</p>	4.8–5.2 V	Go to Step 9	Go to Step 8

Step	Action	Values	Yes	No
7	<p>1. Turn OFF the ignition. 2. Disconnect the ECM. 3. Test the 5-volt reference circuit of the MAF sensor and all shared 5-volt reference circuits for an open, short to ground, or for high resistance. Refer to Circuit Testing 4 and Wiring Repairs in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	—	Go to Step 14	Go to Step 10
8	<p>1. Turn OFF the ignition. 2. Disconnect the ECM. 3. Test the signal circuit of the MAF sensor for an open, a short to ground, or for high resistance. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?</p>	—	Go to Step 14	Go to Step 10
9	<p>Test for an intermittent and for a poor connection at the MAF sensor. Refer to Testing for Intermittent and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?</p>	—	Go to Step 14	Go to Step 12
10	<p>Test for an intermittent and for a poor connection at the ECM. Refer to Testing for Intermittent and Poor Connections and Connector Repairs in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	—	Go to Step 14	Go to Step 13

Step	Action	Values	Yes	No
11	1. Repair the short to ground or the open in the ignition 1 voltage circuit of the MAF sensor. Refer to Wiring Repairs in Wiring Systems. 2. Replace the fuse if necessary. Did you complete the repair?	—	Go to Step 14	—
12	Replace the MAF sensor. Refer to Mass Air Flow (MAF)/Intake Air Temperature (IAT) Sensor Replacement. Did you complete the replacement?	—	Go to Step 14	—
13	Replace the ECM. Refer to Engine Control Module (ECM) Replacement. Did you complete the replacement?	—	Go to Step 14	—
14	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	—	Go to Step 2	Go to Step 15
15	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List	System OK