

P0103 Mass Air Flow (MAF) Sensor Circuit High 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 following inputs in order to calculate a predicted MAF sensor value:

- The intake air temperature (IAT)
- The engine coolant temperature (ECT)
- The throttle position (TP)
- The engine speed

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 high, this DTC sets.

DTC Descriptor

This diagnostic procedure supports the following DTC. DTC P0103 Mass Air Flow (MAF) Sensor Circuit High Voltage

Conditions for Running the DTC

- Before the ECM can report DTC P0103 failed, DTCs P0121, P0122, P0123, P0221, P0222, P0223, P0336, and P0338 must run and pass.

- The engine is operating.
- The engine speed is more than 320 RPM.
- The ignition 1 voltage is more than 10.5 volts.
- DTC P0103 runs continuously once the above conditions are met.

Conditions for Setting the DTC

- The ECM detects that the MAF sensor signal is more than 294 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

- 1). Use the J 35616-C Connector Test Adapter Kit for any test that requires probing the ECM harness connector or a component harness connector.
- 2). 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.

- 3). Inspect for mis-routed harnesses. Inspect the MAF sensor harness for routing that is too close to the following components:
 - Ignition coils
 - Solenoids
 - Relays
 - Motors
- 4). 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 signal circuit of the MAF sensor for a short to voltage.
5. This step tests for high resistance in the low reference circuit of the MAF/IAT sensor. The MAF sensor and the IAT sensor share the low reference circuit. If there is a condition with the low reference circuit, a MAF and IAT sensor DTC may set. The ECM must be completely powered down to obtain an accurate resistance reading. It may take up to 30 minutes for the ECM to power down after the ignition key is removed. Removal of the ECM/TCM fuse allows the ECM to power down completely.
6. This step tests the low reference circuit for a short to voltage. The control module or the sensor may be damaged if the circuit is shorted to battery voltage. Ensure that a short to voltage is repaired before replacing any components.
9. Inspect the MAF/IAT sensor connector for water intrusion, corrosion, and bent or damaged terminals.
10. Inspect the ECM connectors for water intrusion, corrosion, and bent or damaged terminals.

DTC P0103

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	<ol style="list-style-type: none"> 1. Start the engine. 2. Observe the MAF Sensor g/s parameter with a scan tool. Does the parameter display less than the specified value? 	290 g/s	Go to Step 3	Go to Step 4
3	<ol style="list-style-type: none"> 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
4	<ol style="list-style-type: none"> 1. Turn OFF the ignition. 2. Disconnect the mass air flow (MAF)/intake air temperature (IAT) sensor connector. 3. Turn ON the ignition, with the engine OFF. 4. Observe the MAF Sensor Volts parameter with a scan tool. Does the parameter display less than the specified value? 	4.0 V	Go to Step 5	Go to Step 7

Step	Action	Values	Yes	No
5	<p>1. Turn OFF the ignition.</p> <p>2. Remove the ECM/TCM fuse from the underhood electrical center.</p> <p>3. Measure the resistance between the low reference circuit of the MAF/IAT sensor and the engine control module (ECM) housing with a DMM.</p> <p>Is the resistance less than the specified value?</p>	5 W	Go to Step 9	Go to Step 6
6	<p>1. Install the ECM/TCM fuse into the underhood electrical center.</p> <p>2. Turn ON the ignition, with the engine OFF.</p> <p>3. Measure the voltage between the low reference circuit of the MAF/IAT sensor and the ECM housing with a DMM.</p> <p>Is the voltage less than the specified value?</p>	1.0 V	Go to Step 8	Go to Step 11
7	<p>Important: The control module or the sensor may be damaged if the circuit is shorted to battery positive voltage.</p> <p>1. Turn OFF the ignition.</p> <p>2. Disconnect the ECM.</p> <p>3. Test the signal circuit of the MAF sensor for a short to voltage. Refer to Circuit Testing 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>Test the low reference circuit of the MAF/IAT sensor for an open or a high resistance. Refer to Circuit Testing and Wiring Repairs in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	—	Go to Step 14	Go to Step 10

Step	Action	Values	Yes	No
9	Test for shorted terminals and poor connections at the MAF/IAT sensor. Refer to Testing for Intermittent and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 14	Go to Step 12
10	Test for shorted terminals and poor connections at the ECM. Refer to Testing for Intermittent and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 14	Go to Step 13
11	Important: The control module or the sensor may be damaged if the circuit is shorted to battery positive voltage. Repair the short to voltage in the low reference circuit of the MAF/IAT sensor. 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

Step	Action	Values	Yes	No
15	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	—	Go to the Diagnostic Trouble Code (DTC) List	System OK

LAUNCH