

YOUR CURRENT VEHICLE

**2014 Toyota Prius**

## P0102,P0103; Mass Or Volume Air Flow Circuit Low Input (2014 Prius From 10/2013)

### DESCRIPTION

The mass air flow meter sub-assembly is a sensor that measures the amount of air flowing through the throttle valve. The ECM uses this information to determine fuel injection duration and to provide an appropriate air fuel ratio.

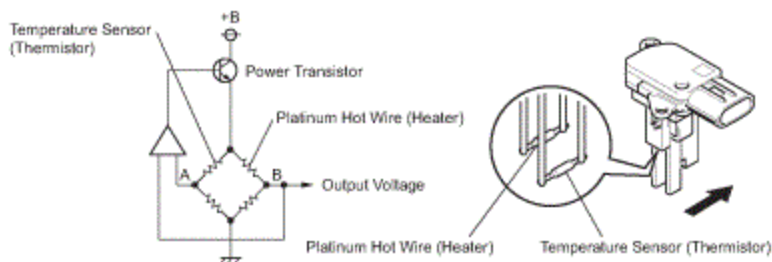
Inside the mass air flow meter sub-assembly, there is a heated platinum wire which is exposed to the flow of intake air. By applying a specific electrical current to the wire, the ECM heats it to a specific temperature. The flow of incoming air cools both the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to the wire and internal thermistor. The voltage level is proportional to the airflow through the sensor, and the ECM uses it to calculate the intake air volume.

The circuit is constructed so that the platinum hot wire and the temperature sensor create a bridge circuit, and the power transistor is controlled so that the potentials of A and B remain equal to maintain the predetermined temperature.

### NOTE

#### HINT:

When any of these DTCs is stored, the ECM enters fail-safe mode. During fail-safe mode, the ignition timing is calculated by the ECM, according to the engine speed and throttle valve position. Fail-safe mode continues until a pass condition is detected.



DTC No.	DTC Detection Condition	Trouble Area
P0102	Mass air flow meter sub-assembly voltage is below 0.2 V for 3 seconds (1 trip detection logic: Engine speed is less than 4000 rpm) (2 trip detection logic: Engine speed is 4000 rpm or more).	<ul style="list-style-type: none"> <li>• Open or short in mass air flow meter sub-assembly circuit</li> <li>• Mass air flow meter sub-assembly</li> <li>• ECM</li> </ul>
P0103	Mass air flow meter sub-assembly voltage is higher than 4.9 V for 3 seconds (1 trip detection logic: Engine speed is less than 4000 rpm) (2 trip detection logic: Engine speed is 4000 rpm or more).	<ul style="list-style-type: none"> <li>• Open or short in mass air flow meter sub-assembly circuit</li> <li>• Mass air flow meter sub-assembly</li> <li>• ECM</li> </ul>

## NOTE

### HINT:

When any of these DTCs are output, check the air-flow rate by entering the following menus: Powertrain / Engine and ECT / Data List / Primary / MAF.

Mass Air Flow Rate (gm/sec)	Malfunction
Approximately 0.0	<ul style="list-style-type: none"> <li>• Open in mass air flow meter sub-assembly power source circuit</li> <li>• Open or short in VG circuit</li> </ul>
271.0 or more	Open in E2G circuit

## MONITOR DESCRIPTION

If there is a defect in the mass air flow meter sub-assembly or an open or short circuit, the voltage level deviates from the normal operating range. The ECM interprets this deviation as a malfunction in the mass air flow meter sub-assembly circuit and stores a DTC.

Example:

When the sensor output voltage remains less than 0.2 V, or higher than 4.9 V for 3 seconds or more, the ECM stores a DTC.

### MONITOR STRATEGY

Related DTCs	P0102: Mass air flow meter range check (Low voltage) P0103: Mass air flow meter range check (High voltage)
Required Sensors/Components (Main)	Mass air flow meter sub-assembly
Required Sensors/Components (Related)	Crankshaft position sensor
Frequency of Operation	Continuous
Duration	3 seconds
MIL Operation	Immediately: Engine speed less than 4000 rpm 2 driving cycles: Engine speed 4000 rpm or more
Sequence of Operation	None

### TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
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### TYPICAL MALFUNCTION THRESHOLDS

#### P0102:

Mass air flow meter voltage	Less than 0.2 V
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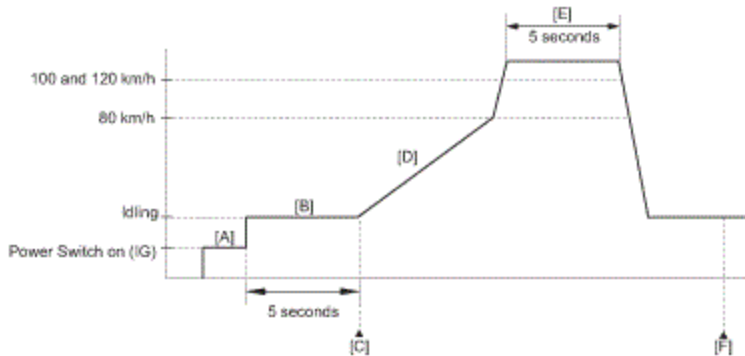
#### P0103:

Mass air flow meter voltage	More than 4.9 V
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### COMPONENT OPERATING RANGE

Mass air flow meter voltage	Between 0.2 V and 4.9 V
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## CONFIRMATION DRIVING PATTERN



1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off and wait for at least 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode (maintenance mode) [2014 MY Prius \[10/2013 - \]](#); [INTRODUCTION: REPAIR INSTRUCTION: INSPECTION MODE PROCEDURE](#).
7. Start the engine.
8. Idle the engine for 5 seconds [B].
9. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes [C].
10. Read the pending DTCs.

### NOTE

#### HINT:

- If a pending DTC is output, the system is malfunctioning.
- If a pending DTC is not output, perform the following procedure.

11. During normal driving, increase the vehicle speed to 80 km/h (50 mph) [D].

### WARNING

When performing the confirmation driving pattern, obey all speed limits and traffic laws.

12. Depress the accelerator pedal fully to increase the vehicle speed to between 100 and 120 km/h (62 and 75 mph) (engine speed of 4000 rpm or more) and then maintain the speed for at least 5 seconds [E].

### WARNING

When performing the confirmation driving pattern, obey all speed limits and traffic laws.

13. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes [F].

14. Read the pending DTCs.

### NOTE

#### HINT:

- If a pending DTC is output, the system is malfunctioning.
- If a pending DTC is not output, perform the following procedure.

15. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

16. Input the DTC: P0102 or P0103.

17. Check the DTC judgment result.

Techstream Display	Description
NORMAL	<ul style="list-style-type: none"> <li>• DTC judgment completed</li> <li>• System normal</li> </ul>
ABNORMAL	<ul style="list-style-type: none"> <li>• DTC judgment completed</li> <li>• System abnormal</li> </ul>
INCOMPLETE	<ul style="list-style-type: none"> <li>• DTC judgment not completed</li> </ul>

Techstream Display	Description
	<ul style="list-style-type: none"> <li>• Perform driving pattern after confirming DTC enabling conditions</li> </ul>
N/A	<ul style="list-style-type: none"> <li>• Unable to perform DTC judgment</li> <li>• Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit</li> </ul>

## NOTE

### HINT:

- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows INCOMPLETE or N/A, perform steps [B] through [F] again.

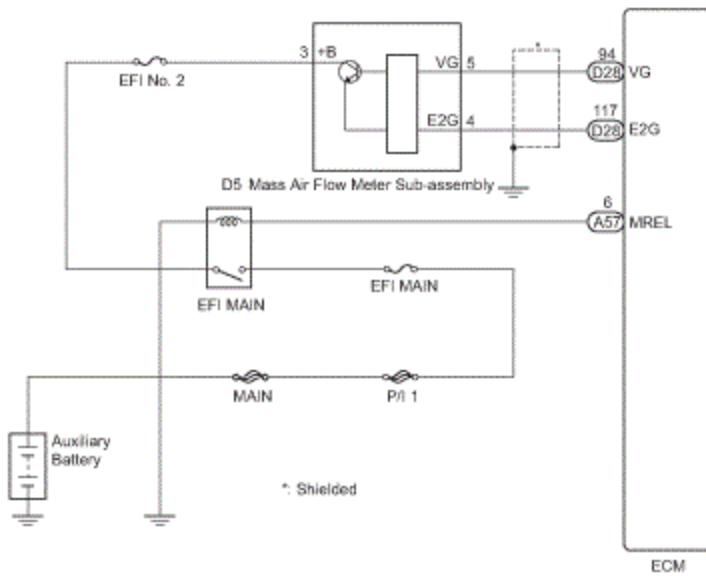
18. If no pending DTC is output, perform a universal trip and check for permanent DTCs [2014 MY Prius \[10/2013 - \]](#); 2ZR-FXE ENGINE CONTROL: SFI SYSTEM: DTC CHECK / CLEAR.

## NOTE

### HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

## WIRING DIAGRAM



## INSPECTION PROCEDURE

### NOTE

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

### NOTE

#### HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

## PROCEDURE

### 1. READ OUTPUT DTC (DTC P0102 OR P0103)

- a. Connect the Techstream to the DLC3.
- b. Turn the power switch on (IG).
- c. Turn the Techstream on.

d. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

e. Read the DTCs.

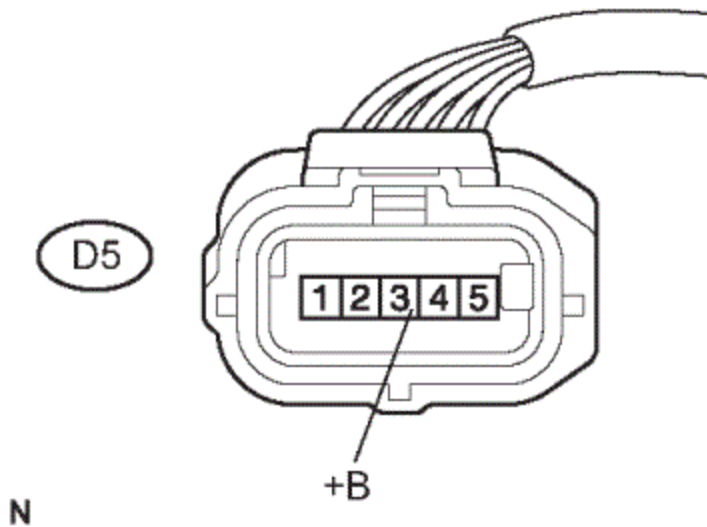
**Result**

Result	Proceed to
DTC P0102 is output	A
DTC P0103 is output	B

B	2014 MY Prius [10/2013 - ]; 2ZR-FXE ENGINE CONTROL: SFI SYSTEM: P0102,P0103; Mass or Volume Air Flow Circuit Low Input+
A	See the next step

**2. INSPECT MASS AIR FLOW METER SUB-ASSEMBLY (POWER SOURCE VOLTAGE)**

\*a



a. Disconnect the mass air flow meter sub-assembly connector.

b. Turn the power switch on (IG).



c. Measure the voltage according to the value(s) in the table below.

### Standard Voltage

Tester Connection	Switch Condition	Specified Condition
D5-3 (+B) - Body ground	Power switch on (IG)	11 to 14 V

### Text in Illustration

*a	Front view of wire harness connector (to Mass Air Flow Meter Sub-assembly)
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NG	<a href="#">2014 MY Prius [10/2013 - ]</a> ; 2ZR-FXE ENGINE CONTROL: SFI SYSTEM: P0102,P0103; Mass or Volume Air Flow Circuit Low Input+
OK	See the next step

## 3. CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER SUB-ASSEMBLY - ECM)

- a. Disconnect the mass air flow meter sub-assembly connector.
- b. Disconnect the ECM connector.
- c. Measure the resistance according to the value(s) in the table below.

### Standard Resistance (Check for Open)

Tester Connection	Condition	Specified Condition
D5-5 (VG) - D28-94 (VG)	Always	Below 1 $\Omega$
D5-4 (E2G) - D28-117 (E2G)	Always	Below 1 $\Omega$

### Standard Resistance (Check for Short)

Tester Connection	Condition	Specified Condition
D5-5 (VG) or D28-94 (VG) - Body ground	Always	10 k $\Omega$ or higher

NG	<a href="#">2014 MY Prius [10/2013 - ]; 2ZR-FXE ENGINE CONTROL: SFI SYSTEM: P0102,P0103; Mass or Volume Air Flow Circuit Low Input+</a>
OK	See the next step

#### 4. INSPECT MASS AIR FLOW METER SUB-ASSEMBLY

- a. Inspect the mass air flow meter sub-assembly, referring to the On-vehicle Inspection for Mass Air Flow Meter [2014 MY Prius \[10/2013 - \]; 2ZR-FXE ENGINE CONTROL: MASS AIR FLOW METER: ON-VEHICLE INSPECTION.](#)
- b. Inspect the mass air flow meter sub-assembly, referring to the Inspection for Mass Air Flow Meter [2014 MY Prius \[10/2013 - \]; 2ZR-FXE ENGINE CONTROL: MASS AIR FLOW METER: INSPECTION.](#)
- c. Inspect the function of the mass air flow meter sub-assembly.
  - i. Connect the Techstream to the DLC3.
  - ii. Turn the power switch on (IG).
  - iii. Turn the Techstream on.
  - iv. Put the engine in inspection mode (maintenance mode) [2014 MY Prius \[10/2013 - \]; INTRODUCTION: REPAIR INSTRUCTION: INSPECTION MODE PROCEDURE.](#)
  - v. Start the engine.
  - vi. Enter the following menus: Powertrain / Engine and ECT / Data List / Primary / MAF.
  - vii. Check that the MAF value changes when the engine is raced.

**OK**

The reading changes.

#### NOTE

##### HINT:

Perform "Inspection After Repair" after replacing the mass air flow meter sub-assembly [2014 MY Prius \[10/2013 - \]; 2ZR-FXE ENGINE CONTROL: SFI SYSTEM: INITIALIZATION.](#)

NG	2014 MY Prius [10/2013 - ]; 2ZR-FXE ENGINE CONTROL: SFI SYSTEM: P0102,P0103; Mass or Volume Air Flow Circuit Low Input+
OK	2014 MY Prius [10/2013 - ]; 2ZR-FXE ENGINE CONTROL: SFI SYSTEM: P0102,P0103; Mass or Volume Air Flow Circuit Low Input+

## 5. CHECK HARNESS AND CONNECTOR (SENSOR GROUND)

- a. Disconnect the mass air flow meter sub-assembly connector.
- b. Measure the resistance according to the value(s) in the table below.

### Standard Resistance (Check for Open)

Tester Connection	Condition	Specified Condition
D5-4 (E2G) - Body ground	Always	Below 1 $\Omega$

### NOTE

#### HINT:

Perform "Inspection After Repair" after replacing the mass air flow meter sub-assembly 2014 MY Prius [10/2013 - ]; 2ZR-FXE ENGINE CONTROL: SFI SYSTEM: INITIALIZATION.

NG	2014 MY Prius [10/2013 - ]; 2ZR-FXE ENGINE CONTROL: SFI SYSTEM: P0102,P0103; Mass or Volume Air Flow Circuit Low Input+
OK	2014 MY Prius [10/2013 - ]; 2ZR-FXE ENGINE CONTROL: SFI SYSTEM: P0102,P0103; Mass or Volume Air Flow Circuit Low Input+

## 6. CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER SUB-ASSEMBLY - ECM)

- a. Disconnect the mass air flow meter sub-assembly connector.
- b. Disconnect the ECM connector.
- c. Measure the resistance according to the value(s) in the table below.

### Standard Resistance (Check for Open)

Tester Connection	Condition	Specified Condition
D5-4 (E2G) - D28-117 (E2G)	Always	Below 1 $\Omega$

NG	2014 MY Prius [10/2013 - ]; 2ZR-FXE ENGINE CONTROL: SFI SYSTEM: P0102,P0103; Mass or Volume Air Flow Circuit Low Input+
OK	2014 MY Prius [10/2013 - ]; 2ZR-FXE ENGINE CONTROL: SFI SYSTEM: P0102,P0103; Mass or Volume Air Flow Circuit Low Input+

**7. REPAIR OR REPLACE HARNESS OR CONNECTOR (EFI MAIN RELAY - MASS AIR FLOW METER SUB-ASSEMBLY)**

**8. REPAIR OR REPLACE HARNESS OR CONNECTOR**

**9. REPLACE ECM 2014 MY Prius [10/2013 - ]; 2ZR-FXE ENGINE CONTROL: ECM: REMOVAL**

**10. REPLACE MASS AIR FLOW METER SUB-ASSEMBLY 2014 MY Prius [10/2013 - ]; 2ZR-FXE ENGINE CONTROL: MASS AIR FLOW METER: REMOVAL**