Last Modified: 7-27-2016	6.6 C	**Doc ID:** RM000000YDP015X
Model Year Start: 2008	**Model:** GX470	**Prod Date Range:** [07/2007 -]
Title: 2UZ-FE ENGINE CONTROL SYSTEM: SFI SYSTEM: P0100,P0102,P0103; Mass Air Flow Circuit Malfunction; 2008 MY GX470 [07/2007 -]		

DTC	**P0100**	**Mass Air Flow Circuit Malfunction**

DTC	**P0102**	**Mass Air Flow Circuit Low**

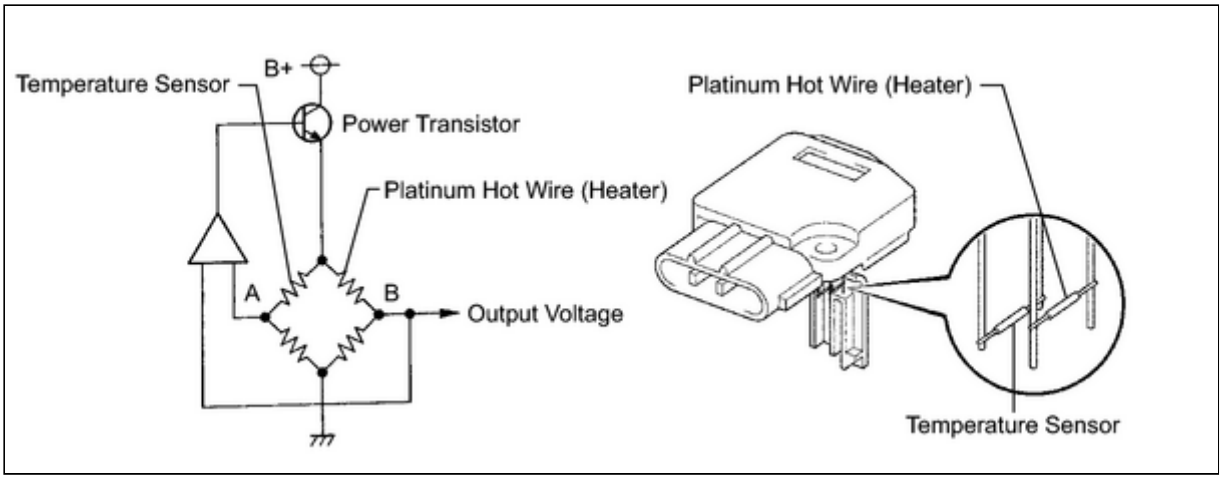
DTC	**P0103**	**Mass Air Flow Circuit High**

DESCRIPTION

The Mass Air Flow (MAF) meter measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and provide a proper air fuel ratio. Inside the MAF meter, there is a heated platinum wire exposed to the flow of intake air.

By applying a specific current to the wire, the ECM heats this wire to a given temperature. The flow of incoming air cools the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the air passing through the sensor. The ECM interprets this voltage as the intake air amount.

The circuit is constructed so that the platinum hot wire and temperature sensor provide a bridge circuit, with the power transistor controlled so that the potential of A and B remains equal to maintain the set temperature.



DTC NO.	DTC DETECTION CONDITION	TROUBLE AREA
P0100	Open or short in mass air flow meter circuit with more than 3 seconds engine speed 4000 rpm or less	• Open or short in mass air flow meter circuit • Mass air flow meter • ECM

DTC NO.	DTC DETECTION CONDITION	MALFUNCTION TROUBLE AREA
P0102	Open or short in mass air flow meter circuit with more than 3 seconds engine speed 4000 rpm or less	• Open in mass air flow meter circuit • Short in ground circuit • Mass air flow meter • ECM
P0103	Open in mass air flow meter circuit with more than 3 seconds (E2G circuit) engine speed 4000 rpm or less Short in mass air flow meter circuit with more than 3 seconds (+B circuit) engine speed 4000 rpm or less	• Open in mass air flow meter circuit (E2G circuit) • Short in mass air flow meter circuit (+B circuit) • Mass air flow meter • ECM

HINT:

After confirming DTC P0100, P0102 or P0103, use the Techstream to confirm the MAF ratio from the All Data (to reach the All Data: Powertrain / Engine and ECT / Data List / All Data).

MASS AIR FLOW RATE (G/SEC.)	MALFUNCTION
Approximately 0.0	• MAF meter power source circuit open • VG circuit open or short
271.0 or more	E2G circuit open

MONITOR DESCRIPTION

If there is a defect in the Mass Air Flow (MAF) meter or an open or short circuit, the voltage level will deviate outside the normal operating range. The ECM interprets this deviation as a defect in the MAF meter and sets a DTC.

Example:

When the sensor output voltage is less than 0.2 V or more than 4.9 V and if either condition continues for more than 3 seconds, the ECM will set a DTC.

MONITOR STRATEGY

Related DTCs	P0100: MAF meter range check (fluttering) P0102: MAF meter range check (low voltage) P0103: MAF meter range check (high voltage)
Required Sensors/Components (Main)	MAF meter
Required Sensors/Components (Related)	Crankshaft position sensor
Frequency of operation	Continuous
Duration	3 seconds
MIL operation	Immediate: Engine RPM is less than 4000 rpm 2 driving cycles: Engine RPM is 4000 rpm or more
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None

The typical enabling condition is not available	-

TYPICAL MALFUNCTION THRESHOLDS

P0100:

MAF meter voltage	Less than 0.2 V or more than 4.9 V

P0102:

MAF meter voltage	Less than 0.2 V

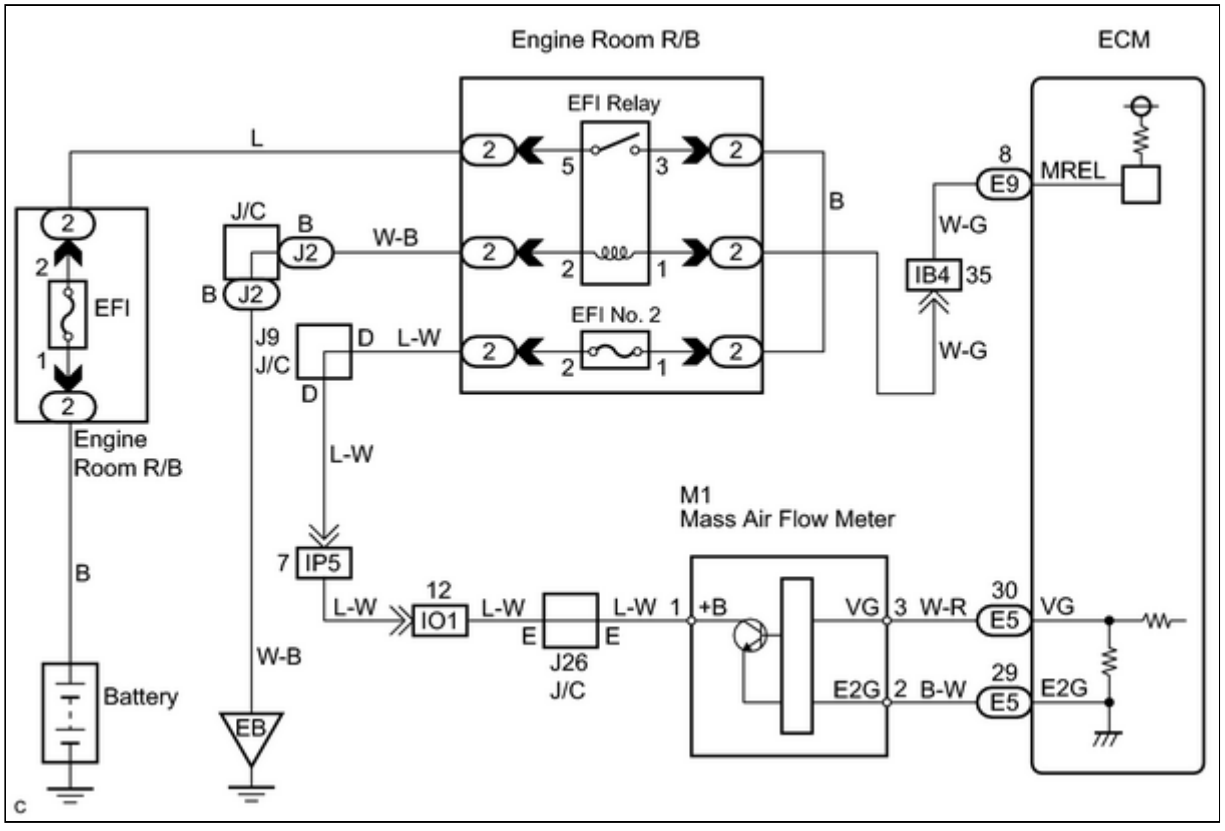
P0103:

MAF meter voltage	More than 4.9 V

COMPONENT OPERATING RANGE

MAF meter voltage	Between 0.4 and 2.2 V

WIRING DIAGRAM



INSPECTION PROCEDURE

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 VALUE USING TECHSTREAM (MASS AIR FLOW RATE)**

(a) Connect the Techstream to the DLC3.

(b) Allow the engine to idle.

(c) Enter the following menus: Powertrain / Engine and ECT / Data List / All Data / MAF.

(d) Read the values displayed on the tester.

MASS AIR FLOW RATE (G/SEC.)	PROCEED TO
0.0	A
271.0 or more	B
Between 1.0 and 270.0 (*1)	C

HINT:

*1: The value must change when the throttle valve is open or closed.

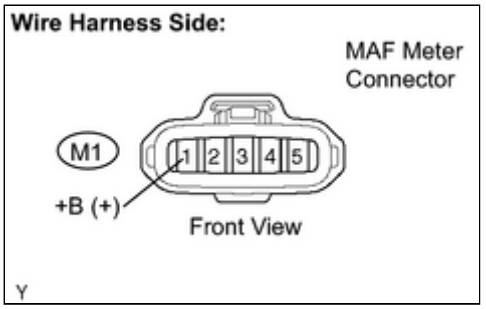
B ▶ **GO TO STEP 6**

C ▶ **CHECK FOR INTERMITTENT PROBLEMS**

A ▼

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

(a) Disconnect the M1 Mass Air Flow (MAF) meter connector.



(b) Turn the ignition switch ON.

(c) Measure the voltage of the wire harness side connector.

Standard voltage:

TESTER CONNECTION	SPECIFIED CONDITION
+B (M1-1) - Body ground	9 to 14 V

(d) Reconnect the MAF meter connector.

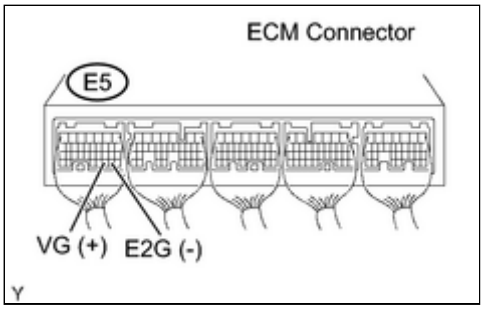
NG ▶ **GO TO STEP 5**

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION

OK

3.	**INSPECT ECM (VG VOLTAGE)**

(a) Start the engine.



(b) Measure the voltage of the E5 ECM connector.

HINT:

Move the shift lever to P or N and turn the A/C switch OFF.

Standard voltage:

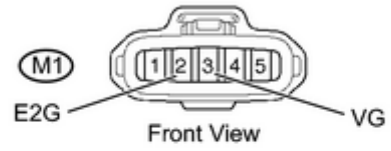
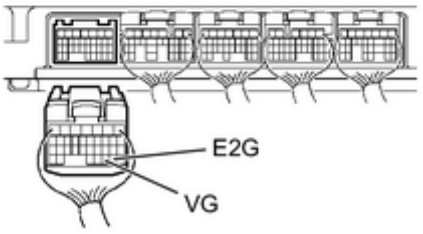
TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
VG (E5-30) - E2G (E5-29)	Engine is idling	0.5 to 3.0 V

OK ▶ **REPLACE ECM**

NG

4.	**CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - ECM)**

(a) Disconnect the M1 mass air flow meter connector.

TESTER CONNECTION	SPECIFIED CONDITION
	Mass Air Flow Meter Connector  E5 ECM Connector 

(b) Disconnect the E5 ECM connector.

(c) Measure the resistance between the wire harness side connectors.

Standard resistance (Check for open):

TESTER CONNECTION	SPECIFIED CONDITION
VG (M1-3) - VG (E5-30)	Below 1 Ω
E2G (M1-2) - E2G (E5-29)	

Standard resistance (Check for short):

TESTER CONNECTION	SPECIFIED CONDITION
VG (M1-3) or VG (E5-30) - Body ground	10 kΩ or higher

(d) Reconnect the ECM connector.

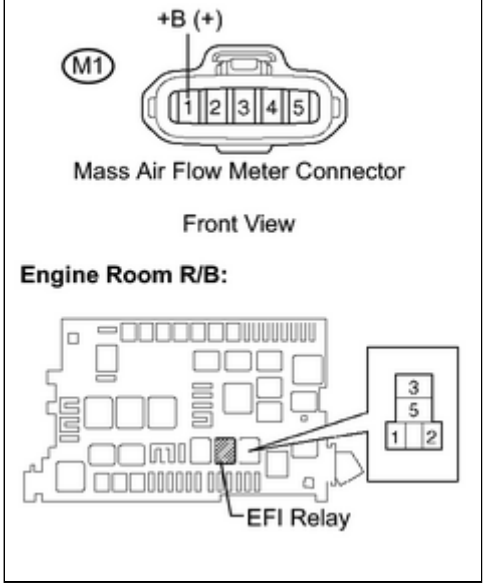
(e) Reconnect the MAF connector.

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK ▶ **REPLACE MASS AIR FLOW METER**

5.	**CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - EFI RELAY)**

(a) Remove the EFI No. 2 fuse from the engine room R/B.

TESTER CONNECTION	SPECIFIED CONDITION
	Wire Harness Side: 

(b) Measure the resistance in the EFI No. 2 fuse.

Standard resistance:
Below 1 Ω

(c) Reinstall the EFI No. 2 fuse.

(d) Disconnect the M1 mass air flow meter connector.

(e) Remove the EFI relay from the engine room R/B.

(f) Measure the resistance between the wire harness side connectors.

Standard resistance (Check for open):

TESTER CONNECTION	SPECIFIED CONDITION
+B (M1-1) - Engine room R/B (EFI relay terminal 3)	Below 1 Ω

Standard resistance (Check for short):

TESTER CONNECTION	SPECIFIED CONDITION
+B (M1-1) or Engine room R/B (EFI relay terminal 3) - Body ground	10 kΩ or higher

(g) Reconnect the MAF meter connector.

(h) Reinstall the EFI relay.

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

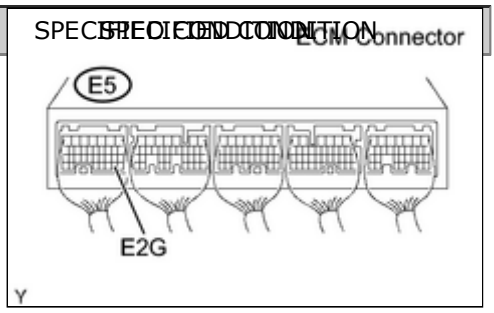
OK ▶ **CHECK ECM POWER SOURCE CIRCUIT**

6.	**INSPECT ECM (SENSOR GROUND)**

(a) Measure the resistance of the ECM connector.

Standard resistance:

TESTER CONNECTION	SPECIFIED CONDITION
E2G (E5-29) - Body ground	Below 1 Ω

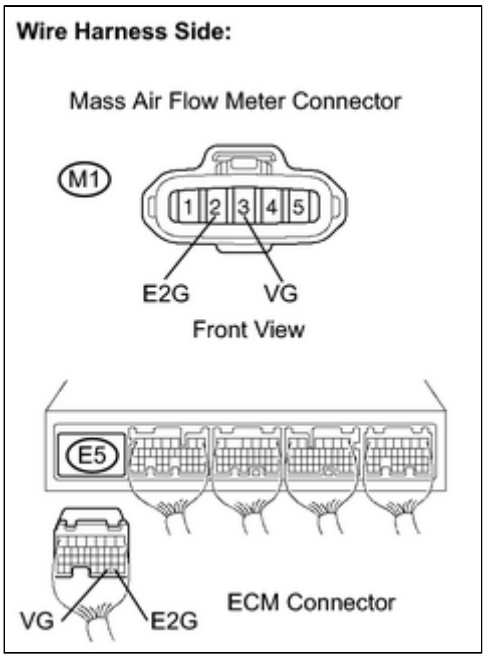


NG ▶ **REPLACE ECM**

OK ▼

7.	CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - ECM)

(a) Disconnect the M1 mass air flow meter connector.



(b) Disconnect the E5 ECM connector.

(c) Measure the resistance between the wire harness side connectors.

Standard resistance (Check for open):

TESTER CONNECTION	SPECIFIED CONDITION
VG (M1-3) - VG (E5-30)	Below 1 Ω
E2G (M1-2) - E2G (E5-29)	

Standard resistance (Check for short):

TESTER CONNECTION	SPECIFIED CONDITION
VG (M1-3) or VG (E5-30) - Body ground	10 kΩ or higher

(d) Reconnect the MAF meter connector.

(e) Reconnect the ECM connector.

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK ▶ **REPLACE MASS AIR FLOW METER**