

## DTC Descriptors

DTC P2120: Accelerator Pedal Position (APP) Sensor 1 Circuit

DTC P2122: Accelerator Pedal Position (APP) Sensor 1 Circuit Low Voltage

DTC P2123: Accelerator Pedal Position (APP) Sensor 1 Circuit High Voltage

DTC P2125: Accelerator Pedal Position (APP) Sensor 2 Circuit

DTC P2127: Accelerator Pedal Position (APP) Sensor 2 Circuit Low Voltage

DTC P2128: Accelerator Pedal Position (APP) Sensor 2 Circuit High Voltage

***DTC P2138: Accelerator Pedal Position (APP) Sensor 1-2 Correlation***

## Diagnostic Fault Information

Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
APP Sensor 1 Signal	P2122	<b><i>P2138</i></b>	P2122	P2123	P2120, <b><i>P2138</i></b>
APP Sensor 1 5-Volt Reference	P0335, P0651, P2122, <b><i>P2138</i></b>	<b><i>P2138</i></b>	P2122	P2123, P2138, P0651	P2120, <b><i>P2138</i></b>
APP Sensor 1 Low Reference	--	<b><i>P2138</i></b>	P2123	--	P2120, <b><i>P2138</i></b>
APP Sensor 2 Signal	P2127	<b><i>P2138</i></b>	P2127	P2128	P2120, <b><i>P2138</i></b>
APP Sensor 2 5-Volt Reference	P0452, P0532, P0641, P2127, <b><i>P2138</i></b>	<b><i>P2138</i></b>	P2127	P2128, P0641	P2120, <b><i>P2138</i></b>
APP Sensor 2 Low Reference	--	<b><i>P2138</i></b>	P2128	--	P2120, P2135

## Typical Scan Tool Data

<u>APP Sensor 1</u> Circuit	Short to Ground	Open	Short to Voltage
<i>Parameter Normal Range: APP 1 varies 1.02-4.29 V</i>			
APP Sensor 1 Signal	0 V	0 V	4.98 V
APP Sensor 1 5-Volt Reference	0 V	0 V	4.98 V
APP Sensor 1 Low Reference	--	5 V	--

<u>APP Sensor 2</u> Circuit	Short to Ground	Open	Short to Voltage
<i>Parameter Normal Range: APP 2 varies 0.50-2.50 V</i>			
APP Sensor 2 Signal	0 V	0 V	4.98 V
APP Sensor 2 5-Volt Reference	0 V	0 V	4.98 V
APP Sensor 2 Low Reference	--	4.98 V	--

## Circuit/System Description

The throttle actuator control (TAC) system uses two accelerator pedal position (APP) sensors to monitor the accelerator pedal position. The APP sensors 1 and 2 are located within the pedal assembly. Each sensor has a 5-volt reference circuit, a low reference circuit, and a signal circuit.

Two processors are also used to monitor the TAC system data. Both processors are located within the engine control module (ECM). Each signal circuit provides both processors with a signal voltage proportional to pedal movement. The processors share and monitor data to verify that the indicated APP calculation is correct.

## Conditions for Running DTC

### **P2120, P2122, P2123, P2125, P2127, P2128**

- DTC P0601, P0602, P0603, P0604, P0606, P060D, P062F, P0641, or P0651 are not set.
- The ignition is ON.
- The battery voltage is more than 5.23 volts.
- DTC P2122, P2123, P2127, P2128 run continuously when the above conditions are met.

### **P2138**

- ***DTC P0601, P0602, P0603, P0604, P0606, P060D, P062F, P0641, P0651, P2120, P2122, P2123, P2125, P2127 or P2128 are not set.***
- ***The ignition is ON.***
- ***The battery voltage is more than 5.23 volts.***
- ***DTC P2138 runs continuously when the above conditions are met.***

## Conditions for Setting DTC

### **P2120**

The ECM detects that the APP sensor 1 voltage is less than 0.33 volt or more than 4.5 volts for less than 1 second.

### **P2122**

The ECM detects that the APP sensor 1 voltage is less than 0.33 volt for less than 1 second.

### **P2123**

The ECM detects that the APP sensor 1 voltage is more than 4.5 volts for less than 1 second.

## **P2125**

The ECM detects that the APP sensor 2 voltage is less than 0.33 volt or more than 4.5 volts for less than 1 second.

## **P2127**

The ECM detects that the APP sensor 2 voltage is less than or equal to 0.33 volt for less than 1 second.

## **P2128**

The ECM detects that the APP sensor 2 voltage is more than 4.5 volts for less than 1 second.

## **P2138**

*The voltage difference between APP sensor 1 and APP sensor 2 exceeds a value of 5 percent with the pedal in the released position, or 10 percent with the pedal at wide open throttle (WOT) for less than 1 second.*

### Action Taken When the DTC Sets

- DTCs P2120, P2122, P2123, P2125, P2127, P2128, and P2138 are type A DTCs.
- The control module commands the TAC system to operate in the Reduced Engine Power mode.
- A message center or an indicator displays Reduced Engine Power.
- Under certain conditions the control module commands the engine OFF.

### Conditions for Clearing the MIL/DTC

DTCs P2120, P2122, P2123, P2125, P2127, P2128, and P2138 are type A DTCs.

### Circuit/System Verification

1. Ignition ON, observe the scan tool APP sensor 1 voltage parameter. The reading should be between 0.32-4.75 volts, and change with accelerator pedal input.
2. Ignition ON, observe the scan tool APP sensors 2 voltage parameter. The reading should be between 0.32-4.75 volts and change with accelerator pedal input.
3. Ignition ON, observe the scan tool APP sensors 1 and 2 parameter. The scan tool should indicate agree.
4. Clear the DTCs with the scan tool. Operate the vehicle within the Conditions for Running the DTC, or within the conditions that you observed from the Freeze Frame/Failure Records.
5. Verify that DTC P2120 or P2125 are not the only throttle position DTCs set.  
⇒If DTC P2120 or P2125 are the only DTCs set, replace the ECM.
6. Verify that DTC P0641 or P0651 are not set.  
⇒IF DTC P0641 or P0651 is set, refer to [DTC P0641 or P0651](#).
7. 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 data.

### Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the accelerator pedal. Allow at least 60 seconds for the ECM to power down. This can be verified by a loss of communication message on the scan tool.
2. Test for less than 5 ohms of resistance between each low reference circuit terminals A and D and ground.  
⇒If greater than 5 ohms, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the ECM.
3. Ignition ON, test for 4.8-5.8 volts between each 5-volt reference circuit terminals C and F and ground.  
⇒If less than 4.8 volts, test the affected 5-volt reference circuit for an open/high resistance or short to ground. If the circuit tests normal, replace the ECM.  
⇒If greater than 5.2 volts, test the affected 5-volt reference circuit for short to voltage. If the circuit test normal, replace the ECM.
4. Ignition ON, verify the scan tool APP sensor 1 and 2 voltages are less than 0.1 volt.  
⇒If greater than 0.1 volt, test the APP sensor 1 and 2 signal circuits terminals B and E for a short to voltage. If the circuit tests normal, replace the ECM.
5. Install a 3A fused jumper wire between the signal circuit terminal E and the 5-volt reference circuit terminal F of the APP sensor 1. Verify the scan tool parameter APP sensor 1 voltage is greater than 4.8 volts.  
⇒If less than 4.8 volts, test the APP sensor 1 signal circuit for an open or short to ground. If the circuit tests normal, replace the ECM.
6. Install a 3A fused jumper wire between the signal circuit terminal B and the 5-volt reference circuit terminal C of the APP sensor 2. Verify that the scan tool parameter APP sensor 2 voltage is greater than 4.8 volts.  
⇒If less than 4.8 volts, test the APP sensor 2 signal circuit for an open/high resistance or short to ground. If the circuit tests normal, replace the ECM.
7. Ignition OFF, disconnect the harness connector at the ECM.
8. Test for less than 5 ohms of resistance on all APP sensor circuits between the following terminals:
  - ECM X1 signal circuit terminal 29 to APP terminal E
  - ECM X1 signal circuit terminal 32 to APP terminal B
  - ECM X1 5-volt reference circuit terminal 36 to APP terminal C
  - ECM X1 5-volt reference circuit terminal 56 to APP terminal F⇒If greater than 5 ohms, repair the affected circuit for an open/high resistance.
9. Test for infinite resistance between APP sensor 1 signal circuit terminal E and APP sensor 2 signal circuit terminal B.  
⇒If less than infinite resistance, repair the short between APP sensor 1 signal circuit and APP sensor 2 signal circuits.

10. If all circuits test normal, test the APP sensor. Refer to Component Testing for instructions.  
⇒ If the APP sensor tests normal, replace the ECM.

### **Component Test**

**Important:** The Circuit/System Testing must be performed before proceeding with the Component Test.

### **Dynamic Test**

1. Install a 3A fused jumper wire between the 5-volt reference terminal of the applicable APP sensor and 5 volts. Install a jumper wire between the low reference terminal and a ground.
2. Sweep the sensor through the entire range while monitoring the voltage between the signal terminal and the low reference terminal with a DMM. The voltage should vary between 0.30-4.98 volts without any spikes or dropouts.  
⇒ If the voltage is not within the specified range or is erratic, replace the accelerator pedal assembly.

### **Repair Instructions**

Perform the [Diagnostic Repair Verification](#) after completing the diagnostic procedure.

- [Accelerator Pedal Position Sensor Replacement](#)
- [Control Module References](#) for ECM replacement, setup, and programming