DTC	P2121	Throttle / Pedal Position Sensor / Switch "D" Circuit Range / Performance

HINT:
This DTC relates to the Accelerator Pedal Position (APP) sensor.

DESCRIPTION

Refer to DTC P2120 (See page ES-343).

DTC No.	DTC Detection Condition	Trouble Area
P2121	Difference between VPA and VPA2 is less than 0.4 V, or more than 1.2 V for 0.5 seconds (1 trip detection logic)	• Accelerator position (APP) sensor • ECM

ES

MONITOR DESCRIPTION

The accelerator pedal position sensor is mounted on the accelerator pedal bracket. The accelerator pedal position sensor has 2 sensor elements and 2 signal outputs: VPA and VPA2. VPA is used to detect the actual accelerator pedal angle (used for engine control) and VPA2 is used to detect malfunctions in VPA. When the difference between the voltage outputs of VPA and VPA2 deviates from the standard, the ECM determines that the accelerator pedal position sensor is malfunctioning. The ECM turns on the MIL and the DTC is set.

MONITOR STRATEGY

Related DTCs	P2121: Accelerator pedal position (APP) sensor rationality
Required Sensors / Components (Main)	APP sensor
Required Sensors / Components (Related)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	None
Either of the following conditions is met.	Condition 1 or 2
1. Ignition switch	ON
2. Electronic throttle actuator power	ON

TYPICAL MALFUNCTION THRESHOLDS

Difference between VPA1 voltage (learned value) and VPA2 voltage (learned value)	Less than 0.4 V, or more than 1.2 V

FAIL-SAFE

The accelerator pedal position sensor has 2 (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the 2 sensor circuits and switches to limp mode. In limp mode, the functioning circuit is used to calculate the accelerator pedal opening angle to allow the vehicle to continue driving. If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal as being fully closed. In this case, the throttle valve remains closed as if the engine is idling.

If a pass condition is detected and then the ignition switch is turned off, the fail-safe operation stops and the system returns to a normal condition.

WIRING DIAGRAM

Refer to DTC P2120 (See page ES-347).

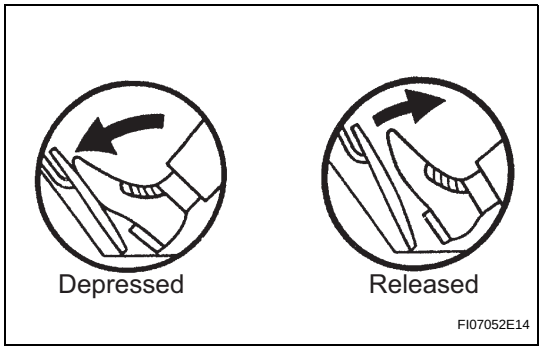
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. 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.

ES

1	READ VALUE OF INTELLIGENT TESTER (ACCEL POS #1 AND ACCEL POS #2)



(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / ACCEL POS #1 and ACCEL POS #2.
(d) Read the values displayed on the tester.

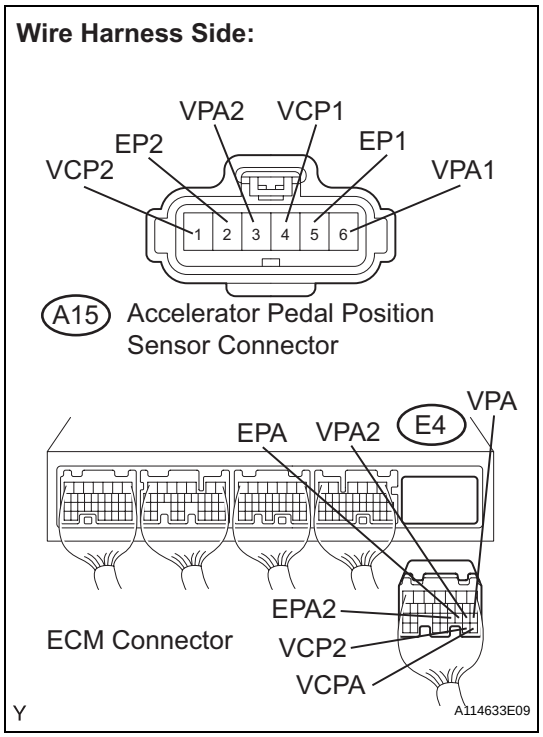
Standard voltage

Accelerator Pedal Operation	ACCEL POS #1 (AP#1)	ACCEL POS #2 (AP#2)
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.0 V

OK → **Go to step 4**

NG

2	CHECK HARNESS AND CONNECTOR (ACCELERATOR PEDAL POSITION SENSOR - ECM)



(a) Disconnect the A15 Accelerator Pedal Position (APP) sensor connector.
(b) Disconnect the E4 ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance :

Check for open

Tester Connection	Specified Condition
VPA1 (A15-6) - VPA (E4-18)	Below 1 Ω
EP1 (A15-5) - EPA (E4-20)	Below 1 Ω
VCP1 (A15-4) - VCPA (E4-26)	Below 1 Ω
VPA2 (A15-3) - VPA2 (E4-19)	Below 1 Ω
EP2 (A15-2) - EPA2 (E4-21)	Below 1 Ω
VCP2 (A15-1) - VCP2 (E4-27)	Below 1 Ω

Check for short

Tester Connection	Specified Condition
VPA1 (A15-6) or VPA (E4-18) - Body ground	10 kΩ or higher
EP1 (A15-5) or EPA (E4-20) - Body ground	10 kΩ or higher
VCP1 (A15-4) or VCPA (E4-26) - Body ground	10 kΩ or higher
VPA2 (A15-3) or VPA2 (E4-19) - Body ground	10 kΩ or higher
EP2 (A15-2) or EPA2 (E4-21) - Body ground	10 kΩ or higher
VCP2 (A15-1) or VCP2 (E4-27) - Body ground	10 kΩ or higher

(d) Reconnect the APP sensor connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (ACCELERATOR PEDAL POSITION SENSOR - ECM)**

OK

3	REPLACE ACCELERATOR PEDAL ROD

(a) Replace the accelerator pedal rod assembly (See page ES-502).

NEXT

4	CHECK WHETHER DTC OUTPUT RECURS (ACCELERATOR PEDAL POSITION SENSOR DTCS)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Clear the DTCs (See page ES-39).
(d) Start the engine.
(e) Allow the engine to idle for 15 seconds.

(f) Select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P2121	A
No output	B

B → **SYSTEM OK**

A

ES

REPLACE ECM (See page ES-498)