

Component Inspection

1.CHECK AIR FUEL RATIO (A/F) SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Check resistance between A/F sensor 1 terminals as per the following.

A/F sensor 1		Resistance
+	-	
Terminal		
3	4	1.8 - 2.44 Ω [at 20°C (68°F)]
	1	$\infty\Omega$ (Continuity should not exist)
	2	
4	1	$\infty\Omega$ (Continuity should not exist)
	2	

Q.Is the inspection result normal?

Yes INSPECTION END

No 

2.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to [Exploded View](#) .
: INSPECTION END

Component Inspection

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector terminals as per the following condition.

ECM				Condition		Voltage
Connector		+	-			
		Terminal				
Sensor 1	E16	158	159	Accelerator pedal	Fully released	0.76 V
					Fully depressed	4.57 V
Sensor 2		151	152		Fully released	0.39 V
					Fully depressed	2.3 V

Q.Is the inspection result normal?

Yes

INSPECTION END

No

Replace accelerator pedal assembly. Refer to [Removal and Installation](#) .

Component Inspection

1.CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector.
2. Check the resistance between combination switch harness connector terminals as per the following conditions.

Combination switch (Spiral cable)			Condition	Resistance (Approx.)
Connector	+	-		
	Terminals			
M154	21	36	MAIN switch: Pressed	0 Ω
			CANCEL switch: Pressed	250 Ω
			SET- switch: Pressed	660 Ω
			RES+ switch: Pressed	1,480 Ω
			All ASCD steering switches: Released	4,000 Ω

Q.Is the inspection result normal?

Yes INSPECTION END

No Replace ASCD steering switch. Refer to [Component Parts Location](#) .

Component Inspection

1.CHECK FUEL RAIL PRESSURE (FRP) SENSOR

① With M.U.T.-III SE

1. Turn ignition switch OFF.
2. Reconnect harness connector disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Select "FUEL PRES SEN V" in "DATA MONITOR" mode of "ENGINE" using M.U.T.-III SE and check the indication under the following condition.

Monitor item	Condition		Indication
FUEL PRES SEN V	• Engine: After warming up • Selector lever: P or N position • A/C switch: OFF • No load	Engine speed: Idle	0.820 – 1.160 V
		Revving engine from idle to 4,000 rpm quickly	0.820 – 2.900 V

② Without M.U.T.-III SE

1. Turn ignition switch OFF.
2. Reconnect harness connector disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Check FRP sensor signal voltage.

ECM			Condition	Voltage
Connector	+	-		
	Terminal			
F51	58	41	[Engine is running] • Engine warm-up condition • Engine speed: Idle	1 V
			[Engine is running] • Engine warm-up condition • Revving engine from idle to 4,000 rpm quickly	1.1 V

Q.Is inspection result normal?

Yes

INSPECTION END

No

Replace FRP sensor. Refer to [Exploded View](#) .

Component Inspection

1.CHECK HEATED OXYGEN SENSOR 2 HEATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
3. Check resistance between HO2S2 terminals as per the following.

Heated oxygen sensor 2		Resistance
Terminal		
1	2	5.4 - 7.3 Ω [at 25°C (77°F)]
4	1	$\infty \Omega$ (Continuity should not exist)
	2	
	3	
3	4	
	1	
	2	

Q.Is the inspection result normal?

Yes INSPECTION END

No 

2.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to [Exploded View](#) .

caution

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

: INSPECTION END

Component Inspection

1.CHECK HIGH PRESSURE FUEL PUMP-1

1. Turn ignition switch OFF.
2. Disconnect high pressure fuel pump harness connector.
3. Check the resistance between high pressure fuel pump terminals as follows.

High pressure fuel pump		Condition		Resistance
+	-			
Terminal				
1	2	Temperature °C (°F)	20 – 30 (68 – 86)	0.46 - 0.51 Ω

Q.Is the inspection result normal?

Yes 

No

Replace high pressure fuel pump. Refer to [Removal and Installation](#) .

2.CHECK HIGH PRESSURE FUEL PUMP-2

Ⓜ WITH M.U.T.-III SE

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check “FUEL PRES SEN” in “DATA MONITOR” of “ENGINE” with M.U.T.-III SE.

Data monitor item	Condition	Voltage (Approx.)
FUEL PRESS V	Engine speed: idle	0.820 - 1.160 V
	Engine speed: Revving engine from idle to 4,000 rpm	0.820 – 2.900 V

⊗ WITHOUT M.U.T.-III SE

1. Start the engine.
2. Check fuel rail pressure sensor signal voltage.

+		Ground	Condition	Voltage (Approx.)
Fuel rail pressure sensor				
Connector	Terminal			
F79	2	Ground	Engine speed: idle	1 V
			Engine speed: Revving engine from idle to 4,000 rpm	1.1 V

Q.Is the inspection result normal?

Yes

INSPECTION END

No

Replace high pressure fuel pump. Refer to [Removal and Installation](#) .

Component Inspection

1.CHECK ACC STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector.
2. Check the resistance between combination switch harness connector terminals as per the following conditions.

Combination switch (Spiral cable)			Condition	Resistance (Approx.)
Connector	+	-		
	Terminals			
M154	21	36	MAIN switch: Pressed	Approx. 0
			CANCEL switch: Pressed	Approx. 310
			DISTANCE switch: Pressed	Approx. 740
			SET- switch: Pressed	Approx. 1,410
			RES+ switch: Pressed	Approx. 2,590
			NOT OPERATE	Approx. 5,456

Q.Is the inspection result normal?

Yes

INSPECTION END

No

Replace ACC steering switch. Refer to [Exploded View](#) .

Component Inspection

1.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE

 With M.U.T.-III SE

1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with M.U.T.-III SE.
3. Fully release accelerator pedal and make sure that "TUMBLE POS SEN" indicates between 2.1 V to 4.1 V.
4. Depress accelerator pedal and make sure that "TUMBLE POS SEN" indicates between 0.2 V to 1.4 V.
5. Check 1st trip DTC.

 With GST

Following the procedure "With M.U.T.-III SE" above.

Q.Is 1st trip DTC detected?

Yes

Replace intake manifold assembly. Refer to [Removal and Installation](#) .

No .

2.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect intake manifold runner control valve motor harness connector.
3. Check the resistance between intake manifold runner control valve motor terminals as per the following.

Intake manifold runner control valve motor		Resistance (Approx.)
+	-	
Terminals		
1	2	3 - 8 Ω [at 25°C (77°F)]

Q.Is the inspection result normal?

Yes

INSPECTION END

No

Replace intake manifold assembly. Refer to [Removal and Installation](#) .

Component Inspection

1.CHECK INTAKE MANIFOLD TUNING VALVE ACTUATOR

1. Turn ignition switch OFF.
2. Disconnect intake manifold tuning valve actuator harness connector.
3. Check the resistance between intake manifold tuning valve actuator terminals as per the following.

Intake manifold tuning valve actuator		Resistance (Approx.)
+	-	
Terminals		
1	2	3 - 8 Ω [at 25°C (77°F)]

Q.Is the inspection result normal?

Yes

INSPECTION END

No

Replace intake manifold assembly. Refer to [Removal and Installation](#) .

[\[Previous\]](#) [\[Next\]](#)

Component Inspection

1.CHECK KNOCK SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect knock sensor 1 harness connector.
3. Check resistance between knock sensor 1 terminals as per the following.

note It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Knock sensor 1		Resistance
Terminals		
1	2	Approx. 532 - 588 kΩ [at 20°C (68°F)]

caution Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

Q.Is the inspection result normal?

Yes



No

Replace knock sensor 1. Refer to [Exploded View](#) .

2.CHECK KNOCK SENSOR 2

1. Turn ignition switch OFF.
2. Disconnect knock sensor 2 harness connector.
3. Check resistance between knock sensor 2 terminals as per the following.

note It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Knock sensor 2		Resistance
Terminals		
1	2	Approx. 532 - 588 kΩ [at 20°C (68°F)]

caution

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

Q.Is the inspection result normal?

Yes

INSPECTION END

No

Replace knock sensor. Refer to [Exploded View](#) .

Component Inspection

1.CHECK MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR-1

1. Turn ignition switch OFF.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
4. Check the voltage between ECM harness connector terminals as follows.

ECM		
Connector	Terminal	
F52	120	106

note	- To avoid the influence of intake manifold vacuum, check the voltage 1 or more minutes past after engine is stopped. - Because the sensor is absolute pressure sensor, output value may differ depending on atmospheric pressure and altitude.
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5. Measure the atmospheric pressure.

note	As the atmospheric pressure described on the synoptic chart is the value at sea level, compensate the pressure with the following chart.
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Altitude (m)	Compensated pressure (hPa)
0	0
200	-24
400	-47
600	-70
800	-92
1000	-114
1500	-168
2000	-218

6. Check the manifold absolute pressure sensor value corresponding to the atmospheric pressure.

Atmospheric pressure (hPa)	Voltage (V)
800	3.1 – 3.7
850	3.3 – 3.9
900	3.5 – 4.1
950	3.8 – 4.3
1000	4.0 – 4.6
1050	4.2 – 4.8

Q.Is the inspection result normal?

Yes 

No

Replace MAP sensor. Refer to Removal and Installation [Exploded View](#) .

2.CHECK MAP SENSOR-2

1. Start engine and let it idle.
2. Check intake manifold vacuum.
3. Check the voltage between ECM harness connector terminals as follows.

ECM		
Connector	Terminal	
F52	120	106

4. Confirm the difference of the voltage when engine is stopped and at idling is within the values shown in the following chart.

Intake manifold vacuum [kPa (mmHg)]	Voltage difference
-40 (-300)	1.5 – 2.0 V
-53.3 (-400)	2.0 – 2.6 V
-66.7 (-500)	2.6 – 3.2 V
-80 (-600)	3.2 – 3.8 V

Q.Is the inspection result normal?

Yes

INSPECTION END

No

Replace MAP sensor. Refer to Removal and Installation [Exploded View](#) .

Component Inspection

1.CHECK MASS AIR FLOW SENSOR-1

 With M.U.T.-III SE

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect M.U.T.-III SE and select "DATA MONITOR" mode of "ENGINE".
5. Select "MASS AIR FLOW SENSOR (g/s)" and check indication.

Monitor item	Condition	Indication
MASS AIR FLOW SENSOR (g/s)	Ignition switch ON (Engine stopped.)	0 g/s
	At 1,500 rpm (Engine is warmed-up to normal operating temperature.)	3.1- 5.3 g/s
	At 2,500 rpm (Engine is warmed-up to normal operating temperature.)	4.9 - 9.7 g/s
	At 4,000 rpm (Engine is warmed-up to normal operating temperature.)	9.7 - 19.3 g/s

 Without M.U.T.-III SE

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Check the frequency between ECM harness connector terminals under the following conditions.

ECM			Condition	Frequency
Connector	+	-		
	Terminal			
F51	47	50	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
			At 1,500 rpm (Engine is warmed-up to normal operating temperature.)	5,400 - 5,900 Hz
			At 2,500 rpm (Engine is warmed-up to normal operating temperature.)	5,800 - 6,500 Hz
			At 4,000 rpm (Engine is warmed-up to normal operating temperature.)	6,400 - 7,200 Hz

Q.Is the inspection result normal?

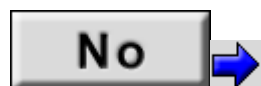
Yes INSPECTION END

No ➡

2.CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR

1. Turn ignition switch OFF.
2. Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
 - Crushed air ducts
 - Malfunctioning seal of air cleaner element
 - Uneven dirt of air cleaner element
 - Intake valve deposits
 - Improper specification of intake air system parts

Q.Is the inspection result normal?



3.CHECK MASS AIR FLOW SENSOR-2

With M.U.T.-III SE

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Connect M.U.T.-III SE and select "DATA MONITOR" mode of "ENGINE".
4. Select "MASS AIR FLOW SENSOR (g/s)" and check indication.

Monitor item	Condition	Indication
MASS AIR FLOW SENSOR (g/s)	Ignition switch ON (Engine stopped.)	0 g/s
	At 1,500 rpm (Engine is warmed-up to normal operating temperature.)	3.1- 5,3 g/s
	At 2,500 rpm (Engine is warmed-up to normal operating temperature.)	4.9 - 9.7 g/s
	At 4,000 rpm (Engine is warmed-up to normal operating temperature.)	9.7 - 19.3 g/s

Without M.U.T.-III SE

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Check the frequency between ECM harness connector terminals under the following conditions.

ECM			Condition	Frequency
Connector	+	-		
	Terminal			
F51	47	50	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
			At 1,500 rpm (Engine is warmed-up to normal operating temperature.)	5,400 - 5,900 Hz
			At 2,500 rpm (Engine is warmed-up to normal operating temperature.)	5,800 - 6,500 Hz
			At 4,000 rpm (Engine is warmed-up to normal operating temperature.)	6,400 - 7,200 Hz

Q.Is the inspection result normal?

Yes INSPECTION END

No 

4.CHECK MASS AIR FLOW SENSOR-3

 With M.U.T.-III SE

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Connect M.U.T.-III SE and select "DATA MONITOR" mode of "ENGINE".
5. Select "MASS AIR FLOW SENSOR (g/s)" and check indication.

Monitor item	Condition	Indication
MASS AIR FLOW SENSOR (g/s)	Ignition switch ON (Engine stopped.)	0 g/s
	At 1,500 rpm (Engine is warmed-up to normal operating temperature.)	3.1- 5.3 g/s
	At 2,500 rpm (Engine is warmed-up to normal operating temperature.)	4.9 - 9.7 g/s
	At 4,000 rpm (Engine is warmed-up to normal operating temperature.)	9.7 - 19.3 g/s

⊗ Without M.U.T.-III SE

1. Turn ignition switch OFF.
2. Disconnect MAF sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Check the frequency between ECM harness connector terminals under the following conditions.

ECM			Condition	Frequency
Connector	+	-		
	Terminal			
F51	47	50	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
			At 1,500 rpm (Engine is warmed-up to normal operating temperature.)	5,400 - 5,900 Hz
			At 2,500 rpm (Engine is warmed-up to normal operating temperature.)	5,800 - 6,500 Hz
			At 4,000 rpm (Engine is warmed-up to normal operating temperature.)	6,400 - 7,200 Hz

Q.Is the inspection result normal?

Yes

INSPECTION END

No

Clean or replace mass air flow sensor. Refer to [Exploded View](#) .

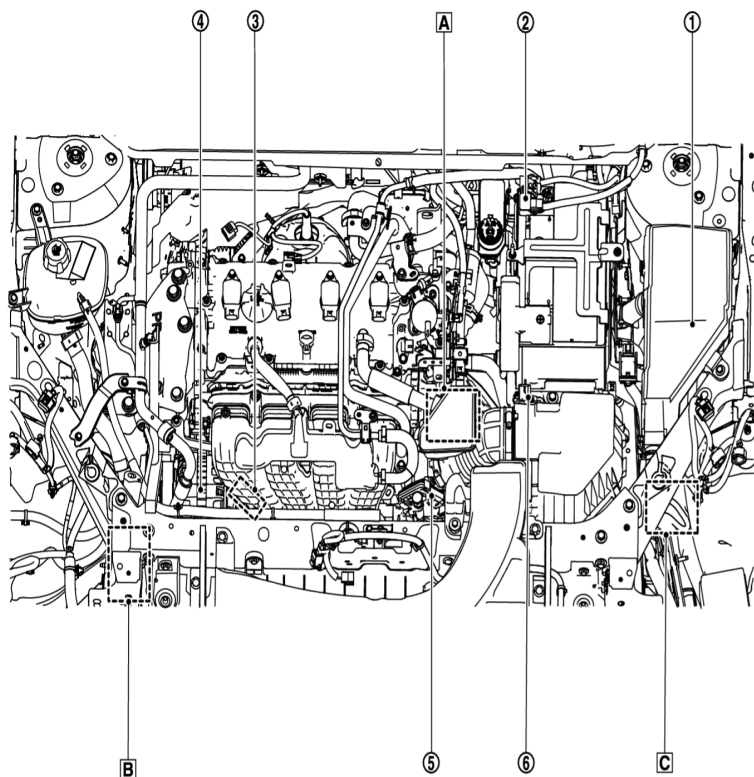
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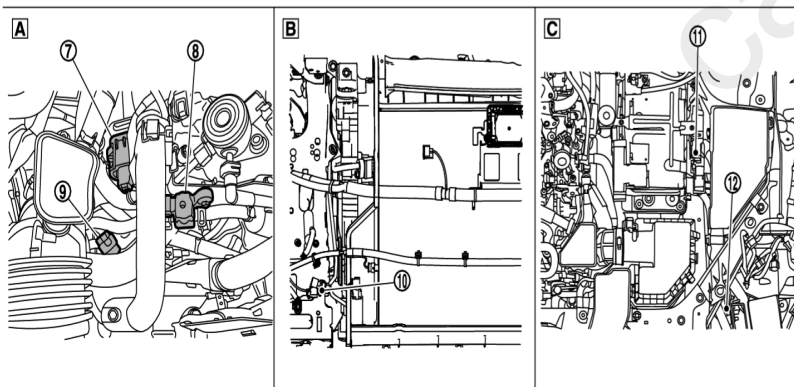
Component Parts Location

ENGINE ROOM COMPARTMENT

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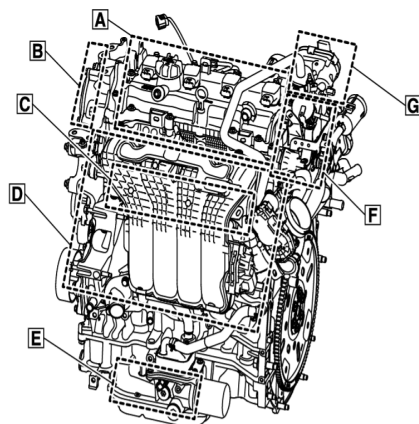


A Left center of engine compartment	B Right front of vehicle	C Left front of engine compartment
① IPDM E/R Component Parts Location ➡	② 12 V battery current sensor	③ Manifold absolute pressure (MAP) sensor
④ Generator Component Parts Location ➡	⑤ Electric throttle control actuator (with built in throttle position sensor and throttle control motor)	⑥ Mass air flow sensor (with intake air temperature sensor)
⑦ Intake manifold runner control valve actuator	⑧ EVAP canister purge volume control solenoid valve	⑨ Transmission range switch
⑩ Refrigerant pressure sensor • AUTOMATIC AIR CONDITIONING SYSTEM: Component Parts Location ➡ • MANUAL AIR CONDITIONING SYSTEM: Component Parts Location ➡	⑪ ECM	⑫ Electric intake valve timing control module

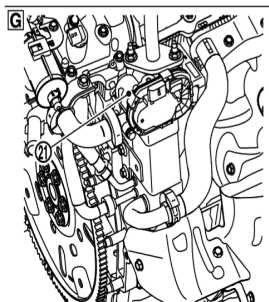
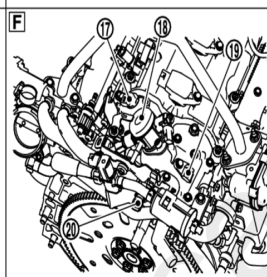
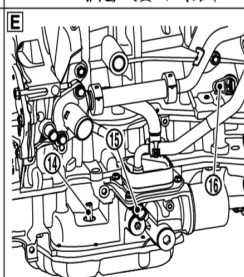
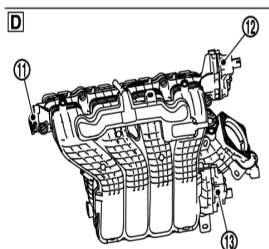
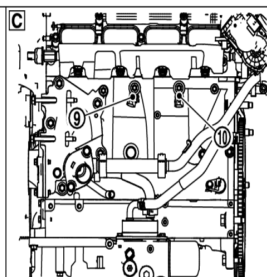
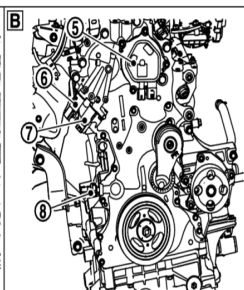
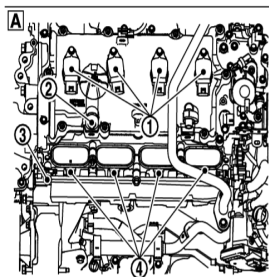


ENGINE COMPARTMENT

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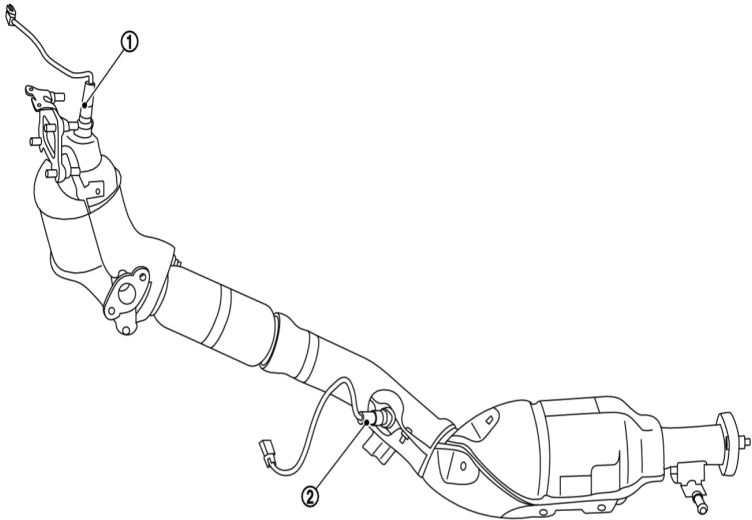


A	Top of engine	B	Top front of engine	C	Left side of engine
D	Air intake	E	Lower front of engine	F	Rear of engine
G	Rear of engine				
①	Ignition coil (with power transistor)	②	PCV valve	③	Fuel rail pressure sensor
④	Fuel injector	⑤	Electric intake valve timing control actuator	⑥	Exhaust valve timing intermediate lock control solenoid valve
⑦	Exhaust valve timing control solenoid valve	⑧	Engine oil pressure sensor	⑨	Knock sensor 1
⑩	Knock sensor 2	⑪	Intake manifold runner control valve position sensor	⑫	Intake manifold runner control valve actuator
⑬	Intake manifold tuning valve	⑭	Engine oil pressure control solenoid valve	⑮	Engine oil temperature sensor
⑯	Crankshaft position sensor	⑰	Intake camshaft position sensor	⑱	High pressure fuel pump
⑲	Exhaust camshaft position sensor	⑳	Engine coolant temperature sensor	㉑	EGR volume control valve

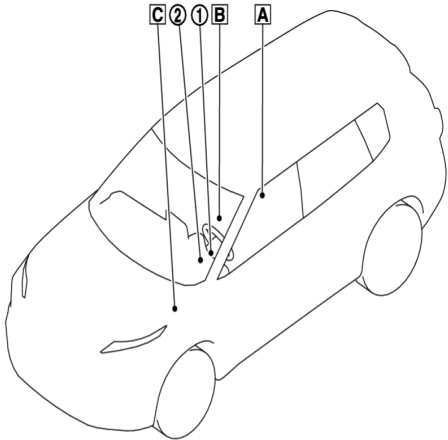


EXHAUST COMPARTMENT

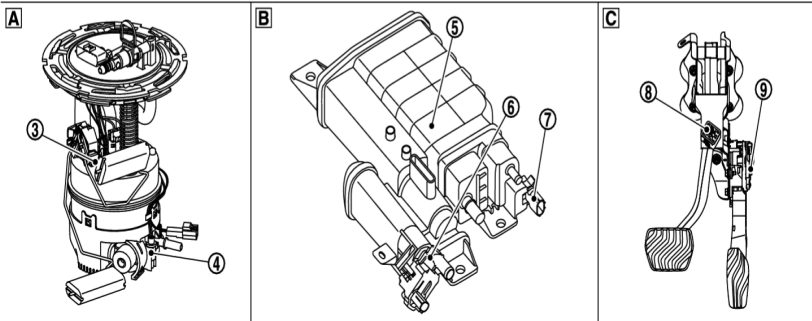
①	Air fuel ratio (A/F) sensor 1	②	Heated oxygen sensor 2		
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BODY COMPARTMENT



A	Inside fuel tank area	B	Front of fuel tank area	C	Pedal periphery area
①	ASCD/ACC steering switch	②	Combination meter [Malfunction indicator light (MIL), Information display]	③	EVAP canister
④	EVAP control system pressure sensor	⑤	EVAP canister vent control valve	⑥	Fuel level sensor unit and fuel pump
⑦	Fuel tank temperature sensor	⑧	Stop light switch	⑨	Accelerator pedal position sensor



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DTC Description

DTC DETECTION LOGIC

DTC		M.U.T.-III SE screen terms (Trouble diagnosis content)	DTC detection condition	
C053C	00	Wheel speed sensor (Wheel speed sensor generic range/performance)	Diagnosis condition	Engine running
			Signal	Vehicle speed signal
			Threshold	Wheel sensor signal is invalid.
			Diagnosis delay time	5 seconds

POSSIBLE CAUSE

- Wheel sensor
- ABS actuator and control unit (control unit)

FAIL-SAFE

Engine operating condition in fail-safe mode		
Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction.
		note ECM does not control the accelerator pedal releasing speed.
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).

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DTC Confirmation Procedure

1.CHECK DTC PRIORITY

If DTC C053C is displayed with other DTC, first perform the confirmation procedure (trouble diagnosis) for other DTC.

Q.Is applicable DTC detected?

Yes

Perform diagnosis of applicable. Refer to [DTC Index](#) .

No .

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and leave the vehicle for 1 hour.

caution Never turn ignition switch ON during this procedure.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 9 V at idle.



3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle for at least 5 seconds.
2. Check DTC.

Q.Is DTC detected?

YesRefer to DTC [Diagnosis Procedure](#) .**No**-1To check malfunction symptom before repair: Refer to Intermittent Incident [Intermittent Incident](#) .**No**

-2Confirmation after repair: INSPECTION END

[\[Previous\]](#) [\[Next\]](#)

DTC Index

×:Applicable —: Not applicable

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
C053C	00	C053C	Wheel speed sensor	—	2	×	A + B	DTC Description 
U0101	00	U0101	LOST COMM (TCM)	—	2	×	A + B	DTC Description 
U0122	00	U0122	ASC MDL	—	2	×	A + B	DTC Description 
U012E	00	U012E	Communication error (lost)	—	2	×	A + B	DTC Description 
U0146	00	U0146	Lost communication (GW) A	—	2	×	A + B	DTC Description 
U0155	00	U0155	LOST COMM (METER)	—	2	×	A + B	DTC Description 
U0284	00	U0284	LOST COMM (A/GRLL SHTTR MDL A)	—	2	×	A + B	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE		GST *2						
U042F	00	U042F	Communication error (invalid)	—	2	×	A + B	DTC Description 
U1040	00	U1040	ENG COMM CIRCUIT	—	2	—	—	DTC Description 
U1050	00	U1050	LIN COMMUNICATION	—	2	—	—	DTC Description 
U1051	00	U1051	LIN COMMUNICATION	—	2	—	—	DTC Description 
U2148	83	U2148	CAN comm err (brake control unit)	—	2	—	—	DTC Description 
U214A	83	U214A	CAN comm err (AWD/4WD)	—	2	—	—	DTC Description 
U214F	83	U214F	CAN comm err (BCM)	—	2	—	—	DTC Description 
U2150	83	U2150	CAN comm err (AIRBAG)	—	2	—	—	DTC Description 
U2152	83	U2152	CAN comm err (ADAS control unit)	—	2	—	—	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE		GST *2						
U215B	83	U215B	CAN comm err (IPDM E/R)	—	2	—	—	DTC Description 
U2165	83	U2165	CAN comm err (sonar)	—	2	—	—	DTC Description 
U2241	83	U2241	CAN comm err (TCM)	—	2	—	—	DTC Description 
U2248	83	U2248	CAN comm err (brake control unit)	—	2	—	—	DTC Description 
U2252	83	U2252	CAN comm err (ADAS control unit)	—	2	—	—	DTC Description 
U2276	83	U2276	CAN comm err (CCM)	—	2	—	—	DTC Description 
U2384	83	U2384	CAN comm err (eVTC)	—	2	—	—	DTC Description 
P0010	00	P0010	A camshaft position actuator B1	—	2	×	A + B	DTC Description 
P0011	00	P0011	INT/V TIM CONT- B1	×	2	×	A	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
P0012	00	P0012	A camshaft position B1	×	2	×	A	DTC Description 
P0014	00	P0014	EXH/V TIM CONT- B1	×	2	×	A	DTC Description 
P0015	00	P0015	B camshaft position B1	×	2	×	A	DTC Description 
P0016	00	P0016	Crankshaft position B1 sensor A	—	2	×	A + B	DTC Description 
P0017	00	P0017	Crankshaft position B1 sensor B	—	2	×	A + B	DTC Description 
P0030	00	P0030	HO2S1 HTR B1	—	2	×	A + B	DTC Description 
P0031	00	P0031	HO2S1 HTR (B1)	—	2	×	A + B	DTC Description 
P0032	00	P0032	HO2S1 HTR (B1)	—	2	×	A + B	DTC Description 
P0036	00	P0036	HO2S1 HTR (B1)	—	2	×	A + B	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
P0037	00	P0037	HO2S1 HTR (B1)	—	2	×	A + B	DTC Description 
P0038	00	P0038	HO2S2 HTR (B1)	—	2	×	A + B	DTC Description 
P0053	00	P0053	HO2S1 HTR B1	x*4	2	×	A + B	DTC Description 
P0078	00	P0078	EX V/T ACT/CIRC- B1	—	2	×	A + B	DTC Description 
P0079	00	P0079	Exhaust valve control solenoid	—	2	×	A + B	DTC Description 
P0080	00	P0080	Exhaust valve control solenoid	—	2	×	A + B	DTC Description 
P0087	00	P0087	LOW FUEL PRES	—	2	×	A + B	DTC Description 
P0088	00	P0088	HIGH FUEL PRES	—	2	×	A + B	DTC Description 
P0090	00	P0090	FUEL PUMP	—	2	×	A + B	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
P0091	00	P0091	Fuel pressure regulator 1	—	2	×	A + B	DTC Description 
P0092	00	P0092	Fuel pressure regulator 1	—	2	×	A + B	DTC Description 
P00D2	00	P00D2	Heated O2 sensor heater B1 sensor 2	×	2	×	A + B	DTC Description 
P00FE	00	P00FE	EVAP system vapor line	×	2	×	A + B	DTC Description 
P0101	00	P0101	MAF SEN/CIRCUIT-B1	—	1 or 2	×	A + B or —	DTC Description 
P0102	00	P0102	MAF SEN/CIRCUIT-B1	—	1	×	A + B	DTC Description 
P0103	00	P0103	MAF SEN/CIRCUIT-B1	—	1	×	A + B	DTC Description 
P0106	00	P0106	ABSL PRES SEN/CIRC	—	2	×	A + B	DTC Description 
P0107	00	P0107	ABSL PRES SEN/CIRC	—	2	×	A + B	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
P0108	00	P0108	ABSL PRES SEN/CIRC	—	2	×	A + B	DTC Description 
P0111	00	P0111	IAT SENSOR 1 B1	—	2	×	A + B	DTC Description 
P0112	00	P0112	IAT SEN/CIRCUIT- B1	—	2	×	A + B	DTC Description 
P0113	00	P0113	IAT SEN/CIRCUIT- B1	—	2	×	A + B	DTC Description 
P0116	00	P0116	ECT SENSOR	—	2	×	A + B	DTC Description 
P0117	00	P0117	ECT SEN/CIRC	—	1 or 2	×	A + B	DTC Description 
P0118	00	P0118	ECT SEN/CIRC	—	1 or 2	×	A + B	DTC Description 
P0122	00	P0122	TP SEN 2/CIRC- B1	—	1	×	A + B	DTC Description 
P0123	00	P0123	TP SEN/CIRCUIT	—	1	×	A + B	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
P0125	00	P0125	ECT SENSOR	—	2	×	A + B	DTC Description 
P0127	00	P0127	IAT SENSOR-B1	—	2	×	A + B	DTC Description 
P0128	00	P0128	THERMSTAT FNCTN	—	2	×	A + B	DTC Description 
P0130	00	P0130	HO2S1 (B1)	×	2	×	A + B	DTC Description 
P0131	00	P0131	HO2S1 (B1)	×	2	×	A + B	DTC Description 
P0132	00	P0132	HO2S1 (B1)	×	2	×	A + B	DTC Description 
P0136	00	P0136	HO2S2 (B1)	—	2	×	A + B	DTC Description 
P0137	00	P0137	HO2S2 (B1)	—	2	×	A + B	DTC Description 
P0138	00	P0138	HO2S2 (B1)	—	2	×	A + B	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE		GST *2						
P0139	00	P0139	HO2S2 (B1)	×	2	×	A + B	DTC Description 
P014C	00	P014C	A/F SENSOR1 (B1)	×	2	×	A	DTC Description 
P014D	00	P014D	A/F SENSOR1 (B1)	×	2	×	A	DTC Description 
P015A	00	P015A	A/F SENSOR1 (B1)	×	2	×	A	DTC Description 
P015B	00	P015B	A/F SENSOR1 (B1)	×	2	×	A	DTC Description 
P0171	00	P0171	FUEL SYS-LEAN- B1	—	2	×	A + B	DTC Description 
P0172	00	P0172	FUEL SYS-RICH- B1	—	2	×	A + B	DTC Description 
P0181	00	P0181	FTT SENSOR	—	2	×	A + B	DTC Description 
P0182	00	P0182	FTT SEN/CIRCUIT	—	2	×	A + B	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
P0183	00	P0183	FTT SEN/CIRCUIT	—	2	×	A + B	DTC Description 
P0191	00	P0191	FRP SENSOR A	—	2	×	A + B	DTC Description 
P0192	00	P0192	FRP SEN/CIRC	—	1	×	A + B	DTC Description 
P0193	00	P0193	FRP SEN/CIRC	—	1	×	A + B	DTC Description 
P0196	00	P0196	EOT SENSOR	—	2	×	A + B	DTC Description 
P0197	00	P0197	EOT SEN/CIRK	—	2	×	A + B	DTC Description 
P0198	00	P0198	EOT SEN/CIRK	—	2	×	A + B	DTC Description 
P01F0	00	P01F0	Coolant temperature	—	2	×	A + B	DTC Description 
P0201	00	P0201	INJECTOR CIRC- CYL1	—	2	×	A + B	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
P0202	00	P0202	INJECTOR CIRC- CYL2	—	2	×	A + B	DTC Description 
P0203	00	P0203	INJECTOR CIRC- CYL3	—	2	×	A + B	DTC Description 
P0204	00	P0204	INJECTOR CIRC- CYL4	—	2	×	A + B	DTC Description 
P0222	00	P0222	TP SEN 1/CIRC- B1	—	1	×	A + B	DTC Description 
P0223	00	P0223	TP SEN 1/CIRC- B1	—	1	×	A + B	DTC Description 
P025A	00	P025A	FUEL PUMP MODULE A	—	2	×	A + B	DTC Description 
P025C	00	P025C	Fuel pump module A	—	2	×	A + B	DTC Description 
P025D	00	P025D	Fuel pump module A	—	2	×	A + B	DTC Description 
P0261	00	P0261	CYL1 INJECTOR	—	2	×	A + B	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE		GST *2						
P0262	00	P0262	CYL1 INJECTOR	—	2	×	A + B	DTC Description 
P0264	00	P0264	CYL2 INJECTOR	—	2	×	A + B	DTC Description 
P0265	00	P0265	CYL2 INJECTOR	—	2	×	A + B	DTC Description 
P0267	00	P0267	CYL3 INJECTOR	—	2	×	A + B	DTC Description 
P0268	00	P0268	CYL3 INJECTOR	—	2	×	A + B	DTC Description 
P026B	00	P026B	Injection timing	—	2	×	A + B	DTC Description 
P0270	00	P0270	CYL4 INJECTOR	—	2	×	A + B	DTC Description 
P0271	00	P0271	CYL4 INJECTOR	—	2	×	A + B	DTC Description 
P0300	00	P0300	MULTI CYL MISFIRE	—	2	×	A + B	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
P0301	00	P0301	CYL 1 MISFIRE	—	2	×	A + B	DTC Description 
P0302	00	P0302	CYL 2 MISFIRE	—	2	×	A + B	DTC Description 
P0303	00	P0303	CYL 3 MISFIRE	—	2	×	A + B	DTC Description 
P0304	00	P0304	CYL 4 MISFIRE	—	2	×	A + B	DTC Description 
P0315	00	P0315	Crankshaft position	—	2	×	A + B	DTC Description 
P0326	00	P0326	KNOCK SENSOR 1 B1	—	2	×	A + B	DTC Description 
P0327	00	P0327	KNOCK SEN/CIRC-B1	—	2	×	A + B	DTC Description 
P0328	00	P0328	KNOCK SEN/CIRC-B1	—	2	×	A + B	DTC Description 
P032B	00	P032B	Knock/combustion vibration sen 3 B1	—	2	×	A + B	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
P032C	00	P032C	Knock/combustion vibration sen 3 B1	—	2	×	A + B	DTC Description 
P032D	00	P032D	Knock/combustion vibration sen 3 B1	—	2	×	A + B	DTC Description 
P0335	00	P0335	CKP SEN/CIRCUIT	—	2	×	A + B	DTC Description 
P0340	00	P0340	CMP SEN/CIRC- B1	—	2	×	A + B	DTC Description 
P0365	00	P0365	CAMSHAFT POSITION SENSOR B B1	—	2	×	A + B	DTC Description 
P0401	00	P0401	EGR A FLOW INSUFFICIENT	×	2	×	A	DTC Description 
P0402	00	P0402	EGRC-BPT VALVE	×	2	×	A	DTC Description 
P0404	00	P0404	EGR A CONTROL	—	2	×	A + B	DTC Description 
P0420	00	P0420	TW CATALYST SYS-B1	×	2	×	A	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
P0441	00	P0441	EVAP PURG FLOW/MON	×	2	×	A + B	DTC Description 
P0443	00	P0443	PURG VOLUME CONT/V	—	2	×	A + B	DTC Description 
P0444	00	P0444	PURG VOLUME CONT/V	—	2	×	A + B	DTC Description 
P0445	00	P0445	PURG VOLUME CONT/V	—	2	×	A + B	DTC Description 
P0446	00	P0446	VENT CONTROL VALVE	—	2	×	A + B	DTC Description 
P0447	00	P0447	VENT CONTROL VALVE	—	2	×	A + B	DTC Description 
P0448	00	P0448	VENT CONTROL VALVE	—	2	×	A + B	DTC Description 
P044A	00	P044A	EGR SENSOR C	—	2	×	A + B	DTC Description 
P044B	00	P044B	EGR SENSOR C	—	2	×	A + B	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
P044C	00	P044C	EGR SENSOR C	—	2	×	A + B	DTC Description 
P044D	00	P044D	EGR SENSOR C	—	2	×	A + B	DTC Description 
P044E	00	P044E	EGR SENSOR C	—	2	×	A + B	DTC Description 
P0450	00	P0450	EVAP O SYS PRES SEN	—	2	×	A + B	DTC Description 
P0451	00	P0451	Barometric pressure sensor A/B	—	2	×	A + B	DTC Description 
P0452	00	P0452	EVAP SYS PRES SEN	—	2	×	A + B	DTC Description 
P0453	00	P0453	EVAP SYS PRES SEN	—	2	×	A + B	DTC Description 
P0454	00	P0454	EVAP SYS PRES SEN	—	2	×	A + B	DTC Description 
P0456	00	P0456	EVAP VERY SML LEAK	x *4	2	×	A	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
P0460	00	P0460	FUEL LEV SEN SLOSH	—	2	×	A + B	DTC Description 
P0461	00	P0461	FUEL LEVEL SENSOR	—	2	×	A + B	DTC Description 
P0462	00	P0462	FUEL LEVL SEN/CIRC	—	2	×	A + B	DTC Description 
P0463	00	P0463	FUEL LEVL SEN/CIRC	—	2	×	A + B	DTC Description 
P0500	00	P0500	VEHICLE SPEED SEN A *5	—	2	×	A + B	DTC Description 
P0501	00	P0501	VEHICLE SPEED SEN A	—	2	×	A + B	DTC Description 
P0506	00	P0506	ISC SYSTEM	—	2	×	A + B	DTC Description 
P0507	00	P0507	ISC SYSTEM	—	2	×	A + B	DTC Description 
P050A	00	P050A	COLD START CONTROL	—	2	×	A + B	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE		GST *2						
P050B	00	P050B	COLD START CONTROL	—	2	×	A + B	DTC Description 
P050E	00	P050E	COLD START CONTROL	—	2	×	A + B	DTC Description 
P0520	00	P0520	EOP SENSOR/SWITCH	—	2	×	A + B	DTC Description 
P0522	00	P0522	Engine oil pressure sensor/switch	—	2	×	A + B	DTC Description 
P0523	00	P0523	Engine oil pressure sensor/switch	—	2	×	A + B	DTC Description 
P0524	00	P0524	ENGINE OIL PRESSURE	—	2	×	A + B	DTC Description 
P052A	00	P052A	CAMSHAFT POSITION TIMING B1	×	2	×	A	DTC Description 
P052B	00	P052B	CAMSHAFT POSITION TIMING B1	×	2	×	A	DTC Description 
P0531	00	P0531	REFRIGERANT PRESS SENSOR A	—	2	×	A + B	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
P0532	00	P0532	REFRIGERANT PRESS SENSOR A	—	2	×	A + B	DTC Description 
P0533	00	P0533	REFRIGERANT PRESS SENSOR A	—	2	×	A + B	DTC Description 
P054A	00	P054A	Cold start B camshaft position bank 1	×	2	×	A	DTC Description 
P054B	00	P054B	Cold start B camshaft position bank 1	×	2	×	A	DTC Description 
P059F	00	P059F	ACTIVE GRILLE AIR SHUTTER A	—	2	×	A + B	DTC Description 
P05EC	00	P05EC	COLD START CONTROL	—	2	×	A + B	DTC Description 
P0604	00	P0604	ECM	—	1	×	A + B	DTC Description 
P0605	00	P0605	ECM	—	1	×	A + B	DTC Description 
P0606	00	P0606	CONTROL MODULE	—	1 or 2	×	A + B or —	DTC Description 

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
P0607	00	P0607	ECM	—	1 or 2	×	A + B	DTC Description 
P060A	00	P060A	CONTROL MODULE	—	1	×	A + B	DTC Description 
P060B	00	P060B	CONTROL MODULE	—	1	×	A + B	DTC Description 
P060C	00	P060C	Control module	—	1	×	A + B	DTC Description 
P061B	00	P061B	Internal control module	—	1	×	A + B	DTC Description 
P062B	00	P062B	ECM	—	2	×	A + B	DTC Description 
P062D	00	P062D	Fuel injector driver bank 1	—	2	×	A + B	DTC Description 
P062F	00	P062F	CONTROL MODULE	—	1 or 2	×	A + B	DTC Description 
P0641	00	P0641	Sensor reference voltage A	—	2	×	A + B	DTC Description 

DTC *1		Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2						
P064D	00	P064D Internal Control Module O2 Sensor Processor Performance (bank 1)	—	2	×	A + B	DTC Description 
P0660	00	P0660 INT Manifold Tuning Valve Control B1	—	2	—	—	DTC Description 
P0661	00	P0661 INT Manifold Tuning Valve Control B1	—	2	—	—	DTC Description 
P0662	00	P0662 INT Manifold Tuning Valve Control B1	—	2	—	—	DTC Description 
P06B0	11	P06B1 Sensor Power Supply A	—	1	×	A + B	DTC Description 
	12	P06B2 Sensor Power Supply A	—	1	×	A + B	
P06B3	11	P06B4 Sensor Power Supply B	—	1	×	A + B	DTC Description 
	12	P06B5 Sensor Power Supply B	—	1	×	A + B	
P06DA	00	P06DA ENGINE OIL PRESSURE CONTROL	—	2	—	—	DTC Description 
P06DB	00	P06DB ENGINE OIL PRESSURE CONTROL	—	2	—	—	DTC Description 
P06DC	00	P06DC Engine oil pressure control	—	2	—	—	DTC Description

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
								
P06E6	11	P06E7	Internal control module	—	1	×	A + B	DTC Description
	12	P06E8	Internal control module	—	1	×	A + B	
P0850	00	P0850	P-N POS SW/CIRCUIT	—	2	×	A + B	DTC Description 
P10C8	00	P10C8	Cylinder1 injector A	—	2	×	A + B	DTC Description 
P10C9	00	P10C9	Cylinder2 injector A	—	2	×	A + B	DTC Description 
P10CA	00	P10CA	Cylinder3 injector A	—	2	×	A + B	DTC Description 
P10CB	00	P10CB	Cylinder4 injector A	—	2	×	A + B	DTC Description 
P1148	00	P1148	CLOSED LOOP- B1	—	1	×	A + B	DTC Description 
P1197	00	P1197	FUEL RUN OUT	—	2	—	—	DTC Description 
P119A	00	P119A	FUEL PRESSURE SENSOR	—	2	×	A + B	DTC Description

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
								
P119B	00	P119B	FUEL PRESSURE SENSOR	—	2	×	A + B	DTC Description 
P119C	00	P119C	FUEL PRESSURE SENSOR	—	2	×	A + B	DTC Description 
P119D	00	P119D	FRP SEN/CIRC	—	2	×	A + B	DTC Description 
P119E	00	P119E	FRP SEN/CIRC	—	2	×	A + B	DTC Description 
P1217	00	P1217	OVER HEAT	—	1	×	A + B	DTC Description 
P1225	00	P1225	CTP LEARNING- B1	—	2	—	—	DTC Description 
P1226	00	P1226	CTP LEARNING- B1	—	2	—	—	DTC Description 
P14C1	00	P14C1	CCS brake pedal SW (BCM)	—	1	—	—	DTC Description 
P1526	00	P1526	Vehicle speed sensor	—	1	—	—	DTC Description

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
								
P1536	00	P1536	Auto Cruise Control	—	1	—	—	DTC Description 
P1538	00	P1538	Auto Cruise Control	—	1	—	—	DTC Description 
P155B	00	P155B	Electrical energy management system	—	2	—	—	DTC Description 
P155D	00	P155D	GENERATOR	—	2	—	—	DTC Description 
P155E	00	P155E	GENERATOR VOLTAGE	—	2	—	—	DTC Description 
P155F	00	P155F	GENERATOR VOLTAGE	—	2	—	—	DTC Description 
P1564	00	P1564	ASCD SW	—	1	—	—	DTC Description  (With ASCD), DTC Description  (With ACC)

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
P1568	00	P1568	ACC COMMAND VALUE	—	1	—	—	DTC Description 
P1572	00	P1572	ASCD BRAKE SW	—	1	—	—	DTC Description 
P1574	00	P1574	ASCD VHL SPD SEN	—	1	—	—	DTC Description 
P1575	00	P1575	BRAKE SW	—	2	×	A + B	DTC Description 
P159F	00	P159F	ACTIVE GRILLE AIR SHUTTER A	—	2	—	—	DTC Description 
P1603	00	P1603	CONTROL MODULE	—	2	—	—	DTC Description 
P161D	00	P161D	IMMOBILIZER	—	2	—	—	DTC Description 
P161E	00	P161E	IMMOBILIZER	—	2	—	—	—
P161F	00	P161F	IMMOBILIZER	—	2	—	—	DTC Description 
P1800	00	P1800	VIAS S/V CIRCB1	—	2	—	—	DTC Description

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
								
P1805	00	P1805	BRAKE SW/CIRCUIT	—	1	—	—	DTC Description 
P1A10	00	P1A10	ECM initial learning Incomplete	—	2	—	—	DTC Description 
P2004	00	P2004	SWIRL CONT/V (B1)	—	2	×	A + B	DTC Description 
P2008	00	P2008	SWIRL CONT/V (B1)	—	2	×	A + B	DTC Description 
P2009	00	P2009	Intake manifold runner control	—	2	×	A + B	DTC Description 
P2010	00	P2010	Intake manifold runner control	—	2	×	A + B	DTC Description 
P2014	00	P2014	SWIRL CONT SEN/SW	—	2	×	A + B	DTC Description 
P2015	00	P2015	Intake manifold runner posi sen/sw B1	—	2	×	A + B	DTC Description 
P2016	00	P2016	IN/MANIFOLD RUNNER POS	—	2	×	A + B	DTC Description

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
			SEN B1					
P2017	00	P2017	IN/MANIFOLD RUNNER POS SEN B1	—	2	×	A + B	DTC Description 
P2018	00	P2018	IN/MANIFOLD RUNNER POS SEN B1	—	2	×	A + B	DTC Description 
P2096	00	P2096	POST CATALYST FUEL TRIM SYS B1	×	2	×	A	DTC Description 
P2097	00	P2097	POST CATALYST FUEL TRIM SYS B1	×	2	×	A	DTC Description 
P2100	00	P2100	ETC MOT PWR- B1	—	1	×	A + B	DTC Description 
P2101	00	P2101	ETC FNCTN/CIRC-B1	—	1	×	A + B	DTC Description 
P2103	00	P2103	ETC MOT PWR- B1	—	1	×	A + B	DTC Description 
P2119	00	P2119	ETC ACTR-B1	—	1	×	A + B or —	DTC Description 
P2121	00	P2121	Throttle/pedal position sen/sw D	—	1	×	A + B	DTC Description

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
								
P2122	00	P2122	APP SEN 1/CIRC	—	1	×	A + B	DTC Description 
P2123	00	P2123	APP SEN 1/CIRC	—	1	×	A + B	DTC Description 
P2126	00	P2126	Throttle/pedal position sen/sw E	—	1	×	A + B	DTC Description 
P2127	00	P2127	APP SEN 2/CIRC	—	1	×	A + B	DTC Description 
P2128	00	P2128	APP SEN 2/CIRC	—	1	×	A + B	DTC Description 
P2135	00	P2135	TP SENSOR-B1	—	1	×	A + B	DTC Description 
P2138	00	P2138	APP SENSOR	—	1	×	A + B	DTC Description 
P2159	00	P2159	VEHICLE SPEED SEN B	—	2	×	A + B	DTC Description 
P219A	00	P219A	AIR FUEL RATIO IMBALANCE B1	×	2	×	A	DTC Description

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
								
P2227	00	P2227	Barometric pressure sensor A	—	2	×	A + B	DTC Description 
P2237	00	P2237	O2 sensor bank 1 sensor 1	—	2	×	A + B	DTC Description 
P2238	00	P2238	O2 sensor bank 1 sensor 1	—	2	×	A + B	DTC Description 
P2239	00	P2239	O2 sensor bank 1 sensor 1	—	2	×	A + B	DTC Description 
P2251	00	P2251	O2 sensor bank 1 sensor 1	—	2	×	A + B	DTC Description 
P2252	00	P2252	O2 sensor bank 1 sensor 1	—	2	×	A + B	DTC Description 
P2253	00	P2253	O2 sensor bank 1 sensor 1	—	2	×	A + B	DTC Description 
P2270	00	P2270	O2 sensor signal bank 1 sensor 2	×	2	×	A + B	DTC Description 
P2271	00	P2271	O2 sensor signal bank 1 sensor 2	×	2	×	A	DTC Description

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
								
P2297	00	P2297	O2 SENSOR 1 B1	×	2	×	A	DTC Description 
P2413	00	P2413	EGR SYSTEM	—	2	×	A + B	DTC Description 
P2610	00	P2610	ECM/PCM INTERNAL ENG OFF TIMER	—	2	×	A + B	DTC Description 
P2614	00	P2614	A camshaft posi signal B1	—	2	×	A + B	DTC Description 
P2615	00	P2615	A camshaft posi signal B1	—	2	×	A + B	DTC Description 
P2616	00	P2616	A camshaft posi signal B1	—	2	×	A + B	DTC Description 
P2617	00	P2617	Crankshaft position signal	—	2	×	A + B	DTC Description 
P2618	00	P2618	Crankshaft position signal	—	2	×	A + B	DTC Description 
P2619	00	P2619	Crankshaft position signal	—	2	×	A + B	DTC Description

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE		GST *2						
								
P2A01	00	P2A01	O2 sensor bank 1 sensor 2	×	2	×	A + B	DTC Description 
P2B95	00	P2B95	COLD START CONTROL	—	2	×	A + B	DTC Description 
P2B96	00	P2B96	Injection pulse	—	2	×	A + B	DTC Description 
P34AC	00	P34AC	A camshaft posi actuator posi sens B1	—	2	×	A + B	DTC Description 
P34AD	00	P34AD	A camshaft posi actuator posi sens B1	—	2	×	A + B	DTC Description 
P34AE	00	P34AE	A camshaft posi actuator posi sens B1	—	2	×	A + B	DTC Description 
P34AF	00	P34AF	A camshaft posi actuator posi sens B1	—	2	×	A + B	DTC Description 
P34C8	00	P34C8	Camshaft position control module	—	2	×	A + B	DTC Description 

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J1979/ ISO 15031-5.

*3: Refer to Description [Description](#) .

*4: This DTC is not displayed in “SRT STATUS” function on M.U.T.-III SE.

*5: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

Network-DTC

×:Applicable —: Not applicable

DTC *1			Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE		GST *2						
U2118	87	U2118	CAN comm err (Keyless operation key)	—	2	—	—	DTC Description 
U2148	87	U2148	CAN comm err (brake control unit)	—	2	—	—	DTC Description 
U214A	87	U214A	CAN comm err (AWD/4WD)	—	2	—	—	DTC Description 
U214E	87	U214E	CAN comm err (combination meter)	—	2	—	—	DTC Description 
U214F	87	U214F	CAN comm err (BCM)	—	2	—	—	DTC Description 
U2150	87	U2150	CAN comm err (AIRBAG)	—	2	—	—	DTC Description 
U2152	87	U2152	CAN comm err (ADAS control unit)	—	2	—	—	DTC Description 

DTC *1		Items (M.U.T.-III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2						
U215B	87	U215B	CAN comm err (IPDM E/R)	—	2	—	DTC Description 
U2165	87	U2165	CAN comm err (sonar)	—	2	—	DTC Description 
U2241	87	U2241	CAN comm err (TCM)	—	2	—	DTC Description 
U2248	87	U2248	CAN comm err (brake control unit)	—	2	—	DTC Description 
U2252	87	U2252	CAN comm err (ADAS control unit)	—	2	—	DTC Description 
U2259	87	U2259	CAN comm err (steering control unit)	—	2	—	DTC Description 
U226B	87	U226B	CAN comm err (front camera)	—	2	—	DTC Description 
U2276	87	U2276	CAN comm err (CCM)	—	2	—	DTC Description 

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J1979/ ISO 15031-5.

*3: Refer to Description [Description](#) .

MAC-DTC

×:Applicable —: Not applicable

DTC *1			Items (M.U.T.- III SE screen terms)	SRT code	Trip	MIL	Permanent DTC group *3	Reference page
M.U.T.-III SE	GST *2							
U1327	52	U1327	MAC Key update	—	1	—	—	DTC Description 
U1327	54	U1327	MAC Key update	—	1	—	—	DTC Description 
U214F	57	U214F	CAN comm err (BCM)	—	2	—	—	DTC Description 
U2152	57	U2152	CAN comm err (ADAS control unit)	—	2	—	—	DTC Description 
U2165	57	U2165	CAN comm err (sonar)	—	2	—	—	DTC Description 
U2176	57	U2176	CAN comm err (CCM)	—	2	—	—	DTC Description 

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J1979/ ISO 15031-5.

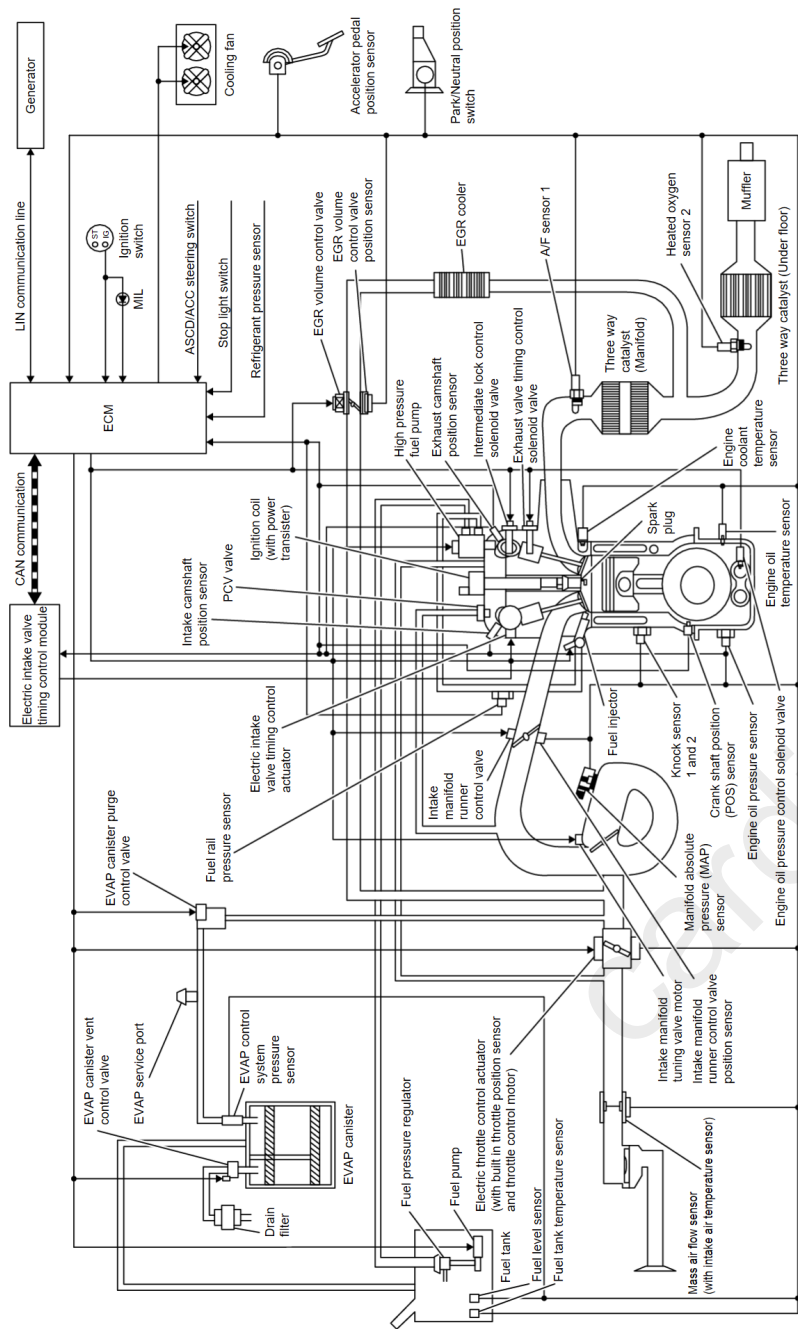
*3: Refer to Description [Description](#) .



System Description

SYSTEM DIAGRAM

cardiagn.com



Component parts	Function
Accelerator pedal position sensor	Accelerator Pedal Position Sensor 
Air fuel ratio (A/F) sensor 1	Air Fuel Ratio (A/F) Sensor 1 
ASCD steering switch	Steering Switch 
ACC steering switch	
Cooling fan	Cooling Fan 
Crankshaft position sensor	Crankshaft Position Sensor 
ECM	ECM 
EGR system	System Description 
EGR volume control valve	EGR Volume Control Valve 
Electric intake valve timing control actuator	Electric Intake Valve Timing Control Actuator 
Electric intake valve timing control module	Electric Intake Valve Timing Control Module 
Electric throttle control actuator	Electric Throttle Control Actuator 
Engine coolant temperature sensor	Engine Coolant Temperature Sensor 
Engine oil pressure sensor	Engine Oil Pressure Sensor 
Engine oil pressure control solenoid valve	Engine Oil Pressure Control Solenoid Valve 
Engine oil pressure control system	Warning Light/Indicator Light Warning lamps/Indicator lamps 
Engine oil temperature sensor	Engine Oil Temperature Sensor 
EVAP canister	EVAP Canister 
EVAP canister purge volume control solenoid valve	EVAP Canister Purge Volume Control Solenoid Valve 

Component parts	Function
EVAP canister vent control valve	EVAP Canister Vent Control Valve ➡
EVAP control system pressure sensor	EVAP Control System Pressure Sensor ➡
Exhaust camshaft position sensor	Exhaust Camshaft Position Sensor ➡
Exhaust valve timing control solenoid valve	Exhaust Valve Timing Control Solenoid Valve ➡
Exhaust valve timing intermediate lock control solenoid valve	Exhaust Valve Timing Intermediate Lock Control Solenoid Valve ➡
Fuel injector	Fuel Injector ➡
Fuel level sensor unit and fuel pump	Fuel Level Sensor Unit And Fuel Pump Fuel Level Sensor Unit and Fuel Pump ➡
Fuel pressure control	System Description ➡
Fuel rail pressure sensor	Fuel Rail Pressure Sensor ➡
Fuel tank temperature sensor	Fuel Tank Temperature Sensor ➡
Heated oxygen sensor 2	Heated Oxygen Sensor 2 ➡
High pressure fuel pump	High Pressure Fuel Pump ➡
Ignition coil with power transistor	Ignition Coil With Power Transistor ➡
Intake camshaft position sensor	Intake Camshaft Position Sensor ➡
Intake manifold runner control valve	Intake Manifold Runner Control Valve ➡
Intake manifold tuning valve	Intake Manifold Tuning Valve ➡
Knock sensor	Knock Sensor ➡
Malfunction indicator light (MIL)	Malfunction Indicator Light (MIL) Malfunction Indicator Lamp (MIL) ➡ (Full TFT meter)

Component parts	Function
	Malfunction Indicator Light (MIL) Malfunction Indicator Lamp (MIL) (7 inch information display) 
Manifold absolute pressure sensor	Manifold Absolute Pressure Sensor 
Mass air flow sensor (With intake air temperature sensor)	Mass Air Flow Sensor (With Intake Air Temperature Sensor) 
Power generation voltage variable control system	System Description 
Refrigerant pressure sensor	Refrigerant Pressure Sensor 
Stop light switch	Stop Light Switch Stop Lamp Switch 

SYSTEM DESCRIPTION

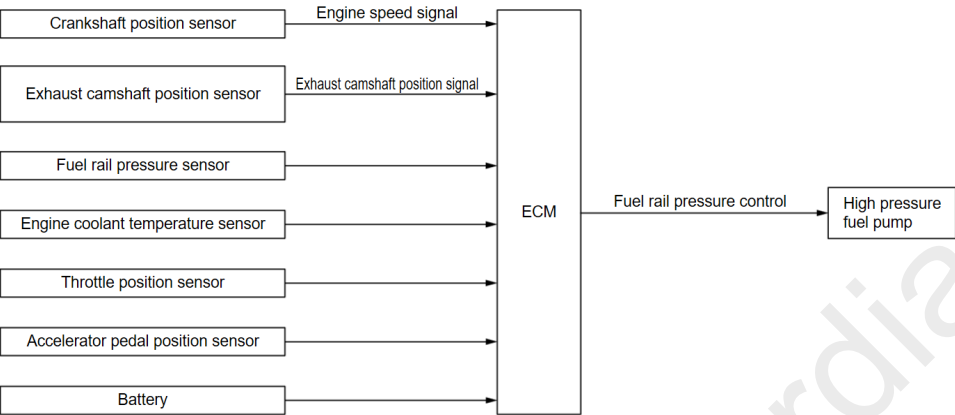
ECM controls the engine by various functions.

Function	Reference
Dig (direct injection gasoline) system	System Description 
Electric ignition system	System Description 
Intake valve timing control	System Description 
Exhaust valve timing control	System Description 
Intake manifold runner control	System Description 
Intake manifold tuning system	System Description 
Engine protection control	System Description 
Air conditioning cut control	System Description 

Function	Reference
Cooling fan control	System Description 
Evaporative emission system	System Description 
Automatic speed control device (ASCD)	System Description 
CAN communication	System Description 
Active grille shutter system	System Description System Description 

System Description

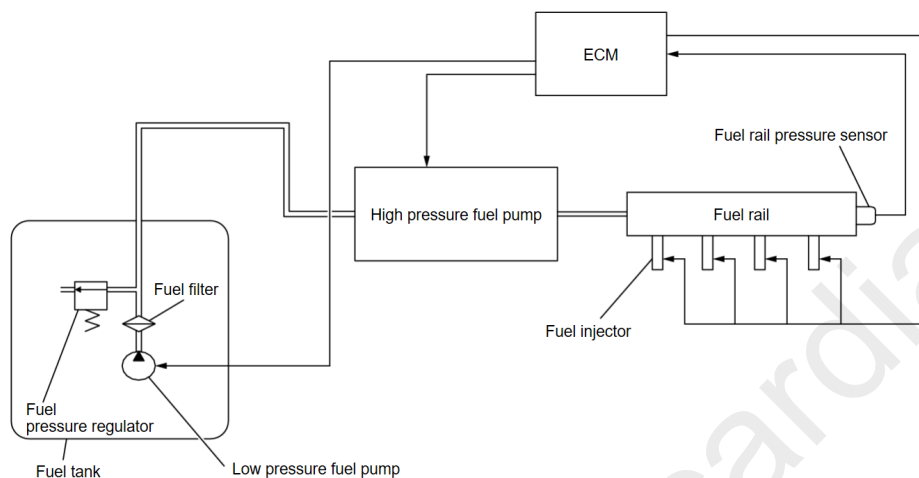
System Diagram



Component parts	Function
Crankshaft position sensor	Refer to Crankshaft Position Sensor ➡.
Exhaust camshaft position sensor	Refer to Exhaust Camshaft Position Sensor ➡.
Fuel rail pressure sensor	Refer to Fuel Rail Pressure Sensor ➡.
Engine coolant temperature sensor	Refer to Engine Coolant Temperature Sensor ➡.
Throttle position sensor	Refer to Electric Throttle Control Actuator ➡.

Component parts	Function
Accelerator pedal position sensor	Refer to Accelerator Pedal Position Sensor ➡.
Battery	ECM detects the battery voltage.
ECM	Refer to ECM ➡.
High pressure fuel pump	Refer to High Pressure Fuel Pump ➡.

SYSTEM DESCRIPTION



Low fuel pressure control

- The low fuel pressure pump is controlled by ECM and pumps fuel according to a driving condition. The pumped fuel passes through the fuel filter and is sent to the high pressure fuel pump.
- Low fuel pressure is adjusted by the fuel pressure regulator.

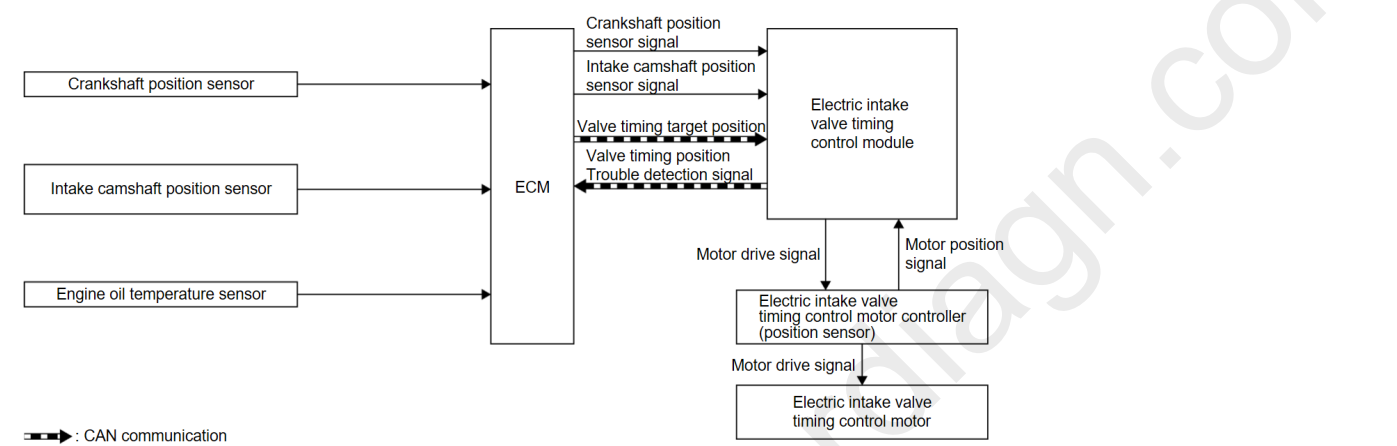
High fuel pressure control

- The high pressure fuel pump is actuated by the cam of camshaft (EXH).
- The high pressure fuel pump activates the high pressure fuel pump solenoid based on a signal received from ECM, and adjusts the amount of discharge by changing the timing of closing the inlet checkvalve to control fuel rail pressure.

For details about operation, Refer to [High Pressure Fuel Pump](#) .

System Description

SYSTEM DIAGRAM



Component parts	Function
Crankshaft position sensor	Crankshaft Position Sensor 
Intake camshaft position sensor	Intake Camshaft Position Sensor 
Engine oil temperature sensor	Engine Oil Temperature Sensor 
ECM	ECM 
Electric intake valve timing control module	Electric Intake Valve Timing Control Module 

Component parts	Function
Electric intake valve timing control actuator	Electric Intake Valve Timing Control Actuator
Electric intake valve timing control motor*	

*: Electric intake valve timing control motor is built in to the cam sprocket (INT).

SYSTEM DESCRIPTION

Electric VTC responds faster than hydraulic VTC and can extend the operation angle of the camshaft. This improves the fuel economy, engine output, and exhaust performance.

This mechanism continuously controls the phase of camshaft by the electric intake valve timing (IVT) control motor with the amount of intake valve operation held constant.

ECM transmits a target position of the electric IVT control motor to electric IVT control module via CAN communication.

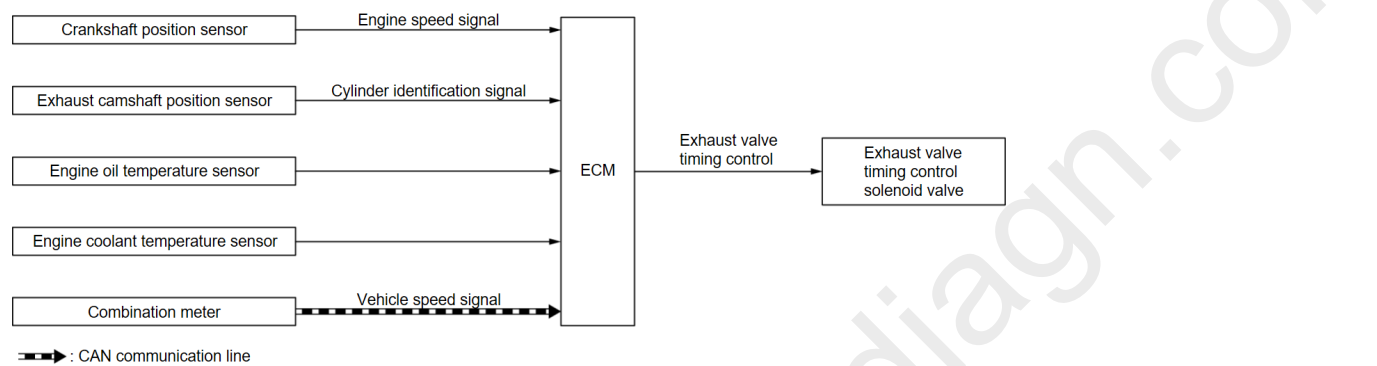
The electric IVT control module controls the electric IVT control motor according to a signal from ECM and changes the opening and closing timing of intake valve.

Furthermore, the electric IVT control module has a diagnostic function and transmits a DTC detection signal to ECM via engine communication when detecting a system error.

Intake camshaft condition	Electric intake valve timing control actuator operation
Advanced angle	The electric intake valve timing control motor rotates the intake camshaft to advanced angle.
Maintained	Stop rotating the electric intake valve timing control motor to keep the intake camshaft position (cam phase).
Retard angle	The electric intake valve timing control motor rotates the intake camshaft to retard angle.

System Description

SYSTEM DIAGRAM



Component parts	Function
Crankshaft position sensor	Refer to Crankshaft Position Sensor ➡.
Exhaust camshaft position sensor	Refer to Exhaust Camshaft Position Sensor ➡.
Engine oil temperature sensor	Refer to Engine Oil Temperature Sensor ➡.
Engine coolant temperature sensor	Refer to Engine Coolant Temperature Sensor ➡.
Combination meter	ECM receives vehicle speed signal via CAN communication.

Component parts	Function
ECM	Refer to ECM  .
Exhaust valve timing control solenoid valve	Refer to Exhaust Valve Timing Control Solenoid Valve  .

SYSTEM DESCRIPTION

With the exhaust valve timing controller which controls the phase of exhaust camshaft to optional position continuously, ECM improves both low-middle speed torque and high speed performance, emission and fuel efficiency by optimizing the exhaust valve open/close timing according to driving conditions.

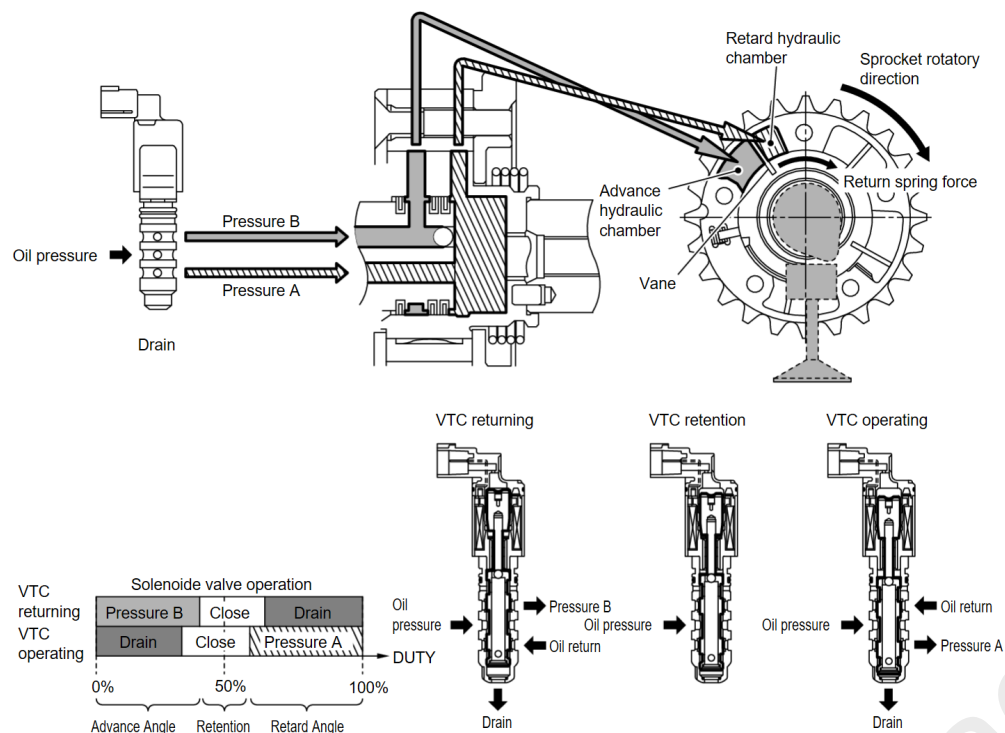
The exhaust valve timing controller is hydraulically controlled by the exhaust valve timing control solenoid valve.

This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the exhaust valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine oil temperature. Then, the ECM sends ON/OFF pulse duty signals to the exhaust valve timing control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the exhaust valve to increase engine torque and output in a range of high engine speed.

EXHAUST VALVE TIMING CONTROL SOLENOID VALVE CONTROL

The exhaust valve timing control solenoid valve is driven ON-OFF (duty control) by ECM output signal, and controls the open/close timing of the exhaust valve to the optimum by changing its duty ratio according to the vehicle's driving condition.



Exhaust valve timing control solenoid valve condition	Exhaust valve timing controller operation
Engine OFF	When starting the engine, the controller vane and sprocket are fixed in full advanced position by the reaction force of return spring, improving the starting performance of the engine.
Active (Retard angle)	When the energization rate to the control solenoid valve is increased, the oil pressure from the oil pump is conveyed to the retard angle chamber of the controller. And advanced angle chamber oil is drained. Accordingly, the controller vane rotates leftward and the phase of camshaft becomes retard angle. This condition brings about the greater overlap with the intake valve, enabling the exhaust gas cleaning by the internal EGR effect and the fuel consumption improvement by the reduction in pumping loss.
Neutral (Maintained)	When it is the target valve timing, the energization rate to the control solenoid valve is adjusted to the intermediate state. The solenoid valve

Exhaust valve timing control solenoid valve condition	Exhaust valve timing controller operation
	is positioned at the neutral position and the oil path is interrupted to maintain the cam shaft phase.
Return (Advanced angle)	When the energization rate to the control solenoid valve is decreased, the oil pressure from the oil pump is conveyed to the advanced chamber of the controller. And retard angle chamber oil is drained. Accordingly, the controller vane rotates rightward and the phase of camshaft becomes advanced angle.

EXHAUST VALVE TIMING CONTROL FEEDBACK CONTROL

Cam Position Detection

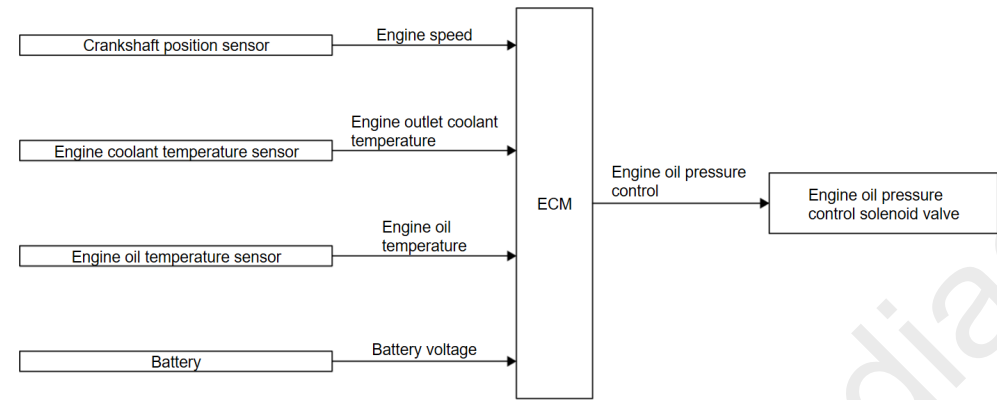
The exhaust camshaft position sensor mounted at the rear of the cylinder head detects a cam position, by using the groove on the plate located at the rear of the exhaust camshaft.

Feedback Control

The exhaust camshaft position sensor feeds back an actual cam position signal to ECM. Based on the signal, ECM controls the exhaust valve timing control solenoid valve to satisfy the optimum target valve opening/closing timing according to a driving condition.

System Description

SYSTEM DIAGRAM



Component parts	Function
Crankshaft position sensor	Crankshaft Position Sensor 
Engine coolant temperature sensor	Engine Coolant Temperature Sensor 
Engine oil temperature sensor	Engine Oil Temperature

Component parts	Function
	Sensor 
Battery	ECM receives the battery voltage signal.
ECM	ECM 
Engine oil pressure control solenoid valve	Engine Oil Pressure Control Solenoid Valve 

SYSTEM DESCRIPTION

ECM performs the variable hydraulic control (low oil pressure control and high oil pressure control) based on signals from each sensor according to oil temperature and engine load. ECM activates the engine oil pressure control solenoid valve and switches to the low oil pressure control and high oil pressure control. ECM uses the low oil pressure control for 80-90 % of the operating area to maintain low oil pressure and stops piston cooling jet (i.e. achievement of less than or equal to jet injection valve opening pressure).

High oil pressure control start condition

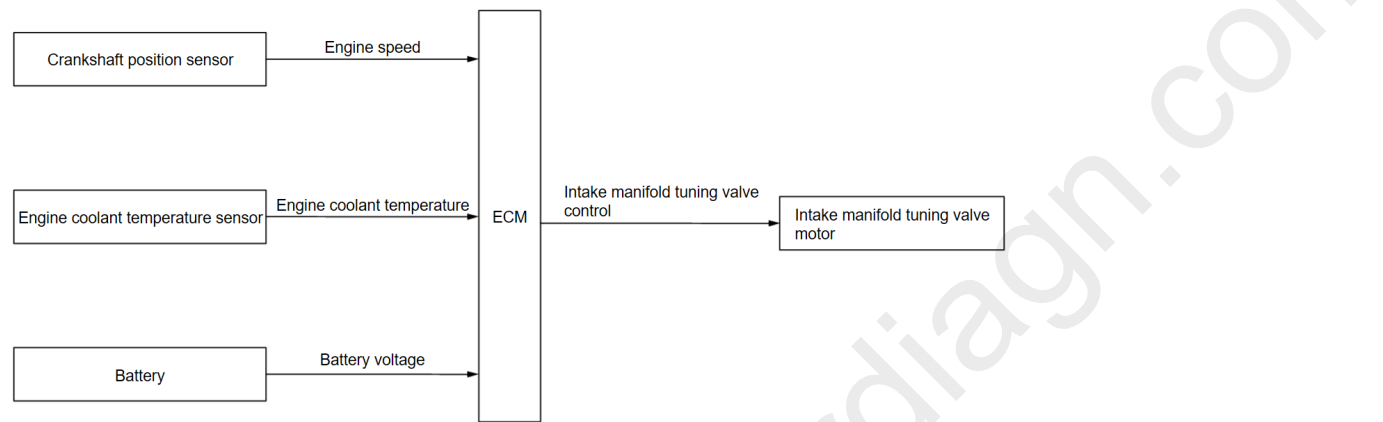
- High oil pressure control start condition
- High engine speed
- Coolant temperature is 60°C (140°F) or more under high engine load condition

Low oil pressure control start condition

- Coolant temperature is less than 60°C (140°F) under low engine speed condition
- Coolant temperature is 60°C (140°F) or more under low engine load and low engine speed conditions

System Description

SYSTEM DIAGRAM



Component parts	Function
Crankshaft position sensor	Refer to Crankshaft Position Sensor ➡.
Engine coolant temperature sensor	Refer to Engine Coolant Temperature Sensor ➡.
Battery	ECM detects the battery voltage.
ECM	Refer to ECM ➡.
Intake manifold tuning valve motor	Refer to Intake Manifold Tuning Valve ➡.

SYSTEM DESCRIPTION

This system switches the length of intake air path according to the low-to-medium speed range or high speed range. Torque is increased in the low-to-medium speed range and the engine output is improved in the high speed range.

Engine speed: Low and medium speed range

Since the intake manifold tuning (IMT) valve is closed when the engine speed is less than 5,000 rpm, the length of the effective intake air path is from the mouth of intake manifold collector to the intake valve. This long path brings the inertia effect of intake air, contributing to the improvement in intake air efficiency and the generation of high torque.

Engine speed: High speed range

When engine speed is 5,000 rpm or more, ECM turns ON the intake manifold tuning valve motor to open the intake manifold tuning valve. The length of the effective intake air path at this time is from the intake manifold tuning valve to the intake valve. This short path brings the inertia effect of intake air in the high speed range, contributing to the torque improvement while the engine is running at high speeds. (The highest engine output is improved.)

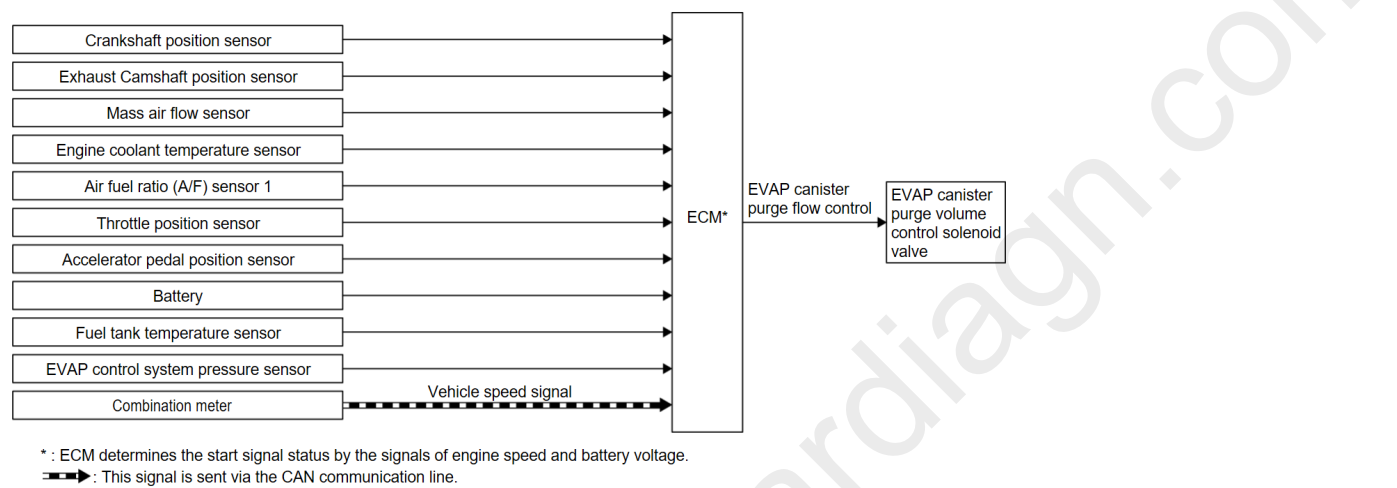
Intake Manifold Tuning Valve Operating Condition

ECM opens the intake manifold tuning valve when all of the following conditions are satisfied.

- Engine speed: 5,000 rpm or more
- Engine coolant temperature: -30°C (-22°F) or more
- Battery voltage: 16 V or less

System Description

SYSTEM DIAGRAM



Component parts	Function
Crankshaft position sensor	Refer to Crankshaft Position Sensor  .
Exhaust camshaft position sensor	Refer to Exhaust Camshaft Position Sensor  .
Mass air flow sensor (With intake air temperature sensor)	Refer to Mass Air Flow Sensor (With Intake Air Temperature Sensor)  .
Engine coolant temperature sensor	Refer to Engine Coolant Temperature Sensor  .

Component parts	Function
Air fuel ratio (A/F) sensor 1	Refer to Air Fuel Ratio (A/F) Sensor 1 ➡.
Throttle position sensor	Refer to Electric Throttle Control Actuator ➡.
Accelerator pedal position sensor	Refer to Accelerator Pedal Position Sensor ➡.
Battery	ECM detects the battery voltage.
Fuel tank temperature sensor	Refer to Fuel Tank Temperature Sensor ➡.
EVAP control system pressure sensor	Refer to EVAP Canister Vent Control Valve ➡.
Combination meter	It transmits the vehicle speed signal to ECM via CAN communication.
ECM	Refer to ECM ➡.
EVAP canister purge volume control solenoid valve	Refer to EVAP Canister Purge Volume Control Solenoid Valve ➡.

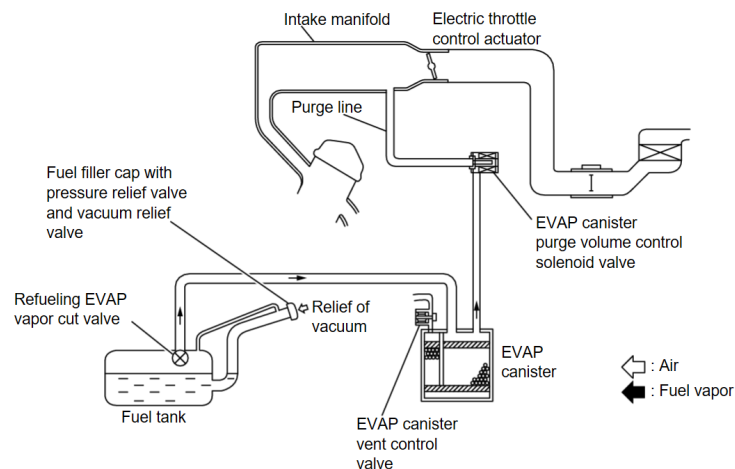
INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor Camshaft position sensor	Engine speed* ¹	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage* ¹		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
EVAP control system pressure sensor	Pressure in purge line		
Combination meter	Vehicle speed* ²		

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

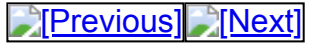


The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.

The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.

EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating.



System Description

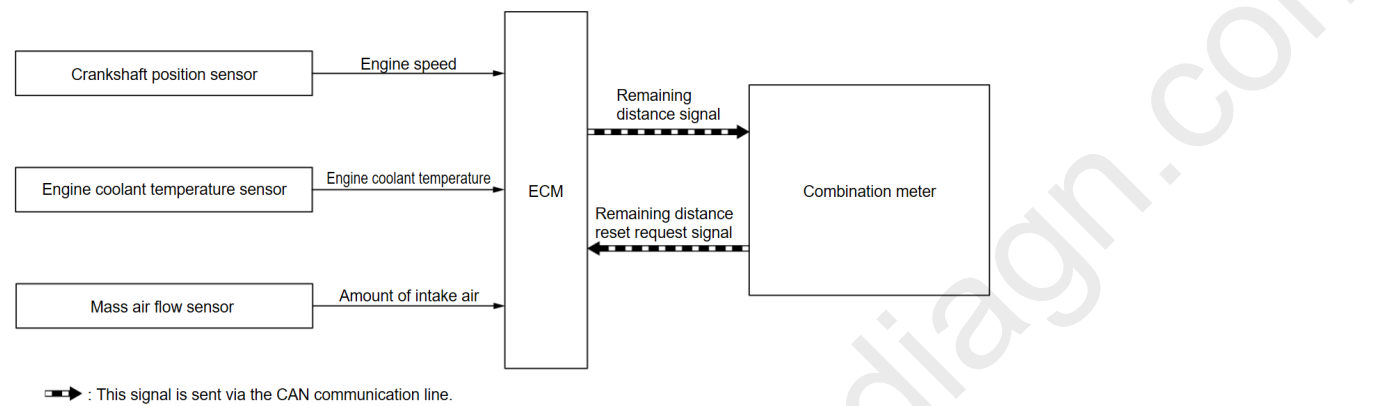
DESCRIPTION

ECM transmits a target power generation voltage signal received from IPDM E/R to the generator via LIN communication. The generator includes a self-diagnosis function and transmits a diagnosis signal to ECM via LIN communication when detecting a malfunction. When ECM receives a diagnosis signal, ECM detects DTC and transmits a charge warning light request signal to the combination meter to turn ON the charge warning light.

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System Description

SYSTEM DIAGRAM



Component parts	Function
Crankshaft position sensor	Crankshaft Position Sensor ➡
Engine coolant temperature sensor	Engine Coolant Temperature Sensor ➡
Mass Air Flow Sensor (With Intake Air Temperature Sensor)	Mass Air Flow Sensor (With Intake Air Temperature Sensor) ➡
ECM	ECM ➡
Combination meter	ECM receives the vehicle speed signal via CAN communication.

SYSTEM DESCRIPTION

ECM calculates engine load, engine coolant temperature, and engine speed based on signals from the mass air flow sensor, engine coolant temperature sensor, and crankshaft position sensor and monitors the deterioration state of engine oil.

When the mileage before engine oil change comes to approximately 1,500 km or less, pre-alert message is displayed to inform the driver that the maintenance timing is close as shown in the following table.

Remaining mileage to the engine oil change timing	Alert timing
1,000 km < the mileage ≤ 1,500 km (630 mile < the mileage ≤ 940 mile)	The first IGN ON after reaching 1,500 km (940 mile)
500 km < the mileage ≤ 1,000 km (310 mile < the mileage ≤ 630 mile)	The first IGN ON after reaching 1,000 km (630 mile)
500 km or less (310 mile or less)	The first IGN ON every 100 km (60 mile)

Furthermore, when the timing is passed, alert message is displayed every time when ignition switch is turned ON to inform the driver that engine oil change is necessary.

At oil change, the mileage must be reset using vehicle information display function.

note	Alerted mileage might be different from actual mileage.
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Work Procedure

Before Replacing ECM

1.SAVE ECM DATA

① With M.U.T.-III SE

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Select "SAVING DATA FOR REPLC CPU" in "WORK SUPPORT" mode of "ENGINE" using M.U.T.-III SE.
5. Follow the instruction of M.U.T.-III SE display.

note

- Necessary data in ECM is copied and saved to M.U.T.-III SE.
- Go to Step 2 regardless of with or without success in saving data.



:

- Replace ECM.
- After replacing ECM, perform necessary work.

2.REMOVE ECM

Remove ECM. Refer to [ECM : Removal & Installation](#) .

caution

After removing ECM, do not install new ECM, but change BCM at first.



3. REPLACE BCM

Replace BCM. Refer to [Removal and Installation](#) .



4. INSTALL ECM

Install ECM. Refer to [ECM : Removal & Installation](#) .
: After replacing ECM, perform necessary work.

After Replacing ECM

1.PERFORM ECM PROGRAMMING

 With M.U.T.-III SE

Perform ECM programming according to the procedure of “Programming” in M.U.T.-III SE Operation Manual. Refer to M.U.T.-III SE Operation Manual.

caution	During programming, maintain the following conditions: • Ignition switch: ON • Electric load: OFF • Brake pedal: Not depressed • Battery voltage: 12 – 13.5 V (Check the value displayed on the M.U.T.-III SE screen.)
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2.PERFORM IGNITION SWITCH OPERATION

1. Turn ignition switch OFF.
2. Turn ignition switch ON.



3.PERFORM INITIALIZATION OF NATS SYSTEM AND REGISTRATION OF ALL NATS IGNITION KEY IDS

Refer to [Description](#) .



4.CHECK ECM DATA STATUS

Check if the data is successfully copied from the ECM at Step 1 (before replacement) and saved in M.U.T.-III SE.

Q.Is the data saved successfully?





5.WRITE ECM DATA

 With M.U.T.-III SE

1. Select “WRITING DATA FOR REPLC CPU” in “WORK SUPPORT” mode of “ENGINE” using M.U.T.-III SE.
2. Follow the instruction of M.U.T.-III SE display.

note	The data saved by “SAVING DATA FOR REPLC CPU” is written to ECM.
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6.PERFORM VIN REGISTRATION

Refer to Description [Description](#) .



7.WRITING MAC KEY FOR ECM

Refer to [Description](#) .



8.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to Description [Description](#) .



9.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to Description [Description](#) .



10.PERFORM IDLE AIR VOLUME LEARNING

Refer to [Description](#) .



11.PERFORM EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING

Refer to [Description](#) .



12.CHECK DTC

1. Turn ignition switch OFF and wait for 10 seconds or more.
2. Turn ignition switch ON.

3. If DTC is displayed, perform diagnosis of detected DTC. Refer to [DTC Index](#) .

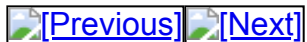


: END

13.WRITING MAC KEY FOR BCM

Refer to [Description](#) .

: END



Work Procedure

1.START

1. Turn ignition switch ON.
2. Check information display of the combination meter.

Q.Is Distance to Engine Oil Change displayed?



2.SELECT OIL CONTROL SYSTEM MODE

Push the Display next switch and select oil control system mode.



3.RESET ENGINE OIL DATA

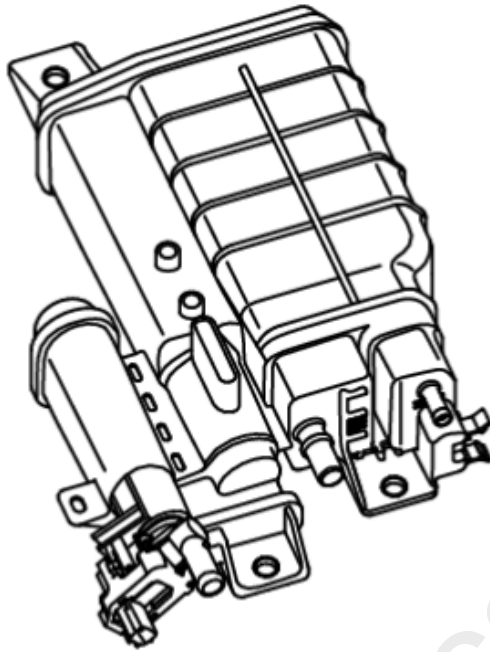
1. Press and hold the Display Next switch at least 1 second while Distance to Engine Oil Change is displayed.
2. Stop pressing the Display Next switch, and a few seconds later, check that the value of Distance to Engine Oil Change is reset.

: END

[\[Previous\]](#) [\[Next\]](#)

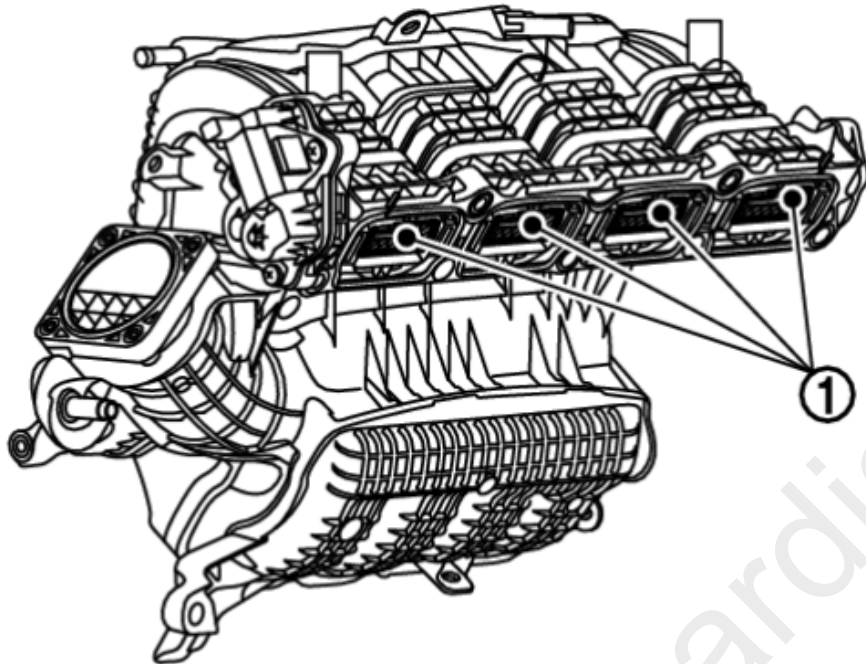
EVAP Canister

EVAP canister stores the generated fuel vapors in the sealed fuel tank to activated charcoals of EVAP canister when the engine is not operating or when refueling to the fuel tank.



Intake Manifold Runner Control Valve

Intake manifold runner control valve ① is integrated to intake manifold.

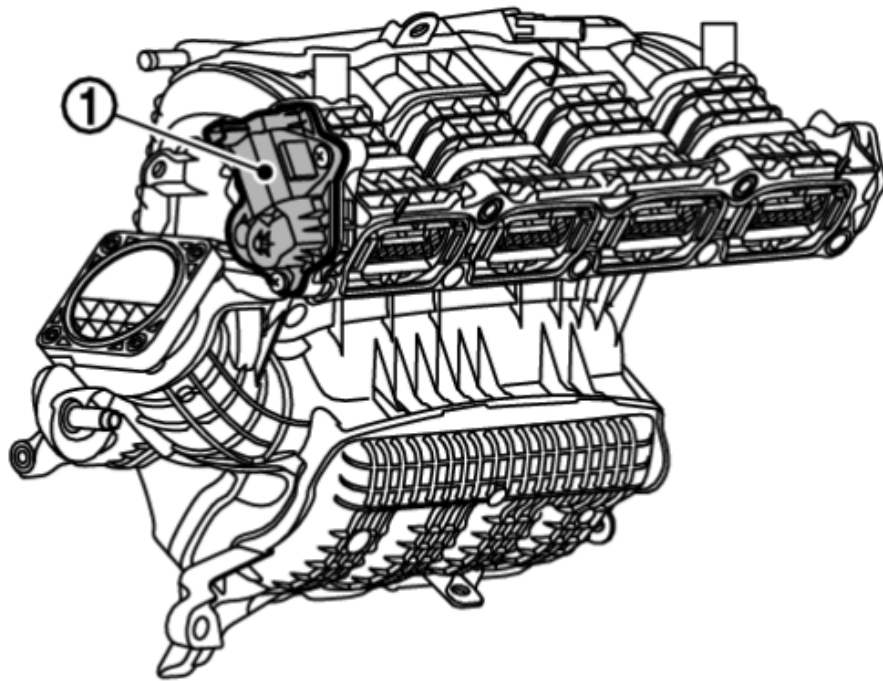


Intake manifold runner control valve is mounted each port of the intake manifold and opened/closed by the intake manifold runner control valve motor.

ECM controls the intake manifold runner control valve motor, according to signals of engine speed, water temperature, etc. and stabilizes combustion by generating a strong tumble flow.

INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR

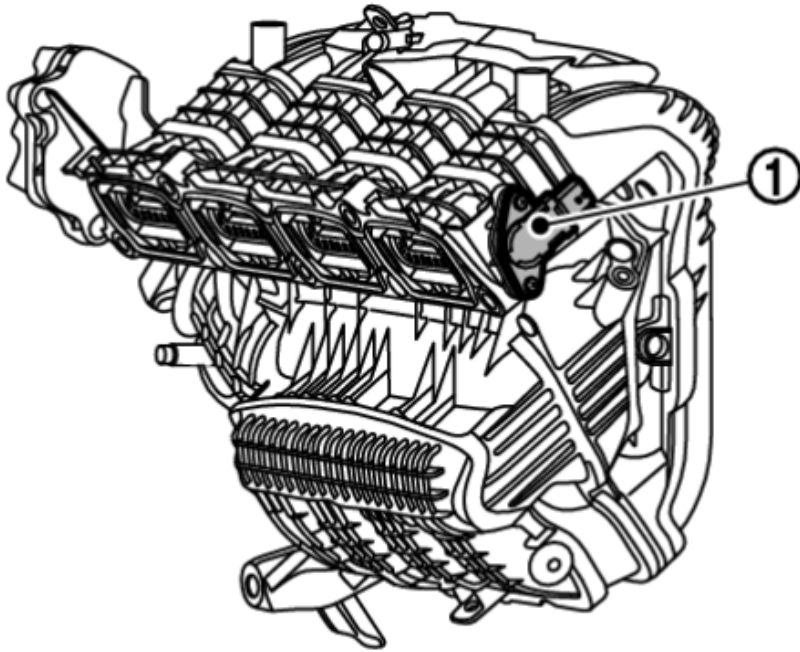
Intake manifold runner control valve motor ① is connected to the rear end of the valve shaft.



The motor opens or closes the valve by the output signal of the ECM.

INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

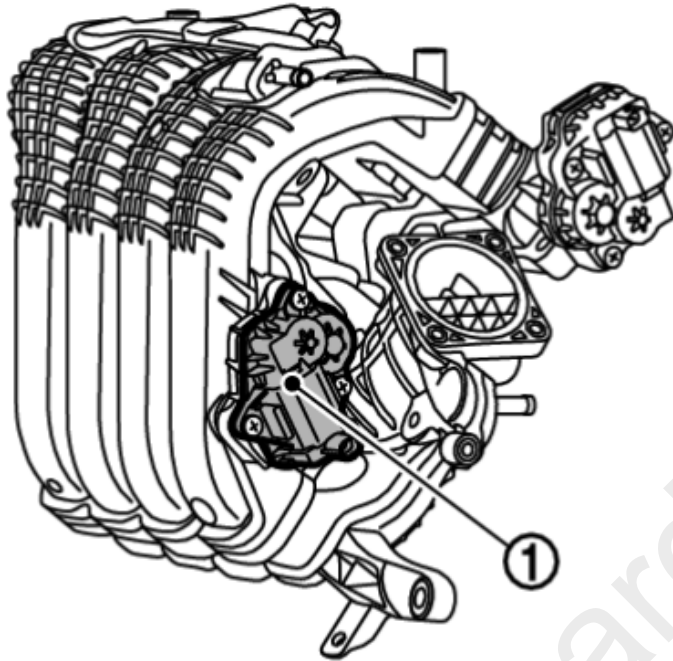
Intake manifold runner control valve position sensor ① is connected to the front end of the valve shaft.



The sensor consists of variable resistor. It senses the valve shaft movement and feeds the voltage signals to the ECM.

Intake Manifold Tuning Valve

Intake manifold tuning valve ① is integrated to intake manifold.



Intake manifold tuning valve consists of valve and motor.
Intake manifold tuning valve is used to control the suction passage of the intake manifold tuning system.

INTAKE MANIFOLD TUNING VALVE MOTOR

Intake manifold tuning valve motor is connected to the rear end of the valve shaft.
The motor is operated by the ECM and it opens and closes the intake manifold tuning valve.

Values on the Diagnosis Tool

VALUES ON THE DIAGNOSIS TOOL

note	- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to M.U.T.-III SE display items. - Numerical values in the following table are reference values. - These values are input/output values that ECM receives/transmits and may differ from actual operations. Example: The ignition timing shown by the timing light may differ from the ignition timing displayed on the data monitor. This occurs because the timing light shows a value calculated by ECM according to signals received from the camshaft position sensor and other sensors related to ignition timing. - For outlines of following items, refer to M.U.T.-III SE Function CONSULT Function .
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Monitor Item	Condition	Values/Status
COOLANT TEMP/S	Engine: After warming up	More than 70°C (158°F)
BATTERY VOLT	Ignition switch: ON (Engine stopped)	11 – 14 V
INT/A TEMP SE	Engine: After warming up	Indicates intake air temperature

Monitor Item	Condition		Values/Status
Ignition timing 1	- Engine: After warming up - Selector lever: P or N position - Air conditioner switch: OFF - No load	Idle	0 – 10 BTDC
		2,000 rpm	30 – 50 BTDC
PURG VOL C/V	- Engine: After warming up - Selector lever: P or N position - Air conditioner switch: OFF - No load	Idle (Accelerator pedal: Not depressed even slightly, after engine starting)	0 %
		2,000 rpm	1 – 90 %
FUEL T/TMP SE	Ignition switch: ON		Indicates fuel tank temperature
FUEL LEVEL SE	Ignition switch: ON		Depending on fuel level of fuel tank
EVAP SYS PRES	Ignition switch: ON		Approx. 1.8 – 4.8 V
CAL/LD VALUE	- Engine: After warming up - Selector lever: P or N position - Air conditioner switch: OFF - No load	Idle	5 – 35 %
		2,500 rpm	5 – 35 %

Monitor Item	Condition		Values/Status
HO2S2 (B1)	- Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	Revving engine from idle up to 3,000 rpm quickly	0 – 0.3 V ↔ 0.6 – 1.0 V
			LEAN ↔ RICH
ENG OIL TEMP	Engine: After warming up		More than 70°C (158°F)
A/F ALPHA-B1	See Diagnosis Procedure DTC Diagnosis Procedure  .		
MAP SENSOR	- Engine: After warming up - Selector lever: P or N - Air conditioner switch: OFF - No load	Idle	Approx. 1.16 V
		2,000 rpm	Approx. 0.9 V
A/F S1 HTR (B1)	Engine: After warming up, idle the engine (More than 140 seconds after starting engine)		4 – 100%
ATOM PRES SEN 2	Ignition switch: ON		0 V
EXH/V TIM B1	- Engine: After warming up - Selector lever: P or N position - Air conditioner switch: OFF - No load	Idle	–5 – 5 °CA
		Around 2,500 rpm while the engine speed is rising	12 - 60 °CA

Monitor Item	Condition		Values/Status
EGR VALVE POSITION	Ignition switch: ON		0.0 deg
	Engine: Idle		0.0 deg
FUN DUTY	Engine: Running		0 – 100 %
A/GRLL SHTR POSITION	- Engine RPM: idle speed. - Vehicle speed: 0 km/h (0 MPH).		F/OPEN
	Vehicle speed: 30 km/h (19 MPH) or faster. (Comply the condition of active grille shutter operation.)		F/OPEN →MOVING→F/ CLOSE
ENG SPEED	- Connect the tachometer. - Run engine and compare M.U.T.-III SE value with the tachometer indication.		Almost the same speed as the tachometer indication.
TRVL AFTER MIL	Ignition switch: ON		0 – 65.535 km
B/FUEL SCHDL	See Diagnosis Procedure DTC Diagnosis Procedure  .		
MASS AIRFLOW	These items are displayed but not used.		
FUEL PRES SEN	- Engine: After warming up - Selector lever: P or N position - Air conditioner switch: OFF - No load	Idle	Approx. 3.69 MPa
		2,000 rpm	Approx. 3.96 MPa
ACCEL SEN 1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 – 1.0 V
		Accelerator pedal: Fully depressed	4.2 – 4.8 V

Monitor Item	Condition		Values/Status
ACCEL SEN 2*	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.25 – 0.5 V
		Accelerator pedal: Fully depressed	2.0 – 2.5 V
TP SEN 1-B1	- Ignition switch: ON (Engine stopped) - Selector lever: D position	Accelerator pedal: Fully released	More than 0.74 V
		Accelerator pedal: Fully depressed	Less than 4.75 V
TP SEN 2-B1*	- Ignition switch: ON (Engine stopped) - Selector lever: D position	Accelerator pedal: Fully released	More than 0.765 V
		Accelerator pedal: Fully depressed	Less than 4.75 V
I/P PULLY SPD	- Connect the tachometer. - Start the engine and compare M.U.T.-III SE value with the tachometer indication.	Vehicle speed: More than 20 km/h (12 MPH)	Almost the same speed as the tachometer indication
VEHICLE SPEED	Turn drive wheels and compare M.U.T.-III SE value with the speedometer indication.		Almost the same speed as the speedometer indication
TUMBLE POS SEN	Ignition switch: ON		Approx. 0.8 V
	Engine: After warming up	Idle	Approx. 4.3 V
AC PRESS SEN	- Engine: Idle - Both air conditioner switch and blower fan switch: ON (Compressor operates)		0.3 – 4.5 V

Monitor Item	Condition		Values/Status
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.15 V
VHCL SPEED SE	Turn drive wheels and compare M.U.T.-III SE value with the speedometer indication.		Almost the same speed as speedometer indication
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
A/F ADJ-B1	Engine: Idle		-0.450 – 0.330
A/F ALPHA-B1	Diagnosis Procedure DTC Diagnosis Procedure 		
H/P FUEL PUMP DEG	- Engine: After warming up - Selector lever: P or N position - Air conditioner switch: OFF - No load	Idle	244.6 deg
		2,000 rpm	244.4 deg
FUEL PRES SEN V	- Engine: After warming up - Selector lever: P or N position - Air conditioner switch: OFF - No load	Idle	0.820 – 1.160 V
		When revving engine up to 4,000 rpm quickly	0.820 – 2.900 V

Monitor Item	Condition		Values/Status	
EOP SENSOR	• Engine oil temperature: 80°C • Selector lever: P or N position • Air conditioner switch: OFF • No load	Idle	1000 – 2000 mV	
		2,000 rpm	1500 – 3500 mV	
MASS AIR FLOW SENSOR (g/s) B1	Diagnosis Procedure DTC Diagnosis Procedure 			
EGR VALVE POSITION SEN	Ignition switch: ON		Approx. 0.5 V	
TOTAL DISTNC-OCS RST 1	Ignition switch: ON		0 - 655,350 km (0 - 407,234 miles) note Varies depending on vehicle environment.	
TOTAL DISTNC-OCS RST 2	Ignition switch: ON		0 - 655,350 km (0 - 407,234 miles) note Varies depending on vehicle environment.	
TOTAL DISTNC-OCS RST 3	Ignition switch: ON		0 - 655,350 km (0 - 407,234 miles) note Varies depending on vehicle environment.	
DETERIORTN VL-OCS RST 1	Ignition switch: ON		0 - 655.35 note Varies depending	

Monitor Item	Condition	Values/Status
		on vehicle environment.
DETERIORTN VL-OCS RST 2	Ignition switch: ON	0 - 655.35 note Varies depending on vehicle environment.
DETERIORTN VL-OCS RST 3	Ignition switch: ON	0 - 655.35 note Varies depending on vehicle environment.
TOTAL DISTNC-OCS WRN 1	Ignition switch: ON	0 - 655,350 km (0 - 407,234 miles) note Varies depending on vehicle environment.
TOTAL DISTNC-OCS WRN 2	Ignition switch: ON	0 - 655,350 km (0 - 407,234 miles) note Varies depending on vehicle environment.
TOTAL DISTNC-OCS WRN 3	Ignition switch: ON	0 - 655,350 km (0 - 407,234 miles) note Varies depending on vehicle environment.
DETERIORTN VL-OCS WRN 1	Ignition switch: ON	0 - 655.35

Monitor Item	Condition		Values/Status
			note Varies depending on vehicle environment.
DETERIORATION VL-OCS WRN 2	Ignition switch: ON		0 - 655.35 note Varies depending on vehicle environment.
DETERIORATION VL-OCS WRN 3	Ignition switch: ON		0 - 655.35 note Varies depending on vehicle environment.
CURRENT DETERIORATION VAL	Ignition switch: ON		0 - 655.35 note Varies depending on vehicle environment.
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	On
		Rear window defogger switch and lighting switch: OFF	Off
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: OFF	Off
		Air conditioner switch: ON (Compressor operates)	On

Monitor Item	Condition		Values/Status
PW/ST SIGNAL	Engine: After warming up, idle the engine	Steering wheel: Not being turned	Off
		Steering wheel: Being turned	On
P/N POSI SW	Ignition switch: ON	Selector lever: P or N position	On
		Selector lever: Except above position	Off
START SIGNAL	Ignition switch: ON → START → ON		Off → On → Off
CLSD THL POS	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	On
		Accelerator pedal: Slightly depressed	Off
HO2S2 MNTR(B1)	Engine: After warming up	Revving engine from idle up to 3,000 rpm quickly	LEAN ↔ RICH
	After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.		
IGNITION SW	Ignition switch: ON → OFF → ON		On → Off → On
HEATER FAN SW	Engine: After warming up, idle the engine	Blower fan switch: ON	On
		Blower fan switch: OFF	Off
IDL AV LEARN	- Engine: After warming up - Air conditioner switch: OFF - No load - Throttle valve closed position learning: Completed	Idle air volume learning has already been performed successfully.	CMPLT
		Idle air volume learning has not been performed yet.	YET

Monitor Item	Condition		Values/Status
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	Off
		Brake pedal: depressed	On
COMBUSTION	note This item is displayed but are not applicable to this model.		
VIAS S/V-1	- Engine: After warming up - Selector lever: P or N position - Air conditioner switch: OFF - No load	When revving engine up to 5,000 rpm quickly	Off → On → Off
AIR COND RLY	Engine: After warming up, idle the engine	A/C switch: OFF	Off
		A/C switch: ON (Compressor operates)	On
FUEL PUMP RLY	- For 1 seconds after turning ignition switch ON - Engine is running or cranking		On
	Except above		Off
VENT CONT/V	Ignition switch: ON		Off
HO2S2 HTR(B1)	Ignition switch: ON		Off
DIST SW	Ignition switch: ON	DISTANCE switch: Pressed	On
		DISTANCE switch: Released	Off
BRAKE SW2	Ignition switch: ON	Brake pedal: Fully released	On
		Brake pedal: Depressed	Off

Monitor Item	Condition		Values/Status
BRAKE SW1	Ignition switch: ON	Brake pedal: Fully released	Off
		Brake pedal: Depressed	On
SET SW	Ignition switch: ON	SET – switch: Pressed	On
		SET – switch: Released	Off
RESUME/ACC SW	Ignition switch: ON	RES + switch: Pressed	On
		RES + switch: Released	Off
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	On
		CANCEL switch: Released	Off
MAIN SW	Ignition switch: ON	ASCD/ACC MAIN switch: Pressed	On
		ASCD/ACC MAIN switch: Released	Off
CRUISE LIGHT	Ignition switch: ON	ASCD switch: Pressed at the 1st time → at the 2nd time	On → Off
A/GRLL SHTR CALIBRATION	- Turn ignition switch OFF → ON - Drive the vehicle at a speed more than 30 km/h (19 MPH) for the first time.		CMPLT
	- Turn ignition switch OFF → ON. - When the vehicle speed does not reach 30 km/h (19 MPH).		INCMP
A/GRLL SHTR CIRCUIT DIAG	Malfunction of active grill shutter power supply is detected.		NG
	Malfunction of active grill shutter power supply is not detected.		OK

Monitor Item	Condition	Values/Status
A/GRLL SHTRR TEMP DIAG	Abnormal temperature of active grill shutter actuator is detected.	NG
	Abnormal temperature of active grill shutter actuator is not detected.	OK
A/GRLL SHTRR OVER RUN	Active grill shutter does not stop within normal moving limit.	NG
	Active grill shutter stops within normal moving limit.	OK
A/GRLL SHTRR STUCK	Detecting the active grille shutter stuck or the operation range less than normal.	NG
	Not detecting the active grille shutter stuck or the operation range less than normal.	OK
A/GRLL SHTRR CALIB DIAG	Malfunction of active grill shutter initial position learning is detected.	NG
	Malfunction of active grill shutter initial position learning is not detected.	OK
HO2 S2 DIAG1 (B1)	DTC P0139 self-diagnosis (delayed response) is incomplete.	INCMP
	DTC P0139 self-diagnosis (delayed response) is complete.	CMPLT
HO2 S2 DIAG2 (B1)	DTC P0139 self-diagnosis (slow response) is incomplete.	INCMP
	DTC P0139 self-diagnosis (slow response) is complete.	CMPLT
EVAP LEAK DIAG	Ignition switch: ON	Depending on condition of EVAP leak diagnosis
EVAP DIAG READY	Ignition switch: ON	Depending on ready condition of EVAP leak diagnosis
SYSTEM 1 DIAGNOSIS A B1	DTC P219A self-diagnosis is incomplete.	INCMP
	DTC P219A self-diagnosis is complete.	CMPLT

Monitor Item	Condition		Values/Status
A/F SEN1 DIAG1 (B1)	DTC P015A and P015B self-diagnosis incomplete.		INCMP
	DTC P015A and P015B self-diagnosis is complete.		CMPLT
A/F SEN1 DIAG2 (B1)	DTC P014C and P014D self-diagnosis incomplete.		INCMP
	DTC P014C and P014D self-diagnosis is complete.		CMPLT
SYSTEM 1 DIAGNOSIS B B1	DTC P219A self-diagnosis is on standby.		ABSENT
	DTC P219A self-diagnosis is under diagnosis.		PRSENT
A/F IMBALNC DIAG- CPS STAT	The vehicle condition is not within the diagnosis range of DTC P219C – P219F.		ABSNT
	The vehicle condition is within the diagnosis range of DTC P219C – P219F.		PRSNT
A/F SEN1 DIAG3(B1)	The vehicle condition is not within the diagnosis range of DTC P014C, P014D, P015A or P015B.		ABSNT
	The vehicle condition is within the diagnosis range of DTC P014C, P014D, P015A or P015B.		PRSNT
A/F IMBLNC DIAG- CPS CMPLT	Self-diagnosis of DTC P219C – P219F and P21A0 – P21A3 is incomplete.		INCMP
	Self-diagnosis of DTC P219C – P219F and P21A0 – P21A3 is complete.		CMPLT
Di inj pulse B1	- Engine: After warming up - Selector lever: P position - A/C switch: OFF - No load	Idle	About 1.47 – 1.75 ms
		2,000 rpm	About 1.5 – 1.77 ms

Monitor Item	Condition		Values/Status
DI timing SOI multi inj step1	• Engine: After warming up • Selector lever: P or N position • A/C switch: OFF • No load	Idle	28 BTDC
		2,000 rpm	48 BTDC
THRTL STK CNT B1	note This item is displayed but are not applicable to this model.		
VTC DTY EX B1	• Engine: After warming up • Selector lever: P or N position • Air conditioner switch: OFF • No load	Idle	0 %
		When revving engine up to 2,000 rpm quickly	Approx. 0 – 90 %

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

Component Inspection (Active Grille Shutter)

1.CHECK ACTIVE GRILLE SHUTTER

 With M.U.T.-III SE

1. Start the engine.
2. Select "ACTIVE GRILLE SHUTTER" in "Special Function" of "ENGINE" using M.U.T.-III SE.
3. Touch "CALIBRTN".
4. After the calibration completes, check the operation of active grille shutter as follows.

Condition	Active grille shutter
Select "CLOSE"	Open → Close
Select "OPEN"	Close → Open

 Without M.U.T.-III SE

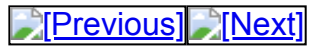
1. Turn ignition switch OFF.
2. Operate shutter by hands to close position.
3. Check the operation of active grille shutter as follows.

Condition	Active grille shutter
Ignition switch: ON	Close → Open

Q.Is the inspection result normal?

Yes INSPECTION END

No Replace active grille shutter. Refer to [Removal and Installation](#) .

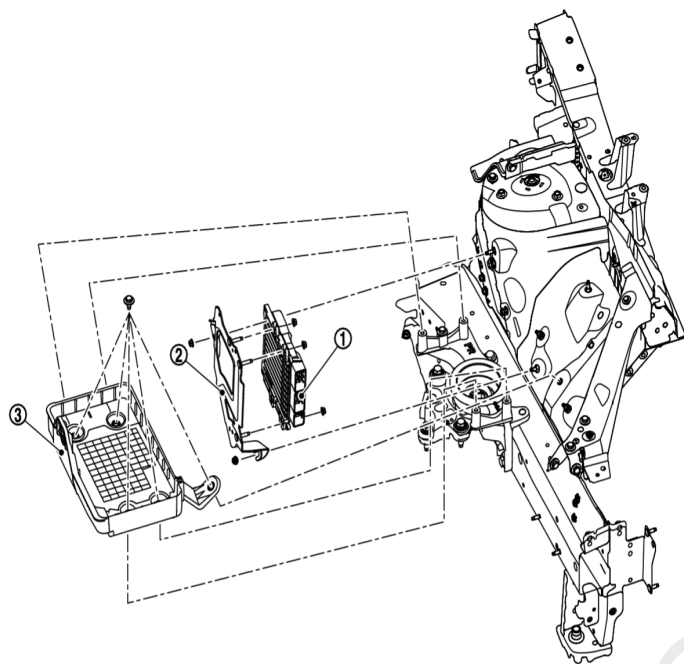


ECM : Exploded View

1. ECM

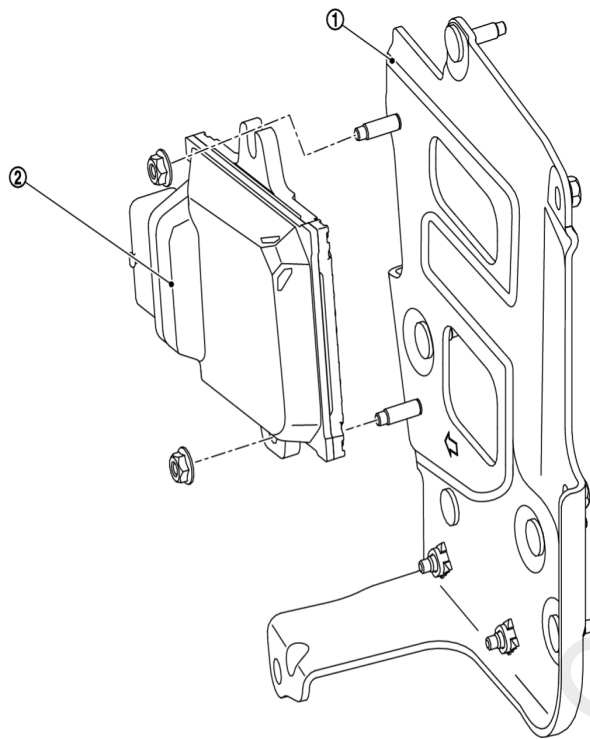
2. Bracket

3. Battery tray 2





ELECTRIC INTAKE VALVE TIMING CONTROL MODULE : Exploded View



1. Bracket

2. Electric intake valve
timing control module



IDLE SPEED : Service Data

Condition	Specification
No load* (in P or N position)	650 ± 50 rpm

*: Under the following conditions

1. A/C switch: OFF
2. Electric load: OFF (Lights, heater fan & rear window defogger)
3. Steering wheel: Kept in straight-ahead position



IGNITION TIMING : Service Data

Condition	Specification
No load* (in P or N position)	5 ± 5° BTDC

*: Under the following conditions

1. A/C switch: OFF
2. Electric load: OFF (Lights, heater fan & rear window defogger)
3. Steering wheel: Kept in straight-ahead position

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MASS AIR FLOW SENSOR : Service Data

Supply voltage	5 V
Output voltage/frequency at ignition SW ON (Engine stopped)	Approx. 3,700 Hz
Mass air flow (Using M.U.T.-III SE or GST)	3.1 – 5.3 g/s 1,500 rpm* 4.9 – 9.7 g/s 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.

[\[Previous\]](#) [\[Next\]](#)

M.U.T.-III SE Function

FUNCTION

Diagnostic test mode	Function
Self Diagnostic Result	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*1 Display DTC which ECM memorizes.
Data List	Input/Output data in the ECM can be read.
Special Function	- Diagnostic Test Mode in which M.U.T.-III SE drives some actuators apart from the ECMs and also shifts some parameters in a specified range. - ECM part number can be read. - This mode enables a technician to adjust some devices faster and more accurately by following the indications on the M.U.T.-III SE unit.

*1: The following emission-related diagnostic information is cleared when the ECM memory is erased.

1. DTC (Diagnostic trouble codes)
2. 1st trip diagnostic trouble codes
3. Freeze frame data
4. 1st trip freeze frame data
5. System readiness test (SRT) codes
6. Test values

SELF DIAGNOSTIC RESULT MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC ,Refer to [DTC Index](#) .

How to Read DTC and 1st Trip DTC

DTCs and 1st trip DTCs related to the malfunction are displayed in "Self-diagnosis" mode with M.U.T.-III SE. Status of DTCs is displayed as follows.

- When ECM has detected a current DTC, "Active DTC" is displayed.
 - When ECM memorizes a 1st trip DTC, "1t" is displayed.
 - For a DTC other than the above, "Stored DTC" is displayed.
-

How to Erase DTC

note	If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
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Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*1	Description
Detected DTC [PXXXX]	The engine control component part/control system has a trouble code displayed as PXXXX. (DTC Index  .)
ODO/TRIP METER	The ODO/TRIP at the moment a malfunction is detected is displayed.
Warm up cycle counter	
FUEL SYS-B1	• “Fuel injection system status” at the moment a malfunction is detected is displayed. • One of the following mode is displayed. • MODE 2: Open loop due to detected system malfunction • MODE 3: Open loop due to driving conditions (power enrichment, deceleration enrichment) • MODE 4: Closed loop - using oxygen sensor(s) as feedback for fuel control • MODE 5: Open loop - has not yet satisfied condition to go to closed loop
FUEL SYS-B2	
CAL/LD VALUE [%]	The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C]	The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	• “Long-term fuel trim” at the moment a malfunction is detected is displayed. • The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
L-FUEL TRM-B2 [%]	
S-FUEL TRM-B1 [%]	• “Short-term fuel trim” at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
S-FUEL TRM-B2 [%]	

Freeze frame data item*1	Description
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed.
INT MANI PRES [kPa]	• Constant value is displayed. • These items are displayed but are not applicable to this model.
ABSOL TH·P/S [%]	The throttle valve opening angle at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.
COMBUST CONDITION	• Constant value is displayed. • These items are displayed but are not applicable to this model.
FUEL RAIL PRESSURE [MPa]	The fuel rail pressure at the moment a malfunction is detected is displayed.
TARGET FUEL RAIL PRESSURE [MPa]	The target fuel rail pressure at the moment a malfunction is detected is displayed.
BATTERY VOLTAGE [V]	The battery voltage at the moment a malfunction is detected is displayed.
FUEL LEVEL [%]	The fuel level at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed.

*1: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE

note

- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to M.U.T.-III SE display items.
- For reference values of the following items, Refer to Values On The Diagnosis Tool [Values on the Diagnosis Tool](#) .

Monitored Item

Monitored item	Unit	Description	Remarks
ATOM PRES SEN 2	V	The signal voltage from the manifold absolute pressure (MAP) sensor is displayed.	—
INT/V TIM(B1)	°CA	Indicates [°CA] of intake camshaft advance angle.	—
COOLANT TEMP/S	°C or °F	The engine coolant temperature (determined by the signal voltage of the engine outlet coolant temperature sensor) is displayed.	When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	—

Monitored item	Unit	Description	Remarks
BATTERY VOLT	V	The power supply voltage of ECM is displayed.	—
INT/A TEMP SE	°C or °F	The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	—
Ignition timing 1	BTDC	Indicates the ignition timing computed by ECM according to the input signals.	When the engine is stopped, a certain value is indicated.
PURG VOL C/V	%	- Indicates the control value of the EVAP canister purge volume control solenoid valve computed by the ECM according to the input signals. - The opening becomes larger as the value increases.	—
FUEL T/TMP SE	°C or °F	The fuel temperature (determined by the signal voltage of the	—

Monitored item	Unit	Description	Remarks
		fuel tank temperature sensor) is displayed.	
FUEL LEVEL SE	V	The signal voltage of the fuel level sensor is displayed.	—
EVAP SYS PRES	V	The signal voltage of EVAP control system pressure sensor is displayed.	—
CAL/LD VALUE	%	“Calculated load value” indicates the value of the current air flow divided by peak air flow.	—
HO2S2 (B1)	V	The signal voltage of the heated oxygen sensor 2 is displayed.	—
ENG OIL TEMP	°C or °F	The engine oil temperature (determined by the signal voltage of the engine oil temperature sensor) is displayed.	—
A/F ALPHA-B1	%	The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • This data also includes the data for the air-

Monitored item	Unit	Description	Remarks
			fuel ratio learning control. • Specification value is indicated on monitor screen under the following conditions. • Reference: Select • Display type: Line graph
MAP SENSOR	V	The manifold absolute pressure sensor signal voltage is displayed,	—
A/F S1 HTR (B1)	%	• Indicates the duty ratio of the Air fuel ratio (A/F) sensor 1 heater computed by ECM according to the input signals. • The current flow to the heater becomes larger as the value increases.	—

Monitored item	Unit	Description	Remarks
EXH/V TIM B1	°CA	Indicates [°CA] of exhaust camshaft advance angle.	—
EGR VALVE POSITION	deg	ECM-calculated EGR valve position is displayed.	—
FAN DUTY	%	Indicates a command value for cooling fan. The value is calculated by ECM based on input signals.	—
A/GRLL SHTR POSITION	F/CLOSE MOVING F/OPEN UNIDTF	Indicates the status of active grille shutter. • F/CLOSE: Active grille shutter is fully closed. • MOVING: Active grille shutter is in motion. • F/OPEN: Active grille shutter is fully opened. • UNIDTF: Unable to specify the shutter position.	—

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	Indicates the engine speed computed from the signal of the crankshaft position sensor and camshaft position sensor.	Accuracy becomes poor if engine speed drops below the idle rpm.
TRVL AFTER MIL	km or mile	Distance traveled while MIL is activated.	—
B/FUEL SCHDL	ms	“Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	Specification value is indicated on monitor screen under the following conditions. • Reference: Select • Display type: Line graph
MASS AIRFLOW	g/s	These items are displayed but not used.	—
FUEL PRES SEN	MPa	Indicates the fuel rail pressure computed by ECM according to the input signals.	—
ACCEL SEN 1	V	The signal voltage of the accelerator pedal position sensor 1 is displayed.	—
ACCEL SEN 2	V	The converted value of the accelerator pedal position	ACCEL SEN 2 signal is converted by ECM internally. Thus, they differs from ECM

Monitored item	Unit	Description	Remarks
		sensor signal voltage is displayed.	terminal voltage signal.
TP SEN 1-B1	V	The signal voltage of the throttle position sensor 1 B1 is displayed.	—
TP SEN 2-B1	V	The value converted from the signal voltage of the throttle position sensor 2 B1 is displayed.	TP SEN 2-B1 signal is converted by ECM internally. Thus, they differs from ECM terminal voltage signal.
I/P PULLY SPD	rpm	Indicates the engine speed computed from the input shaft revolution signal.	—
VEHICLE SPEED	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	—
TUMBLE POS SEN	V	The intake manifold runner control valve position sensor signal voltage is displayed.	—
AC PRESS SEN	V	The signal voltage from the refrigerant pressure sensor is displayed.	—
A/F SEN1 (B1)	V	The A/F signal voltage computed from the input signal of the air fuel ratio	—

Monitored item	Unit	Description	Remarks
		(A/F) sensor 1 is displayed.	
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	—
SET VHCL SPD	km/h	The preset vehicle speed is displayed.	—
A/F ADJ-B1	—	Indicates the correction of a factor stored in ECM. The factor is calculated from the difference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 signal.	—
H/P FUEL PUMP DEG	deg	Displays ECM-calculated fuel discharge position of the high pressure fuel pump.	—
FUEL PRES SEN V	V	The signal voltage of FRP sensor is displayed.	—
EOP SENSOR	V	The signal voltage of EOP sensor is displayed.	—
MASS AIR FLOW	g/s	The signal flow rate of the mass air flow sensor is displayed.	When the engine is

Monitored item	Unit	Description	Remarks
SENSOR (g/s) B1			stopped, a certain value is indicated. • Specification value is indicated on monitor screen under the following conditions. • Reference: Select • Display type: Line graph
EGR VALVE POSITION SEN	V	The signal voltage of EGR valve position sensor is displayed.	—
TOTAL DISTNC-OCS RST 1	km	The Multi-way Control Valve position detected by the position sensor is displayed.	—
TOTAL DISTNC-OCS RST 2	km	Total travel distance of odd meter when Oil Control System is reset.	—
TOTAL DISTNC-OCS RST 3	km	Total travel distance of odd meter when Oil Control System is reset. (two times ago)	—
DETERIORTN VL-OCS RST 1	—	Total travel distance of odd meter when	—

Monitored item	Unit	Description	Remarks
		Oil Control System is reset. (three times ago)	
DETERIORTN VL-OCS RST 2	—	Indicates deterioration condition of the engine oil when Oil Control System is reset.	—
DETERIORTN VL-OCS RST 3	—	Indicates deterioration condition of the engine oil when Oil Control System is reset. (three times ago)	—
TOTAL DISTNC-OCS WRN 1	km	Total travel distance of odd meter when Oil Control System remaining distance is zero.	—
TOTAL DISTNC-OCS WRN 2	km	Total travel distance of odd meter when Oil Control System remaining distance is zero. (two times ago)	—
TOTAL DISTNC-OCS WRN 3	km	Total travel distance of odd meter when Oil Control System remaining distance is zero. (two times ago)	—
DETERIORTN VL-OCS WRN		Indicates deterioration	—

Monitored item	Unit	Description	Remarks
1		condition of the engine oil when Oil Control System remaining distance is zero.	
DETERIORATN VL-OCS WRN 2		Indicates deterioration condition of the engine oil when Oil Control System remaining distance is zero. (two times ago)	—
DETERIORATN VL-OCS WRN 3		Indicates deterioration condition of the engine oil when Oil Control System remaining distance is zero. (three times ago)	—
CURRENT DETERIORATN VAL	—	Indicates deterioration condition of the engine oil.	—
LOAD SIGNAL	On/Off	Indicates [On/Off] condition of the electrical load signal. • ON...Rear window defogger switch is ON or lighting switch	—

Monitored item	Unit	Description	Remarks
		is in 2nd position. • OFF...Both rear window defogger switch and lighting switch are OFF.	
AIR COND SIG	On/Off	Indicates [On/Off] condition of the air conditioner switch as determined by the air conditioner signal.	—
PW/ST SIGNAL	On/Off	Indicates [On/Off] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor signal).	—
P/N POSI SW	On/Off	Indicates [On/Off] condition from the reverse/neutral position signal.	—
START SIGNAL	On/Off	Indicates start signal status [On/Off] computed by the ECM according to the signals of engine speed and battery voltage.	After starting the engine, [Off] is displayed regardless of the starter signal.
CLSD THL POS	On/Off	Indicates idle position [On/Off] computed by ECM	—

Monitored item	Unit	Description	Remarks
		according to the accelerator pedal position sensor signal.	
HO2S2 MNTR(B1)	RICH/LEAN	Display of heated oxygen sensor 2 signal: • RICH: means the amount of oxygen after three way catalyst is relatively small. • LEAN: means the amount of oxygen after three way catalyst is relatively large.	When the engine is stopped, a certain value is indicated.
IGNITION SW	On/Off	Indicates [On/Off] condition from ignition switch signal.	—
HEATER FAN SW	On/Off	Indicates [On/Off] condition from the heater blower ON signal.	—
IDL A/V LEARN	YET/CMPLT	Displays the condition of Idle Air Volume Learning. • YET...Idle air volume	—

Monitored item	Unit	Description	Remarks
		learning has not been performed yet. • DONE...Idle air volume learning has already been performed successfully.	
BRAKE SW	On/Off	Indicates [On/Off] condition from the stop light switch signal.	—
COMBUSTION	—	These items are displayed but not used.	—
VIAS S/V-1	On/Off	The control condition of the VIAS control solenoid valve 1 (determined by ECM according to the input signals) is indicated. • On: VIAS control solenoid valve 1 is operating. • Off: VIAS control solenoid valve 1 is not operating.	—

Monitored item	Unit	Description	Remarks
AIR COND RLY	On/Off	The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	—
FUEL PUMP RLY	On/Off	Indicates the fuel pump relay control condition determined by ECM according to the input signals.	—
VENT CONT/V	On/Off	The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. • ON: Closed • OFF: Open	—
HO2S2 HTR (B1)	On/Off	Indicates [On/Off] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	—
DIST SW	On/Off	Indicates [On/Off] condition from DISTANCE switch signal.	—

Monitored item	Unit	Description	Remarks
BRAKE SW2	On/Off	Indicates [On/Off] condition of stop light switch signal.	—
BRAKE SW1	On/Off	Indicates [On/Off] condition from brake pedal position switch signal.	—
SET SW	On/Off	Indicates [On/Off] condition from SET – switch signal.	—
RESUME/ACC SW	On/Off	Indicates [On/Off] condition from RES + switch signal.	—
CANCEL SW	On/Off	Indicates [On/Off] condition from CANCEL switch signal.	—
MAIN SW	On/Off	Indicates [On/Off] condition from MAIN switch signal.	—
CRUISE LIGHT	On/Off	Indicates [On/Off] condition of CRUISE indicator determined by the ECM according to the input signals.	—
A/GRLL SHTTR CALIBRATION	INCMP/CMPLT	Indicates initial position learning status of active grille shutter. • CMPLT: The leaning is complete.	—

Monitored item	Unit	Description	Remarks
		INCOMP: The learning is incomplete.	
A/GRLL SHTTR CIRCUIT DIAG	OK/NG	Indicates the diagnosis result of active grille shutter circuit. - OK: Normal - NG: Malfunction detected.	—
A/GRLL SHTTR TEMP DIAG	OK/NG	Indicates the diagnosis result of active grille shutter actuator temperature status. - OK: Normal - NG: Abnormal temperature detected.	—
A/GRLL SHTTR OVER RUN	OK/NG	Indicates active grille shutter moves beyond normal moving limit. - OK: Normal - NG: Malfunction detected.	—
A/GRLL SHTTR STUCK	OK/NG	Indicates the diagnosis result of active grille shutter	—

Monitored item	Unit	Description	Remarks
		stuck or the operation range less than normal. • OK: Normal • NG: Malfunction detected.	
A/GRL SHTTR CALIB DIAG	OK/NG	Indicates the diagnosis result of initial position learning of active grille shutter. • OK: Normal • NG: Deficiency detected.	—
HO2 S2 DIAG1 (B1)	INCMP/CMPLT	Indicates DTC P0139 self-diagnosis (delayed response) condition. • INCMP: Self-diagnosis is incomplete. • CMPLT: Self-diagnosis is complete.	—
HO2 S2 DIAG2 (B1)	INCMP/CMPLT	Indicates DTC P0139 self-diagnosis (slow response) condition.	—

Monitored item	Unit	Description	Remarks
		• INCMP: Self-diagnosis is incomplete. • CMPLT: Self-diagnosis is complete.	
EVAP LEAK DIAG	YET/CMPLT	Indicates the condition of EVAP leak diagnosis. • YET: EVAP leak diagnosis has not been performed yet. • CMPLT: EVAP leak diagnosis has been performed successfully.	—
EVAP DIAG READY	On/Off	Indicates the ready condition of EVAP leak diagnosis. • ON: Diagnosis has been ready condition. • OFF: Diagnosis has not been ready condition.	—
SYSTEM 1 DIAGNOSIS A	INCMP/CMPLT	Indicates DTC P219A self-	—

Monitored item	Unit	Description	Remarks
B1		diagnosis condition. • INCMP: Self-diagnosis is incomplete. • CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG1 (B1)	INCMP/CMPLT	Indicates DTC P015A or P015B self-diagnosis condition. • INCMP: Self-diagnosis is incomplete. • CMPLT: Self-diagnosis is complete.	—
A/F SEN1 DIAG2(B1)	INCMP/CMPLT	Indicates DTC P014C or P014D self-diagnosis condition. • INCMP: Self-diagnosis is incomplete. • CMPLT: Self-diagnosis is complete.	—
SYSTEM 1 DIAGNOSIS B B1	ABSNT/PRSNT	• Indicates DTC P219A self-	—

Monitored item	Unit	Description	Remarks
		diagnosis condition. • ABSNT: Self-diagnosis standby • PRSNT: Under self-diagnosis	
A/F IMBALNC DIAG-CPS STAT	ABSNT/PRSNT	Indicates DTC P219C - P219F self diagnosis condition. • ABSNT: The vehicle condition is not within the diagnosis range. • PRSNT: The vehicle condition is not within the diagnosis range.	—
A/F SEN1 DIAG3(B1)	ABSNT/PRSNT	Indicates DTC P014C, P014D, P015A or P015B self-diagnosis condition. • ABSNT: The vehicle condition is not within the	—

Monitored item	Unit	Description	Remarks
		diagnosis range. • PRSNT: The vehicle condition is within the diagnosis range.	
A/F IMBLNC DIAG-CPS CMPLT	INCMP/CMPLT	Indicates DTC P219C - P219F self diagnosis condition. • INCMP: Self-diagnosis is incomplete. • CMPLT: Self-diagnosis is incomplete.	—
Di inj pulse B1	ms	ECM-calculated injection pulse width of the direct fuel injector on the bank 1 side.	—
DI timing SOI multi inj step1	BTDC	These items are displayed but not used.	—

WORK SUPPORT MODE

Work Item

Function name	Work Item	Condition	Usage
ECU Information	—	—	—
Actuator Test	—	—	—
Misfire count	Misfire count (real-time)	These items are displayed but not used.	—
	Misfire count (past)	These items are displayed but not used.	—
FUEL PRESSURE RELEASE	FUEL PRESSURE RELEASE	- Fuel pump will stop by touching “START” during idling. - Crank a few times after engine stops.	When releasing fuel pressure from fuel line
EVAP SYSTEM CLOSE	—	Close the EVAP canister vent control valve in order to make EVAP system close under the following conditions. - Ignition switch ON - Engine not running - Ambient temperature is above 0°C (32°F). - No vacuum and no high pressure in EVAP system - Fuel tank temp. is more than 0°C (32°F). - Within 10 minutes after starting “EVAP SYSTEM CLOSE” - When trying to execute “EVAP SYSTEM CLOSE” Under the condition except above, M.U.T.-III SE will discontinue it and display appropriate instruction.	When detecting EVAP vapor leak in the EVAP system

Function name	Work Item	Condition		Usage
			note When starting engine, M.U.T.-III SE may display “Battery voltage is low. Charge battery”, even when using a charged battery.	
Adjustment	TARGET IGN TIM ADJ*	Idle condition		When adjusting target ignition timing
	TARGET IDLE RPM ADJ*	Idle condition		When setting target idle speed
SAVING DATA FOR REPLC CPU	—	In this mode, save data that is in ECM.		When ECM is replaced.
WRITING DATA FOR REPLC CPU	—	In this mode, write data stored by “SAVE DATA FOR CPU REPLC” in work support mode to ECM.		When ECM is replaced.
IDLE AIR VOL LEARN	IDLE AIR VOL LEARN	The idle air volume that keeps the engine speed within the specified range is memorized in ECM.		When learning the idle air volume

Function name	Work Item	Condition	Usage
Learning	CLSD THL POS LEARN	Ignition switch ON and engine stopped.	When learning the throttle valve closed position
	SELF-LEARNING CONT	The coefficient of self-learning control mixture ratio returns to the original coefficient.	When clearing mixture ratio self-learning value
	A/F INITIAL LEARNING	Air fuel ratio learning frequency is low while idling, learning the air fuel ratio of the idling domain in ECM.	When learning the air fuel ratio.
	EGR CONTROL VALVE CLOSED POSITION LEARNING	Ignition switch: ON	When learning closed position of the EGR volume control valve.
Chassis No./VIN Registration	—	In this mode, VIN is registered in ECM.	When registering VIN in ECM
ELECTRIC INTAKE VALVE TIMING CONTROL LEARNING	—	Ignition switch ON and engine stopped.	After the following parts are replaced. • Electric intake valve timing control actuator • Electric intake valve timing control module • camshaft, timing chain, camshaft sprocket • piston, connecting rod, crankshaft • position sensor

Function name	Work Item	Condition	Usage
Data Recorder	Stop/Start prohibit cause data recorder	These items are displayed but not used.	—
	Stop/Start engine restart cause data recorder	These items are displayed but not used.	—
	Stop/Start engine stall cause data recorder	These items are displayed but not used.	—
MAC KEY writing	—	Ignition switch: ON	Write MAC key to ECM.

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
ENG COOLANT TEMP	Change the engine coolant temperature using M.U.T.-III SE.	If malfunctioning symptom disappears, see CHECK ITEM.	• Harness and connectors • Engine coolant temperature sensor • Fuel injector

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	Change the amount of fuel injection using M.U.T.-III SE.	If malfunctioning symptom disappears, see CHECK ITEM.	• Harness and connectors • Fuel injector • Air fuel ratio (A/F) sensor 1
IGNITION TIMING	• Timing light: Set • Retard the ignition timing using M.U.T.-III SE.	If malfunctioning symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learning.
PURG VOL CONT/V	• Engine: After warming up, run engine at 1,500 rpm. • Change the EVAP canister purge volume control solenoid valve opening percent using M.U.T.-III SE.	Engine speed changes according to the opening percent.	• Harness and connectors • EVAP canister purge volume control solenoid valve
FUEL/T TEMP SEN	Change the fuel tank temperature using M.U.T.-III SE.		
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch OFF • Selector lever: N position • Cut off each injector signal one at a time using M.U.T.-III SE.	Engine runs rough or stops. (Works for accidental fire.)	• Harness and connectors • Compression • Direct fuel injector • Power transistor • Spark plug • Ignition coil

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
INT V/T ASSIGN ANGLE	Changes intake valve timing using M.U.T.-III SE.	If malfunctioning symptom disappears, see CHECK ITEM.	• Harness and connectors • Intake valve timing control solenoid valve
EXH V/T ASSIGN ANGLE	Changes exhaust valve timing using M.U.T.-III SE.	If malfunctioning symptom disappears, see CHECK ITEM.	Fuel pump speed changes or stops.
VIAS S/V-1	• Ignition switch: ON • Turn solenoid valve "ON" and "OFF" using M.U.T.-III SE and listen to operating sound.	Solenoid valve makes the operating sound.	• Harness and connectors • Solenoid valve
VENT CONTROL/V	• Ignition switch: ON (Engine stopped) • Turn EVAP canister vent control valve ON and OFF with the M.U.T.-III SE and listen to operating sound.	EVAP canister vent control valve makes an operating sound.	• Harness and connectors • EVAP canister vent control valve
EGR CONTROL VALVE	• Ignition switch: ON • Engine stopped • Change valve target angle using M.U.T.-III SE	Valve opening angle changes according to target angle (from 0deg to 70deg)	• Harness and connectors • EGR valve
FAN DUTY CONTROL*	• Ignition switch: ON • Change duty ratio using M.U.T.-III SE.	Cooling fan speed changes.	• Harness and connectors • Cooling fan motor

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
			• IPDM E/R
ACTIVE GRILLE SHUTTER	To check the operation of the active grille shutter, follow the steps below: 1. Park the vehicle in a safe area and apply the parking brake. 2. Start the engine or bring the vehicle into READY state. 3. Press the "CALIBRTN" button. 4. Select the "OPEN" or "CLOSE" button to check the operation.	Active grille shutter fully opens or fully closes.	• Harness or connector • Active grille shutter actuator • Active grille shutter
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay "ON" and "OFF" using M.U.T.-III SE and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connectors • Fuel pump relay
TUMBLE CONTROL VALVE	• Ignition switch: ON (Engine stopped) • Turn the intake manifold runner control valve "ON" and "OFF" using M.U.T.-III SE to open or close.	Touch the intake manifold runner control valve motor and check the operating vibration and sound.	• Harness and connectors • Intake manifold runner control valve • Intake manifold runner control valve motor

*: Leaving cooling fan OFF with M.U.T.-III SE while engine is running may cause the engine to overheat.

SRT STATUS Mode

- For items whose SRT codes are set, “CMPLT” is displayed on the M.U.T.-III SE screen; for items whose SRT codes are not set, “INCMP” is displayed.
 - “SRT STATUS” provides the presence or absence of permanent DTCs stored in control module memory.
-

PERMANENT DTC STATUS Mode

How to Display Permanent DTC Status

1. Turn ignition switch OFF and wait at 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at 10 seconds.
4. Turn ignition switch ON.
5. Select “PERMANENT DTC STATUS” in “ENGINE” with M.U.T.-III SE.

note

Permanent DTCs stored in control module memory are displayed on the M.U.T.-III SE screen to show if a driving pattern required for erasing permanent DTCs is complete (CMPLT) or incomplete (INCMP).

caution

Since the “PERMANENT DTC STATUS” screen displays the previous trip information, repeat the following twice to update the information: “Ignition switch OFF”, “Wait for more than 10 seconds” and “Ignition switch ON”.

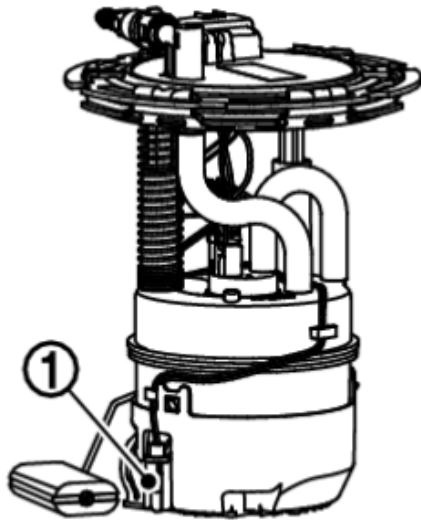
note

This mode is not used in regions that permanent DTCs are not regulated by law.

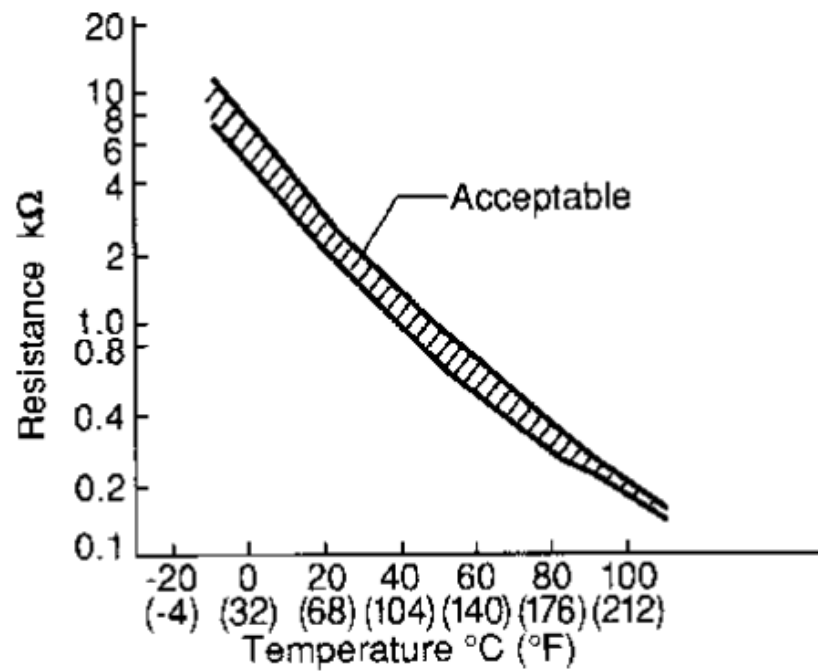
[\[Previous\]](#) [\[Next\]](#)

Fuel Tank Temperature Sensor

The fuel tank temperature sensor ① is used to detect the fuel temperature inside the fuel tank.



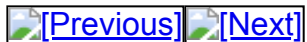
The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Fluid temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminals.



Heated Oxygen Sensor 2

FUNCTIONS WITHIN THE SYSTEM

Heated oxygen sensor 2 detects the oxygen concentration in the exhaust gases, converts it to a voltage signal, and transmits the signal to the ECM. Heated oxygen sensor 2 contains a heater for maintaining its activation.

INDIVIDUAL FUNCTION WITHIN THE SYSTEM

Heated Oxygen Sensor 2

Under normal conditions, heated oxygen sensor 2 is not used for engine control. When A/F sensor 1 is malfunctioning, the signal from heated oxygen sensor 2 is used to control the A/F ratio to the stoichiometric ratio.

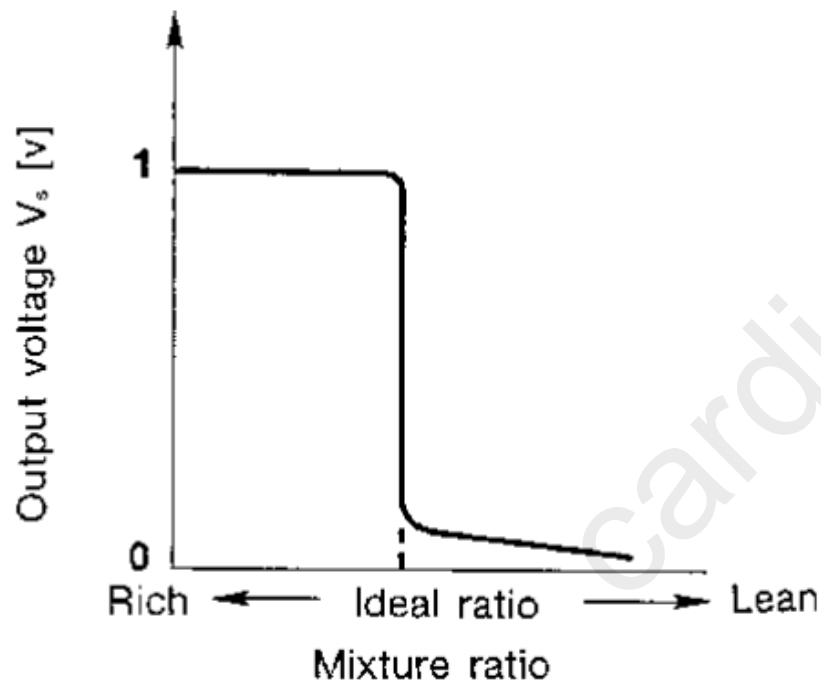
Heated Oxygen Sensor 2 Heater

The heated oxygen sensor 2 heater activates heated oxygen sensor 2.

INDIVIDUAL OPERATION

Heated Oxygen Sensor 2

Heated oxygen sensor 2 is composed of a zirconia element in a test tube shape, and is exposed to the atmosphere on the inside and the exhaust gases on the outside. When there is a difference in the oxygen concentration between the inside and outside, electromotive force is generated. When the A/F ratio is leaner than the stoichiometric ratio, the voltage is approximately 0 V. When it is richer, the voltage is approximately 1 V.



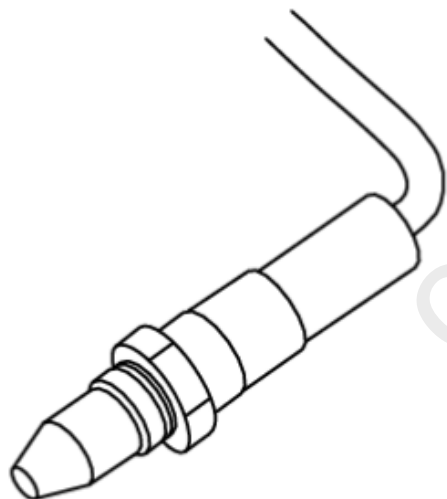
Heated Oxygen Sensor 2 Heater

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

Engine speed	Heated oxygen sensor 2 heater
Above 3,600 rpm	OFF
Below 3,600 rpm after the following conditions are met. • Engine: After warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

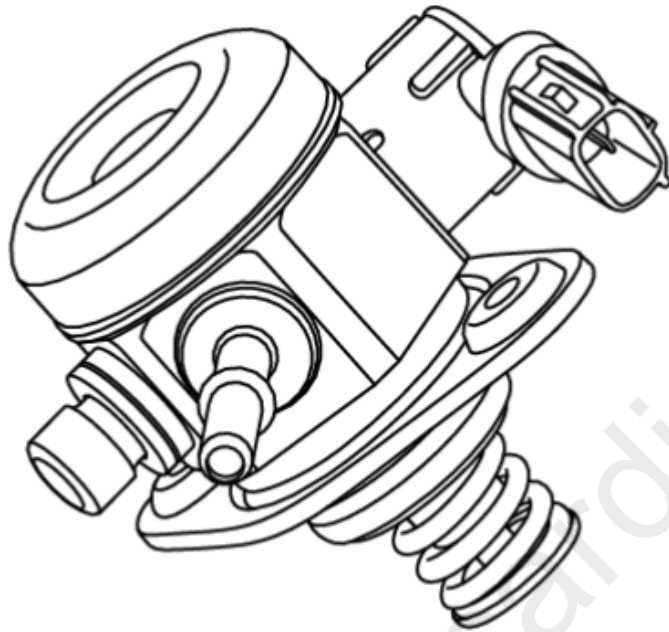
COMPONENT PARTS LOCATION

The heated oxygen sensor 2 is installed on the downstream side of three way catalyst (manifold).



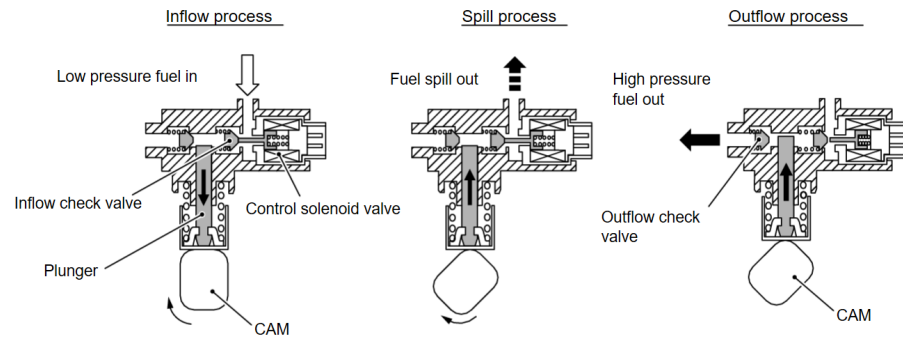
High Pressure Fuel Pump

- Balanced flow volume control type single cylinder high pressure fuel pump, which approximately equalize the amount of injection and pump output, is adopted.

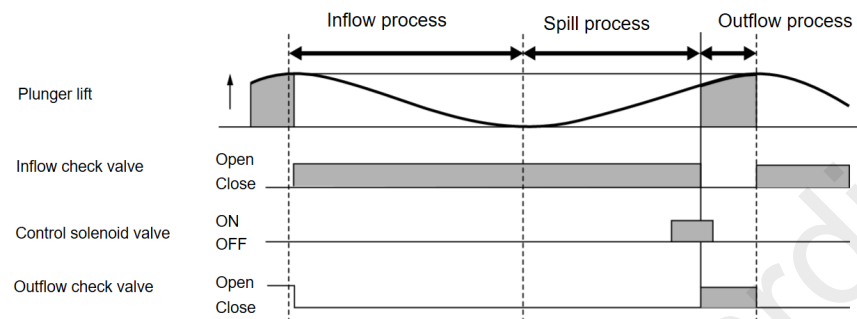


- The high pressure fuel pump is activated by the exhaust camshaft. ECM controls the high pressure fuel pump control solenoid valve built into the high pressure fuel pump and adjusts the amount of discharge by changing the suction timing of the low pressure fuel.
 - Inflow process: Cam driven lowering plunger let the fuel from low pressure fuel pump induced into high pressure fuel pump.
 - Spill process: Although the cam driven plunger start moving upward, inflow check valve still at open position due to the control solenoid valve, so the fuel is not pressurized and spilled out to low pressure fuel pump side. By changing the amount of this spill out volume changes the amount of injection.
 - Outflow process: When the control solenoid valve turns ON, the inflow check valve is closed, fuel is pressurized and when the pressure exceeds certain point discharge check valve is pushed open to discharge fuel into fuel rail.

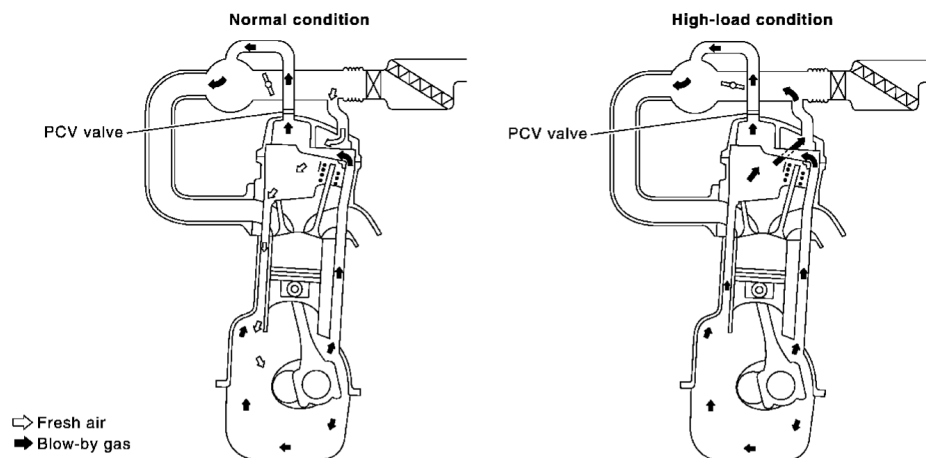
Operating Description



Operating Chart



Positive Crankcase Ventilation



This system returns blow-by gas to the intake manifold.

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

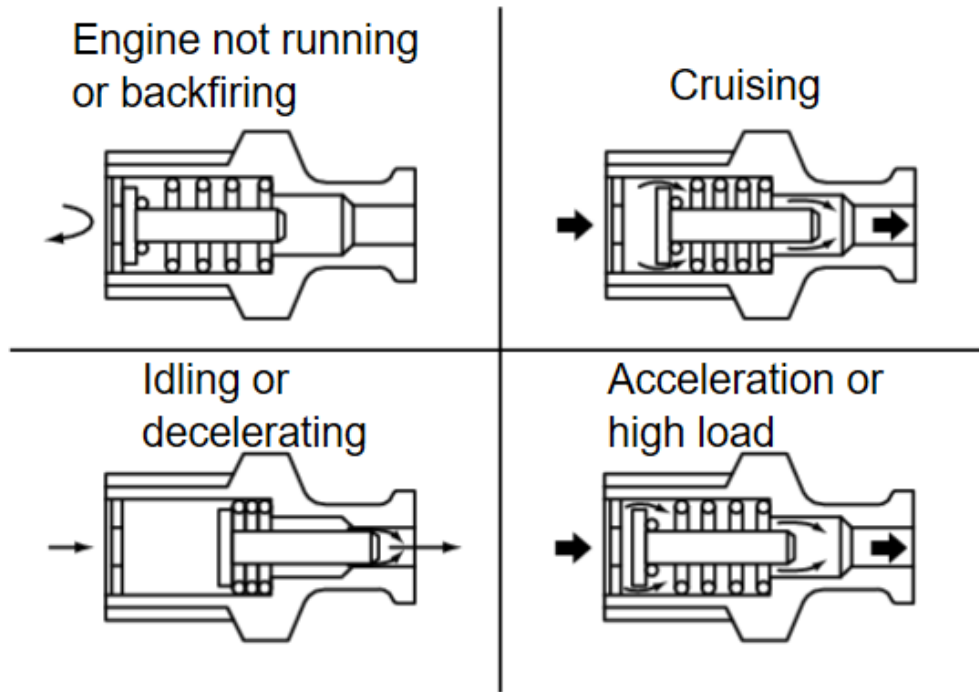
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

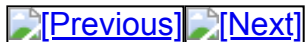
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

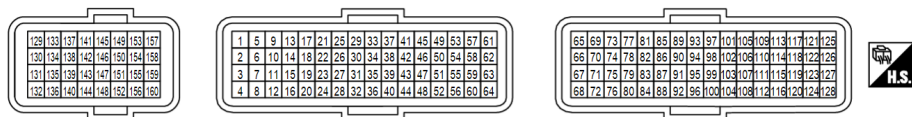
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.





Reference Value

TERMINAL LAYOUT



PHYSICAL VALUES

note	- ECM is located in the engine room left side near battery. - Specification data are reference values and are measured between each terminal and ground. - Pulse signal is measured by M.U.T.-III SE.
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Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
1 (R)	160 (B)	Fuel injector driver power supply 1	Input	[Engine is running]	BATTERY VOLTAGE (11 – 14 V)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/Output		
				• Engine: Warm-up condition • Idle speed	

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/Output		
2 (Y)	160 (B)	High pressure fuel pump (LO)	Output	[Engine is running] • Engine: Warm-up condition • Idle speed note The pulse cycle changes depending on rpm at idle.	2.5 V 

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
					3.5 V
				[Engine is running] Engine speed: 2,500 rpm	
4 (B)	—	Fuel injector driver ground 1	—	—	—
5 (G)	160 (B)	ECM power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
6 (P)	160 (B)	A/F sensor 1 heater	Input	[Engine is running] - Engine: Warm-up condition - Idle speed (More than 260 seconds after starting engine)	5.24 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
					

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Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
7 (BR)	160 (B)	High pressure fuel pump (HI)	Output	[Engine is running] note The pulse cycle changes depending on rpm at idle. - Engine: Warm-up condition - Idle speed	3.1 V 20mSec/div  5V/div

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
				[Engine is running] Engine speed: 2,500 rpm	4.3 V
					

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	−	Signal name	Input/Output		
9 (W)	160 (B)	Fuel injector No. 1, 4 (HI)	Output	[Engine is running] - Engine: Warm-up condition - Idle speed note The pulse cycle changes depending on rpm at idle	100mSec/div  20V/div

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/Output		
12 (SB)	160 (B)	Fuel injector No. 2, 3 (HI)	Output	[Engine is running] - Engine: Warm-up condition - Idle speed note The pulse cycle changes depending on rpm at idle	
13 (L)	14 (W)	EGR volume control valve (-)	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] - Engine: after warming up - Idle speed	0.1 – 0.2 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
14 (W)	13 (L)	EGR volume control valve (+)	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] • Engine: after warming up • Idle speed	0.13 V
17 (G)	160 (B)	Fuel injector No. 1 (LO)	Output	[Engine is running] • Engine: Warm-up condition • Idle speed note The pulse cycle changes depending on rpm at idle.	
18 (Y)		Fuel injector No. 3 (LO)			
19 (R)		Fuel injector No. 4 (LO)			
20 (V)		Fuel injector No. 2 (LO)			
21 (LG)	—	LIN	Input/ Output	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
24 (LG)	160 (B)	ECM relay (Self shut-off)	Input	[Engine is running] [Ignition switch: OFF] A few seconds after turning ignition switch OFF	0 – 1.0 V
			Output	[Ignition switch: OFF] More than a few seconds after turning ignition switch OFF	0 V
29 (BR)	160 (B)	Fuel pump relay	Input	[Ignition switch: ON] For 1 second after turning ignition switch ON [Engine is running]	0 - 1.0 V
30 (GR)	—	Drivetrain CAN communication - H	Input/ Output	—	—
31 (R)	—	Drivetrain CAN communication - L	Input/ Output	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
33 (P)	160 (B)	Ignition signal No. 3	Output	[Engine is running] - Engine: Warm-up condition - Idle speed	
34 (LA/L)	160 (B)	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/Output		
35 (G)	160 (B)	Ignition signal No. 1	Output	[Engine is running] • Engine: Warm-up condition • Idle speed	50mSec/div  2V/div

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
				[Engine is running] - Engine: Warm-up condition - Engine speed: 2,500 rpm	

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
36 (V)	160 (B)	Ignition signal No. 4	Output	[Engine is running] • Engine: Warm-up condition • Idle speed	50mSec/div  2V/div

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
				[Engine is running] • Engine: Warm-up condition • Engine speed: 2,500 rpm	
41 (LA/G)	—	Sensor ground (Fuel rail pressure sensor, engine oil pressure sensor, and refrigerant pressure sensor)	—		—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
44 (LG)	160 (B)	Ignition signal No. 2	Output	[Engine is running] • Engine: Warm-up condition • Engine speed: 2,500 rpm	
45 (W/L)	—	Sensor ground (Throttle position sensor 1 and 2)	—	—	—
46 (B)	—	Sensor ground (A/F sensor 1 shield)	—	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
47 (LA/W)	160 (B)	Mass air flow sensor	Input	[Ignition switch: ON] Engine stopped	Approx. 3,700 Hz
				[Engine is running] - Engine: Warm-up condition - Engine speed: 1,500 rpm	5,400 – 5,900 Hz
				[Engine is running] - Engine: Warm-up condition - Engine speed: 2,500 rpm	5,800 – 6,500 Hz
				[Engine is running] - Engine: Warm-up condition - Engine speed: 4,000 rpm	6,400 – 7200 Hz
49 (GR)	160 (B)	Knock sensor 1	Input	[Engine is running] Idle speed	1.97 V
50 (LA/Y)	—	Sensor ground (Mass air flow sensor and Intake air temperature sensor)	—	—	—
51 (W)	160 (B)	Knock sensor 2	Input	[Engine is running]	2 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
				- Engine: Warm-up condition - Idle speed	
52 (L/Y)	160 (B)	Throttle position sensor 2	Input	[Engine is running] - Selector lever: P - Accelerator pedal: Fully released	4.47 V
				[Engine is running] - Selector lever: P - Engine speed: 2,500 rpm	4.3 V
53 (B)	—	Sensor ground (Knock sensor 1 and 2)	—	—	—
54 (B)	—	Sensor ground (Throttle position sensor shield)	—	—	—
56 (W)	160 (B)	A/F sensor 1	Input	[Ignition switch: ON]	2.89 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
57 (L/G)	160 (B)	Throttle position sensor 1	Input	[Engine is running] • Selector lever: P • Accelerator pedal: Fully released	0.64 V
				[Engine is running] • Selector lever: P • Engine speed: 2,500 rpm	0.86 V
58 (LA/R)	160 (B)	Fuel rail pressure sensor	Input	[Engine is running] • Engine: after warming up • Idle speed	1 V
				[Engine is running] • Engine: after warming up • Revving engine from idle to 4,000 rpm	1.1 V
60 (B)	160 (B)	A/F sensor 1	Input	[Engine is running] • Engine speed: 2,500 rpm	2.53 V Output voltage varies with air fuel ratio.
61 (LA/SB)	160 (B)	Sensor power supply (Fuel rail pressure sensor and engine oil pressure sensor)	—	[Ignition switch: ON]	5 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/Output		
62 (O/L)	160 (B)	Sensor power supply (Throttle position sensor 1 and 2)	—	[Ignition switch: ON]	5 V
64 (LA/R)	160 (B)	Sensor power supply (Mass air flow sensor)	—	[Ignition switch: ON]	5 V
65 (V)	160 (B)	Engine oil pressure control solenoid valve	Output	[Engine is running] • Engine: Warm-up condition • Engine speed: no more than 4,000 rpm	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] • Engine: Warm-up condition • Engine speed: 4,000 rpm or more	14.2 V
66 (W)	160 (B)	Battery power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
67 (R)	160 (B)	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	2.0 - 2.3 V
68 (G)	160 (B)	Throttle control motor (Close)	Output	[Ignition switch: ON] • Selector lever: P • Accelerator pedal: Fully released	0 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
70 (Y)	160 (B)	Heated oxygen sensor 2 heater	Output	[Engine is running] - Engine speed: Below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	14.3 V
				[Ignition switch: ON] - Engine stopped [Engine is running] - Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/Output		
71 (BR)	160 (B)	Intake manifold tuning valve actuator (open)	Output	[Engine is running] - Engine: Warm-up condition - Idle speed	0 V
				[Engine is running] - Engine: Warm-up condition - No load - Revvng engine from idle to 5,000 rpm	Generates a voltage for a moment (11 – 14 V)
72 (Y)	160 (B)	Intake manifold tuning valve actuator (close)	Output	[Engine is running] - Engine: Warm-up condition - Idle speed	0 V
				[Engine is running] - Engine: Warm-up condition - No load - When the engine speed is decreased from 3,000 rpm to idle speed (Accelerator pedal is released)	Generates a voltage for a moment (11 – 14 V)
74 (L)	160 (B)	Refrigerant pressure sensor	Input	[Engine is running]	0.3 - 4.5 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
				• Engine: Warm-up condition • Idle speed • Both air conditioner switch: ON (Compressor operates)	
77 (LA/SB)	103 (LA/G)	Sensor power supply (Engine oil pressure sensor)	—	[Ignition switch: ON]	5 V
78 (LA/R)	160 (B)	Sensor power supply (Crankshaft position sensor)	—	[Ignition switch: ON]	5 V
79 (W)	105 (R)	Sensor power supply (Refrigerant pressure sensor)	—	[Ignition switch: ON]	5 V
80 (LA/P)	160 (B)	Sensor power supply [Manifold absolute pressure (MAP) sensor]	—	[Ignition switch: ON]	5 V
84 (LA/W)	160 (B)	Sensor power supply (Intake manifold runner control valve position sensor and EGR volume control valve)	—	[Ignition switch: ON]	5 V
86 (LA/Y)	100 (LA/R)	Sensor power supply (Intake camshaft position sensor)	—	[Ignition switch: ON]	5 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/Output		
88 (W)	160 (B)	Crankshaft position sensor (Electric intake valve timing control signal)	Output	[Engine is running] note The pulse cycle changes depending on rpm at idle.	4.9 V 

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
					3.52 V
				[Engine is running] • Engine: after warming up • Engine speed: 2,000 rpm	

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/Output		
90 (LA/SB)	160 (B)	Exhaust camshaft position sensor	Input	[Engine is running] - Engine: after warming up - Idle speed note The pulse cycle changes depending on rpm at idle.	4.3 V 

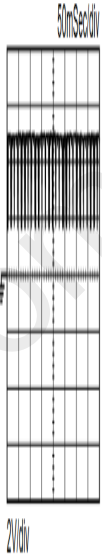
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
					5 V
				[Engine is running] • Engine: after warming up • Engine speed: 2,000 rpm	
92 (SB)	160 (B)	Heated oxygen sensor 2	Input	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met • Engine: after warming up	0 - 1.0 V
94 (LA/G)	160 (B)	Sensor power supply (Exhaust camshaft position sensor)	—	[Ignition switch: ON]	5 V
95 (V)	160 (B)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
96 (LA/Y)	160 (B)	Crankshaft position sensor	Input	[Engine is running] • Engine: after warming up • Idle speed note The pulse cycle changes depending on rpm at idle. 	4.0 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
					0.73 V
				[Engine is running] - Engine: after warming up - Engine speed: 2,500 rpm	
97 (BG)	—	Sensor ground (Heated oxygen sensor 2)	—	—	—
100 (LA/R)	—	Sensor ground (Intake camshaft position sensor)	—	—	—
101 (SB)	160 (B)	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with Engine coolant temperature.
102 (W)	—	Sensor ground	—	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
		(Engine coolant temperature sensor)			
103 (LA/G)	—	Sensor ground (Engine oil pressure sensor)	—	—	—
104 (LA/LG)	160 (B)	Intake manifold runner control valve position sensor	Input	[Key switch: ON]	0.8 V
				[Engine is running] • Engine: after warming up • Idle speed	4.3 V
105 (R)	—	Sensor ground (Refrigerant pressure sensor)	—	—	—
106 (LA/G)	160 (B)	Sensor ground [Manifold absolute pressure (MAP) sensor]	—	—	—
107 (LA/L)	—	Sensor ground (Intake manifold runner control valve position sensor and EGR volume control valve)	—	—	—
108 (LA/W)	—	Sensor ground (Crankshaft position sensor)	—	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
109 (LA/W)	100 (LA/R)	Intake camshaft position sensor	Input	[Engine is running] • Engine: after warming up • Idle speed note The pulse cycle changes depending on rpm at idle.	4.3V 

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
				[Engine is running] • Engine: after warming up • Engine speed: 2,500 rpm	4.3 V
					
110 (LA/B)	—	Sensor ground (Exhaust camshaft position sensor)	—	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
114 (LA/R)	160 (B)	Engine oil pressure sensor	Input	[Engine is running] • Engine: after warming up • Idle speed	1.53 V 

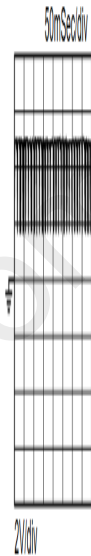
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
					1.84 V
				[Engine is running] Engine speed: 2,000 rpm	
116 (B)	107 (LA/L)	EGR volume control valve position sensor	Input	[Ignition switch: ON]	0.5 V
117 (W)	160 (B)	Exhaust valve timing intermediate lock control solenoid valve	Output	[Engine is running] - Warm-up condition ON - Idle speed	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] - Cold condition [Engine coolant temperature: below 50°C (122°F)] ON - Idle speed	0.67 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/Output		
120 (LA/R)	160 (B)	Manifold absolute pressure (MAP) sensor	Input	[Ignition switch: ON]	4.28 V Output voltage varies with atmospheric pressure.
121 (LA/L)	160 (B)	Intake manifold runner control valve motor (close)	Output	[Engine is running] • Engine: after warming up • Idle speed	0 V
				[Engine is running] • Engine: after warming up • No load • When the engine speed is decreased from 3,000 rpm to idle speed (Accelerator pedal is released)	Generates a voltage for a moment (11 – 14 V)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/Output		
122 (LA/P)	160 (B)	Intake manifold runner control valve motor (open)	Output	[Engine is running] - Engine: after warming up - Idle speed	0 V
				[Engine is running] - Engine: after warming up - No load - Revvng engine from idle to 5,000 rpm	Generates a voltage for a moment (11 – 14 V)
125 (SB)	160 (B)	Exhaust valve timing control solenoid valve	Output	[Engine is running] - Engine: Warm-up condition - Idle speed	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] - Engine: Warm-up condition - Engine speed: 2,500 rpm	9.0 - 10.5 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/Output		
126 (L)	160 (B)	EVAP canister purge volume control solenoid valve	Output	[Engine is running] - Idle speed - Accelerator pedal: Not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] Engine speed: 2,500 rpm (More than 100 seconds after starting engine.)	Battery voltage (11 - 14 V) 

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/Output		
127 (Y)	160 (B)	Intake camshaft position sensor (Electric intake valve timing control signal)	Input	[Engine is running] note The pulse cycle changes depending on rpm at idle. 50mSec/div 2V/div	4.99 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
					4.07 V
				[Engine is running] • Engine: after warming up • Engine speed: 2,000 rpm	
129 (G)	160 (B)	EVAP control system pressure sensor	Input	[Ignition switch: ON]	4.13 V
131 (R)	—	Drivetrain CAN communication - L	Input/Output	—	—
132 (GR)	—	Drivetrain CAN communication - H	Input/Output	—	—
133 (LA/SB)	160 (B)	Sensor power supply (EVAP control system pressure sensor)	—	[Ignition switch: ON]	5 V
136 (LA/BR)	160 (B)	Fuel tank temperature sensor	Input	[Engine is running]	3.3 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/Output		
141 (LG)	160 (B)	Ignition switch	Input	[Ignition switch: OFF]	0 V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/Output		
142 (LA/V)	160 (B)	ASCDC steering switch	Input	[Ignition switch: ON] • ASCDC steering switch: OFF	4.23 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/Output		
				[Ignition switch: ON] • MAIN switch: Pressed	0 V
				[Ignition switch: ON] • CANCEL switch: Pressed	1.19 V
				[Ignition switch: ON] • RES+ switch: Pressed	3.61 V
				[Ignition switch: ON] • SET- switch: Pressed	2.93 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
		ACC steering switch	Input	[Ignition switch: ON] • ACC steering switch: OFF	4.23 V
				[Ignition switch: ON] • MAIN switch: Pressed	0 V
				[Ignition switch: ON] • CANCEL switch: Pressed	1.19 V
				[Ignition switch: ON] • DISTANCE switch: Pressed	2.15 V
				[Ignition switch: ON] • SET- switch: Pressed	2.93 V
				[Ignition switch: ON] • RES+ switch: Pressed	3.61 V
143 (LA/BR)	—	Sensor ground (ASCD/ACC steering switch)	—	—	—
145 (P)	—	Engine CAN communication - L	Input/ Output	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
146 (GR)	—	Engine CAN communication - H	Input/ Output	—	—
148 (GR)	160 (B)	Stop light switch	Input	[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: OFF] • Brake pedal: Fully released	0 V
149 (LA/V)	160 (B)	EVAP canister vent control valve	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
150 (LA/P)	160 (B)	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5 V
151 (LA/G)	160 (B)	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	2.0 - 2.5 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.25- 0.5 V
152 (LA/Y)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/Output		
153 (V)	160 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
154 (LG)	160 (B)	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5 V
155 (V)	—	Sensor ground (EVAP control system pressure sensor and fuel tank temperature sensor)	—	—	—
156 (B)	—	ECM ground	—	—	—
157 (B)	—	ECM ground	—	—	—
158 (L)	160 (B)	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.5 - 1.0 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	4.2 - 4.8 V
159 (Y)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
160 (B)	—	ECM ground	—	—	—

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

*1: With ACC/ASCD models

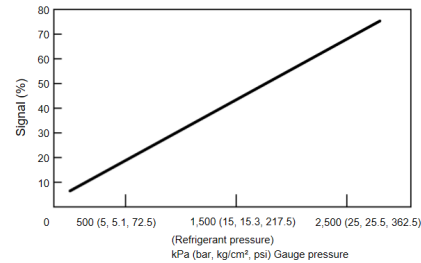
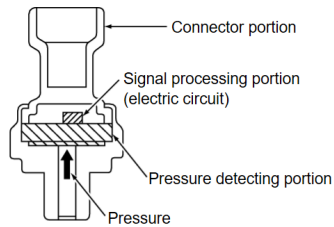
*2: Without ACC/ASCD models

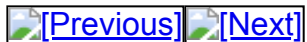
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Refrigerant Pressure Sensor

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.





Test Value and Test Limit

The following is the information specified in Service \$06 of SAE J1979/ISO 15031-5.

The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by On Board Monitor ID (OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.

The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (e.g., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	01H	Air fuel ratio (A/F) sensor 1 (Bank 1)	P0131	83H	0BH	Minimum sensor output voltage for test cycle
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Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	

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Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
			P0131	84H	0BH	Maximum sensor output voltage for test cycle
			P0130	85H	0BH	Minimum sensor output voltage for test cycle
			P0130	86H	0BH	Maximum sensor output voltage for test cycle
			P0133	87H	04H	Response rate: Response ratio (lean to rich)
			P0133	88H	04H	Response rate: Response ratio (rich to lean)
			P2A00 or P2096	89H	84H	The amount of shift in air fuel ratio (too lean)
			P2A00 or P2097	8AH	84H	The amount of shift in air fuel ratio (too rich)
			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
			P014C	8DH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1
			P014C	8EH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1
			P014D	8FH	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1
			P014D	90H	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1
			P015A	91H	01H	O2 sensor delayed response - Rich to lean

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
						bank 1 sensor 1
			P015A	92H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1
			P015B	93H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1
			P015B	94H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1
			P0133	95H	04H	Response rate: Response ratio (lean to rich)
			P0133	96H	84H	Response rate: Response ratio (rich to lean)
			P2297	97H	0BH	A/F Sensor IL High Gain Monitor
			P2297	98H	0BH	A/F Sensor IL Low Gain Monitor
			P0138	07H	0CH	Minimum sensor output voltage for test cycle
			P0137	08H	0CH	Maximum sensor output voltage for test cycle
			P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
			P0139	82H	11H	Rear O2 sensor delay response diagnosis
	02H	Heated oxygen sensor 2 (Bank 1)				

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
	03H	Heated oxygen sensor 3 (Bank 1)	P0143	07H	0CH	Minimum sensor output voltage for test cycle
			P0144	08H	0CH	Maximum sensor output voltage for test cycle
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0151	83H	0BH	Minimum sensor output voltage for test cycle

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Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
			P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for test cycle
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
			P0153	87H	04H	Response rate: Response ratio (lean to rich)
			P0153	88H	04H	Response rate: Response ratio (rich to lean)
			P2A03 or P2098	89H	84H	The amount of shift in air fuel ratio (too lean)
			P2A03 or P2099	8AH	84H	The amount of shift in air fuel ratio (too rich)
			P0150	8BH	0BH	Difference in sensor output voltage
			P0153	8CH	83H	Response gain at the limited frequency
			P014E	8DH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1
			P014E	8EH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1
			P014F	8FH	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1
			P014F	90H	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1
			P015C	91H	01H	O2 sensor delayed response - Rich to lean

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
	06H	Heated oxygen sensor 2 (Bank 2)				bank 2 sensor 1
			P015C	92H	01H	O2 sensor delayed response - Rich to lean bank 2 sensor 1
			P015D	93H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1
			P015D	94H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1
			P0153	95H	04H	Response rate: Response ratio (lean to rich)
			P0153	96H	84H	Response rate: Response ratio (rich to lean)
			P2298	97H	0BH	A/F Sensor IL High Gain Monitor
			P2298	98H	0BH	A/F Sensor IL Low Gain Monitor
			P0158	07H	0CH	Minimum sensor output voltage for test cycle
			P0157	08H	0CH	Maximum sensor output voltage for test cycle
			P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
			P0159	82H	11H	Rear O2 sensor delay response diagnosis

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
CATALYST	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle
			P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage
	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
			P0420	82H	01H	Switching time lag engine exhaust index value
			P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2423	84H	84H	O2 storage index in HC trap catalyst
	22H	Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index
			P0430	82H	01H	Switching time lag engine exhaust index value
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
EGR SYSTEM	31H	EGR function	P0400	80H	96H	Low flow faults: EGR temp change rate (short term)
			P0400	81H	96H	Low flow faults: EGR temp change rate (long term)
			P0400	82H	96H	Low flow faults: Difference between max EGR temp and EGR temp under idling condition
			P0400	83H	96H	Low flow faults: Max EGR temp
			P1402	84H	96H	High Flow Faults: EGR temp increase rate
			P0402	85H	FCH	EGR differential pressure high flow
			P0401	86H	37H	EGR differential pressure low flow
			P2457	87H	96H	EGR temperature
			P0402	87H	FCH	Delta intake pressure of EGR high flow monitor
			P0401	88H	FCH	Delta intake pressure of EGR low flow monitor
			P0402	89H	FCH	Intake manifold pressure as parameter of HP-EGR high flow monitor

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
VVT SYSTEM	35H	VVT Monitor (Bank1)	P100A	84H	10H	VEL slow response diagnosis

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Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
			P1090	85H	10H	VEL servo system diagnosis
			Advanced: P052A Retarded: P052B	87H	9DH	VTC intake intermediate lock system diagnosis (VTC intermediate lock position check diagnosis)
			P0011	88H	9DH	VTC function failure diagnosis (Intake ADV side)
			P0012	89H	9DH	VTC function failure diagnosis (Intake RET side)
			P0015	8AH	9DH	VTC function failure diagnosis (Exhaust RET side)
			P0014	8BH	9DH	VTC function failure diagnosis (Exhaust ADV side)
			Advanced: P054A Retarded: P054B	8CH	9DH	Exhaust intermediate lock VTC function check diagnosis

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
36H	VVT Monitor (Bank2)		P100B	84H	10H	VEL slow response diagnosis
			P1093	85H	10H	VEL servo system diagnosis
			Advanced: P052C Retarded: P052D	87H	9DH	VTC intake intermediate lock system diagnosis (VTC intermediate lock position check diagnosis)
			P0021	88H	9DH	VTC function failure diagnosis (Intake ADV side)
			P0022	89H	9DH	VTC function failure diagnosis (Intake RET side)
			P0025	8AH	9DH	VTC function failure diagnosis (Exhaust RET side)
			P0024	8BH	9DH	VTC function failure diagnosis (Exhaust ADV side)
			Advanced: P054C Retarded: P054D	8CH	9DH	Exhaust intermediate lock VTC function check diagnosis

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
EVAP SYSTEM	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3BH	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
	3CH	EVAP control system leak (Very small leak)	P0456	80H	05H	Leak area index (for more than 0.02 inch)
			P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
			P0456	82H	FDH	Internal pressure of EVAP system at the end of monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close
		Fuel Tank Vent Line	P00FE	84H	04H	Evap system air volume ratio of estimated to measured

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
O2 SENSOR HEATER	41H	A/F sensor 1 heater (Bank 1)	P0030	83H	0BH	A/F sensor heater circuit malfunction
			P0053	84H	14H	A/F sensor heater circuit malfunction (RACmonitor)
	42H	Heated oxygen sensor 2 heater (Bank 1)	P0141	81H	14H	Rear O2 sensor internal impedance
			P00D2	82H	0CH	Rear O2 sensor heater performance
	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of heater electric current to voltage
	45H	A/F sensor 1 heater (Bank 2)	P0036	83H	0BH	A/F sensor heater circuit malfunction
			P0059	84H	14H	A/F sensor heater Malfunction (RACmonitor)
	46H	Heated oxygen sensor 2 heater (Bank 2)	P0161	81H	14H	Rear O2 sensor internal impedance
			P00D4	82H	0CH	Rear O2 sensor heater performance
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of heater electric current to voltage

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
SECONDARY AIR	71H	Secondary air system	P0411	80H	01H	Secondary air injection system incorrect flow detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary air injection system insufficient flow
			P2445	82H	01H	Secondary air injection system pump stuck off
			P2448	83H	01H	Secondary air injection system high airflow
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary air injection system switching valve stuck open
			P2440	85H	01H	Secondary air injection system switching valve stuck open
			P2444	86H	01H	Secondary air injection system pump stuck on

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
Fuel System	81H	Fuel injection system function (Bank 1)	P219A	82H	03H	Air-fuel ratio cylinder imbalance diagnosis parameter backup

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Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	

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Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
			P219C	83H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS method #1 cylinder parameter
			P219D	84H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS method #2 cylinder parameter
			P219E	85H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS method #3 cylinder parameter
			P219F	86H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS method #4 cylinder parameter
			P21A0	87H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS method #5 cylinder parameter
			P21A2	89H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS method #7 cylinder parameter
			P23FE	8AH	03H	Air-fuel ratio cylinder imbalance diagnosis for DIG+MPI area parameter backup
			P23F2	8BH	83H	Air-fuel ratio cylinder imbalance diagnosis CPS

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
						method for DIG+MPI area #1 cylinder parameter
			P23F3	8CH	83H	Air-fuel ratio cylinder imbalance diagnosis CPS method for DIG+MPI area #2 cylinder parameter
			P23F4	8DH	83H	Air-fuel ratio cylinder imbalance diagnosis CPS method for DIG+MPI area #3 cylinder parameter
			P23F5	8EH	83H	Air-fuel ratio cylinder imbalance diagnosis CPS method for DIG+MPI area #4 cylinder parameter
			P23F6	8FH	83H	Air-fuel ratio cylinder imbalance diagnosis CPS method for DIG+MPI area #5 cylinder parameter
			P23F8	91H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS method for DIG+MPI area #7 cylinder parameter

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
	82H	Fuel injection system function (Bank 2)	P219B	82H	03H	Air-fuel ratio cylinder imbalance diagnosis parameter backup

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Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
			P219D	83H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS method #2 cylinder parameter
			P219F	85H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS method #4 cylinder parameter
			P21A1	87H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS method #6 cylinder parameter
			P21A3	89H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS method #8 cylinder parameter
			P23FF	8AH	03H	Air-fuel ratio cylinder imbalance diagnosis for DIG+MPI area parameter backup
			P23F3	8BH	83H	Air-fuel ratio cylinder imbalance diagnosis CPS method for DIG+MPI area #2 cylinder parameter
			P23F5	8DH	83H	Air-fuel ratio cylinder imbalance diagnosis CPS method for DIG+MPI area #4 cylinder parameter
			P23F7	8FH	83H	Air-fuel ratio cylinder imbalance diagnosis CPS

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
						method for DIG+MPI area #6 cylinder parameter
			P23F9	91H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS method for DIG+MPI area #8 cylinder parameter

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A1H	Multiple cylinder misfires	P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	

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Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	

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Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder
			P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder
			P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder
			P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder
			P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders
			P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder
			P0302	8AH	24H	Misfiring counter at 200 revolution of the second

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
						cylinder
			P0303	8BH	24H	Misfiring counter at 200 revolution of the third cylinder
			P0304	8CH	24H	Misfiring counter at 200 revolution of the fourth cylinder
			P0305	8DH	24H	Misfiring counter at 200 revolution of the fifth cylinder
			P0306	8EH	24H	Misfiring counter at 200 revolution of the sixth cylinder
			P0307	8FH	24H	Misfiring counter at 200 revolution of the seventh cylinder
			P0308	90H	24H	Misfiring counter at 200 revolution of the eighth cylinder
			P0300	91H	24H	Misfiring counter at 1000 revolution of the single cylinder
			P0300	92H	24H	Misfiring counter at 200 revolution of the single cylinder
			P0300	93H	24H	Misfiring counter at 200 revolution of the multiple cylinders

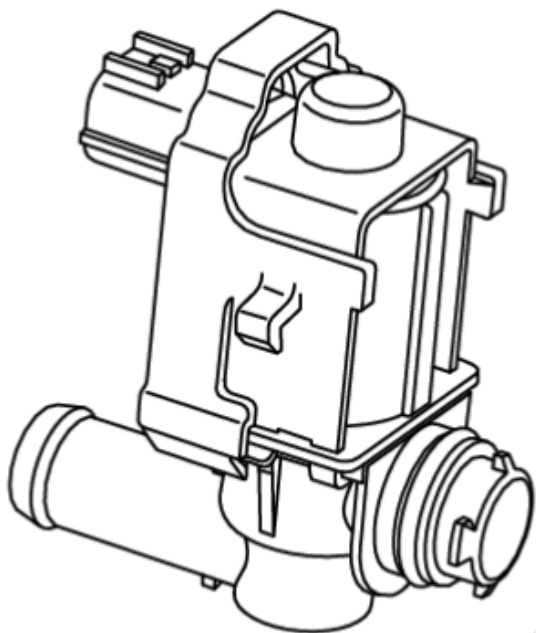
Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
	A2H	No. 1 cylinder misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	A3H	No. 2 cylinder misfire	P0302	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	No. 3 cylinder misfire	P0303	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No. 4 cylinder misfire	P0304	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0304	0CH	24H	Misfire counts for last/current driving cycles

Item	OBDMID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
PM FILTER	A6H	No. 5 cylinder misfire	P0305	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0305	0CH	24H	Misfire counts for last/current driving cycles
	A7H	No. 6 cylinder misfire	P0306	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
	A8H	No. 7 cylinder misfire	P0307	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0307	0CH	24H	Misfire counts for last/current driving cycles
	A9H	No. 8 cylinder misfire	P0308	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0308	0CH	24H	Misfire counts for last/current driving cycles
	B2H	PM Filter Monitor (Bank 1)	P226D	80H	84H	GPF Removal diagnosis parameter by Tdiff
			P226D	81H	84H	GPF Removal diagnosis parameter by Pdiff

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EVAP Canister Vent Control Valve

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.



This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows “EVAP Control System” diagnosis.