FAIL-SAFE CHART

If any of the following DTCs are set, the ECM enters fail-safe mode to allow the vehicle to be driven temporarily.

DTCs	Components	Fail-Safe Operations	Fail-Safe Deactivation Conditions
P0031 and P0032	Air-Fuel Ratio (A/F) Sensor Heater	ECM turns off A/F sensor heater	Ignition switch OFF
P0037 and P0038	Heated Oxygen (HO2) Sensor Heater	ECM turns off HO2 sensor heater	Ignition switch OFF
P0100, P0102 and P0103	Mass Air Flow (MAF) Meter	ECM calculates ignition timing according to engine speed and throttle valve position	Pass condition detected
P0110, P0112 and P0113	Intake Air Temperature (IAT) Sensor	ECM estimates IAT to be 20°C (68°F)	Pass condition detected
P0115, P0117 and P0118	Engine Coolant Temperature (ECT) Sensor	ECM estimates ECT to be 80°C (176°F)	Pass condition detected
P0120, P0121, P0122, P0123, P0220, P0222, P0223, P0604, P0606, P0607, P0657, P2102, P2103, P2111, P2112, P2118, P2119 and P2135	Electronic Throttle Control System (ETCS)	ECM cuts off throttle actuator current and throttle valve returned to 6.5° throttle position by return spring ECM then adjusts engine output by controlling fuel injection (intermittent fuel-cut) and ignition timing in accordance with accelerator pedal opening angle, to allow vehicle to continue at minimal speed *	Pass condition detected and then ignition switch turned OFF
P0325, P0327 and P0328	Knock Sensor	ECM sets ignition timing to maximum retard	Ignition switch OFF
P0351 to P0354	Igniter	ECM cuts fuel	Pass condition detected
P2120, P2121, P2122, P2123, P2125, P2127, P2128 and P2138	Accelerator Pedal Position (APP) Sensor	APP sensor has 2 sensor circuits: Main and Sub If either of circuits malfunctions, ECM controls engine using other circuit If both of circuits malfunctions, ECM regards accelerator pedal as being released. As a result, throttle valve is closed and engine idles	Pass condition detected and then ignition switch turned OFF

HINT:
* The vehicle can be driven slowly when the accelerator pedal is depressed firmly and slowly. If the accelerator pedal is depressed quickly, the vehicle may speed up and slow down erratically.

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DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:
By reading the DATA LIST displayed on an intelligent tester or OBD II scan tool, you can check values, including those of the switches, sensors, and actuators, without removing any parts. Reading the DATA LIST as the first step of troubleshooting is one method of shortening diagnostic time.

NOTICE:
In the table below, the values listed under Normal Conditions are for reference only. Do not depend solely on these values when determining whether or not a part is faulty.

(a) Warm up the engine.
(b) Turn the ignition switch to OFF.
(c) Connect an intelligent tester or OBD II scan tool to the DLC3.
(d) Turn the ignition switch to ON.
(e) Turn the tester or scan tool ON.
(f) If using an intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
(g) If using an OBD II scan tool, refer to the instruction manual.
(h) Check the values by referring to the table below.

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Notes
INJECTOR	Injection period of No. 1 cylinder: Min.: 0 ms, Max.: 32.6 ms	1.1 to 2.5 ms: Idling	-
IGN ADVANCE	Ignition timing advance for No. 1 cylinder: Min.: -64 deg., Max.: 63.5 deg.	BTDC 8 to 20 deg: Idling	-
CALC LOAD	Calculated load by ECM: Min.: 0 %, Max.: 100 %	• 11.3 to 20.0 %: Idling • 11.5 to 17.9 %: Running without load (2,500 rpm)	-
MAF	Air flow rate from Mass Air Flow (MAF) meter: Min.: 0 g/sec, Max.: 665.35 g/sec	• 1.4 to 2.3 g/sec for Manual Transaxle (M/T): Idling • 1.4 to 2.3 g/sec for Automatic Transaxle (A/T): Idling • 5.4 to 7.9 g/sec: Running without load (2,500 rpm)	If value is approximately 0.0 g/sec: • MAF meter power source circuit open • VG circuit open or shorted If value is 271.0 g/sec or more: • E2G circuit open
ENGINE SPD	Engine speed: Min.: 0 rpm, Max.: 16,383 rpm	• 650 to 750 rpm for M/T: Idling • 650 to 750 rpm for A/T: Idling	-
COOLANT TEMP	Engine coolant temperature: Min.: -40°C (-40°F), Max.: 140°C (284°F)	80 to 95°C (176 to 203°F): After warming up engine	• If value is -40°C (-40°F): sensor circuit open • If value is 140°C (284°F): sensor circuit shorted
INTAKE AIR	Intake air temperature: Min.: -40°C (-40°F), Max.: 140°C (284°F)	Equivalent to ambient air temperature	• If value is -40°C (-40°F): sensor circuit open • If value is 140°C (284°F): sensor circuit shorted
THROTTLE POS	Absolute throttle position sensor: Min.: 0 %, Max.: 100 %	• 10 to 22 %: Throttle valve fully closed • 64 to 98 %: Throttle valve fully open	Read value with ignition switch ON (Do not start engine)
CTP SW	Closed throttle position switch: ON or OFF	• ON: Throttle fully closed • OFF: Throttle open	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Notes
VEHICLE SPD	Vehicle speed: Min.: 0 km/h, Max.: 255 km/h	Same as speedometer reading	-
ACCEL POS #1	Accelerator Pedal Position (APP) sensor No. 1 output voltage: Min.: 0 V, Max.: 5 V	• 0.5 to 1.1 V: Accelerator pedal released • 2.6 to 4.5 V: Accelerator pedal depressed	Read value with ignition switch ON (Do not start engine)
ACCEL POS #2	Accelerator Pedal Position (APP) sensor No. 2 output voltage: Min.: 0 V, Max.: 5 V	• 1.2 to 2.0 V: Accelerator pedal released • 3.4 to 5.0 V: Accelerator pedal depressed	Read value with ignition switch ON (Do not start engine)
THROTTLE POS #2	Throttle Position (TP) sensor No. 2 output voltage: Min.: 0 V, Max.: 5 V	• 2.1 to 3.1 V: Throttle valve fully closed • 4.5 to 5.0 V: Throttle valve fully open	Read value with ignition switch ON (Do not start engine)
THROTTLE TARGT	Throttle requirement position: Min.: 0 V, Max.: 5 V	0.4 to 1.1 V: Idling	-
THROTL OPN DUTY	Throttle actuator duty ratio (to open throttle valve): Min.: 0 %, Max.: 100 %	0 %: Throttle valve fully closed	• When accelerator pedal depressed, duty ratio increased • Read value with ignition switch ON (Do not start engine)
THROTL CLS DUTY	Throttle actuator closed duty ratio (to close throttle valve): Min.: 0 %, Max.: 100 %	0 %: Throttle valve fully open	• When accelerator pedal released, duty ratio increased • Read value with ignition switch ON (Do not start engine)
THROTTLE MOT	Whether or not throttle actuator control permitted: ON or OFF	ON: Idling	Read value with ignition switch ON (Do not start engine)
+BM	Whether or not electric throttle control system power applied: ON or OFF	ON: Idling	-
ACCEL IDL POS	Whether or not APP sensor detected engine idling: ON or OFF	ON: Idling	-
THROTTL IDL POS	Whether or not TP sensor detected engine idling: ON or OFF	ON: Idling	-
FAIL #1	Whether or not fail-safe mode executed: ON or OFF	ON: ETCS failed	-
FAIL #2	Whether or not fail-safe mode executed: ON or OFF	ON: ETCS failed	-
THROTTL INITIAL	Throttle valve fully closed (learned value): Min.: 0 V, Max.:5 V	0.5 to 0.9 V	-
ACCEL LEARN VAL	Accelerator pedal fully closed (learned value): Min.: 0 V, Max.: 5 V	0.4 to 0.8 V	-
THROTTLE MOT	Throttle actuator current: Min.: 0 A, Max.: 20 A	0 to 3.0 A: Idling	-
O2S B1 S2	Heated Oxygen (HO2) sensor output voltage for bank 1 sensor 2: Min.: 0 V, Max.: 1.275 V	0.1 to 0.9 V: Driving (31 mph, 50 km/h)	Performing either Active Test INJ VOL or A/F CONTROL, enables HO2 sensor voltage output to be checked
AFS B1 S1	A/F sensor output voltage for bank 1 sensor 1: Min.: 0 V, Max.: 7.999 V	2.8 to 3.8 V: Idling	Performing either Active Test, INJ VOL or A/F CONTROL, enables A/F sensor voltage output to be checked
TOTAL FT #1	Total fuel trim value for fuel system: Min.: -0.5, Max.: 0.496	-0.2 to 0.2	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Notes
VAPOR PRESS	Vapor pressure: Min.: -4.125 kPa, Max.: 2.125 kPa	0 kPa: Fuel tank cap removed	-
SHORT FT #1	Short-term fuel trim of bank 1: Min.: -100 %, Max.: 100 %	0 +- 20 %	Short-term fuel compensation used to maintain air-fuel ratio at stoichiometric levels
LONG FT #1	Long-term fuel trim of bank 1: Min.: -100 %, Max.: 100 %	0 +- 20 %	Overall long-term fuel compensation that helps maintain air-fuel ratio at stoichiometric levels (moderates long-term deviations of short-term fuel trim from central value)
TOTAL FT #1	Total fuel trim of bank 1: Min.: 0.5, Max.: 1.496	0.5 to 1.4: Idling	-
O2FT B1 S2	Short-term fuel trim associated with bank 1 sensor 2: Min.: -100 %, Max.: 100 %	0 +- 20 %	-
AF FT B1 S1	Short-term fuel trim associated with bank 1 sensor 1: Min.: 0, Max.: 1.999	• 0.000 to 0.999: Lean • 1: Stoichiometric air-fuel ratio • 1.001 to 1.999: Rich	-
FUEL SYS #1	Fuel system status (Bank1) : OL or CL or OL DRIVE or OL FAULT or CL FAULT	CL: Idling with warm engine	• OL (Open Loop): Conditions for closed loop not yet satisfied • CL (Closed Loop): Using AF sensor as feedback for fuel control • OL DRIVE: Open loop due to driving conditions (fuel enrichment) • OL FAULT: Open loop due to detected system fault • CL FAULT: Closed loop but AF sensor used for fuel control malfunctioning
FC IDL	Fuel cut idling: ON or OFF	ON: Fuel cut operation	ON: Throttle valve fully closed and engine speed 1,500 rpm or more
MIL	MIL status: ON or OFF	ON: MIL ON	-
STARTER SIG	Starter signal: ON or OFF	ON: Cranking	-
A/C SIG	A/C signal: ON or OFF	ON: A/C ON	-
PNP SW [NSW] *1	Park/Neutral position switch signal: ON or OFF	ON: P or N position	-
ELECT LOAD SIG	Electrical load signal: ON or OFF	• ON: Taillight switch ON • ON: Defogger switch ON	-
STOP LIGHT SW	Stop light switch: ON or OFF	• ON: Brake pedal depressed • OFF: Brake pedal released	-
PS OIL PRESS SW	Power steering oil pressure switch signal: ON or OFF	• ON: While turning steering wheel • OFF: While not turning steering wheel	ON: Idle-up control activated
PS SIGNAL	Power steering signal: ON or OFF	ON: When steering wheel first turned after ignition switch turned to ON	This signal status usually ON until ignition switch turned OFF
FUEL PUMP / SPD	Fuel pump/speed status: ON/H, OFF/M or L	ON/H: Idling	-
A/C MAG CLUTCH	A/C magnet clutch status: ON or OFF	ON: A/C magnet clutch ON	-
EVAP VSV	EVAP VSV: ON or OFF	ON: VSV operation	EVAP VSV controlled by ECM (ground side duty control)
VVT CTRL B1	VVT control status (bank 1): ON or OFF	ON: VVT system operation	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Notes
VACUUM PUMP	Key-off EVAP system leak detection pump status: ON or OFF	-	Active test support data
IGNITION	Ignition counter: Min.: 0, Max.: 400	0 to 400	-
CYL #1, #2, #3, #4	Misfire ratio of cylinder 1 to 4: Min.: 0 %, Max.: 50 %	0 %	Only displayed when idling
MISFIRE RPM	Engine RPM for first misfire range: Min.: 0 rpm, Max.: 6,375 rpm	0 rpm: Misfire 0	-
MISFIRE LOAD	Engine load for first misfire range: Min.: 0 g/rev, Max.: 3.98 g/rev	0 g/rev: Misfire 0	-
FC TAU	Fuel cut during very light load: ON or OFF	ON: Fuel cut operation	Fuel cut performed under very light load to prevent incomplete engine combustion
#CODES	#Codes: Min.: 0, Max.: 255	Number of detected DTCs	-
SPD TEST	Check mode result for vehicle speed sensor. COMPL or INCMPL	-	-
MISFIRE TEST	Check mode result for misfire monitor. COMPL or INCMPL	-	-
OXS1 TEST	Check mode result for HO2 sensor. COMPL or INCMPL	-	-
OBD CERT	OBD requirement	OBD2	-
# CARB CODES	Emission related DTCs	-	Number of emission related DTCs
O2S (A/FS) MON	O2S (A/FS) monitor. NOT AVL or AVAIL	-	-
EVAP MON	EVAP monitor: NOT AVL or AVAIL	-	-
CAT MON	Catalyst monitor: NOT AVL or AVAIL	-	-
CHECK MODE	Check mode: ON or OFF	ON: Check mode ON	See page ES-31
MIL ON RUN DIST	Distance vehicle driven with illuminated MIL: Min.: 0 km, Max.: 65,535 km	Distance after DTC detected	-

Normal Condition: If no idling conditions are specified, the transmission gear selector lever should be in the N or P position, and the A/C switch and all accessory switches should be OFF.
*1: A/T only

2. ACTIVE TEST

HINT:
Performing an ACTIVE TEST enables components including the relays, VSV (Vacuum Switching Valve), and actuators, to be operated without removing any parts. The ACTIVE TEST can be performed with an intelligent tester. Performing an ACTIVE TEST as the first step of troubleshooting is one method of shortening diagnostic time.
DATA LIST can be displayed during ACTIVE TESTs.

(a) Connect an intelligent tester to the DLC3.
(b) Turn the ignition switch to ON.
(c) Turn the tester ON.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.

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(e) Perform the ACTIVE TEST by referring to the table below.

Tester Display	Test Part	Control Range	Diagnostic Notes
INJ VOL	Change injection volume	Between -12 % and 25 %	• All injectors tested at the same time • Perform test at less than 3,000 rpm • Injection volume can be changed in 1 % graduations within control range
A/F CONTROL	Change injection volume	Lower by 12.5% or increase by 25 %	• Perform test at less than 3,000 rpm • A/F CONTROL enables checking and graphing of A/F (Air-Fuel Ratio) sensor and Heated Oxygen (HO2) sensor voltage outputs • To conduct test, select following menu items: ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1S1 and O2S B1S2, and press YES and ENTER followed by F4
IAC DUTY RATIO	Control IAC duty ratio	Between 0 % and 90 %	Perform test under following conditions: • Engine speed: Idling • Vehicle speed: 0 mph (0 km/h) • Battery voltage: 8.5 V or more
EVAP VSV (ALONE)	Activate EVAP VSV control	ON/OFF	-
A/C MAG CLUTCH	Activate A/C magnet clutch	ON/OFF	-
FUEL PUMP/SPD	Activate fuel pump (C/OPN Relay)	ON/OFF	-
VVT CTRL B1	Turn on and off OCV (Oil Control Valve)	ON/OFF	• Engine stalls or idles roughly when OCV turned ON • Normal engine running or idling when OCV off
TC/TE1	Turn on and off TC and TE1 connection	ON/OFF	• ON: TC and TE1 connected • OFF: TC and TE1 disconnected
FC IDL PROHBT	Prohibit idling fuel cut control	ON/OFF	-
VENT VALVE (ALONE)	Activate vent valve (built into pump module)	ON/OFF	-
VCUUM PUMP	Activate vacuum pump (built into pump module)	ON/OFF	-

3. SYSTEM CHECK

HINT:
Performing a SYSTEM CHECK enables the system, which consists of multiple actuators, to be operated without removing any parts. In addition, it can show whether or not any DTCs are set, and can detect potential malfunctions in the system. The SYSTEM CHECK can be performed with an intelligent tester.

(a) Connect an intelligent tester to the DLC3.
(b) Turn the ignition switch to ON.
(c) Turn the tester ON.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK.

(e) Perform the SYSTEM CHECK by referring to the table below.

Tester Display	Test Part	Control Range	Diagnostic Notes
EVAP SYS CHECK (AUTO OPERATION)	Perform 4 steps in order to operate EVAP key-off monitor automatically	35°C (95°F) or less	• If no DTCs in PENDING CODE after performing this test, system functioning normally • Refer to EVAP System (See page ES-339)
EVAP SYS CHECK (MANUAL OPERATION)	Perform 4 steps in order to operate EVAP key-off monitor manually	35°C (95°F) or less	• Used to detect malfunctioning parts • Refer to EVAP System (See page ES-339)