

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

Using the hand-held tester DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading DATA LIST early in troubleshooting is one way to shorten labor time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

- (a) Warm up the engine.
- (b) Turn the power switch OFF.
- (c) Connect the hand-held tester to the DLC3.
- (d) Turn the power switch ON (IG).
- (e) Turn the hand-held tester ON.
- (f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ENGINE AND ECT / DATA LIST.
- (g) According to the display on the tester, read items in DATA LIST.

Hand-Held Tester Display	Measurement Item/Range (Display)	Normal Condition *	Diagnostic Note
INJECTOR	Injection period of the No. 1 cylinder/ Min.: 0 ms, Max.: 32.64 ms	Idling: 1 to 3 ms (Inspection mode)	—
IGN ADVANCE	Ignition timing advance for No. 1 cylinder/ Min.: -64 deg., Max.: 63.5 deg.	Idling: BTDC 7 to 15° (Inspection mode)	—
CALC LOAD	Calculated load by ECM/ Min.: 0 %, Max.: 100 %	• Idling: 10 to 20 % (Inspection mode) • Running without load (1,500 rpm): 10 to 20 %	—
MAF	Air flow rate from MAF meter/ Min.: 0 g/s, Max.: 655 g/s	Idling: 3 to 7 gm/s (1,500 rpm)	If the value is approximately 0.0 g/s: • Mass air flow meter power source circuit open • VG circuit open or short If the value is 160.0 g/s or more: • E2G circuit open
ENGINE SPD	Engine speed/ Min.: 0 rpm, Max.: 16383 rpm	Idling 1,000 rpm (when putting the engine in inspection mode)	—
COOLANT TEMP	Engine coolant temperature/ Min.: -40°C, Max.: 140°C	After warming up: 80 to 100°C (176 to 212°F)	• If the value is -40°C (-40°F): sensor circuit is open • If the value is 140°C (284°F): sensor circuit is shorted
INTAKE AIR	Intake air temperature/ Min.: -40°C, Max.: 140°C	Equivalent to ambient air temperature	• If the value is -40°C (-40°F): sensor circuit is open • If the value is 140°C (284°F): sensor circuit is shorted
THROTTLE POS	Absolute throttle position sensor/ Min.: 0 %, Max.: 100 %	• Throttle fully closed: 10 to 24 % • Throttle fully open: 64 to 96 %	Read the value with intrusive operation (active test)
VEHICLE SPD	Vehicle speed/ Min.: 0 km/h, Max.: 255 km/h	Actual vehicle speed	Speed indicated on speedometer
THROTTLE POS #2	Throttle position sensor No.2 output voltage/ Min.: 0 V, Max.: 5.0 V	• Throttle fully closed: 2.0 to 2.9 V • Throttle fully open: 4.6 to 5.5 V	Read the value with intrusive operation (active test)
THRTL REQ POS	Throttle requirement position/ Min.: 0 V, Max.: 5 V	Idling: 0.5 to 1.0 V (Inspection mode)	—

Hand-Held Tester Display	Measurement Item/Range (Display)	Normal Condition *	Diagnostic Note
THROTL OPN DUTY	Throttle motor opening duty ratio/ Min.: 0 %, Max.: 100 %	During idling: 0 to 40 %	When accelerator pedal is depressed, duty ratio is increased
THROTL CLS DUTY	Throttle motor closed duty ratio/ Min.: 0 %, Max.: 100 %	During idling: 0 to 40 %	When accelerator pedal is released quickly, duty ratio is increased
THROTTLE MOT	Whether or not throttle motor control is permitted/ ON or OFF	Idling: ON (Inspection mode)	Read the value with the power switch ON (Do not start engine)
+BM	Whether or not electric throttle control system power is inputted/ ON or OFF	Idling: ON (inspection mode)	—
ACCEL IDL POS	Whether or not accelerator pedal position sensor is detecting idle/ ON or OFF	Idling: ON (inspection mode)	—
THROTTLE IDL POS	Whether or not throttle position sensor is detecting idle/ ON or OFF	Idling: ON (inspection mode)	—
FAIL #1	Whether or not fail safe function is executed/ ON or OFF	ETCS has failed: ON	—
FAIL #2	Whether or not fail safe function is executed/ ON or OFF	ETCS has failed: ON	—
THRTL LEARN VAL	Throttle valve fully closed (learned value) Min.: 0 V, Max.: 5 V	0.4 to 0.8 V	—
THROTTLE MOT	Throttle motor current Min.: 0 A, Max.: 80 A	Idling: 0 to 3.0 A (Inspection mode)	—
O2S B1 S2	Heated oxygen sensor output voltage for bank 1 sensor 2/ Min.: 0 V, Max.: 1.275 V	Driving 44 mph (70 km/h): 0.1 to 0.9 V	Performing the INJ VOL or A/F CONTROL function of the ACTIVE TEST enables the technician to check voltage output of the sensor
AFS B1 S1	A/F sensor output voltage for bank 1 sensor 1/ Min.: 0 V, Max.: 7.999 V	Idling 2.8 to 3.8 V (Inspection mode)	Performing the INJ VOL or A/F CONTROL function of the ACTIVE TEST enables the technician to check voltage output of the sensor
VAPOR PRESS	Vapor pressure/ Min.: -4.125 kPa, Max.: 2.125 kPa	Fuel tank cap removed: 0 kPa	Pressure inside fuel tank is monitored by the vapor pressure sensor
SHORT FT #1	Short-term fuel trim of bank 1/ Min.: -100 %, Max.: 99.2 %	0 ± 20 %	This item is the short-term fuel compensation used to maintain the air-fuel ratio at stoichiometric air-fuel ratio
LONG FT #1	Long-term fuel trim of bank 1/ Min.: -100 %, Max.: 99.2 %	0 ± 20 %	This item is the overall fuel compensation carried out in long-term to compensate a continual deviation of the short-term fuel trim from the central value
TOTAL FT #1	Total fuel trim of bank 1: Average value for fuel trim system of bank 1/ Min.: -0.5, Max.: 0.496	Idling: -0.2 to 0.2 (Inspection mode)	—
O2FT B1 S2	Short-term fuel trim associated with the bank 1 sensor 2/ Min.: -100 %, Max.: 99.2 %	0 ± 20 %	Same as SHORT FT #1

DIAGNOSTICS – SFI SYSTEM

Hand-Held Tester Display	Measurement Item/Range (Display)	Normal Condition *	Diagnostic Note
AF FT B1 S1	Short-term fuel trim associated with the bank 1 sensor 1/ Min.: 0, Max.: 1.999	<ul style="list-style-type: none"> • Value less than 1 (0.000 to 0.999) = Lean • Stoichiometric air-fuel ratio=1 • Value greater than 1 (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	Idling after warming up: CL (Inspection mode)	<ul style="list-style-type: none"> • OL (Open Loop): Has not yet satisfied conditions to go closed loop • CL (Closed Loop): Using heated oxygen 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 heated oxygen sensor, which is used for fuel control is malfunctioning
FC IDL	Fuel cut idle/ ON or OFF	Fuel cut operation: ON	FC IDL = "ON" when throttle valve fully closed and engine speed is over 2,800 rpm
MIL	MIL status/ ON or OFF	MIL ON: ON	—
ST1	Starter signal/ ON or OFF	Cranking: ON	—
FUEL PUMP / SPD	Fuel pump/speed status/ ON or OFF	Idling: ON (Inspection mode)	—
EVAP VSV	VSV status for EVAP control/ ON or OFF	VSV operating: ON	VSV for EVAP is controlled by the ECM (ground side duty control)
IGNITION	Ignition counter/ Min.: 0, Max.: 800	0 to 800	—
CYL #1, #2, #3, #4	Misfire ratio of the cylinder 1 to 4/ Min.: 0, Max.: 255	0 %	This item is displayed in only idling
MISFIRE LOAD	Engine load for first misfire range/ Min.: 0 g/rev, Max.: 3.98 g/rev	Misfire 0: 0 g/rev	—
MISFIRE RPM	Engine RPM for first misfire range/ Min.: 0 rpm, Max.: 6,375 rpm	Misfire 0: 0 rpm	—
FC TAU	Fuel cut TAU: Fuel cut during very light load/ ON or OFF	Fuel cut operating: ON	The fuel cut is being performed under very light load to prevent the engine combustion from becoming incomplete
CHECK MODE	Check mode/ ON or OFF	Check mode ON: ON	See page 05-45
ENG RUN TIME	Engine run time/ Min.: 0 second, Max.: 65535 seconds	Time after engine start	Service data
MIL ON RUN DIST	MIL ON Run Distance/ Min.: 0 second, Max.: 65535 seconds	Distance after DTC is detected	—
EVAP PURGE VSV	EVAP (Purge) VSV control duty/ Min.: 0 %, Max.: 100 %	0 to 100 % During idling: 1,500 rpm	Order signal from ECM
WU CYC DTC CLEAR	Warm-up cycle after DTC cleared/ Min.: 0, Max.: 255	—	Number of warm-up cycles after DTC is cleared
DIST DTC CLEAR	Distance after DTC cleared/ Min.: 0 km/h, Max.: 65535 km/h	Equivalent to drive distance after DTCs were erased	—

Hand-Held Tester Display	Measurement Item/Range (Display)	Normal Condition *	Diagnostic Note
EVAP VAPOR PRES	EVAP vapor pressure/ Min.: -8192 Pa, Max.: 8191 Pa	Fuel tank cap removed: 0 Pa	—
BATTERY VOLTAGE	Battery voltage/ Min.: 0 V, Max.: 65.535 V	Idling: 9 to 14 V (Inspection mode)	—
AIR-FUEL RATIO	Air-fuel ratio: Min.: 0, Max.: 1.999	During idling: 1,500 rpm 0.8 to 1.2	—
THROTTLE POS	Throttle sensor positioning/ Min.: 0 %, Max.: 100 %	Idling 10 to 18 % (Inspection mode)	Calculated value based on VTA1
AMBIENT TEMP	Ambient air temperature/ Min.: -40°C, Max.: 215°C	Equivalent to ambient air temperature	<ul style="list-style-type: none"> • If the value is -40°C: sensor circuit is open • If the value is 215°C: sensor circuit is shorted
THROTTLE POS #2	Throttle sensor positioning #2/ Min.: 0 %, Max.: 100 %	—	Calculated value based on VTA2
THROTTLE MOT	Throttle motor Min.: 0 %, Max.: 100 %	Idling: 0.5 to 40 % (Inspection mode)	—
MIL ON RUN TIME	Running time from MIL ON/ Min.: 0 minute, Max.: 65535 minutes	Equivalent to running time after MIL was ON	—
TIME DTC CLEAR	Time after DTC cleared/ Min.: 0 minute, Max.: 65535 minutes	Equivalent to time after DTCs were erased	—
KNOCK CRRT VAL	Correction learning value of knocking/ Min.: -64 CA, Max.: 1984 CA	0 to 22 °CA Driving: 44 mph (70 km/h)	Service data
KNOCK FB VAL	Feedback value of knocking/ Min.: -64 CA, Max.: 1984 CA	-22 to 0 °CA Driving: 44 mph (70 km/h)	Service data
PURGE DENSITY	Learning value of purge density/ Min.: -50, Max.: 350	-40 to 0 % Idling (Inspection mode)	Service data
PURGE FLOW	Purge flow/ Min.: 0 %, Max.: 102.4 %	Idling: 0 to 100 %	—
CYLINDER	Cylinder number/ Min.: 0, Max.: 255	—	Identifying the cylinder number
MODEL YEAR	Model year/ Min.: 0, Max.: 255	—	Identifying the model year
THROTTLE POS #1	Throttle position sensor No. 1 output voltage/ Min.: 0 V, Max.: 4.9 V	<ul style="list-style-type: none"> • Throttle fully closed: 0.5 to 1.2 V • Throttle fully opened : 3.2 to 4.8 V 	—
THROTTLE MOT	Throttle motor current/ Min.: 0 A, Max.: 19.92 A	Idling: 0 to 3.0 A	—
THROTTLE SSR #1	Throttle sensor opener position No. 1/ Min.: 0 V, Max.: 4.98 V	0.6 to 0.9 V	ETCS service data
THROTTLE SSR #2	Throttle sensor opener position No. 2/ Min.: 0 V, Max.: 4.98 V	2.2 to 2.6 V	ETCS service data
THRTL COMND VAL	Throttle position command value/ Min.: 0 V, Max.: 4.98 V	0.5 to 4.8 V	ETCS service data
THRTL SSR #1 AD	Throttle sensor opener position No.1 (AD)/ Min.: 0 V, Max.: 4.98 V	0.6 to 0.9 V	ETCS service data

DIAGNOSTICS – SFI SYSTEM

Hand-Held Tester Display	Measurement Item/Range (Display)	Normal Condition *	Diagnostic Note
ACTUATOR POWER	Actuator power supply/ ON or OFF	Idling ON (Inspection mode)	ETCS service data
OPN MALFUNCTION	Open side malfunction/ ON or OFF	—	ETCS service data
SYSGUARD JUDGE	System guard/ ON or OFF	—	ETCS service data
THROTTLE POS #1	Throttle position No. 1/ Min.: 0 V, Max.: 5 V	—	ETCS service data
THROTTLE POS #2	Throttle position No. 2/ Min.: 0 V, Max.: 5 V	—	ETCS service data
THRTL MOT (OPN)	Throttle motor duty ratio (open)/ Min.: 0 %, Max.: 100 %	—	ETCS service data
THRTL MOT (CLS)	Throttle motor duty ratio (close)/ Min.: 0 %, Max.: 100 %	—	ETCS service data
+BM VOLTAGE	+BM voltage/ Min.: 0, Max.: 19.92	Idling: 10 to 15 V	ETCS service data
#CODES	#Codes/ Min.: 0, Max.: 255	—	Number of detected DTCs
VVTL AIM ANGL #1	VVT aim angle (bank 1)/ Min.: 0 %, Max.: 100 %	Idling: 0 %	VVT duty signal value during intrusive operation
VVT CHNG ANGL #1	VVT change angle/ Min.: 0°FR, Max.: 60°FR	Idling: 0 to 5 °FR	Displacement angle during intrusive operation
VVT OCV DUTY B1	VVT OCV operation duty/ Min.: 0 %, Max.: 100 %	Idling: 0 %	Requested duty value for intrusive operation
VVT CTRL B1	VVT control status/ ON or OFF	—	Support for VVT active test
FAN MOTOR	Electric fan motor/ ON or OFF	—	Support for fan motor active test
TANK BYPASS VSV	Tank bypass VSV/ ON or OFF	—	Support for tank bypass VSV active test
CAN CTRL VSV	Canister control VSV/ ON or OFF	—	Support for canister control VSV active test
INI COOL TEMP	Initial engine coolant temperature/ Min.: -40°C, Max.: 140°C	Close to ambient air temperature	Service data
INI INTAKE TEMP	Initial intake air temperature/ Min.: -40°C, Max.: 140°C	Close to ambient air temperature	Service data
INJ VOL	Injection volume (cylinder 1)/ Min.: 0 ml, Max.: 2.048 ml	0 to 0.5 ml	Quantity of fuel injection volume for 10 times
CYL ALL	All cylinders misfire rate/ Min.: 0, Max.: 255	0 to 35	—
MISFIRE MARGIN	Misfire monitoring/ Min.: -100 %, Max.: 99.22 %	-100 to 99.2 %	Misfire detecting margin
REQ ENG TRQ	Requested engine torque/ Min.: 0 kW, Max.: 16383.75 kW	0 to 57 kw	Flag information for hybrid vehicle
HV TRGT ENG SPD	HV target engine speed/ Min.: 0 rpm, Max.: 6375 rpm	0 to 5000 rpm	Flag information for hybrid vehicle
ACT ENGINE TRQ	Actual engine torque/ Min.: -128 Nm, Max.: 127 Nm	-128 to 127 Nm	Flag information for hybrid vehicle
EST ENGINE TRQ	Estimated engine torque/ Min.: 0 Nm, Max.: 510 Nm	0 to 120 Nm	Flag information for hybrid vehicle

Hand-Held Tester Display	Measurement Item/Range (Display)	Normal Condition *	Diagnostic Note
ENGINE RUN TIME	Engine run time/ Min.: 0 second, Max.: 255 seconds	0 to 255 seconds	Flag information for hybrid vehicle
ENGINE RUN TIME	Request engine run time/ Min.: 0 second, Max.: 25.5 seconds	0 to 25.5 seconds	Flag information for hybrid vehicle
IGNITION TIME	Judgment time for ignition of engine/ Min.: 0 second, Max.: 25.5 seconds	0 to 25.5 seconds	Flag information for hybrid vehicle
OUTPUT TIME	Judgment time for engine output/ Min.: 0 second, Max.: 25.5 seconds	0 to 25.5 seconds	Flag information for hybrid vehicle
EST PORT TEMP	Estimated intake port temperature/ Min.: -40°C, Max.: 215°C	80 to 100°C	Flag information for hybrid vehicle
FUEL LEVEL	Fuel level/ 0: EMPTY/1: NOT EMP	—	Flag information for hybrid vehicle
FUEL CUT	Fuel cut for engine stop request/ 0: OFF/1: ON	—	Flag information for hybrid vehicle
INDPNDNT OPR	Engine independently operation/ 0: NOT OPR/1: OPERATE	—	Flag information for hybrid vehicle
TANK WATER TEMP	CHS tank outlet temperature sen- sor output/ Max: 215 °C, Min: -40 °C	—	<ul style="list-style-type: none"> • If the value is -40°C: sensor cir- cuit is open • If the value is 215°C: sensor cir- cuit is shorted
WATER FLW VLV	Water valve position signal/ Max: 4.98 V, Min: 0 V	0.45 to 4.6 V	Voltage varies based on valve position
ISC LEARN VAL	ISC learning value/ Max: 19.92 L/s, Min: 0 L/s	—	Flag information for hybrid vehicle
RACING	Rev-up operation/ 0: NOT OPR/1: OPERATE	—	Flag information for hybrid vehicle
WARM UP	Request warm-up/ 0: NOT REQ/1: REQUEST	—	Flag information for hybrid vehicle
INDPNDNT CNTRL	Engine independently control operation/ 0: NOT OPR/1: OPERATE	—	Flag information for hybrid vehicle
ENG OIL PRES SW	Engine oil pressure switch signal/ 0: OFF / 1: ON	Indicating ON while engine is run- ning	—

*: If no condition is specifically stated for "Idling", it means the transaxle position is in the N or P, the A/C switch is OFF and all accessory switches are OFF.

2. ACTIVE TEST

HINT:

Performing ACTIVE TEST using the hand-held tester or the OBD II scan tool allows the relay, VSV, actuator and so on to operate without parts removal. Performing ACTIVE TEST as a first step of troubleshooting is one method to shorten diagnostic time.

It is possible to display DATA LIST during ACTIVE TEST.

- (a) Warm up the engine.
- (b) Turn the power switch OFF.
- (c) Connect the hand-held tester to the DLC3.
- (d) Turn the power switch ON (IG).
- (e) Turn the hand-held tester ON.
- (f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ENGINE AND ECT / ACTIVE TEST.
- (g) According to the display on the tester, perform items in ACTIVE TEST.

Hand-held Tester Display	Test Details	Diagnostic Note
INJ VOL	[Test Details] Control the injection volume Min.: -12.5 %, Max.: 25 % [Vehicle Condition] Engine speed: 3,000 rpm or less	<ul style="list-style-type: none"> • All injectors are tested at once • Injection volume is gradually changed between -12.5 and 25 %
A/F CONTROL	[Test Details] Control the injection volume -12.5 or 25 % (Change the injection volume -12.5 % or 25 %.) [Vehicle Condition] Engine speed: 3,000 rpm or less	The following A/F CONTROL procedure enables the technician to check and graph the voltage outputs of both the A/F sensor and heated oxygen sensor To display the graph, enter ACTIVE TEST / A/F CONTROL / USER DATA, then select "AFS B1S1 and O2S B1S2" or "AFS B2S1 and O2S B2S2" by pressing "YES" button and followed by "ENTER" button and then pressing "F4" button
CAN CTRL VSV	[Test Details] Activate the VSV for canister control ON or OFF	(See page 05-202)
EVAP VSV (ALONE)	[Test Details] Activate the VSV for EVAP control ON or OFF	(See page 05-202)
FUEL PUMP / SPD	[Test Details] Control the fuel pump ON or OFF	—
VVT CTRL B1	[Test Details] Activate the VVT system (Bank 1) ON or OFF	<ul style="list-style-type: none"> • ON: Rough idle or engine stall • OFF: Normal engine speed (See page 05-63)
TC/TE1	[Test Details] Connect the TC and TE1 ON or OFF	—
FC IDL PROHBT	[Test Details] Control the idle fuel cut prohibit ON or OFF	—
COOLING FAN	[Test Details] Control the electric cooling fan ON or OFF	—
TANK BYPASS VSV	[Test Details] Activate the VSV for tank bypass ON or OFF	(See page 05-202)
ETCS OPEN/CLOSE SLOW	[Test Details] Control the ETCS opening/closing slow speed ON or OFF	Throttle valve intrusive operation

Hand-held Tester Display	Test Details	Diagnostic Note
ETCS OPEN/CLOSE FAST	[Test Details] Control the ETCS opening/closing fast speed ON or OFF	Throttle valve intrusive operation
FUEL CUT #4	[Test Details] Control the cylinder #4 fuel cut ON or OFF	Cylinder No. 4 fuel cut for power balance
FUEL CUT #3	[Test Details] Control the cylinder #3 fuel cut ON or OFF	Cylinder No. 3 fuel cut for power balance
FUEL CUT #2	[Test Details] Control the cylinder #2 fuel cut ON or OFF	Cylinder No. 2 fuel cut for power balance
FUEL CUT #1	[Test Details] Control the cylinder #1 fuel cut ON or OFF	Cylinder No. 1 fuel cut for power balance
VVT B1	[Test Details] Control the VVT (bank 1) Min.: -128 %, Max.: 127 %	—
WATER FLW VLV3	[Test Details] Activate the water valve ON or OFF	Water valve intrusive valve operation (position when engine is in pre-heat mode) (See page 05-284)
WATER FLW VLV4	[Test Details] Activate the water valve ON or OFF	Water valve intrusive valve operation (position when hot coolant recovering) (See page 05-284)
WATER FLW VLV5	[Test Details] Activate the water valve ON or OFF	Water valve intrusive valve operation (position when engine is in normal operation) (See page 05-284)
WATER PUMP	[Test Details] Activate the water pump ON or OFF	Coolant heat storage water pump