

DATA LIST/ACTIVE TEST

1. DATA LIST

NOTICE:

- The DATA LIST values may vary significantly if there are slight differences in measurement, differences in the environment in which the measurements are obtained, or the aging of the vehicle. Thus, definite standards or judgment values are unavailable. Therefore, there may be a malfunction even if a measured value is within the reference range.
- In the event of intricate symptoms, collect sample data from another vehicle of the same model operating under identical conditions, in order to reach an overall judgment by comparing all the items of DATA LIST.

HINT:

Using the DATA LIST displayed on the hand-held tester, you can read values including those of the switches, sensors, actuators, without removing any parts. Reading the DATA LIST as the first step of troubleshooting is one method to shorten diagnostic time.

- Connect the hand-held tester to the DLC3.
- Turn the power switch ON (IG).
- Turn the hand-held tester ON.
- Select the following menu items: DIAGNOSIS / OBD/MOBD / HV ECU / DATA LIST.
- Check the results by referring to the following table.

Hand-held Tester Display	Measurement Item/Range (Display)	Reference Range	Diagnostic Note
COOLANT TEMP	Engine coolant temperature/ Min.: -40°C, Max.: 140°C	After warming up: 80 to 100°C (176 to 212°F)	<ul style="list-style-type: none"> • If the value is -40°C (-40°F): Open in sensor circuit • If the value is 140°C (284°F): Short in sensor circuit
VEHICLE SPD	Vehicle speed/ Min.: 0 km/h, Max.: 255 km/h	Vehicle stopped: 0 km/h (0 mph)	—
ENG RUN TIME	Elapsed time after starting engine Min.: 0 s, Max.: 65,535 s	—	—
+B	Auxiliary battery voltage/ Min.: 0 V, Max.: 65.535 V	Constant: Auxiliary battery voltage ± 3 V	—
ACCEL POS #1	Accelerator pedal position sensor No. 1/ Min.: 0 %, Max.: 100 %	Accelerator pedal depressed: Changes with accelerator pedal pressure	—
ACCEL POS #2	Accelerator pedal position sensor No. 2/ Min.: 0 %, Max.: 100 %	Accelerator pedal depressed: Changes with accelerator pedal pressure	—
AMBIENT TEMP	Ambient air temperature/ Min.: -40°C, Max.: 215°C	Power switch ON (IG): Same as ambient air temperature	—
INTAKE AIR TEMP	Intake air temperature/ Min.: -40°C, Max.: 140°C	Constant: Same as ambient air temperature	—
DTC CLEAR WARM	The number of times engine is warmed up after clearing DTCs/ Min.: 0, Max.: 255	MIL OFF, engine coolant temperature increases from below 22°C (71.6°F) before starting the engine to above 70°C (158°F) after starting the engine: Increases once	—
DTC CLEAR RUN	Drive distance after clearing DTCs/ Min.: 0 km, Max.: 65,535 km	—	—
DTC CLEAR MIN	Elapsed time after clearing DTCs/ Min.: 0 min, Max.: 65,535 min	—	—
MIL ON RUN DIST	Drive distance after malfunction occurrence/ Min.: 0 km, Max.: 65,535 km	—	—

DIAGNOSTICS - HYBRID CONTROL SYSTEM

Hand-held Tester Display	Measurement Item/Range (Display)	Reference Range	Diagnostic Note
MIL ON ENG TIME	Elapsed time after starting engine with MIL ON/ Min.: 0 min, Max.: 65,535 min	—	—
MIL Status	MIL status/ ON or OFF	MIL ON: ON	Constant ON: Repair in accordance with detected DTCs
MG2 REV	MG2 revolution/ Min.: -16,383 rpm, Max.: 16,383 rpm	—	—
MG2 TORQ	MG2 torque/ Min.: -500 Nm, Max.: 500 Nm	—	—
MG2 TRQ EXC VAL	MG2 torque execution value/ Min.: -512 Nm, Max.: 508 Nm	After full-load acceleration with READY lamp ON and engine stopped: Less than $\pm 20\%$ of MG2 TORQ	—
MG1 REV	MG1 revolution/ Min.: -16,383 rpm, Max.: 16,383 rpm	—	—
MG1 TORQ	MG1 torque/ Min.: -500 Nm, Max.: 500 Nm	—	—
MG1 TRQ EXC VAL	MG1 torque execution value/ Min.: -512 Nm, Max.: 508 Nm	1 second has elapsed after the engine was started automatically with READY lamp ON, engine stopped, A/C fan Hi, head lamp ON and the P position: Less than $\pm 20\%$ of MG1 TORQ	—
REGEN EXEC TORQ	Regenerative brake execution torque/ Min.: 0 Nm, Max.: 186 Nm	—	—
REGEN RQST TORQ	Regenerative brake request torque/ Min.: 0 Nm, Max.: 186 Nm	Vehicle speed 30 km/h (19 mph) and master cylinder hydraulic pressure -200 Nm: Changes with brake pedal pressure	—
MG1 INVERT TEMP	MG1 inverter temperature/ Min.: -50°C, Max.: 205°C	<ul style="list-style-type: none"> • Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 80°C (77 to 176°F) 	<ul style="list-style-type: none"> • If the value is -50°C (-58°F): +B short in sensor circuit • If the value is 205°C (401°F): Open or GND short in sensor circuit
MG2 INVERT TEMP	MG2 inverter temperature/ Min.: -50°C, Max.: 205°C	<ul style="list-style-type: none"> • Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 80°C (77 to 176°F) 	<ul style="list-style-type: none"> • If the value is -50°C (-58°F): +B short in sensor circuit • If the value is 205°C (401°F): Open or GND short in sensor circuit
MOTOR2 TEMP	Transaxle fluid temperature/ Min.: -50°C, Max.: 205°C	<ul style="list-style-type: none"> • Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 80°C (77 to 176°F) 	<ul style="list-style-type: none"> • If the value is -50°C (-58°F): Open or +B short in sensor circuit • If the value is 205°C (401°F): GND short in sensor circuit
MOTOR1 TEMP	MG2 motor temperature/ Min.: -50°C, Max.: 205°C	<ul style="list-style-type: none"> • Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 80°C (77 to 176°F) 	<ul style="list-style-type: none"> • If the value is -50°C (-58°F): Open or +B short in sensor circuit • If the value is 205°C (401°F): GND short in sensor circuit

Hand-held Tester Display	Measurement Item/Range (Display)	Reference Range	Diagnostic Note
CONVERTER TEMP	Boost converter temperature/ Min.: -50°C, Max.: 205°C	<ul style="list-style-type: none"> • Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 60°C (77 to 140°F) 	<ul style="list-style-type: none"> • If the value is -50°C (-58°F): +B short in sensor circuit • If the value is 205°C (401°F): Open or GND short in sensor circuit
ACCEL DEG	Accelerator pedal depressed angle/ Min.: 0 %, Max.: 100 %	Accelerator pedal depressed: Changes with accelerator pedal pressure	—
POWER RQST	Engine power output request value/ Min.: 0 W, Max.: 320,000 W	—	—
TARGET ENG SPD	Target engine speed/ Min.: 0 rpm, Max.: 8,000 rpm	—	—
ENGINE SPD	Engine speed/ Min.: 0 rpm, Max.: 8,000 rpm	Idling*: 950 to 1,050 rpm	—
VEHICLE SPD	Resolver vehicle speed/ Min.: -256 km/h, Max.: 254 km/h	Driving at 40 km/h (25 mph): 40 km/h (25 mph)	—
MCYL CTRL POWER	Braking torque that is equivalent to the master cylinder hydraulic pressure/ Min.: -512 Nm, Max.: 508 Nm	Brake pedal depressed: Changes with brake pedal pressure	—
SOC	Battery state of charge/ Min.: 0 %, Max.: 100 %	Constant: 0 to 100 %	—
WOUT CTRL POWER	Discharge control power value/ Min.: 0 W, Max.: 81,600 W	21,000 W or less	—
WIN CTRL POWER	Charge control power value/ Min.: -40,800 W, Max.: 0 W	-25,000 W or more	—
DCHG RQST SOC	Discharge request to adjust SOC/ Min.: -20,480 W, Max.: 20,320 W	<ul style="list-style-type: none"> • Uniform on-board charging: -4,400 W • Usually: 0 W 	—
PWR RESOURCE VB	HV battery voltage/ Min.: 0 V, Max.: 510 V	READY lamp ON and P position: 150 to 300 V	—
PWR RESOURCE IB	HV battery current/ Min.: -256 A, Max.: 254 A	—	—
VL	High voltage before it is boosted/ Min.: 0 V, Max.: 510 V	Power switch ON (READY): Practically the same as the HV battery voltage	<ul style="list-style-type: none"> • If the value is 0 V: Open or GND short in sensor circuit • If the value is 510 V: +B short in sensor circuit
VH	High voltage after it is boosted/ Min.: 0 V, Max.: 765 V	Engine revved up in P position: HV battery voltage to 500 V	<ul style="list-style-type: none"> • If the value is 0 V: Open or GND short in sensor circuit • If the value is 765 V: +B short in sensor circuit
RAIS PRES RATIO	Boost ratio/ Min.: 0 %, Max.: 100 %	The pre-boost voltage and the post-boost voltage are equal: 0 to 10 %	—
DRIVE CONDITION	Drive condition ID/ Min.: 0, Max.: 6	<ul style="list-style-type: none"> • Engine stopped: 0 • Engine about to be stopped: 1 • Engine about to be started: 2 • Engine operated or operating: 3 • Generating or loading movement: 4 • Revving up with P position: 6 	—

DIAGNOSTICS - HYBRID CONTROL SYSTEM

Hand-held Tester Display	Measurement Item/Range (Display)	Reference Range	Diagnostic Note
M SHIFT SENSOR	Output voltage of the shift position sensor (main)/ Min.: 0 V, Max.: 5 V	<ul style="list-style-type: none"> • Selector lever in home position: 2.0 to 3.0 V • Shifting into R position: 4.0 to 4.8 V • Shifting into B or D position: 0.2 to 1.0 V 	—
S SHIFT SENSOR	Output voltage of the shift position sensor (sub)/ Min.: 0 V, Max.: 5 V	<ul style="list-style-type: none"> • Selector lever in home position: 2.0 to 3.0 V • Shifting into R position: 4.0 to 4.8 V • Shifting into B or D position: 0.2 to 1.0 V 	—
SM SHIFT SENSOR	Output voltage of the select position sensor (main)/ Min.: 0 V, Max.: 5 V	<ul style="list-style-type: none"> • Selector lever in home position: 0.5 to 2.0 V • Shifting into R, N or D position: 3.0 to 4.85 V 	—
SS SHIFT SENSOR	Output voltage of the select position sensor (sub)/ Min.: 0 V, Max.: 5 V	<ul style="list-style-type: none"> • Selector lever in home position: 0.5 to 2.0 V • Shifting into R, N or D position: 3.0 to 4.85 V 	—
SHIFT POSITION	Shift position	P, R, N, D or B	—
A/C CONSMPT PWR	A/C consumption power/ Min.: 0 kW, Max.: 5 kW	—	—
DRIVE CONDITION	Driving condition	<ul style="list-style-type: none"> • MG1 load: MG1 • MG2 load: MG2 	—
SHORT WAVE HIGH	Waveform voltage in leak detection circuit in battery ECU/ Min.: 0 V, Max.: 5 V	READY lamp is left ON for 2 minutes, and the pre-boost voltage and the post-boost voltage are equal: 4 V or more	—
ECU TYPE	Type of ECU	HV ECU	—
CURRENT DTC	The number of current DTCs/ Min.: 0, Max.: 255	—	—
HISTORY DTC	The number of history DTCs/ Min.: 0, Max.: 255	—	—
CHECK MODE	Check mode/ ON or OFF	—	—
ENG STOP RQST	Engine stop request/ NO or RQST	Requesting engine stop: RQST	—
IDLING REQUEST	Engine idling request/ NO or RQST	Requesting idle: RQST	—
HV BATT CH RQST	HV battery charging request/ NO or RQST	Requesting HV battery charging: RQST	—
AIRCON REQUEST	Engine starting request from A/C amplifier/ NO or RQST	Requesting engine start from A/C amplifier: RQST	—
ENG WARM UP RQT	Engine warm-up request/ NO or RQST	Requesting engine warm-up: RQST	—
SMR CONT1	Operating condition of system main relay No. 1/ ON or OFF	Power switch ON (READY): OFF	—
SMR CONT2	Operating condition of system main relay No. 2/ ON or OFF	Power switch ON (READY): ON	—
SMR CONT3	Operating condition of system main relay No. 3/ ON or OFF	Power switch ON (READY): ON	—
MG1 GATE	MG1 gate status/ ON or OFF	ON	—
MG2 GATE	MG2 gate status/ ON or OFF	Shutting down motor inverter: ON	—

Hand-held Tester Display	Measurement Item/Range (Display)	Reference Range	Diagnostic Note
CNV GATE	Boost converter gate status/ ON or OFF	Shutting down boost converter: ON	—
A/C GATE	A/C gate status/ ON or OFF	Shutting down A/C inverter: ON	—
SMART KEY	Electronic key ID code check status/ ON or OFF	When electronic key ID code corresponds to ID code registered in ECU: ON	—

*: If no conditions are specifically stated for "Idling", it means the engine for inspection mode, the shift position is in P, the A/C switch is OFF, and accelerator pedal is not depressed.

2. ACTIVE TEST

NOTICE:

Beware that if the connector to the hand-held tester becomes disconnected or a communication error occurs during the ACTIVE TEST, the vehicle could become inoperative (READY lamp OFF).

HINT:

Performing an ACTIVE TEST using the hand-held tester enables components including the relay, VSV, and actuator, to be operated without removing any parts. Performing an ACTIVE TEST as the first step of troubleshooting is one method to shorten diagnostic time.

It is possible to display items in the DATA LIST during the ACTIVE TEST.

- (a) Connect the hand-held tester to the DLC3.
- (b) Turn the power switch ON (IG).
- (c) Turn the hand-held tester ON.
- (d) Select the following menu items: DIAGNOSIS / OBD/MOBD / HV ECU / ACTIVE TEST.
- (e) According to the display on the tester, perform ACTIVE TEST.

Hand-held Tester Display	Purpose	Test Details	Test Condition
INSPECTION MOD1 *1, *2	<ul style="list-style-type: none"> To check its operation while the engine is running To disable traction control while performing a speedometer test or the like 	<ul style="list-style-type: none"> Runs the engine continuously with the P position Cancels the traction control that is effected when the rotational difference between the front and rear wheels is excessive other than the P position 	Power switch ON (IG), HV system normal, not in inspection mode, and other active tests not being executed
INSPECTION MOD2 *1, *2	To disable traction control while performing a speedometer test or the like	Cancels the traction control that is effected when the rotational difference between the front and rear wheels is excessive other than the P position	Power switch ON (IG), HV system normal, not in inspection mode, and other active tests not being executed
INVERTER STOP *1	To determine if there is an internal leak in the inverter or the HV control ECU	Keeps the inverter power transistor actuation signal ON	Power switch ON (IG), P position, HV system normal, inverter actuation not being disabled, shutting down inverter, and other active tests not being executed
CRANKING RQST *1, *3, *4	To crank the engine continuously in order to measure the compression	Allows the engine to continue cranking by activating the generator continuously	Power switch ON (IG), HV system normal, not in cranking mode, and other active tests not being executed

NOTICE:

***1: The hand-held tester displays a communication error and the vehicle's READY lamp turns OFF when the ACTIVE TEST is completed. Therefore, in order to use the tester again, turn the power switch OFF, and restart by turning it ON.**

***2: After turning on INSPECTION MOD1 or MOD2, push the power switch, depressing the brake pedal.**

***3: After turning on CRANKING RQST, push the power switch, depressing the brake pedal. To stop engine cranking, push the power switch again.**

***4: CRANKING RQST may not be activated depending on the condition of the engine or the HV battery.**