DATA LIST / ACTIVE TEST

1. DATA LIST

NOTICE:

- **Some data list values may vary significantly if there are slight differences in the environment in which the vehicle is operating when measurements are obtained. Variations may also occur due to aging of the vehicle. Due to these considerations, it is not always possible to provide definite values to be used for judgment of malfunctions. It is possible that a malfunction may be present even if measured values are within the reference range.**
- **In the event of a problem with 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 in the data list.**

HINT:

Using the intelligent tester to read the data list allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the data list information early in troubleshooting is one way to save diagnostic time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester on.
(c) Select the following menu items: DIAGNOSIS / OBD/MOBD / HV ECU / DATA LIST.
(d) Check the results by referring to the following table.

DATA LIST:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
COOLANT TEMP (Engine coolant temperature)	Engine coolant temperature / Min.: -40°C, Max.: 140°C	After warming up: 80 to 100°C (176 to 212°F)	-
ENGINE REV (Engine revolution)	Min.: 0 rpm, Max.: 16383.75 rpm	Idling: 950 to 1,050 rpm	-
VEHICLE SPD (Vehicle SPD)	Vehicle speed / Min.: 0 km/h, Max.: 255 km/h	Vehicle stopped: 0 km/h (0 mph)	-
ENG RUN TIME (Engine run time)	Elapsed time after starting engine / Min.: 0 s, Max.: 65535 s	-	-
+B (+B)	Auxiliary battery voltage / Min.: 0 V, Max.: 65.535 V	Constant: Auxiliary battery voltage +-3 V	-
ACCEL POS #1 (Accelerator pedal position #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 #2)	Accelerator pedal position sensor No. 2 / Min.: 0%, Max.: 100%	Accelerator pedal depressed: Changes with accelerator pedal pressure	-
AMBIENT TEMP (Ambient Temperature)	Ambient air temperature / Min.: -40°C, Max.: 215°C	Power switch on (IG): Same as ambient air temperature	-
INTAKE AIR TEMP (Intake air temperature)	Intake air temperature / Min.: -40°C, Max.: 140°C	Constant: Same as ambient air temperature	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
DTC CLEAR WARM (DTC Clear Warm Up times)	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 (DTC Clear Run Distance)	Drive distance after clearing DTCs / Min.: 0 km, Max.: 65535 km	-	-
DTC CLEAR MIN (DTC Clear Min)	Elapsed time after clearing DTCs / Min.: 0 min, Max.: 65535 min	-	-
MIL ON RUN DIST (MIL ON RUN Distance)	Travel distance after a malfunction occurs / Min.: 0 km, Max.: 65535 km	-	-
MIL ON ENG TIME (MIL ON Engine Run Time)	Driving time after a malfunction occurs / Min.: 0 km, Max.: 65535 km	-	-
MIL status (MIL status)	MIL status / ON or OFF	MIL ON: ON	Constant ON: Repair in accordance with detected DTCs
MODEL CODE (MODEL CODE)	Model code	-	Identifying model code: AHV40L
ENGINE CODE (ENGINE CODE)	Engine code	-	Identifying engine code: AHV40L
ECU CODE (ECU CODE)	ECU code	-	Identifying ECU code: 33###
DESTINATION (DESTINATION)	Destination	-	Identifying destination: A (America)
Calc Load (Calculate Load)	Calculate load / Min.: 0%, Max.: 100%	• Idling (INSPECTION MODE): 11 to 22% • Driving (2,500 rpm): 12.1 to 18.2%	-
THROTTLE POS (Throttle POS)	Throttle position sensor / Min.: 0%, Max.: 100%	• Throttle valve fully closed: 10 to 24% • Throttle valve fully open: 64 to 96%	-
L-TEMP ST JUDGE (Times of low temperature start-judging)	Time of low temperature start judging / Min.: 0, Max.: 65535	-	-
L-TEMP ST TIME (Low temperature-starting accumulation time)	Low temperature starting accumulation / Min.: 0, Max.: 67107840	-	-
TAR BAT VOL (DC) (Target Battery Voltage (DCDC Converter))	Target auxiliary battery voltage / Min.: 0 V, Max.: 20 V	-	-
DCDC FAN MODE (DCDC Converter cooling fan mode)	Hybrid vehicle converter cooling fan mode / Min.: 0%, Max.: 255%	-	-
INV COOLANT TMP (Inverter Coolant Water Temperature)	Inverter coolant temperature / Min.: -128°C, Max.: 127°C	Cold start → Fully warmed up: Gradually rises	-
MG2 REV (Motor (MG2) Revolution)	Motor revolution / Min.: -16383 rpm, Max.: 16383 rpm	-	-
MG2 TORQ (Motor (MG2) Torq)	Motor torque / Min.: -500 N*m, Max.: 500 N*m	-	-
MG2 TRQ EXC VAL (Motor (MG2) Torque execute value)	MG2 torque execution value / Min.: -512 N*m, Max.: 508 N*m	After full-load acceleration with READY light ON and engine stopped: Within +-20% of MG2 TORQ	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
MG1 REV (Generator (MG1) Revolution)	Generator revolution / Min.: -16383 rpm, Max.: 16383 rpm	-	-
MG1 TORQ (Generator (MG1) Torq)	Generator torque / Min.: -500 N*m, Max.: 500 N*m	-	-
MG1 TRQ EXC VAL (Generator (MG1) Torque execute value)	MG1 torque execution value / Min.: -512 N*m, Max.: 508 N*m	After full-load acceleration with READY light ON and engine stopped: Within +-20% of MG1 TORQ	-
REGEN EXEC TORQ (Regenrative Brake Torq)	Regenerative brake execution torque / Min.: 0 N*m, Max.: 186 N*m	-	-
REGEN RQST TORQ (Request Regenerative Brake Torq)	Regenerative brake request torque / Min.: 0 N*m, Max.: 186 N*m	Vehicle speed 30 km/h (19 mph) and master cylinder hydraulic pressure -200 N*m: Changes with brake pedal pressure	-
MG1 INVERT TEMP (Inverter temperature-(MG1))	Generator inverter temperature / Min.: -50°C, Max.: 205°C	• Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 80°C (77 to 176°F)	• 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 (Inverter temperature-(MG2))	Motor inverter temperature / Min.: -50°C, Max.: 205°C	• Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 80°C (77 to 176°F)	• 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 (Motor Temperature No2)	Motor temperature / Min.: -50°C, Max.: 205°C	• Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 90°C (77 to 194°F)	• 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
MOTOR1 TEMP (Motor temperature No1)	Generator temperature / Min.: -50°C, Max.: 205°C	• Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 100°C (77 to 212°F)	• 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
CONVERTER TEMP (Converter Temperature)	Boost converter temperature / Min.: -50°C, Max.: 205°C	• Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 60°C (77 to 140°F)	• 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 (the difference degree of an accelerator)	Accelerator pedal depressed angle / Min.: 0%, Max.: 100%	Accelerator pedal depressed: Changes with accelerator pedal pressure	-
POWER RQST (Request Power)	Request engine power / Min.: 0 W, Max.: 320000 W	-	-
TARGET ENG SPD (Target Engine Revolution)	Target engine speed / Min.: 0 rpm, Max.: 8000 rpm	-	-
ENGINE SPD (Engine SPD)	Engine speed / Min.: 0 rpm, Max.: 8000 rpm	Idling: 950 to 1,050 rpm	-
VEHICLE SPD (RSLVR) (Vehicle SPD (Resolver))	Resolver / Min.: -256 km/h, Max.: 254 km/h	Same as vehicle speed	-
MCYL CTRL POWOR (Master Cylinder Control Torq)	Braking torque that is equivalent to master cylinder hydraulic pressure / Min.: -2040 N*m, Max.: 0 N*m	Brake pedal depressed: Changes with brake pedal pressure	-
SOC (State Of Charge)	Battery state of charge / Min.: 0%, Max.: 100%	Constant: 0 to 100%	-
WOUT CTRL POWER (Wout Control Power)	Discharge control power value / Min.: 0 W, Max.: 81600 W	26,000 W or less	-
WIN CTRL POWER (Win Control Power)	Charge control power value / Min.: -40800 W, Max.: 0 W	-25,000 W or more	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
PWR RESOURCE VB (Power Resource VB)	HV battery voltage / Min.: 0 V, Max.: 510 V	READY light ON: 200 to 340 V	-
PWR RESOURCE IB (Power Resource IB)	HV battery current / Min.: -256 A, Max.: 254 A	-	-
VL (VL-Voltage before boosting)	High voltage before boosting / Min.: 0 V, Max.: 510 V	READY ON: Practically the same as the HV battery voltage	• 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 (VH-Voltage past boosting)	High voltage past boosting / Min.: 0 V, Max.: 765 V	Engine revving up in P position: HV battery voltage to 650 V	• If the value is 0 V: Open or GND short in sensor circuit • If the value is 765 V: +B short in sensor circuit
BOOST RATIO (Boosting ratio)	Boost ratio / Min.: 0%, Max.: 100%	The pre-boost and the post boost voltages are equal: 0 to 10%	-
DRIVE CONDITION ID (Drive Condition ID)	Drive condition ID / Min.: 0, Max.: 6	• 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 in P position: 6	-
SHIFT POSITION (Shift sensor shift position)	Shift lever position	P, R, N, D or B	-
CRANK POS (Crank position)	Crankshaft position / Min.: -90 deg, Max.: 90 deg	-	-
A/C CONSMPT PWR (Aircon consumption power)	A/C consumption power / Min.: 0 kW, Max.: 5 kW	-	-
Load Condition (Loading Condition)	Driving condition	• Generator load: MG1 • Motor load: MG2	-
DRIVING PATTEN 1 (Driving pattern 1)	Driving pattern / Min.: 0, Max.: 3	0: Driving at a low speed 1: Driving at a medium speed 2: Driving at a medium-high speed 3: Driving at a high speed	-
DRIVING PATTEN 2 (Driving pattern 2)	Driving pattern / Min.: 0, Max.: 3	0: Driving at a low speed 1: Driving at a medium speed 2: Driving at a medium-high speed 3: Driving at a high speed	-
DRIVING PATTEN 3 (Driving pattern 3)	Driving pattern / Min.: 0, Max.: 3	0: Driving at a low speed 1: Driving at a medium speed 2: Driving at a medium-high speed 3: Driving at a high speed	-
SHORT WAVE HIGH (Short circuit wave highest value)	Waveform voltage in leak detection circuit in battery ECU / Min.: 0 V, Max.: 5 V	Left for 2 minutes in READY-on state, and pre-boost and post boost voltages are equal: 4 V or more	-
MG1 CTRL MODE (MG1 control model)	MG1 control mode	-	-
MG1 CARRIR FREQ (MG1 carrier frequency)	MG1 carrier frequency / 10 kHz / 5 kHz / 2.5 kHz / 1.25 kHz	-	-
MG2 CTRL MODE (MG2 control mode)	MG2 control mode	-	-
MG2 CARRIR FREQ (MG2 carrier frequency)	MG2 carrier frequency / 5 kHz / 2.5 kHz / 1.25 kHz	-	-
ECU TYPE (Type of ECU)	ECU TYPE	-	Identifying ECU type: HV ECU

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
CURRENT DTC (The number of current code)	The number of current DTCs/ Min.: 0, Max.: 255	-	-
HISTORY DTC (The number of history DTC)	The number of history DTCs/ Min.: 0, Max.: 255	-	-
CHECK MODE (Check mode)	Check mode: ON or OFF	ON: Check mode ON	-
ENG STOP RQST (Engine Stop Request)	Engine stop request / NO or RQST	Requesting engine stop: RQST	-
IDLING REQUEST (Engine Idling Request)	Engine idling request / NO or RQST	Requesting idle: RQST	-
HV BATT CH RQST (Main Battery Charging Request)	HV battery charging request / NO or RQST	Requesting HV battery charging: RQST	-
SHIFT SW P (Shift Sensor SW-P)	Park / Neutral position switch / ON or OFF	P position: ON Except P position: OFF	-
SHIFT SW R (Shift Sensor SW-R)	Park / Neutral position switch / ON or OFF	R position: ON Except R position: OFF	-
SHIFT SW N (Shift Sensor SW-N)	Park / Neutral position switch / ON or OFF	N position: ON Except N position: OFF	-
SHIFT SW D (Shift Sensor SW-D)	Park / Neutral position switch / ON or OFF	D position: ON Except D position: OFF	-
SHIFT SW B (Shift Sensor SW-B)	Park / Neutral position switch / ON or OFF	B position: ON Except B position: OFF	-
SHIFT SW FD (Shift Sensor SW-FD)	Park / Neutral position switch / ON or OFF	D or B position: ON Except D or B position: OFF	-
SHIFT SW RV (Shift Sensor SW-RV)	Park / Neutral position switch / ON or OFF	R position: ON Except R position: OFF	-
SHIFT SW MJ (Shift Sensor SW-MJ)	Park / Neutral position switch / ON or OFF	P, R, N, D or B position: ON	-
AIRCON REQUEST (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 Warming up request)	Engine warm-up request / NO or RQST	Requesting engine warm-up: RQST	-
SMRP (System Precharge Relay Status-SMRP)	Operating condition of system precharge relay SMRP / ON or OFF	READY ON: OFF	-
SMRB (System Main Relay Status-SMRB)	Operating condition of system main relay SMRB / ON or OFF	READY ON: ON	-
SMRG (System Main Relay Status-SMRG)	Operating condition of system main relay SMRG / ON or OFF	READY ON: ON	-
MG1 GATE (MG1 gate status)	MG1 gate status / ON or OFF	Shutting down generator inverter: ON	-
MG2 GATE (MG2 gate status)	MG2 gate status / ON or OFF	Shutting down motor inverter: ON	-
CNV GATE (Converter gate status)	Boost converter gate status / ON or OFF	Shutting down boost converter: ON	-
A/C GATE (Aircon gate status)	A/C gate status / ON or OFF	While A/C inverter is being shut off: ON	-
CNV CARIER FREQ (Converter carrier frequency)	Converter signal carrier frequency / 5kHz/10kHz	5kHz/10kHz	-
COMP MON (Comprehensive Component Monitor)	Converter monitor / NOT AVL or AVAIL	-	-
CCM ENA (Comprehensive Component Monitor ENA)	Converter monitor enable / UNABLE or ENABLE	-	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
CCM CMPL (Comprehensive Component Monitor CMPL)	Component monitor complete / COMPL or INCMPL	-	-
BATTERY SOC (Battery State of Charge)	Battery state of charge / Min.: 0%, Max.: 127.5%	-	-
DELTA SOC (Delta SOC)	Difference between maximum and minimum values of SOC / Min.: 0%, Max.: 100%	READY light ON, engine stopped and no electrical load: 0 to 60%	-
IB BATTERY (Current value of Battery Pack)	Current value of battery pack/ Min.: - 327.68 A, Max.: 327.67 A	-	-
BATT INSIDE AIR (Inhalation-of-air temperature into a battery pack)	Battery cooling fan intake air temperature / Min.: -327.68°C, Max.: 327.67°C	-	-
VMF FAN VOLT 1 (VMF fan motor voltage 1)	Battery blower motor monitoring voltage / Min.: -25.6 V, Max.: 25.4 V	Fan mode 1 with READY light ON and P position: 0.9 to 1.1 V	-
AUX. BAT V (Auxiliary battery voltage)	Auxiliary battery voltage / Min.: -25.6 V, Max.: 25.4 V	Equivalent to auxiliary battery voltage	-
WIN (Charge control value)	Charge control wattage / Min.: -64 kW, Max.: 63.5 kW	-25 kW or more	-
WOUT (Discharge control value)	Discharge control wattage / Min.: 0 kW, Max.: 63.5 kW	26 kW or less	-
COOLING FAN1 (COOLING FANMODE1)	Battery blower motor actuation mode / Min.: 0, Max.: 40	Stopped: 0 Low to high speed actuation: 1 to 40	-
ECU CTRL MODE (ECU Control mode)	ECU control mode / Min.: 0, Max.: 4	-	-
SBLW RQST (Cooling fan stop control request (Standby Blower))	Battery blower motor stop control request (standby blower) / ON or OFF	While blower motor stop control is requested: ON	-
BATT TEMP 1 to 4 (Temperature of battery TB 1 to 4)	Temperature of HV battery / Min.: -327.68°C, Max.: 327.67°C	Undisturbed for 1 day: Same as ambient air temperature	-
NUM OF BATT (The number of Battery Block)	The number of battery blocks / Min.: 0, Max.: 255	Always: 17	-
BAT BLOCK MIN V (Battery Block Minimum Voltage)	Battery block minimum voltage / Min.: -327.68 V, Max.: 327.67 V	SOC 50 to 60%: 12 V or more	-
MIN BAT BLOCK # (Minimum Battery Block No)	Battery block number with minimum voltage / Min.: 1, Max.: 255	One of numbers 1 to 17	-
BAT BLOCK MAX V (Battery Block Max Voltage)	Battery block maximum voltage / Min.: -327.68 V, Max.: 327.67 V	SOC 55 to 60%: 18 V or less	-
MAX BAT BLOCK # (Max Battery Block No)	Battery block number with maximum voltage / Min.: 1, Max.: 255	One of numbers 1 to 17	-
V1 to V17 BATT BLOCK (Battery Block Voltage V01 to 17)	Battery block voltage / Min.: -327.68 V, Max.: 327.67 V	SOC 60% : 12 to 20 V	-
1 to 17 INTNL RESIST (Internal resistance R01 to 17)	Internal resistance of each battery block / Min.: 0 Ω, Max.: 0.255 Ω	Always: 0.01 to 0.1	-
BLOW TIME (Accumulated time of Battery LOW)	Battery low time / Min.: 0, Max.: 65535	-	-
DCIH TIME (Accumulated time of DC Inhibit)	DC inhibit time / Min.: 0, Max.: 65535	-	-
BHI TIME (Accumulated time of Battery too High)	Battery too high time / Min.: 0, Max.: 65535	-	-
HTMP TIME (Accumulated time of Hot Temperature)	Hot temperature time / Min.: 0, Max.: 65535	-	-

2. ACTIVE TEST

HINT:

Using the intelligent tester to perform active tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing active tests early in troubleshooting is one way to save diagnostic time. Data list information can be displayed while performing active tests.

NOTICE:

It is necessary to use caution, because if the intelligent tester DLC3 connector becomes disconnected or if a communication error occurs during an active test, the vehicle could become inoperative (the READY light may go off).

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester on.

(c) On the system selection screen, enter the following menus: DIAGNOSIS / OBD/MOBD / HV ECU / ACTIVE TEST.

(d) According to the display on the tester, perform the appropriate active test.

ACTIVE TEST:

Tester Display	Test Part	Control Range	Test Details	Test Condition
INSPECTION MOD 1 (Inspection mode-2WD inspection)	• To check engine running operation • To release traction control while using a speedometer tester	ON or OFF	• Runs the engine continuously with the shift lever in the P position • Releases traction control that is initiated when the rotational difference between the front and rear wheels is excessive with the shift lever in any position other than P	Power switch on (IG), HV system normal, not in maintenance mode, and other active tests not being done
INSPECTION MOD 2 (Inspection mode-2WD chassis-dynamo)	To release traction control while using a speedometer tester	ON or OFF	Releases traction control that is initiated when the rotational difference between the front and rear wheels is excessive with the shift lever in any position other than P	Power switch on (IG), HV system normal, not in maintenance mode, and other active tests not being done
COMPRESS TEST (Compression Test) *1	To crank the engine continuously in order to measure the compression	ON or OFF	Allows the engine to continue cranking by activating the MG1 continuously	Power switch on (IG), HV system normal, not in cranking mode, and other active tests not being done
WATER PUMP (Activate the Water Pump)	To activate the HV water pump continuously	ON or OFF	Activates the HV water pump continuously	Power switch on (IG), HV system normal, not in maintenance mode, and other active tests not being done
COOLING FAN SPD (Driving the battery cooling fan)	To check operation of the cooling fan and if there is sufficient air flow	0 to 6	Stops the cooling fan or changes air volume mode (1 to 6)	-

Tester Display	Test Part	Control Range	Test Details	Test Condition
TC/TE1 (Connect the TC and TE1)	Batch display of warnings on combination meter	ON or OFF	TC terminal can be switched ON/OFF	Power switch on (IG), system is normal
BATTERY CHECK (Discharging battery to check weak battery cells)	-	ON or OFF	-	-

NOTICE:
For items marked with *1 in the chart, the intelligent tester will display a communication error and the vehicle's READY light will turn off when the active test is completed. If the tester will be used on the vehicle again, turn the power switch off and then on (READY) again to restart the tester.