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Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: M20A-FXS (ENGINE CONTROL): SFI SYSTEM: DATA LIST / ACTIVE TEST; 2023 - 2024 MY Prius Prius Prime [03/2023 -]		

DATA LIST / ACTIVE TEST

DATA LIST

HINT:

Using the GTS 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.

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) Put the engine in Inspection Mode (Maintenance Mode).

Powertrain > Hybrid Control > Utility

TESTER DISPLAY
Inspection Mode

(b) Start the engine.

(c) Warm up the engine.

(d) Turn the A/C switch off.

(e) Turn the ignition switch off.

(f) Enter the following menus: Powertrain / Engine / Data List.

HINT:

- To display the list box, press the pull down menu button next to Primary. Then select a measurement group.
- When you select a measurement group, the ECU data belonging to that group is displayed.
- Measurement Group List / Description
    - All Data / All data
    - Primary / -
    - Engine Control / Engine control system related data
    - Gas General / -
    - Gas AF Control / Air fuel ratio control system related data
    - Gas AF Control (D4) / Air fuel ratio control system related data (D4)
    - Gas AF O2 Sensor / Air fuel ratio sensors related data
    - Gas Throttle / Gasoline throttle system related data
    - Gas Intake Control / Intake control system related data
    - Gas Valve Control / Valve control system related data
    - Gas Misfire / "Misfire" related data
    - Gas Starting / "Difficult to start" related data
    - Gas Rough Idle / "Rough idle" related data
    - Gas Evaporative / Evaporative system related data
    - Gas CAT Converter / Catalyst converter related data
    - Flexible Fuel Vehicle / Flexible fuel vehicle related data
    - Check Mode / Check mode related data
    - Monitor Status / Monitor status related data
    - Ignition / Ignition system related data

- Charging Control / Charging control system related data
- Compression / Data used during "Check the Cylinder Compression" Active Test
- AT / Automatic transmission system related data
- Vehicle Information / Vehicle information
- Catalytic Converter / Catalyst converter related data
- AF/O2 Sensor Operation (Banked) / Air fuel ratio control system related data
- AF/O2 Sensor Operation (Inline) / Air fuel ratio control system related data

(g) Read the Data List according to the display on the GTS.

HINT:

The title used for each group of Data List items in this repair manual does not appear on the GTS. However, the name in parentheses after the title, which is a Measurement Group, does appear on the GTS. When the name shown in parentheses is selected on the GTS, all of the Data List items listed for that group will be displayed.

Various Vehicle Conditions 1 (All Data)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Total Distance Traveled	Total distance traveled	Min.: 0, Max.: 1677715	-	-
Total Distance Traveled - Unit	Total Distance Traveled unit	km or mile	-	-
Vehicle Speed	Vehicle speed	Min.: 0 km/h (0 mph), Max.: 255 km/h (158 mph)	Actual vehicle speed	This is the current vehicle speed.
Engine Speed	Engine speed	Min.: 0 rpm, Max.: 16383 rpm	950 to 1050 rpm: Idling (P selected, engine warmed up, inspection mode [maintenance mode] and not charge control)	When the crankshaft position sensor is malfunctioning, "Engine Speed" is approximately 0 rpm or varies greatly from the actual engine speed.
Calculate Load	Load calculated by ECM	Min.: 0%, Max.: 100%	• 10 to 30%: Idling (P selected, engine warmed up, inspection mode [maintenance mode] and not charge control) • 10 to 30%: 2500 rpm (P selected, engine warmed up	• This is the engine load calculated based on the actual intake manifold pressure. • Calculate Load = Actual intake manifold pressure / maximum intake manifold pressure x 100 (%) (For example, when the actual intake manifold

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
			and inspection mode [maintenance mode])	pressure is the same as atmospheric pressure, Calculate Load is 100%.)
Vehicle Load	Vehicle load	Min.: 0%, Max.: 25700%	Actual vehicle load	• This is the engine intake air charging efficiency. • Vehicle Load = Current intake airflow (g/rev.) / maximum intake airflow x 100 (%) Maximum intake airflow = Displacement (L) / 2 x 1.2 (g/rev.) **HINT:** Due to individual engine differences, intake air temperature, etc., the value may exceed 100%. Intake airflow (g/rev.) = Intake airflow (gm/sec) x 60 / Engine speed (rpm) (Intake airflow [gm/sec] is value of Mass Air Flow Sensor)
Mass Air Flow Sensor	Airflow rate from mass air flow meter sub-assembly	Min.: 0 gm/sec, Max.: 655.35 gm/sec	• 2.6 to 8.6 gm/sec: Idling (shift lever in N, engine warmed up, inspection mode [maintenance mode] and not charge control) • 5.5 to 18.6 gm/sec: 2500 rpm (P selected, engine warmed up and inspection mode [maintenance mode])	This is the intake air amount measured by the mass air flow meter sub-assembly.
Atmospheric Pressure	Atmospheric pressure	Min.: 0 kPa (0 psi), Max.: 255 kPa (36.98 psi)	Equivalent to atmospheric pressure	• This value is calculated based on the atmospheric pressure sensor. • Standard atmospheric pressure: 101 kPa(abs) [15 psi(abs)]

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
				• For every 100 m (328 ft.) increase in altitude, pressure drops by 1 kPa (0.1 psi). This varies depending on the weather.
Intake Manifold Absolute Pressure	Intake manifold absolute pressure	Min.: 0 kPa (0 psi), Max.: 2047.96 kPa (296.95 psi)	• 80 to 110 kPa (11.6 to 15.95 psi): Ignition switch ON • 20 to 40 kPa (2.9 to 5.8 psi): Idling (engine warmed up, inspection mode [maintenance mode] and not charge control)	• This is the intake manifold pressure. • This item is the pressure detected by the manifold absolute pressure sensor and is used for air fuel ratio control and EGR valve control. **HINT:** When the ignition switch is ON, the manifold absolute pressure and atmospheric pressure are approximately the same (standard atmospheric pressure = 101 kPa(abs) [15 psi(abs)]).
Intake Manifold Absolute Pressure Supported	Status of Intake Manifold Absolute Pressure	Unsupp or Supp	Supp	-
Engine Oil Temperature Sensor	Engine oil temperature	Min.: -40°C (-40°F), Max.: 215°C (419°F)	80 to 110°C (176 to 230°F): After warming up	This is the engine oil temperature. **HINT:** • After warming up the engine, the engine oil temperature will be 80 to 110°C (176 to 230°F). • After a long soak, the engine oil temperature, intake air temperature and ambient air temperature will be approximately equal. • If the value is -40°C (-40°F), or higher than 156°C (312.8°F), the sensor circuit is open or shorted.
Coolant Temperature	Engine coolant temperature	Min.: -40°C (-40°F), Max.:	75 to 100°C (167 to 212°F): After warming up	This is the engine coolant temperature. **HINT:**

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
		140°C (284°F)		• After warming up the engine, the engine coolant temperature will be 75 to 100°C (167 to 212°F). • After a long soak, the engine coolant temperature, intake air temperature and ambient air temperature will be approximately equal. • If the value is -40°C (-40°F), or higher than 135°C (275°F), the sensor circuit is open or shorted. • Check if the engine overheats if the value indicated is higher than 135°C (275°F).
Intake Air Temperature	Intake air temperature	Min.: -40°C (-40°F), Max.: 140°C (284°F)	Equivalent to temperature at location of mass air flow meter sub-assembly	This is the engine intake air temperature. **HINT:** • After a long soak, the engine coolant temperature, intake air temperature and ambient air temperature will be approximately equal. • If the value is -40°C (-40°F), or higher than 123°C (253°F), the sensor circuit is open or shorted.
Ambient Temperature	Ambient temperature	Min.: -40°C (-40°F), Max.: 215°C (419°F)	Equivalent to ambient temperature	This is the ambient temperature. **HINT:** After a long soak, the engine coolant temperature, intake air temperature and ambient air temperature will be approximately equal.
Engine Run Time	Engine run time	Min.: 0 sec, Max.: 65535 sec	Time after engine start	• This is the time elapsed since the engine is first started with the ignition switch ON (READY). • With the ignition switch ON (READY), time measurement will not stop even after the engine stops.
Radiator Coolant Temperature	Radiator coolant temperature	Min.: -40°C (-40°F), Max.:	-	This is the radiator coolant temperature. **HINT:**

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
		215°C (419°F)		If the vehicle has been left as is for a long time after the ignition switch was turned off, coolant temperature, intake air temperature, ambient temperature and radiator coolant temperature will be almost the same.
IG-ON Coolant Temperature	Engine coolant temperature when the ignition switch is turned to ON	Min.: -40°C (-40°F), Max.: 119.3°C (246.7°F)	-	This is the engine coolant temperature stored when the ignition switch is turned to ON.
Initial Engine Coolant Temperature	Engine coolant temperature when the engine is started	Min.: -40°C (-40°F), Max.: 119.3°C (246.7°F)	-	This is the engine coolant temperature stored when the ignition switch is turned to ON (READY).
IG-ON Intake Air Temperature	Intake air temperature when the ignition switch is turned to ON	Min.: -40°C (-40°F), Max.: 119.3°C (246.7°F)	-	This is the intake air temperature stored when the ignition switch is turned to ON.
Initial Engine Intake Air Temperature	Intake air temperature when the engine is started	Min.: -40°C (-40°F), Max.: 119.3°C (246.7°F)	-	This is the intake air temperature stored when the ignition switch is turned to ON (READY).
Battery Voltage	Auxiliary battery voltage	Min.: 0 V, Max.: 65.5 V	11 to 14 V: Ignition switch ON.	If 11 V or less, characteristics of some electrical components may change.
BATT Voltage	Auxiliary battery voltage	Min.: 0 V, Max.: 79.998 V	11 to 14 V: Ignition switch ON.	If 11 V or less, characteristics of some electrical components may change.
IG2 / IGP	Status of IGP terminal	ON or OFF	ON: Ignition switch ON	-
IGR	Status of IGR terminal	ON or OFF	ON: Ignition switch ON	-

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Engine Oil Pressure	Engine oil pressure	Min.: 0 kPa, Max.: 5119.921 kPa	• 80 kPa(gauge) or higher: 1500 rpm (engine oil temperature is 75 to 85°C [167 to 185°F]) • 80 kPa(gauge) or higher: 2500 rpm (engine oil temperature is 75 to 85°C [167 to 185°F])	• This is the engine oil pressure. • During idling to low engine speed, the oil pressure control valve assembly is turned on to reduce oil pressure. At engine speeds other than low engine speeds, the oil pressure control valve assembly is turned off to drastically raise the oil pressure.
Engine Oil Pressure Control Valve	Oil pressure control valve assembly operation current	Min.: 0 mA, Max.: 4999.92 mA	Approximately 100 mA: Ignition switch ON	The oil pressure control valve drive current is displayed. When the system is operating normally, a low value is displayed when the oil pressure is to be high, and a high value is displayed when the oil pressure is to be low.
Intake Camshaft Position Sensor Voltage	Camshaft position sensor (for intake camshaft) voltage	Min.: 0 V, Max.: 4.999 V	-	-
Intake Camshaft Position Sensor Speed Bank 1	Intake camshaft speed	Min.: 0 rpm, Max.: 65535 rpm	-	This item is displayed only for PHEV Model.
Exhaust Camshaft Position Sensor Voltage	Camshaft position sensor (for exhaust camshaft) voltage	Min.: 0 V, Max.: 4.999 V	-	-
Exhaust Camshaft Position Sensor Speed Bank 1	Exhaust camshaft speed	Min.: 0 rpm, Max.: 65535 rpm	-	This item is displayed only for PHEV Model.

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Crankshaft Position Sensor Voltage	Crankshaft position sensor voltage	Min.: 0 V, Max.: 4.999 V	-	-

Various Vehicle Conditions 2 (Freeze Frame Data)

Powertrain > Engine

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Target Engine Oil Pressure	Target engine oil pressure	Min.: 0 kPa, Max.: 5119.9 kPa	-	This item is displayed in Freeze Frame Data only.

Throttle Control (All Data)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Throttle Position Sensor No.1 Voltage %	Absolute No. 1 throttle position sensor	Min.: 0%, Max.: 100%	10 to 22%: Accelerator pedal fully released	The No. 1 throttle position sensor output is converted using 5 V = 100%. **HINT:** If there are no throttle position sensor DTCs stored, it is possible to conclude that the throttle position sensor system is normal.
Throttle Position Sensor No.2 Voltage %	Absolute No. 2 throttle position sensor	Min.: 0%, Max.: 100%	42 to 62%: Accelerator pedal fully released	The No. 2 throttle position sensor output is converted using 5 V = 100%.
System Guard	System guard	ON or OFF	ON: Idling or throttle actuator operating	• When there is a difference between the target and actual throttle valve opening angles, this item changes to OFF and the electronic throttle control system operation is disabled. • OFF: Electronic throttle control is stopped.

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Open Side Malfunction	Open malfunction	ON or OFF	OFF	This item indicates a malfunction in the electronic throttle when the throttle valve is open.
Throttle Request Position	Required throttle position	Min.: 0 V, Max.: 4.98 V	0.6 to 1.1 V: Idling (A/C off and inspection mode [maintenance mode])	The value of this item is calculated by the ECM and shows the voltage for the target throttle valve position.
Throttle Sensor Position	Throttle sensor position	Min.: 0%, Max.: 100%	-	-
Throttle Position Sensor No.1 Voltage	No. 1 throttle position sensor output voltage	Min.: 0 V, Max.: 4.98 V	• 0.6 to 1.1 V: Ignition switch ON, accelerator pedal fully released • 0.6 to 1.4 V: Fail-safe operating	This is the No. 1 throttle position sensor output voltage.
Throttle Position Sensor No.2 Voltage	No. 2 throttle position sensor output voltage	Min.: 0 V, Max.: 4.98 V	• 2.1 to 3.1 V: Ignition switch ON, accelerator pedal fully released • 2.1 to 3.1 V: Fail-safe operating	This is the No. 2 throttle position sensor output voltage.
Throttle Position Command	Throttle position command value	Min.: 0 V, Max.: 4.98 V	0.6 to 1.1 V: Idling (A/C off, P selected, engine warmed up, inspection mode [maintenance mode] and not charge control)	The value displayed for this item is the same as Throttle Request Position.
Throttle Position Sensor Open Position No.1	No. 1 throttle position sensor	Min.: 0 V, Max.: 4.98 V	0.6 to 1.4 V	This is the No. 1 throttle position sensor output voltage when there is no current supplied to the electronic throttle actuator. If the accelerator pedal is released, the throttle valve is kept open by the throttle valve opener when the ignition switch is ON.

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Throttle Position Sensor Open Position No.2	No. 2 throttle position sensor	Min.: 0 V, Max.: 4.98 V	1.7 to 2.5 V	This is the No. 2 throttle position sensor output voltage when there is no current supplied to the electronic throttle actuator. If the accelerator pedal is released, the throttle valve is kept open by the throttle valve opener when the ignition switch is ON.
Throttle Motor Current	Throttle actuator current	Min.: 0 A, Max.: 19.9 A	0 to 3.0 A: Idling (A/C off, P selected, engine warmed up, inspection mode [maintenance mode] and not charge control)	When the value of this item is large but the actual opening angle (Throttle Position Sensor No.1 Voltage) does not reach the target opening angle (Throttle Request Position), there is an "unable to open" malfunction.
Throttle Motor Duty Ratio	Throttle actuator	Min.: 0%, Max.: 100%	5 to 30: Idling (A/C off, P selected, engine warmed up, inspection mode [maintenance mode] and not charge control)	This is the output duty ratio of the throttle actuator drive circuit.
Throttle Motor Duty Ratio (Open)	Throttle actuator duty ratio (open)	Min.: 0%, Max.: 255%	0 to 40%: Idling (A/C off, P selected, engine warmed up, inspection mode [maintenance mode] and not charge control)	This is the duty ratio used to drive the throttle actuator and open the throttle valve. It is an ECM command signal.
Throttle Motor Duty Ratio (Close)	Throttle actuator duty ratio (close)	Min.: 0%, Max.: 255%	0 to 40%: Idling with warmed up engine (A/C off and inspection mode [maintenance mode])	This is the duty ratio used to drive the throttle actuator and close the throttle valve. It is an ECM command signal. **HINT:** During idle, the throttle valve opening angle is usually controlled using a duty ratio drive signal which closes the throttle valve. However, if carbon deposits have built up, it may be necessary to open the throttle valve more than the throttle valve opener does. In that case, the opening angle is controlled using the "Throttle Motor Duty Ratio (Open)" signal.
Throttle Position Sensor Fully Closed Learn Value	Throttle valve fully closed position (learned value)	Min.: 0 V, Max.: 4.98 V	0.4 to 1.0 V: Ignition switch ON, accelerator pedal fully released	• The ECM uses this learned value to determine the fully closed (and fully open) position of the throttle valve. The ECM calculates the

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
				learned value based on the position of the throttle valve when the accelerator pedal is released and the throttle valve motor is not operating. • Learning is performed immediately after the ignition switch is turned to ON.
+BM Voltage	+BM voltage	Min.: 0 V, Max.: 79.998 V	11 to 14 V: Ignition switch ON	This is the power supply for the electronic throttle actuator. When the power supply is interrupted for approximately 1 second, DTC P065714 (open or short circuit) and P06579E (ECU malfunction) are stored and the electronic throttle control system enters fail-safe mode (normal operation is not restored until the ignition switch is turned off).
Actuator Power Supply	Actuator power supply	ON or OFF	ON: Idling or throttle actuator operating	-
Throttle Air Flow Learn Value (Area 1)	Throttle air flow learning value of area 1	Min.: 0, Max.: 1.99	-	-
Throttle Air Flow Learn Value (Area 2)	Throttle air flow learning value of area 2	Min.: 0, Max.: 1.99	-	-
Throttle Air Flow Learn Value (Area 3)	Throttle air flow learning value of area 3	Min.: 0, Max.: 1.99	-	-
Throttle Air Flow Learn Value (Calculated Value)	Throttle air flow learning value (calculated value)	Min.: 0, Max.: 1.99	-	-

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Throttle Air Flow Learn Value (Atmosphere Pressure Offset Value)	Throttle air flow learning value (atmosphere pressure offset value)	Min.: 0, Max.: 2.55	-	-

Idle Speed Control (Gas Rough Idle)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Low Revolution Control	Low engine speed control operation state	ON or OFF	OFF	This item indicates whether the engine speed dropped immediately after starting due to poor combustion, etc.
Engine Stall Control F/B Flow	ISC torque lower limit value to prevent engine stall	Min.: -1024 Nm, Max.: 1023.96 Nm	-	• The intake air amount and ignition timing are adjusted when there is a large decrease in engine speed (for example, a decrease to 550 rpm or less) in order to prevent the engine from stalling. • For use when the starting problems or rough idle is present.

Fuel System 1 (All Data)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Target Fuel Pressure (High)	Target fuel pressure (for high pressure side)	Min.: 0 kPag, Max.: 655350 kPag	3000 to 25000 kPag: 2500 rpm (A/C off, P selected, engine warmed up, inspection mode [maintenance mode]), direct injection control	This item indicates the target fuel pressure for the fuel pump (for high pressure side).
Target Fuel Pressure (High) Supported	Status of Target Fuel Pressure (High) supported	Unsupp or Supp	Supp	-
Target Fuel Pressure (Low) / Target Fuel Pressure 2	Target fuel pressure (for low pressure side)	Min.: 0 kPag, Max.: 655350 kPag	300 to 530 kPag: Idling (A/C off, P selected, engine warmed up, inspection mode [maintenance mode] and not charge control)	This item indicates the target fuel pressure for the fuel pump (for low pressure side).

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Target Fuel Pressure (Low) / Target Fuel Pressure 2 Supported	Status of Target Fuel Pressure (Low) / Target Fuel Pressure 2 supported	Unsupp or Supp	Supp	-
Fuel Pressure (High)	Fuel pressure (for high pressure side)	Min.: 0 kPag, Max.: 655350 kPag	3000 to 25000 kPag: 2500 rpm (A/C off, P selected, engine warmed up, inspection mode [maintenance mode]), direct injection control	This item indicates the fuel pressure (for high pressure side).
Fuel Pressure (High) Supported	Status of Fuel Pressure (High) supported	Unsupp or Supp	Supp	-
Fuel Pressure (Low) / Fuel Pressure 2	Fuel pressure (for low pressure side)	Min.: 0 kPag, Max.: 655350 kPag	300 to 640 kPag: Idling (A/C off, P selected, engine warmed up, inspection mode [maintenance mode] and not charge control)	This item indicates the fuel pressure (for low pressure side).
Fuel Pressure (Low) / Fuel Pressure 2 Supported	Status of Fuel Pressure (Low) / Fuel Pressure 2 supported	Unsupp or Supp	Supp	-

EVAP System 1 (All Data)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
VSV for Vent Valve	Key-off EVAP system vent valve status	ON or OFF	-	Active Test item [Activate the VSV for Vent Valve] support data*.
Vacuum Pump	Key-off EVAP system leak detection pump status	ON or OFF	-	Active Test item [Activate the Vacuum Pump] support data*.

*: Click here INFO

Fuel System 2 (All Data)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Fuel Pump Target Speed	Fuel pump target speed (for low pressure side)	-32768 to 32767 rpm	-	-
Fuel Pump F/B Offset	Feedback compensation level of the fuel pump (low pressure side)	-327.68 to 327.67 L/h	-	-
Fuel Pump Control Duty Ratio	Fuel pump duty ratio (for low pressure side)	Min.: 0%, Max.: 399.9%	0 to 100%: Idling (A/C off, P selected, engine warmed up, inspection mode [maintenance mode] and not charge control)	This item indicates the duty ratio of the fuel pump (for low pressure side).
Low Pressure Fuel Delivery Internal Temperature	Low pressure fuel delivery internal temperature	Min.: -40°C (-40°F), Max.: 119.3°C (246.7°F)	-	The fuel temperature is estimated from the engine speed, oil temperature, water temperature, intake air temperature and fuel flow rate.
Injector Cylinder #1 (Port)	Injection period of the No. 1 cylinder (port injection)	Min.: 0 µs, Max.: 65535 µs	2000 to 3000 µs: Idling (A/C off, P selected, engine warmed up, inspection mode [maintenance mode] and not charge control)	• This is the injection period of the No. 1 cylinder (port injection) (the command value from the ECM). • The latest injection timing may be displayed even when fuel injection is not performed. Confirm the injection status by also referring to the Data List item "Injection Mode".
Injection Volume Cylinder #1	Injection volume (cylinder 1)	Min.: 0 ml, Max.: 2 ml	-	This is the fuel injection volume for 10 injections.
Target Fuel Pressure Offset	Target fuel pressure offset	Min.: -25%, Max.: 24.8%	-	• Active Test item [Control the Target Fuel Pressure Offset] support data.

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
				• 0 is displayed when the Active Test is not being performed.
Injection Volume	Injection volume	Min.: -25%, Max.: 24.8%	-	• Active Test item [Control the Injection Volume] or [Control the Injection Volume for A/F Sensor] support data. • 0 is displayed when the Active Test is not being performed.
Engine Fuel Rate	Fuel consumption	Min.: 0 gm/sec, Max.: 1310.70 gm/sec	-	-
Vehicle Fuel Rate	Vehicle fuel rate	Min.: 0 gm/sec, Max.: 1310.70 gm/sec	-	-
Low Fuel Pressure Sensor	No. 2 fuel pressure sensor (for low pressure side) output	Min.: -3276.8 kPag, Max.: 3276.7 kPag	300 to 640 kPag: Idling with warmed up engine (A/C off, P selected, engine warmed up, inspection mode [maintenance mode] and not charge control)	This item indicates the fuel pressure (for low pressure side) from the No. 2 fuel pressure sensor (for low pressure side).
High Fuel Pressure Sensor	Fuel pressure sensor (for high pressure side) output	Min.: -64 MPa, Max.: 63.998 MPa	3 to 25 MPa: 2500 rpm (A/C off, P selected, engine warmed up and inspection mode [maintenance mode]), direct injection control	This item indicates the fuel pressure (for high pressure side) from the fuel pressure sensor (for high pressure side).
High Pressure Fuel Pump Duty Ratio (D4)	Fuel pump duty ratio (for high pressure side)	Min.: 0%, Max.: 127.5%	-	This item indicates the duty ratio of the electromagnetic spill valve.

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
High Pressure Fuel Pump Discharge Rate	Fuel volume required by the high pressure fuel pump	Min.: 0 ml, Max.: 2 ml	-	This item indicates the fuel (engine room side) pump assembly (for high pressure side) discharge amount.
High Pressure Fuel Pump Internal Temperature	High pressure fuel pump internal temperature	-40 to 119.3°C	-	Estimate fuel temperature from engine speed, oil temperature, water temperature, intake air temperature and fuel flow rate.
Injection Mode	Injection mode	Port / Direct / Either	-	This item indicates the injection mode.
Injection Switching Status	Prohibition of changing the D-4S injection method	OK or NG	-	This item indicates whether the Control the Injection Mode Active Test is prohibited.
Injection Timing Cylinder #1 (D4)	Injection timing (for direct injection)	Min.: -3276.8 deg(CA), Max.:3276.7 deg(CA)	240 to 360 deg(CA): 2500 rpm (A/C off, P selected, engine warmed up and inspection mode [maintenance mode]), direct injection control	This item indicates the injection timing of the No. 1 direct fuel injector assembly.
Injection Time Cylinder #1 (D4)	Injection time (for direct injection)	Min.: 0 µs, Max.: 65535 µs	0 to 2000 µs: 2500 rpm (A/C off, P selected, engine warmed up and inspection mode [maintenance mode]), direct injection control	• This item indicates the last injection time of the No. 1 direct fuel injector assembly. • The latest injection timing may be displayed even when fuel injection is not performed. Confirm the injection status by also referring to the Data List item "Injection Mode".
Current Fuel Type	Current fuel type	-	Gasoline/petrol	-

EVAP System 2 (Gas Evaporative)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
EVAP (Purge) VSV	Purge VSV control duty	Min.: 0%, Max.: 100%	-	• This is the command signal from the ECM. • This is the purge VSV control duty ratio. When EVAP (Purge) VSV is any value except 0%, EVAP purge* is being performed. *: Gasoline vapor from the fuel tank is being introduced into the intake system via the purge VSV. • When the engine is cold or immediately after the engine is started, EVAP (Purge) VSV will be 0%.
EVAP Purge Flow	Purge flow	Min.: 0%, Max.: 399.9%	-	This is the percentage of total engine airflow contributed by EVAP purge operation. (Evap Purge Flow = Purge flow / Engine airflow x 100 (%))
EVAP Purge Density Learn Value	Purge density learned value	Min.: -200, Max.: 199.993	-	• This is the proportion of the decrease in injection volume (based on the change in the air fuel ratio feedback compensation value) related to a 1% purge flow rate. • When the value of this item is a large negative value, the purge effect is large. • The purge density is determined from the change in the air fuel ratio feedback compensation value when purge flow is introduced. • Purge density learning is performed so that the feedback compensation value is 0 +/-2%. **HINT:** • Usually, the value is approximately +/-1. • 1: The concentration of HC in the purge gas is relatively low. • 0: The concentration of HC in the purge gas is approximately

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
				equal to the stoichiometric air fuel ratio. • Large negative values indicate that the concentration of HC in the purge gas is relatively high.
Vapor Pressure Pump	Vapor pressure	Min.: 0 kPa (0 psi), Max.: 1441.77 kPa (209.07 psi)	Approximately 100 kPa(abs) [14.5 psi(abs)]: Ignition switch ON	This is the EVAP system pressure monitored by the canister pressure sensor. **HINT:** • Except for when the monitor is running, this value should be approximately the same as atmospheric pressure. • As Vapor Pressure Pump is almost the same as atmospheric pressure when the engine is stopped, this item can be used to help determine if the canister pressure sensor characteristics are abnormal, if there is noise, or if the sensor output is stuck at a certain value.
Vapor Pressure (Calculated)	Calculated EVAP system pressure	Min.: -720.896 kPa (-104.53 psi), Max.: 720.874 kPa (104.53 psi)	Approximately 100 kPa(abs) [14.5 psi(abs)]: Ignition switch ON	-
Fuel Filler Opener	Fuel lid lock with motor assembly status	ON or OFF	-	• Active Test [Activate the Fuel Filler Opener] support data. • ON: Fuel lid lock with motor assembly operating • OFF: Fuel lid lock with motor assembly not operating
Fuel Vapor-Containment Valve	Fuel vapor-containment valve status	Open or Close	Open: Fuel vapor-containment valve open	-
Fuel Lid SW	Fuel lid courtesy switch status	Open or Close	• Open: Fuel lid opener switch pushed • Close: Fuel lid opener	-

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
			switch not pushed	
Fuel Lid Sensor SW	Fuel lid opener switch status	Open or Close	• Open: Fuel lid open • Close: Fuel lid closed	-
EVAP Purge VSV	VSV status for EVAP control	ON or OFF	-	This item is ON when EVAP (Purge) VSV is approximately 30% or higher, and is OFF when the VSV duty ratio is less than 30%.
Purge Cut VSV Duty	Purge VSV duty	Min.: 0%, Max.: 399.9%	-	-
Fuel Tank Internal Pressure	Fuel tank pressure	Min.: -102.4 kPa (-14.848 psi), Max.: 102.396 kPa (14.847 psi)	Atmospheric pressure: Fuel tank cap assembly removed	Pressure inside fuel tank monitored by fuel tank pressure sensor.
Vapor Pressure when Fuel Tank Leak Check Finished	Pressure directly after EVAP system key-off monitor fuel tank leak check	Min.: -720.896 kPa (-104.53 psi), Max.: 720.874 kPa (104.527 psi)	-1kPa (-0.145psi) or less	-
Fuel Tank Leak Check Time Required	Required time for EVAP system key-off monitor fuel tank leak check	Min.: 0 ms, Max.: 4294901.76 ms	-	-
Vapor Pressure 1 during Fuel Tank Side Pressure Applied	Fuel tank pressure 30 seconds after start of EVAP system key-off monitor fuel tank leak check	Min.: -5.63 kPa (-0.82 psi), Max.: 5.68 kPa (0.82 psi)	-1kPa (-0.145psi) or less	-
Vapor Pressure 2 during Fuel Tank Side	Fuel tank pressure 1 minute after start of EVAP system	Min.: -5.63 kPa (-0.82 psi), Max.:	-1kPa (-0.145psi) or less	-

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Pressure Applied	key-off monitor fuel tank leak check	5.68 kPa (0.82 psi)		
EVAP System Vapor Pressure 1 Supported	Status of EVAP system vapor pressure (sensor 1) supported	Not Supported or Supported	Not Supported	-
EVAP System Vapor Pressure 2 Supported	Status of EVAP system vapor pressure (sensor 2) supported	Not Supported or Supported	Not Supported	-
EVAP System Vapor Pressure 1 (Wide Range)	Fuel tank pressure (wide range)	Min.: -65536 Pa (-9.503 psi), Max.: 65534 Pa (9.502 psi)	Atmospheric pressure: Fuel tank cap assembly removed	-
EVAP System Vapor Pressure 1 (Wide Range) Supported	Status of EVAP system vapor pressure (sensor 1) (wide range) supported	Not Supported or Supported	Supported	-
EVAP System Vapor Pressure 2 (Wide Range) Supported	Status of EVAP system vapor pressure (sensor 2) (wide range) supported	Not Supported or Supported	Not Supported	-

Air Fuel Ratio Control (All Data)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Target Air-Fuel Ratio	Target air fuel ratio	Min.: 0, Max.: 2	0.8 to 1.2: During idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	• This is the target air fuel ratio used by the ECM. • 1.0 is the stoichiometric air fuel ratio. Values that are more than 1.0 indicate the system attempting to make the air fuel ratio leaner. Values that are less than 1.0 indicate the system attempting to make the air fuel ratio richer.
A/F (O2) Lambda Sensor B1S1	Output air fuel ratio associated with bank 1 sensor 1	Min.: 0, Max.: 1.99	• Value less than 1 (0.000 to 0.999) = Rich • 1 = Stoichiometric air fuel ratio • Value more than 1 (1.001 to 1.999) = Lean	This is the actual air fuel ratio calculated based on the air fuel ratio sensor (sensor 1) output.
A/F (O2) Lambda Sensor B1S2	Output air fuel ratio associated with bank 1 sensor 2	Min.: 0, Max.: 1.99	• Value less than 1 (0.000 to 0.999) = Rich • 1 = Stoichiometric air fuel ratio • Value more than 1 (1.001 to 1.999) = Lean	This is the actual air fuel ratio calculated based on the air fuel ratio sensor (sensor 2) output.
A/F (O2) Sensor Current B1S1	Air fuel ratio sensor (sensor 1) output current	Min.: -128 mA, Max.: 127.996 mA	-0.5 to 0.5 mA: Idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	• With a stoichiometric air fuel ratio (for example, during idling after the engine is warmed up), the air fuel ratio sensor (sensor 1) current output is approximately -0.5 to 0.5 mA. • When the value is outside the range of 0.47 to 2.2 mA when the fuel-cut is being performed, there is a malfunction in the air fuel ratio sensor (sensor 1) or sensor circuit. • Performing the "Control the Injection Volume or Control

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
				the Injection Volume for A/F Sensor" Active Test enables the technician to check the output current of the sensor.
A/F (O2) Sensor Current B1S2	Air fuel ratio sensor (sensor 2) output current	Min.: -128 mA, Max.: 127.99 mA	-0.5 to 0.5 mA: Idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	• A/F (O2) Sensor Current B1S2 display is below 0 mA: Richer than the stoichiometric air-fuel ratio • A/F (O2) Sensor Current B1S2 display is higher than 0 mA: Leaner than stoichiometric air-fuel ratio • With a stoichiometric air fuel ratio (for example, during idling after the engine is warmed up), the air fuel ratio sensor (sensor 2) current output is approximately -0.5 to 0.5 mA. • When the value is outside the range of 7.5 to 33.13 mA when the fuel-cut is being performed, there is a malfunction in the air fuel ratio sensor (sensor 2) or sensor circuit. • Performing the "Control the Injection Volume or Control the Injection Volume for A/F Sensor" Active Test enables the technician to check the output current of the sensor.
A/F (O2) Sensor Heater Duty Ratio B1S1	Air fuel ratio sensor (sensor 1) heater duty ratio	Min.: 0%, Max.: 399.9%	0 to 100%: Idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	When the value is any value except 0%, current is being supplied to the heater.
A/F Sensor Heater Current Value B1S2	Air fuel ratio sensor (sensor 2) heater current	Min.: 0 A, Max.: 65.535 A	-	When the value is any value except 0 A, current is being supplied to the heater.

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
A/F Sensor Heater Duty B1S2	Air fuel ratio sensor (sensor 2) heater duty ratio	Min.: 0%, Max.: 399.9%	0 to 100%: Idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	When the value is any value except 0%, current is being supplied to the heater.
A/F Sensor Impedance B1S1	Air fuel ratio sensor (sensor 1) impedance	Min.: 0 ohm, Max.: 21247.67 ohm	5 to 15000 ohm: Idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	-
A/F Sensor Impedance B1S2	Air fuel ratio sensor (sensor 2) impedance	Min.: 0 ohm, Max.: 21247.67 ohm	5 to 15000 ohm: Idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	-
A/F (O2) Sensor +Terminal Voltage Bank 1	Air fuel ratio sensor positive terminal voltage	Min.: 0 V, Max.: 79.998 V	-	-
A/F (O2) Sensor - Terminal Voltage Bank 1	Air fuel ratio sensor negative terminal voltage	Min.: 0 V, Max.: 79.998 V	-	-
A/F (O2) Sensor Heater Control Duty Ratio Bank1	Air fuel ratio sensor heater control duty ratio	Min.: -327.68%, Max.: 327.67%	-	• This is the air fuel ratio sensor heater duty ratio requested by the ECM. • During normal operation, displays the same value as "A/F (O2) Sensor Heater Output Duty Ratio Bank1". • When "A/F Sensor Heater Control Duty Ratio Bank1" is other than 0% and "A/F Sensor Heater Control Duty Ratio Bank1" is 0%, the heater has stopped operating due to a malfunction of the air fuel ratio sensor.

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
A/F (O2) Sensor Heater Output Duty Ratio Bank1	Air fuel ratio sensor heater output duty ratio	Min.: 0%, Max.: 399.99%	-	• Actual output "air fuel ratio sensor heater duty ratio". • During normal operation, displays the same value as "A/F (O2) Sensor Heater Control Duty Ratio Bank1". • When "A/F Sensor Heater Control Duty Ratio Bank1" is other than 0% and "A/F Sensor Heater Control Duty Ratio Bank1" is 0%, the heater has stopped operating due to a malfunction of the air fuel ratio sensor.
A/F (O2) Sensor Heater ON Current Value Bank1	Air fuel ratio sensor heater on output current	Min.: 0 A, Max.: 65.535 A	-0.5 to 0.5 mA: Idling with engine warmed up (inspection mode [maintenance mode], not charge control)	-
A/F (O2) Sensor Heater Current-Carrying Status Bank1 (at Heater OFF)	Air fuel ratio sensor heater off energizing status	ON or OFF	OFF: Ignition switch ON	-
A/F (O2) Sensor Heater Overcurrent Bank1	Air fuel ratio sensor heater overcurrent	ON or OFF	OFF	-
A/F (O2) Sensor Heater Control Run Time Bank1	Time elapsed since air fuel ratio sensor heater control started	Min.: 0 ms, Max.: 65535 ms	-	-
Short FT B1S1	Short-term fuel trim	Min.: -100%, Max.: 99.21%	-20 to 20%	This item is the "short-term fuel injection volume compensation ratio" used to maintain the air fuel ratio at the stoichiometric ratio using the air fuel ratio sensor (sensor 1) for feedback.

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Short FT B1S2	Short-term fuel trim	Min.: -100%, Max.: 99.21%	-	Maintains the air-fuel ratio at the stoichiometric air-fuel ratio by making minor adjustments to the target air-fuel ratio for the air-fuel ratio calibration during normal driving. **HINT:** • Other than normal condition: The target air-fuel ratio may be rich or lean. • If a positive value or a negative value is continuously output for 5 minutes or more, there may be an exhaust gas leak or a deviation in the air fuel ratio sensor characteristics.
Long FT B1S1	Long-term fuel trim	Min.: -100%, Max.: 99.21%	-20 to 20%	• The ECM will learn the Long FT B1S1 values based on Short FT B1S1. The goal is to keep Short FT B1S1 at 0% to keep the air fuel ratio mixture at the stoichiometric ratio. • This item is used to determine whether the system related to air fuel ratio control is malfunctioning. • The condition of the system is determined based on the sum of Short FT B1S1 and Long FT B1S1 (excluding times when the system is in transition). ◦ 20% or higher: The air fuel ratio may be lean. ◦ -20 to 20%: The air fuel ratio can be determined to be normal. ◦ -20% or less: The air fuel ratio may be rich. ◦ Air fuel ratio feedback learning is divided up according to the engine operating range (engine speed x load), and a separate value is stored for each

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
				operating range. "Long FT B1S1" indicates the learned value for the current operating range. [A/F Learn Value Idle (Port) Bank 1], [A/F Learn Value Low (Port) Bank 1], [A/F Learn Value Mid No.1 (Port) Bank 1], [A/F Learn Value Mid No.2 (Port) Bank 1], [A/F Learn Value High (Port) Bank 1], [A/F Learn Value Idle Bank 1], [A/F Learn Value Low Bank 1], [A/F Learn Value Mid No.1 Bank 1], [A/F Learn Value Mid No.2 Bank 1], [A/F Learn Value High Bank 1] indicate the learned values for the different operating ranges. The learned value that is the same as "Long FT B1S1" indicates the current engine operating range.
Long FT B1S2	Long-term fuel trim	Min.: -100%, Max.: 99.21%	-	Learns and records the air-fuel ratio feedback value for "Short FT B1S2". **HINT:** • -2 to +1%: The air-fuel ratio can be determined to be normal. • Other than above: The target air-fuel ratio may be rich or lean. • If only "Long FT B1S2" is not as specified, there may be an exhaust gas leak or a deviation in the air fuel ratio sensor characteristics.

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Total FT Bank 1	Total fuel trim	Min.: -0.5, Max.: 0.496	-0.28 to 0.2: Idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	Total FT Bank 1 = Short FT B1S1 + Long FT B1S1
Fuel System Status Bank 1	Fuel system status (bank 1)	Unused, OL, CL, OLDrive, OLFault or CLFault	CL: Idling after warming up	• OL (Open Loop): Has not yet satisfied conditions to go to closed loop. • CL (Closed Loop): Feedback for fuel control. • OLDrive: Open loop due to driving conditions (fuel enrichment). • OLFault: Open loop due to a detected system fault. • CLFault: Closed loop but the air fuel ratio sensor (sensor 1), which is used for fuel control, is malfunctioning.
Fuel System Status Bank 2	Fuel system status (bank 2)	Unused, OL, CL, OLDrive, OLFault or CLFault	Unused	-
A/F Learn Value Idle (Port) Bank 1	Air fuel ratio learn value of idle area (port)	Min.: -50%, Max.: 49.6%	-20 to 20%	Learning is performed when idling with the engine warmed up (engine coolant temperature is 80°C [176°F] or higher).
A/F Learn Value Low (Port) Bank 1	Air fuel ratio learn value of low load area (port)	Min.: -50%, Max.: 49.6%	-20 to 20%	Learning is performed when driving with the engine warmed up (engine coolant temperature is 80°C [176°F] or higher) and operating in the low load range (when the range of engine loads is divided into four parts).
A/F Learn Value Mid No.1 (Port) Bank 1	Air fuel ratio learn value of middle1 load area (port)	Min.: -50%, Max.: 49.6%	-20 to 20%	Learning is performed when driving with the engine warmed up (engine coolant temperature is 80°C [176°F] or higher) and operating in the mid-size load range closer to the low load range (when the range of engine loads is divided into four parts).

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
A/F Learn Value Mid No.2 (Port) Bank 1	Air fuel ratio learn value of middle2 load area (port)	Min.: -50%, Max.: 49.6%	-20 to 20%	Learning is performed when driving with the engine warmed up (engine coolant temperature is 80°C [176°F] or higher) and operating in the mid-size load range closer to the high load range (when the range of engine loads is divided into four parts).
A/F Learn Value High (Port) Bank 1	Air fuel ratio learn value of high load area (port)	Min.: -50%, Max.: 49.6%	-20 to 20%	Learning is performed when driving with the engine warmed up (engine coolant temperature is 80°C [176°F] or higher) and operating in the high load range (when the range of engine loads is divided into four parts).
A/F Learn Value Idle Bank 1	Air fuel ratio learn value of idle area	Min.: -50%, Max.: 49.6%	-20 to 20%	Learning is performed when idling with the engine warmed up (engine coolant temperature is 80°C [176°F] or higher).
A/F Learn Value Low Bank 1	Air fuel ratio learn value of low load area	Min.: -50%, Max.: 49.6%	-20 to 20%	Learning is performed when driving with the engine warmed up (engine coolant temperature is 80°C [176°F] or higher) and operating in the low load range (when the range of engine loads is divided into four parts).
A/F Learn Value Mid No.1 Bank 1	Air fuel ratio learn value of middle1 load area	Min.: -50%, Max.: 49.6%	-20 to 20%	Learning is performed when driving with the engine warmed up (engine coolant temperature is 80°C [176°F] or higher) and operating in the mid-size load range closer to the low load range (when the range of engine loads is divided into four parts).
A/F Learn Value Mid No.2 Bank 1	Air fuel ratio learn value of middle2 load area	Min.: -50%, Max.: 49.6%	-20 to 20%	Learning is performed when driving with the engine warmed up (engine coolant temperature is 80°C [176°F] or higher) and operating in the mid-size load range closer to the high load range (when the range of engine loads is divided into four parts).

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
A/F Learn Value High Bank 1	Air fuel ratio learn value of high load area	Min.: -50%, Max.: 49.6%	-20 to 20%	Learning is performed when driving with the engine warmed up (engine coolant temperature is 80°C [176°F] or higher) and operating in the high load range (when the range of engine loads is divided into four parts).

Ignition System (Ignition)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Ignition Timing Cylinder #1	Ignition timing advance for No. 1 cylinder	Min.: -64 deg, Max.: 63.5 deg	-2 to 14 deg: Idling (engine warmed up, inspection mode [maintenance mode] and not charge control)	-
Knock F/B Value	Knocking feedback value	Min.: -1024 deg(CA), Max.: 1023.9 deg(CA)	-20 to 0 deg(CA): Driving at 70 km/h (43 mph) (engine running)	This is the ignition timing retard compensation amount determined by the presence or absence of knocking. Ignition timing = Most retarded timing value*1 + Knock Correct Learn Value*2 + Knock F/B Value*3 + each compensation amount Example: 21 deg(CA) = 10 deg(CA) + 14 deg(CA) - 3 deg(CA) *1: The most retarded timing value is a constant determined by the engine speed and engine load. *2: The knock correction learned value is calculated as shown below in order to keep Knock F/B Value as close to -3 deg(CA) as possible. When Knock F/B Value is less than -4 deg(CA), Knock Correct Learn Value is slowly decreased. When Knock F/B Value is higher than -2 deg(CA), Knock Correct Learn Value is slowly increased. *3: The base value is -3 deg(CA) and is adjusted based on the presence or absence of knocking. When there is no knocking, the value is increased, and when knocking is present, the value is decreased. **HINT:** If Knock F/B Value does not change around the time when knocking occurs even

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
				though knocking continues (for example, stays at -3 deg(CA)), it can be determined that knocking is not being detected. **Possible Causes:** • There is a problem with the knock control sensor sensitivity. • The knock control sensor is improperly installed. • There is a problem with a wire harness.
Knock Correct Learn Value	Knocking correction learned value	Min.: -1024 deg(CA), Max.: 1023.9 deg(CA)	0 to 21 deg(CA): Driving at 70 km/h (43 mph) (Engine running)	• Refer to "Knock F/B Value". • When there is knocking or a lack of power, compare the values of following items to another vehicle of the same model. ◦ Engine Speed ◦ Calculate Load ◦ Ignition Timing Cylinder #1 ◦ Knock F/B Value ◦ Knock Correct Learn Value • Knock Correct Learn Value is large: There is no knocking and the ignition timing is advanced. • Knock Correct Learn Value is small: Knocking is present and the ignition timing is being retarded. **HINT:** When knocking continues even though Knock Correct Learn Value is less than that of the vehicle being used for comparison (in other words, the ignition timing is being retarded but the knocking does not stop), there may be a buildup of deposits or other such problems due to deterioration over time (oil entering the cylinders, poor quality fuel, etc.).
Idle Spark Advance Control Cylinder #1	Individual cylinder timing advance compensation amount (No. 1)	Min.: 0 deg(CA), Max.: 15.93 deg(CA)	-	• This is the ignition timing advance compensation amount used to stabilize idling (each cylinder has a separate value). When the speed for a certain cylinder drops, the system advances the timing for that particular cylinder in an attempt to restore the speed and stabilize idling. • It may be possible to use this item to help determine specific cylinders which are not operating normally.

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Idle Spark Advance Control Cylinder #2	Individual cylinder timing advance compensation amount (No. 2)	Min.: 0 deg(CA), Max.: 15.93 deg(CA)	-	• This is the ignition timing advance compensation amount used to stabilize idling (each cylinder has a separate value). When the speed for a certain cylinder drops, the system advances the timing for that particular cylinder in an attempt to restore the speed and stabilize idling. • It may be possible to use this item to help determine specific cylinders which are not operating normally.
Idle Spark Advance Control Cylinder #3	Individual cylinder timing advance compensation amount (No. 3)	Min.: 0 deg(CA), Max.: 15.93 deg(CA)	-	• This is the ignition timing advance compensation amount used to stabilize idling (each cylinder has a separate value). When the speed for a certain cylinder drops, the system advances the timing for that particular cylinder in an attempt to restore the speed and stabilize idling. • It may be possible to use this item to help determine specific cylinders which are not operating normally.
Idle Spark Advance Control Cylinder #4	Individual cylinder timing advance compensation amount (No. 4)	Min.: 0 deg(CA), Max.: 15.93 deg(CA)	-	• This is the ignition timing advance compensation amount used to stabilize idling (each cylinder has a separate value). When the speed for a certain cylinder drops, the system advances the timing for that particular cylinder in an attempt to restore the speed and stabilize idling. • It may be possible to use this item to help determine specific cylinders which are not operating normally.

Mass Air Flow Meter (All Data)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Mass Air Flow Circuit	Status of the mass air flow meter sub-assembly circuit	Normal or Abnormal	Normal	-
Air Flow Meter Output Frequency	Mass air flow meter sub-assembly output frequency	Min.: 0 kHz, Max.: 9.999 kHz	-	This item is displayed only for PHEV Model.

EGR Control (All Data)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Target EGR Valve Position No.1	Target EGR valve position value	Min.: 0%, Max.: 100%	0%: Idling (engine warmed up, inspection mode [maintenance mode] and not charge control)	• When the engine is cold or idling, at engine start, etc., the value is 0%. • When the valve is fully closed, the value is 0%. • When the valve is fully open, the value is 100%.
Target EGR Valve Position No.1 Supported	Status of Target EGR Valve Position No. 1 supported	Unsupp or Supp	Supp	-
Actual EGR Valve Position No.1 Supported	Status of Actual EGR Valve Position No. 1 supported	Unsupp or Supp	Unsupp	-
Target EGR Valve Position No.2 Supported	Status of Target EGR Valve Position No. 2 supported	Unsupp or Supp	Unsupp	-
Actual EGR Valve Position No.2 Supported	Status of Actual EGR Valve Position No. 2 supported	Unsupp or Supp	Unsupp	-
EGR Step Position	EGR step position	Min.: 0 step, Max.: 255 step	-	Active Test item [Control the EGR Step Position] support data.

VVT Control (Gas Valve Control)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
VVT Advance Fail	VVT control failure status	ON or OFF	OFF: Idling	ON: There is an intake VVT timing advance malfunction.
Exhaust VVT Retarded Fail	VVT control retarded failure status	ON or OFF	OFF: Idling	ON: There is an exhaust VVT timing retard malfunction.

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Intake VVT Change Angle Bank 1	Intake VVT displacement angle	Min.: 0 DegFR, Max.: 639.9 DegFR	15 to 25 DegFR: Idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	This is the intake VVT displacement angle.
Exhaust VVT Hold Learn Value Bank 1	Exhaust VVT hold correct learned value	Min.: 0%, Max.: 399.9%	0 to 100%: Idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	-
Exhaust VVT Change Angle Bank 1	Exhaust VVT displacement angle	Min.: 0 DegFR, Max.: 639.9 DegFR	0 to 10 DegFR: Idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	This is the exhaust VVT displacement angle.
Exhaust VVT OCV Control Duty Ratio Bank 1	Cam timing oil control solenoid operation duty ratio	Min.: 0%, Max.: 399.9%	0 to 100%: Idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	-
Intake VVT Target Angle Bank 1	Intake VVT target angle	Min.: 0 DegFR, Max.: 639.9 DegFR	15 to 25 DegFR: Idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	-
Exhaust VVT Target Angle Bank 1	Exhaust VVT target angle	Min.: 0 DegFR, Max.: 639.9 DegFR	0 to 10 DegFR: Idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	-
Intake VVT Timing Most Over-Retarded Learn Value Bank 1	Intake VVT maximum retarded angle learned value	Min.: 0 deg(CA), Max.: 639.99 deg(CA)	19 to 42 deg(CA): Idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	-

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Exhaust VVT Timing Most Over-Advanced Learn Value Bank 1	Exhaust VVT maximum advanced angle learned value	Min.: 0 deg(CA), Max.: 639.99 deg(CA)	80 to 102 deg(CA): Idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	-
VVT-iE Duty Ratio Bank 1	Cam timing control motor operation duty ratio	Min.: -200%, Max.: 199.9%	0 to 100%: Idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	The duty ratio of the cam timing control motor with EDU assembly is displayed.
VVT-iE Motor Direction Bank 1	VVT-iE motor direction	Backward or Forward	Forward: Idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	The direction of rotation of the cam timing control motor with EDU assembly is displayed.
VVT-iE Opening Angle Bank 1	Cam timing control motor operation angle	Min.: 0 deg, Max.: 65 deg	-	• Active Test item [Control the VVT-iE Opening Angle Bank 1] support data. • 0 is displayed when the Active Test is not being performed.

Catalyst (Gas CAT Converter)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Engine Exhaust Flow Rate	Exhaust flow rate	Min.: 0 kg/h, Max.: 13107 kg/h	-	-
Catalyst Temperature B1S1	Front catalyst temperature	Min.: -40°C (-40°F), Max.: 6513.5°C (11756.3°F)	-	• This is the temperature of the front catalyst estimated by the ECM. • This item is included in the conditions used to detect catalyst deterioration (DTC P042000), etc., and should therefore be used as a reference when recreating malfunction conditions.

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Catalyst Temperature B1S2	Rear catalyst temperature	Min.: -40°C (-40°F), Max.: 6513.5°C (11756.3°F)	-	This is the temperature of the rear catalyst estimated by the ECM.

Check Mode (Check Mode)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Misfire Test Result	Check mode result for misfire monitor	Compl or Incmpl	-	-
A/F (O2) Sensor B1S2 Test Results	Check mode result for air fuel ratio sensor (sensor 2)	Compl or Incmpl	-	-
A/F (O2) Sensor B1S1 Test Results	Check mode result for air fuel ratio sensor (sensor 1)	Compl or Incmpl	-	-

Test Result (Monitor Status)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Complete Parts Monitor	Comprehensive component monitor	Not Avl or Avail	-	• *1
Complete Parts Monitor Result	Comprehensive component monitor	Compl or Incmpl	-	• *1
Ignition Monitor	Ignition monitor	Spark Ignition or Compression Ignition	-	-
Fuel System Monitor	Fuel system monitor	Not Avl or Avail	-	• *1
Fuel System Monitor Result	Fuel system monitor	Compl or Incmpl	-	• *1
Misfire Monitor	Misfire monitor	Not Avl or Avail	-	• *1
Misfire Monitor Result	Misfire monitor	Compl or Incmpl	-	• *1

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
EGR/VVT Monitor	EGR/VVT monitor	Not Avl or Avail	-	• *1
EGR/VVT Monitor Result	EGR/VVT monitor	Compl or Incmpl	-	• *1
A/F (O2) Sensor Heater Monitor	A/F (O2) sensor heater monitor	Not Avl or Avail	-	• *1
A/F (O2) Sensor Heater Monitor Result	A/F (O2) sensor heater monitor	Compl or Incmpl	-	• *1
A/F (O2) Sensor Monitor	A/F (O2) sensor monitor	Not Avl or Avail	-	• *1
A/F (O2) Sensor Monitor Result	A/F (O2) sensor monitor	Compl or Incmpl	-	• *1
Secondary Air Injection System Monitor	Secondary air injection system monitor	Not Avl or Avail	-	• *1
Secondary Air Injection System Monitor Result	Secondary air injection system monitor	Compl or Incmpl	-	• *1
EVAP Monitor	EVAP monitor	Not Avl or Avail	-	• *1
EVAP Monitor Result	EVAP monitor	Compl or Incmpl	-	• *1
Heated Catalyst Monitor	Heated catalyst monitor	Not Avl or Avail	-	• *1
Heated Catalyst Monitor Result	Heated catalyst monitor	Compl or Incmpl	-	• *1
Catalyst Monitor	Catalyst monitor	Not Avl or Avail	-	• *1
Catalyst Monitor Result	Catalyst monitor	Compl or Incmpl	-	• *1
Component Monitor ENA (Current)	Comprehensive component monitor	Unable or Enable	-	• *2
Component Monitor Result (Current)	Comprehensive component monitor	Compl or Incmpl	-	• *2

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Ignition Monitor (Current)	Ignition monitor	Spark Ignition or Compression Ignition	-	-
Fuel System Monitor ENA (Current)	Fuel system monitor	Unable or Enable	-	• *2
Fuel System Monitor Result (Current)	Fuel system monitor	Compl or Incmpl	-	• *2
Misfire Monitor ENA (Current)	Misfire monitor	Unable or Enable	-	• *2
Misfire Monitor Result (Current)	Misfire monitor	Compl or Incmpl	-	• *2
EGR/VVT Monitor ENA (Current)	EGR/VVT monitor	Unable or Enable	-	• *2
EGR/VVT Monitor Result (Current)	EGR/VVT monitor	Compl or Incmpl	-	• *2
O2 Sensor Heater ENA (Current)	A/F (O2) sensor heater monitor	Unable or Enable	-	• *2
O2 Sensor Heater Monitor Result (Current)	A/F (O2) sensor heater monitor	Compl or Incmpl	-	• *2
A/F (O2) Sensor Monitor ENA (Current)	A/F (O2) sensor monitor	Unable or Enable	-	• *2
A/F (O2) Sensor Monitor Result (Current)	A/F (O2) sensor monitor	Compl or Incmpl	-	• *2
Secondary Air Injection System Monitor ENA (Current)	Secondary air injection system monitor	Unable or Enable	-	• *2
Secondary Air Injection System Monitor Result (Current)	Secondary air injection system monitor	Compl or Incmpl	-	• *2

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
EVAP Monitor ENA (Current)	EVAP monitor	Unable or Enable	-	• *2
EVAP Monitor Result (Current)	EVAP monitor	Compl or Incmpl	-	• *2
Heated Catalyst Monitor ENA (Current)	Heated catalyst monitor	Unable or Enable	-	• *2
Heated Catalyst Monitor Result (Current)	Heated catalyst monitor	Compl or Incmpl	-	• *2
Catalyst Monitor ENA (Current)	Catalyst monitor	Unable or Enable	-	• *2
Catalyst Monitor Result (Current)	Catalyst monitor	Compl or Incmpl	-	• *2

*1:

Avail: The monitor is available on this vehicle.

Not Avl: The monitor is not available on this vehicle.

Incmpl / Compl: The item changes from Incmpl to Compl if the monitor was completed at least once at some time in the past. This item does not change when the ignition switch is turned off. However, the item changes back to Incmpl when DTCs are cleared or cable is disconnected from the negative (-) auxiliary battery terminal.

*2:

Enable: The monitor is available on the vehicle.

Unable: The monitor is not available on the vehicle.

Incmpl / Compl: The item changes from Incmpl to Compl if the monitor was completed during the current trip. The item changes back to Incmpl when the ignition switch is turned off.

Various Vehicle Conditions 3 (All Data)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
TC Terminal	TC terminal status	ON or OFF	-	Active Test item [Activate the TC Terminal] support data.
MIL	MIL status	ON or OFF	OFF	-

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
MIL ON Run Distance	Distance driven with MIL on	Min.: 0 km (0 mile), Max.: 65535 km (40723 mile)	-	This is the distance driven since the MIL was illuminated.
Running Time from MIL ON	Running time from MIL on	Min.: 0 min, Max.: 65535 min	Running time after MIL turned on	-
Time after DTC Cleared	Time after DTCs cleared	Min.: 0 min, Max.: 65535 min	Time after DTCs cleared	This is the time elapsed after DTCs were cleared (or after the vehicle left the factory). Time elapsed after the ignition switch is turned off is not counted.
Distance from DTC Cleared	Distance driven after DTCs cleared	Min.: 0 km (0 mile), Max.: 65535 km (40723 mile)	Distance driven after DTCs cleared	This is the distance driven since DTCs were cleared (or since the vehicle left the factory).
Warmup Cycle Cleared DTC	Warmup cycles after DTCs cleared	Min.: 0, Max.: 255	-	This is the number of warmup cycles after the DTCs were cleared.
Distance Traveled from Last Battery Cable Disconnect	Distance driven after auxiliary battery cable disconnected	Min.: 0 km (0 mile), Max.: 65535 km (40723 mile)	Total distance vehicle driven after auxiliary battery cable disconnected	-
IG OFF Elapsed Time	Time after ignition switch off	Min.: 0 min, Max.: 655350 min	Cumulative time after ignition switch off	-
Soak IC Current Timer Value	Length of most recent soak timer operation	Min.: 0 sec, Max.: 614390.625 sec	-	This item displays the length of time the soak timer operated from when the ignition switch was last turned off until it was turned to ON.
Soak IC First Start Time	Length of initial soak timer operation	0 to 2550 min or Unknown	-	-

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Soak Timer Start History	History of soak timer operation	Unknown, ON or OFF	ON: History of soak timer operation exists	If the soak timer has not operated in the past, OFF will be displayed.
OBD Requirements	OBD requirement	-	OBD II (California ARB)	-
Number of Emission DTC	Emissions-related DTCs	Min.: 0, Max.: 127	-	This is the number of emissions-related DTCs stored.
Vehicle Speed for PDTC	Displays the vehicle speed for universal trip	Min.: 0 km/h (0 mph), Max.: 255 km/h (158 mph)	-	-
Start Status for PDTC	Displays whether the ignition switch is ON for universal trip	Min.: 0, Max.: 255	-	-
Accelerator Pedal Idle Status for PDTC	Displays whether the accelerator pedal is released for universal trip	Min.: 0, Max.: 255	-	-

Misfire (Gas Misfire)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Ignition Trigger Count	Ignition counter	Min.: 0, Max.: 65535	0 to 400	• This is the cumulative number of ignitions. • This counter is increased by one for each ignition (this stops when misfire monitoring stops). This value is cleared every 200 revolutions. • The misfire rate for each cylinder is calculated by dividing the misfire count for each cylinder by the value of this item. • The misfire rate for each cylinder = Misfire Count Cylinder #1 to #4 / Ignition Trigger Count **HINT:** • For 4-cylinder engines, the values range from 0 to 400.

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
				• For 6-cylinder engines, the values range from 0 to 600. • For 8-cylinder engines, the values range from 0 to 800.
Misfire Count Cylinder #1	Misfire count of No. 1 cylinder	Min.: 0, Max.: 255	0	• This is the misfire count for No. 1 cylinder. • This counter is increased by one for each misfire and is cleared every 200 revolutions. • Check this item to help determine the malfunctioning cylinder.
Misfire Count Cylinder #2	Misfire count of No. 2 cylinder	Min.: 0, Max.: 255	0	• This is the misfire count for No. 2 cylinder. • This counter is increased by one for each misfire and is cleared every 200 revolutions. • Check this item to help determine the malfunctioning cylinder.
Misfire Count Cylinder #3	Misfire count of No. 3 cylinder	Min.: 0, Max.: 255	0	• This is the misfire count for No. 3 cylinder. • This counter is increased by one for each misfire and is cleared every 200 revolutions. • Check this item to help determine the malfunctioning cylinder.
Misfire Count Cylinder #4	Misfire count of No. 4 cylinder	Min.: 0, Max.: 255	0	• This is the misfire count for No. 4 cylinder. • This counter is increased by one for each misfire and is cleared every 200 revolutions. • Check this item to help determine the malfunctioning cylinder.
All Cylinders Misfire Count	Misfire count of all cylinders	Min.: 0, Max.: 255	0	• This is the total misfire count of all cylinders. • This counter is increased by one for each misfire, has a maximum value of 255 and is cleared every 1000 revolutions.
Misfire RPM	Engine speed for first misfire range	Min.: 0 rpm, Max.: 6375 rpm	0 rpm: 0 misfires	• This is the average engine speed recorded when misfiring occurs. • The value of this item is closer to the actual conditions of the vehicle at the time misfire occurred than the values of Engine Speed and

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
				Calculate Load stored in the Freeze Frame Data. When reproducing malfunction conditions, use this value as a reference.
Misfire Load	Engine load for first misfire range	Min.: 0%., Max.: 510%	0%: 0 misfires	• This is the average engine load recorded when misfiring occurs. • The value of this item is closer to the actual conditions of the vehicle at the time misfire occurred than the values of Engine Speed and Calculate Load stored in the Freeze Frame Data. When reproducing malfunction conditions, use this value as a reference.
Misfire Margin	Misfire monitoring	Min.: -128%, Max.: 127%	0 to 127%: Idling (engine warmed up, inspection mode [maintenance mode] and not charge control)	• This is the misfire detection margin. • Misfire Margin = (Misfire detection threshold - maximum engine speed variation) / misfire detection threshold x 100% • When the variation in the engine speed is large and exceeds the misfire detection threshold, the misfire count starts. This item is a measure of how much the engine speed variation can increase with respect to the threshold before the engine is determined to be misfiring. • A large value means there is a large margin for the engine speed to vary before the engine is determined to be misfiring. • Example: When the engine is determined to be misfiring, Misfire Margin = -128 to 0%.
Catalyst OT Misfire Fuel Cut	Fuel cut to prevent catalyst from overheating during misfire	Not Avl or Avail	Avail	• When a high frequency of misfires is concentrated in a certain cylinder, this function stops fuel injection for that cylinder. • For vehicles which support this function, stop this fuel cut using the Active Test and confirm the misfire counts to determine the malfunctioning cylinder.

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
				• Avail: "Fuel cut to prevent catalyst from overheating during misfire" available • Not Avl: "Fuel cut to prevent catalyst from overheating during misfire" not available
Catalyst OT Misfire Fuel Cut History	History of fuel cut to prevent catalyst from overheating during misfire	ON or OFF	OFF	This can be used to tell whether there was a large amount of misfires occurred at a certain cylinder.
Catalyst OT Misfire Fuel Cut Cylinder #1	Fuel cut operation of No. 1 cylinder (if certain level of misfire malfunction is detected)	ON or OFF	OFF	-
Catalyst OT Misfire Fuel Cut Cylinder #2	Fuel cut operation of No. 2 cylinder (if certain level of misfire malfunction is detected)	ON or OFF	OFF	-
Catalyst OT Misfire Fuel Cut Cylinder #3	Fuel cut operation of No. 3 cylinder (if certain level of misfire malfunction is detected)	ON or OFF	OFF	-
Catalyst OT Misfire Fuel Cut Cylinder #4	Fuel cut operation of No. 4 cylinder (if certain level of misfire malfunction is detected)	ON or OFF	OFF	-

Various Vehicle Conditions 4 (All Data)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Total Oil Level Warning Light Counter	Total oil level warning light count	Min.: 0, Max.: 255	-	-

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
IG ON Duration Time	IG ON duration time	Min.: 0 ms, Max.: 2147483647 ms	-	-
IG OFF Duration Time	IG OFF duration time	Min.: 0 ms, Max.: 2147483647 ms	-	-
Engine Start Hesitation	History of hesitation during engine start	ON or OFF	-	This item changes to ON when the engine speed does not reach 500 rpm during cranking.
Low Revolution for Engine Start	History of low engine speed after engine start	ON or OFF	-	This item changes to ON when the engine speed drops to 200 rpm or less within approximately 2 seconds of starting the engine.
Engine ECU Internal Temperature	ECM internal temperature	Min.: -40°C (-40°F), Max.: 215°C (419°F)	-	-
Engine Cooling Fan	Engine cooling fan operation status	OFF, Low or High	-	This item is displayed only for HEV Model.
Cooling Fan Duty Ratio	Electric cooling fan request duty ratio	Min.: 0%, Max.: 127.5%	-	• This item is displayed only for PHEV Model. • Active Test item [Control the Engine Cooling Fan Duty Ratio] support data.
Electric Water Pump	Electric water pump speed status	Min.: 0 rpm, Max.: 10200 rpm	-	Active Test item [Activate the Electric Water Pump] support data.

Compression (Compression)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Engine Speed Cylinder #1	Engine speed for No. 1 cylinder	Min.: 0 rpm, Max.: 51199 rpm	-	• Values for this item are only displayed when the Active Test "Check the Cylinder Compression" is performed. (51199 rpm is displayed when the Active Test is not being performed.) • This is the engine speed of No. 1 cylinder measured during fuel-cut with the engine cranking.

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
				• When there is compression loss, the engine speed of the malfunctioning cylinder increases. **HINT:** When multiple cylinders have compression loss, the engine speeds for multiple cylinders increase and it is not possible to determine which cylinders have compression loss. At this time, it is necessary to actually perform a compression measurement.
Engine Speed Cylinder #2	Engine speed for No. 2 cylinder	Min.: 0 rpm, Max.: 51199 rpm	-	• Values for this item are only displayed when the Active Test "Check the Cylinder Compression" is performed. (51199 rpm is displayed when the Active Test is not being performed.) • This is the engine speed of No. 2 cylinder measured during fuel-cut with the engine cranking. • When there is compression loss, the engine speed of the malfunctioning cylinder increases. **HINT:** When multiple cylinders have compression loss, the engine speeds for multiple cylinders increase and it is not possible to determine which cylinders have compression loss. At this time, it is necessary to actually perform a compression measurement.
Engine Speed Cylinder #3	Engine speed for No. 3 cylinder	Min.: 0 rpm, Max.: 51199 rpm	-	• Values for this item are only displayed when the Active Test "Check the Cylinder Compression" is performed. (51199 rpm is displayed when the Active Test is not being performed.) • This is the engine speed of No. 3 cylinder measured during fuel-cut with the engine cranking. • When there is compression loss, the engine speed of the malfunctioning cylinder increases. **HINT:** When multiple cylinders have compression loss, the engine speeds for multiple cylinders increase and it is not possible to determine which cylinders have compression loss. At this time, it is necessary to actually perform a compression measurement.

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Engine Speed Cylinder #4	Engine speed for No. 4 cylinder	Min.: 0 rpm, Max.: 51199 rpm	-	• Values for this item are only displayed when the Active Test "Check the Cylinder Compression" is performed. (51199 rpm is displayed when the Active Test is not being performed.) • This is the engine speed of No. 4 cylinder measured during fuel-cut with the engine cranking. • When there is compression loss, the engine speed of the malfunctioning cylinder increases. **HINT:** When multiple cylinders have compression loss, the engine speeds for multiple cylinders increase and it is not possible to determine which cylinders have compression loss. At this time, it is necessary to actually perform a compression measurement.
Average Engine Speed of All Cylinder	Average engine speed for all cylinders	Min.: 0 rpm, Max.: 51199 rpm	-	Values for this item are only displayed when the Active Test "Check the Cylinder Compression" is performed. (51199 rpm is displayed when the Active Test is not being performed.)

Air Fuel Ratio Cylinder Imbalance (Gas AF O2 Sensor)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
A/F Sensor Determination (Worst Value) Bank 1	Worst judgment value of air fuel ratio sensor (sensor 1) output	Min.: 0, Max.: 2.55	0.00	• The worst value detected during monitoring is displayed. • The value is reset when DTCs are cleared.
Engine Speed Fluctuation Average (Worst Value) Cylinder #1	Worst value of average engine speed fluctuation (cylinder 1)	Min.: 0, Max.: 2.55	0.00	• The worst value detected during monitoring is displayed. • The value is reset when DTCs are cleared.

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Engine Speed Fluctuation Average (Worst Value) Cylinder #2	Worst value of average engine speed fluctuation (cylinder 2)	Min.: 0, Max.: 2.55	0.00	• The worst value detected during monitoring is displayed. • The value is reset when DTCs are cleared.
Engine Speed Fluctuation Average (Worst Value) Cylinder #3	Worst value of average engine speed fluctuation (cylinder 3)	Min.: 0, Max.: 2.55	0.00	• The worst value detected during monitoring is displayed. • The value is reset when DTCs are cleared.
Engine Speed Fluctuation Average (Worst Value) Cylinder #4	Worst value of average engine speed fluctuation (cylinder 4)	Min.: 0, Max.: 2.55	0.00	• The worst value detected during monitoring is displayed. • The value is reset when DTCs are cleared.
A/F Sensor Determination (Worst Value) (Port) Bank 1	Worst judgment value of air fuel ratio sensor (sensor 1) output (port injection)	Min.: 0, Max.: 2.55	0.00	• The worst value detected during monitoring is displayed. • The value is reset when DTCs are cleared.
Engine Speed Fluctuation Average (Worst Value) (Port) Cylinder #1	Worst value of average engine speed fluctuation (cylinder 1, port injection)	Min.: 0, Max.: 2.55	0.00	• The worst value detected during monitoring is displayed. • The value is reset when DTCs are cleared.
Engine Speed Fluctuation Average (Worst Value) (Port) Cylinder #2	Worst value of average engine speed fluctuation (cylinder 2, port injection)	Min.: 0, Max.: 2.55	0.00	• The worst value detected during monitoring is displayed. • The value is reset when DTCs are cleared.

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Engine Speed Fluctuation Average (Worst Value) (Port) Cylinder #3	Worst value of average engine speed fluctuation (cylinder 3, port injection)	Min.: 0, Max.: 2.55	0.00	• The worst value detected during monitoring is displayed. • The value is reset when DTCs are cleared.
Engine Speed Fluctuation Average (Worst Value) (Port) Cylinder #4	Worst value of average engine speed fluctuation (cylinder 4, port injection)	Min.: 0, Max.: 2.55	0.00	• The worst value detected during monitoring is displayed. • The value is reset when DTCs are cleared.

Various Vehicle Conditions 5 (All Data)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Requested Engine Torque	Requested engine torque	Min.: 0 kW, Max.: 16383.75 kW	0 to 112 kW	-
HV Target Engine Speed	HV target engine speed	Min.: 0 rpm, Max.: 6375 rpm	0 to 6000 rpm	-
Actual Engine Torque	Actual engine torque	Min.: -32768 Nm, Max.: 32767 Nm	0 Nm: Idling (A/C off, engine warmed up, inspection mode [maintenance mode], not charge control)	-
Actual Engine Percent Torque	Actual engine percent torque	Min.: -125%, Max.: 130%	-	-
Engine Reference Torque (Fixed Value)	Engine reference torque (fixed value)	Min.: 0 Nm, Max.: 65535 Nm	-	-
Engine Friction Percent Torque	Engine friction percent torque	Min.: -125%, Max.: 130%	-	-

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Engine Driving Time	Engine driving time	Min.: 0 sec, Max.: 255 sec	0 to 255 sec	-
Request Engine Run Time	Request engine run time	Min.: 0 sec, Max.: 25.5 sec	0 to 25.5 sec	-
Judge Time Engine Ignition	Judgment time for complete explosion of ignition	Min.: 0 sec, Max.: 25.5 sec	0 to 25.5 sec	-
Judge Time Engine Output	Judgment time for time until engine output	Min.: 0 sec, Max.: 25.5 sec	0 to 25.5 sec	-
Fuel Level	Fuel Level	Empty or Not Emp	Not Emp	-
ISC Learning Value	ISC learning value	Min.: -1024 Nm, Max.: 1023.96 Nm	-7 to 20 Nm: Idling (A/C off, engine warmed up, inspection mode [maintenance mode] and not charge control)	-
ISC Learning	ISC learning	Compl or Incmpl	• Compl: ISC learned value complete • Incmpl: ISC learned value incomplete	-
F/C for Engine Stop Req	Fuel cut for engine stop request	ON or OFF	ON → OFF: Engine stopped → Engine start	-
Engine Independent	Engine independent operation	Not Opr or Operate	• Operate: Idling (engine warmed up, inspection mode [maintenance mode] and not charge control) • Not Opr: Idling (engine warmed up, inspection mode [maintenance mode] and not charge control), accelerator pedal depressed	"Not Opr" is displayed during charge control.
Racing Operation	Racing operation	Not Opr or Operate	• Operate: Idling (engine warmed up, inspection mode [maintenance mode] and not	-

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
			charge control), accelerator pedal depressed • Not Opr: Idling (engine warmed up, inspection mode [maintenance mode] and not charge control)	
Request Warm-up	Request engine warm up	Not Req or Request	-	-
Engine Independent Control	Engine independent control operation	Not Opr or Operate	-	-

Electric Water Pump (All Data)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Electric Water Pump Target Speed	Engine water pump assembly target speed	Min.: 0 rpm, Max.: 6375 rpm	-	Target motor speed of the engine water pump assembly.
Electric Water Pump Speed	Engine water pump assembly speed	Min.: 0 rpm, Max.: 6375 rpm	The Electric Water Pump Speed is the same as the Electric Water Pump Target Speed. **HINT:** • If the Electric Water Pump Speed only temporarily exceeds the Electric Water Pump Target Speed, it is not a malfunction. • If the Electric Water Pump Speed is half of the Electric Water Pump Target Speed or less for 15 seconds or more, the engine water pump assembly may be malfunctioning.	• The engine water pump assembly speed is displayed. • As the frequency signal (WPI) is 4 Hz when the engine water pump assembly is stopped to enable the ECM to detect an open or short in the signal line, the engine water pump assembly speed will be displayed as approximately 160 rpm even when the pump is stopped. • When there is an open or short in the signal line, approximately 0 rpm is displayed.

Grille Shutter (All Data)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Grille Shutter Position	Grille shutter position	Min.: 0%, Max.: 255%	0%: Open	-
Grille Shutter Control Mode	Grille shutter control mode status	Normal or Maintenance	• Normal: Normal mode • Maintenance: Maintenance mode	-
Grille Shutter Stuck Status	Grille shutter stuck status	OFF or ON	OFF	When the value is "ON", the swing grille actuator assembly is stuck.
Grille Shutter Slipping Status	Grille shutter slipping status	OFF or ON	OFF	When the value is "ON", the swing grille actuator assembly is free spinning.

Various Vehicle Conditions 6 (All Data)

Powertrain > Engine > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
All Universal Condition History	All universal condition history	Min.: 0, Max.: 255	-	-
Universal Condition 1 Judgment History	Universal condition 1 judgment history	Min.: 0, Max.: 255	-	-
Total Universal Condition 1 Judgment Time	Total universal condition 1 judgment time	Min.: -2147483 ms, Max.: 2147418 ms	-	-
Universal Condition 2 Judgment History	Universal condition 2 judgment history	Min.: 0, Max.: 255	-	-
Total Universal Condition 2 Judgment Time	Total universal condition 2 judgment time	Min.: -2147483 ms, Max.: 2147418 ms	-	-
Universal Condition 3 Judgment History	Universal condition 3 judgment history	Min.: 0, Max.: 255	-	-
Total Universal Condition 3 Judgment Time	Total universal condition 3 judgment time	Min.: -2147483 ms, Max.: 2147418 ms	-	-

ACTIVE TEST

HINT:

Using the GTS 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.

(a) Put the engine in Inspection Mode (Maintenance Mode).

Powertrain > Hybrid Control > Utility

TESTER DISPLAY
Inspection Mode

(b) Start the engine.

(c) Warm up the engine.

(d) Turn the ignition switch off.

(e) Turn the ignition switch to ON.

(f) Enter the following menus: Powertrain / Engine / Active Test.

(g) According to the display on the GTS, perform the Active Test.

Powertrain > Engine > Active Test

TESTER DISPLAY	MEASUREMENT ITEM	CONTROL RANGE	DIAGNOSTIC NOTE
Control the Injection Volume	Control the injection volume	Between -12.5% and 24.8%	• All fuel injector assemblies are tested at the same time. • Injection volume can be changed in fine gradations within the control range. • This Active Test enables the checking and graphing of the air fuel ratio sensor (sensor 1 and sensor 2) current outputs. • To perform this Active Test, enter the following menus: Powertrain / Engine / Active Test / Control the Injection Volume / Data List / A/F (O2) Sensor Current B1S1 and A/F (O2) Sensor Current B1S2. • During the Active Test, air fuel ratio feedback control and feedback learning are stopped.
Control the Injection Volume for A/F Sensor	Change injection volume	-12.5%/0%/12.5%	• All fuel injector assemblies are tested at the same time. • This Active Test enables the checking and graphing of the air fuel ratio sensor (sensor 1 and sensor 2) current outputs.

TESTER DISPLAY	MEASUREMENT ITEM	CONTROL RANGE	DIAGNOSTIC NOTE
			• To perform this Active Test, enter the following menus: Powertrain / Engine / Active Test / Control the Injection Volume / Data List / A/F (O2) Sensor Current B1S1 and A/F (O2) Sensor Current B1S2. • During the Active Test, air fuel ratio feedback control and feedback learning are stopped.
Activate the EVAP Purge VSV	Activate purge VSV control	ON/OFF	The purge VSV is opened with approximately 50% duty ratio.
Activate the Circuit Relay (Brushless)	Activate fuel pump (for low pressure side)	ON/OFF	Perform this test when the following conditions are met: • Ignition switch is ON. • Engine is stopped. • P has been selected.
Control the Fuel Pump Duty Ratio (Brushless)	Change the fuel pump speed (for low pressure side)	Low/High	Perform this test when the following conditions are met: • Ignition switch is ON. • Engine is stopped. • P has been selected.
Fuel Pump Single Phase Energization	Energizes a single phase of fuel pump control ECU	U Phase/V Phase/W Phase	Perform this test when the following conditions are met: • Ignition switch is ON. • P has been selected.
Activate the TC Terminal	Turn on and off TC and TE1 (CG) connection	ON/OFF	• Confirm that the vehicle is stopped. • ON: TC and TE1 (CG) are connected. • OFF: TC and TE1 (CG) are disconnected.
Prohibit the Idle Fuel Cut	Prohibit idling fuel cut control	Start/Stop	Perform this test when the following conditions are met: • Ignition switch is ON. • P has been selected.

TESTER DISPLAY	MEASUREMENT ITEM	CONTROL RANGE	DIAGNOSTIC NOTE
Prohibit the Catalyst OT Misfire Prevent Fuel Cut	Prohibit catalyst overheat protection fuel cut	Start/Stop Start: Fuel cut prohibited	Perform this test when the engine speed is 3000 rpm or less.
Control the ETCS Open/Close Slow Speed	Throttle actuator	• Close/Open • Start/Stop Open: Throttle valve opens slowly	Perform this test when the following conditions are met: • Ignition switch is ON. • Engine is stopped. • Accelerator pedal is fully depressed. • P has been selected.
Control the ETCS Open/Close Fast Speed	Throttle actuator	• Close/Open • Start/Stop Open: Throttle valve opens quickly	Same as above.
Control the Exhaust VVT OCV Duty Ratio Bank 1	Control cam timing oil control solenoid assembly	-100 to 100% (This value added to present cam timing oil control solenoid control duty) 100%: Maximum retard -100%: Maximum advance	• Engine stalls or idles roughly when the cam timing oil control solenoid assembly is set to 100%. • Perform this test when the following conditions are met: ◦ Engine is running. ◦ P has been selected. • DTCs related to the VVT system may be stored due to Active Test operation, but this does not indicate a malfunction.
Control the VVT-iE Opening Angle Bank 1	Control cam timing control motor with EDU assembly	0 to 65 deg	• Perform this test when the following conditions are met: ◦ Ignition switch is ON. ◦ Engine running (warmed up). ◦ P has been selected. • DTCs related to the VVT system may be stored due to Active Test operation, but this does not indicate a malfunction.
Control the EGR Step Position	Control EGR valve assembly	From 0 to 110 step	• The EGR valve is fully closed at step position 0, and fully open at step position 110.

TESTER DISPLAY	MEASUREMENT ITEM	CONTROL RANGE	DIAGNOSTIC NOTE
			• The amount of EGR gas flowing into the intake manifold varies in accordance with the EGR valve opening angle. • Perform this test when the following conditions are met: ◦ Engine is running. ◦ P has been selected. • Do not leave the EGR valve open for 10 seconds or more while performing the Active Test. • Be sure to return the EGR valve to step 0 when the Active Test is completed. • Do not open the EGR valve 30 steps or more while performing the Active Test.
Activate the Vacuum Pump	Activate leak detection pump (built into canister pump module)	ON/OFF	Perform this test when the following conditions are met: • Fuel tank pressure is 3 kPa(gauge) [0.4 psi(gauge)] or less. • Fuel-vapor containment valve is closed. *1
Activate the VSV for Vent Valve	Activate vent valve (built into canister pump module)	ON/OFF	Perform this test when the following conditions are met: • Fuel tank pressure is 3 kPa(gauge) [0.4 psi(gauge)] or less. • Fuel-vapor containment valve is closed. *1
Activate the Fuel Filler Opener	Activate fuel lid opener motor	ON/OFF	Perform this test when the following conditions are met: • Ignition switch ON. • Engine is stopped. • P has been selected.
Activate the Fuel Vapor-Containment Valve	Activate fuel vapor-containment valve	Open/Close	Perform this test when the following conditions are met: • While the engine running, drive the vehicle at a speed of 10 km/h (6mph) or more.

TESTER DISPLAY	MEASUREMENT ITEM	CONTROL RANGE	DIAGNOSTIC NOTE
			• Leave the vehicle for 30 seconds or more. • Engine is stopped. • P has been selected. *1
Control the Target Fuel Pressure Offset	Control the target fuel pressure (for high pressure side)	-12.5 to 24.8%	Perform this test when the following conditions are met: • Engine is running. • Engine speed is 3000 rpm or less.
Control the Injection Mode	Perform 2 pattern in order to operate fuel injection	• Port/Direct • Start/Stop	Perform this test when the following conditions are met: • Vehicle stopped and engine idling. • Data List item "Injection Switching Status" is "OK".
Control the Select Cylinder Fuel Cut	Selected cylinder (cylinder #1 to #4) injector fuel cut and ignition cut	• #1/#2/#3/#4 • Start/Stop	Perform this test when the following conditions are met: • Vehicle is stopped. • Engine is idling. • P has been selected. *2
Control the All Cylinders Fuel Cut	Fuel cut for all cylinders	Start/Stop	Perform this test when the following conditions are met: • Vehicle is stopped. • Engine is idling. • P has been selected.
Check the Cylinder Compression	Check the cylinder compression pressure	Start/Stop	Fuel injection and ignition stop of all cylinders. *3
Activate the Engine Oil Pressure Control Valve	Control the engine oil pressure control valve assembly	0 to 4999.92 mA	• Perform this test when the following conditions are met: ◦ Ignition switch is ON. ◦ Engine is stopped. ◦ P has been selected. • As the maximum operating current of the oil pressure control valve is 1000 mA, it is necessary to operate the oil pressure control valve within this range. (If the Active Test request value exceeds

TESTER DISPLAY	MEASUREMENT ITEM	CONTROL RANGE	DIAGNOSTIC NOTE
			1000 mA, the Active Test will be prohibited.)
D-4S (Fuel Cut)	Perform 2 pattern in order to operate fuel cut and ignition cut	• Port/Direct • #1/#2/#3/#4 • Start/Stop	Perform this test when the following conditions are met: • Vehicle stopped and engine idling. • Data List item "Injection Switching Status" is "OK".
D-4S (Injection Volume)	Perform 2 pattern in order to operate injection volume	• Port/Direct • -12.5 to 24.8%	Perform this test when the following conditions are met: • Vehicle stopped and engine idling. • Data List item "Injection Switching Status" is "OK".
D-4S (A/F Control)	Perform 2 pattern in order to operate air fuel ratio control	• Port/Direct • -12.5% or 25%	Perform this test when the following conditions are met: • Vehicle stopped and engine idling. • Data List item "Injection Switching Status" is "OK".
Control the Engine Cooling Fan	Control electric cooling fan motor	OFF/Low/High	• This item is displayed only for HEV Model. • Perform this test when vehicle is stopped.
Control the Engine Cooling Fan Duty Ratio	Control the cooling fan	0 to 100%	• This item is displayed only for PHEV Model. • Perform this test when vehicle is stopped.
Activate the Electric Water Pump	Engine water pump assembly speed control	0 rpm/3000 rpm	Perform this test when engine coolant temperature below 100°C (212°F).
Control the Grille Shutter	Control the swing grille actuator assembly	0% (open) to 100% (close)	Perform this test when the following conditions are met: • Ignition switch ON. • Auxiliary battery voltage is 10.5 to 16 V.

*1: Refer to EVAP System.

Click here INFO

*2: Control the Select Cylinder Fuel Cut

NOTICE:

- If the display of the Data List item Catalyst OT Misfire Fuel Cut item is Not Avl, perform this Active Test with the vehicle stopped and the engine idling.
- If the display of the Data List item Catalyst OT Misfire Fuel Cut item is Avail, perform this Active Test as described below.

a. Stop the engine, turn the ignition switch to ON.
b. Enter the Control the Select Cylinder Fuel Cut.
c. Select the cylinder for fuel cut (No. 1 to No. 4 cylinder) and turn the Active Test ON.
d. Start the engine.

*3: Check the Cylinder Compression

NOTICE:

Use a fully-charged HV battery.

HINT:

While the Check the Cylinder Compression Active Test is being performed, if the speed of one cylinder is more than the other cylinders, it can be determined that the compression pressure of that cylinder is lower than the other cylinders.

1. Put the engine in Inspection Mode (Maintenance Mode).

Click here INFO

2. Start the engine and warm it up.
3. Turn the ignition switch off.
4. Put the engine in Inspection Mode (Maintenance Mode).

Click here INFO

HINT:

Do not start the engine.

5. Enter the following menus: Powertrain / Engine / Active Test / Check the Cylinder Compression.

HINT:

To display the entire Data List, press the pull down menu button next to Primary. Then select Compression.

6. Push the snapshot button to turn the snapshot function on.

HINT:

Using the snapshot function, data can be recorded while performing the Active Test.

7. While the engine is not running, press the Active Test button to change Check the Cylinder Compression to "Start".

HINT:

After performing the above procedure, Check the Cylinder Compression will start. Fuel injection for all cylinders is prohibited and each cylinder engine speed measurement enters standby mode.

8. Crank the engine.

HINT:

Continue to crank the engine until the values change from the default value (51199 rpm).

9. Monitor the engine speed (Engine Speed Cylinder #1 to #4) displayed on the GTS.

NOTICE:

- If the Check the Cylinder Compression Active Test needs to be performed after it is changed to "Start" and performed once, press the Exit button to return to the Active Test menu screen. Then perform the Check the Cylinder Compression Active Test again.

- As soon as the measurements are obtained, stop the Active Test.

HINT:

- At first, the GTS display will show each cylinder's engine speed measurement to be extremely high. After the engine has started, each cylinder's engine speed measurement will change to the actual engine speed.
- If the cylinder engine speed values (Engine Speed Cylinder #1 to #4) displayed in the Data List do not change from an extremely high value, return to the Active Test menu screen, change "Check the Cylinder Compression" to "Start" and crank the engine again within 1 second.

10. Stop the engine and change the Active Test "Check the Cylinder Compression" to "Stop" after the engine stops.

NOTICE:

After performing the Active Test, make sure to check and clear the DTCs.

11. Push the snapshot button to turn the snapshot function off.
12. Select "Stored Data" on the GTS screen, select the recorded data and display the data as a graph.

HINT:

If the data is not displayed as a graph, the change of the values cannot be observed.

13. Check the change in engine speed values.

SYSTEM CHECK

(a) EVAPORATIVE 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 stored, and can detect potential malfunctions in the system. The System Check can be performed with the GTS.

(1) Enter the following menus: Powertrain / Engine / Utility / Evaporative System Check.

Powertrain > Engine > Utility

TESTER DISPLAY
Evaporative System Check

(2) Perform the System Check by referring to the table below.

GTS DISPLAY	TEST PART	CONDITION	DIAGNOSTIC NOTE
Evaporative System Check (Automatic Mode)	Perform 9 steps in order to operate EVAP key-off monitor automatically	Fuel temperature is below 35°C (95°F), etc.	• If no pending DTCs are output after performing this test, the system is functioning normally. • Refer to EVAP System Inspection Procedure. Click here INFO
Evaporative System Check (Manual Mode)	Perform 9 steps in order to operate EVAP key-off monitor manually	Fuel temperature is below 35°C (95°F), etc.	• Used to detect malfunctioning parts. • Refer to EVAP System Inspection Procedure. Click here INFO