

## ON-BOARD DIAGNOSTIC TEST [SKYACTIV-D 2.2]

id0102s4801000

### DTC Reading Procedure

1. Connect the M-MDS to the DLC-2.
2. After the vehicle is identified, select the following items from the initialization screen of the M-MDS.
  - (1) Select "Self Test".
  - (2) Select "Modules".
  - (3) Select "PCM".
3. Then, select the "Retrieve CMDTCs" and perform procedures according to the directions on the M-MDS screen.
4. Verify the DTC according to the directions on the M-MDS screen.
  - If any DTCs are displayed, perform troubleshooting according to the corresponding DTC inspection.
5. After completion of repairs, clear all DTCs stored in the PCM, while referring to "AFTER REPAIR PROCEDURE".

### Pending Trouble Code Access Procedure

1. Connect the M-MDS to the DLC-2.
2. After the vehicle is identified, select the following items from the initialization screen of the M-MDS.
  - (1) Select "Self Test".
  - (2) Select "Modules".
  - (3) Select "PCM".
3. Then, select the "Retrieve CMDTCs" and perform procedures according to the directions on the M-MDS screen.
4. Retrieve the pending trouble codes according to the directions on the M-MDS screen.

### Freeze Frame PID Data Access Procedure

1. Connect the M-MDS to the DLC-2.
2. After the vehicle is identified, select the following items from the initialization screen of the M-MDS.
  - (1) Select "Self Test".
  - (2) Select "Modules".
  - (3) Select "PCM".
3. Then, select the "Retrieve CMDTCs" and perform procedures according to the directions on the M-MDS screen.
4. Retrieve the freeze frame PID data according to the directions on the M-MDS screen.

#### Note

- Freeze frame data/snapshot data appears at the top of the help screen when the displayed DTC is selected.

#### Freeze frame data

- The freeze frame data consists of data for vehicle and engine control system operation conditions when malfunctions in the engine control system are detected and stored in the PCM.
- Freeze frame data is stored at the instant the check engine light illuminates, and only a part of the DTC data is stored.
- For the freeze frame data, if there are several malfunctions in the engine control system, the data for the malfunction which occurred initially is stored. Thereafter, if a misfire or fuel injection control malfunction occurs, data from the misfire or fuel injection control malfunction is written over the initially stored data. However, if the initially stored freeze frame data is a misfire or fuel injection control malfunction, it is not overwritten.

#### Snapshot data

- The snapshot data stores the currently detected DTC data.
- The recording timing for the freeze frame data/snapshot data differs depending on the number of DTC drive cycles.
  - For a DTC with a drive cycle number 1, only the malfunction determination data is recorded.
  - For a DTC with a drive cycle number 2, both the malfunction determination and undetermined data is recorded.

### Freeze frame data table

#### Note

- Refer to PID monitor table for confirm the engine control system operation status while the PCM does not store the DTC. (See PCM INSPECTION [SKYACTIV-D 2.2].)
- Freeze frame data items are not displayed, according to detected DTC.

—: Not applicable

Freeze frame data item	Description	Unit	Corresponding PID data monitor item
LOAD	Engine load	%	LOAD
ECT	Engine coolant temperature	°C, °F	ECT

Freeze frame data item	Description	Unit	Corresponding PID data monitor item
RPM	Engine speed	RPM	RPM
VS	Vehicle speed	KPH, MPH	VSS
TP	Throttle valve position No.1	%	—
FRP	Fuel pressure at common rail	KPa {MPa}, mBar {Bar}, psi, in H2O	FRP
CLRDIST	Mileage after DTC cleared	km, ft {mi}	—
BARO	Barometric pressure	KPa {MPa}, mBar {Bar}, psi, in H2O	BARO
VPWR	Module supply voltage	V	VPWR
AAT	Ambient air temperature	°C, °F	AMB_TEMP
APP_D	Accelerator pedal position No.1	%	APP1
APP_E	Accelerator pedal position No.2	%	APP2
TAC_PCT	Target throttle valve position	%	—
EOT	Engine oil temperature	°C, °F	EOT
FRP_A_CMD	Commanded fuel pressure at common rail	KPa {MPa}, mBar {Bar}, psi, in H2O	FRP
FRP_A	Fuel pressure at common rail	KPa {MPa}, mBar {Bar}, psi, in H2O	FRP
FRT_A	Fuel temperature at common rail	°C, °F	FRT
TCA_CINP	Manifold absolute pressure (No.1)	KPa {MPa}, mBar {Bar}, psi, in H2O	TCA_CINP
TCB_CINP	Manifold absolute pressure (No.1)	KPa {MPa}, mBar {Bar}, psi, in H2O	—
EP_1	Exhaust gas pressure sensor No.1 value	KPa {MPa}, mBar {Bar}, psi, in H2O	EXHPRES1
CACT12_SUP	Boost air temperature sensor value support	°C, °F	CACT12
EGT11	Exhaust gas temperature sensor No.1 value	°C, °F	EXHTEMP
EGT12	Exhaust gas temperature sensor No.2 value	°C, °F	EXHTEMP1
EGT13	Exhaust gas temperature sensor No.3 value	°C, °F	EXHTEMP2
DPF1_DP	Exhaust gas pressure sensor No.2 value	KPa {MPa}, mBar {Bar}, psi, in H2O	EXHPRESS_DIF

## Snapshot data table

### Note

- Refer to PID monitor table for confirm the engine control system operation status while the PCM does not store the DTC. (See PCM INSPECTION [SKYACTIV-D 2.2].)
- Snapshot data items are not displayed, according to detected DTC.

—: Not applicable

Snapshot data item	Definition	Data read/use method	Unit	Corresponding PID data monitor item
ALTT_V	Generator output voltage	—	V	ALTT V
APP1	Accelerator pedal position No.1 voltage	—	V	APP1
	Accelerator pedal position No.1		%	
APP2	Accelerator pedal position No.2 voltage	—	V	APP2
	Accelerator pedal position No.2		%	
ALT_CUR_DS D	Generator target generated current	—	A	—
BATT_RES	Battery internal resistance (estimated)	—	ohm	BATT_RES

Snapshot data item	Definition	Data read/use method	Unit	Corresponding PID data monitor item
TOTAL_TIME	Total energization time for module	The elapsed time when the PCM detected a DTC can be calculated by performing the following procedure. 1. Verify the instrument cluster PID item TOTAL_TIME. 2. Verify the snapshot data item TOTAL_TIME. 3. Subtract 2 from 1.	hh:mm:ss	—
TOTAL_DIST	Total distance	The distance traveled when the PCM detected a DTC can be calculated by performing the following procedure. 1. Verify the odometer value in the instrument cluster. 2. Verify the snapshot data item TOTAL_DIST. 3. Subtract 2 from 1.	km, ft {mi}	—
FUELSYS	Fuel system status	—	OL/CL/OL-Drive/OL-Fault/CL-Fault	—
LOAD_C	Calculated engine load	—	%	LOAD
ECT	Engine coolant temperature	—	°C, °F	ECT
MAP	Manifold absolute pressure	—	KPa {MPa}, mBar {Bar}, psi, in H2O	MAP
RPM	Engine speed	—	RPM	RPM
VSS	Vehicle speed	—	KPH, MPH	VSS
IAT	Intake air temperature No.1	—	°C, °F	IAT
MAF	Mass airflow	—	g/sec	MAF
TP1	Throttle valve position No.1	—	%	—
EG_RUN_TIME	Time from engine start	—	hh:mm:ss	—
FUEL_PRES	Fuel pressure	—	KPa {MPa}, mBar {Bar}, psi, in H2O	—
SEGRP_DSD	Target EGR valve position	—	%	—
EVAPCP	Purge solenoid valve controlled value	—	%	—
FLI	Fuel level in fuel tank	—	%	—
CLR_CNT	Number of warm-up cycle after DTC cleared	—	—	—
CLR_DIST	Mileage after DTC cleared	—	km, ft {mi}	CLR_DIST
FTP	Fuel tank pressure	—	KPa {MPa}, mBar {Bar}, psi, in H2O	—
BARO	Barometric pressure	—	KPa {MPa}, mBar {Bar}, psi, in H2O	BARO
CATT11_DSD	Estimated catalytic converter temperature	—	°C, °F	—
VPWR	Module supply voltage	—	V	VPWR
EQ_RAT11_DS D	Target equivalence ratio (lambda)	—	—	—
TP_REL	Relative throttle position	—	%	—
AAT	Ambient air temperature	—	°C, °F	AMB_TEMP
TP2	Throttle valve position No.2	—	%	—
ETC_DSD	Target throttle valve position	—	%	—
SHRTFT12	Short term fuel trim (HO2S)	—	%	—
LONGFT12	Long term fuel trim (HO2S)	—	%	—
FRP	Fuel pressure at common rail (absolute)	—	KPa {MPa}, mBar {Bar}, psi, in H2O	FRP
APP_R	Relative accelerator pedal position	—	%	—

Snapshot data item	Definition	Data read/use method	Unit	Corresponding PID data monitor item
EOT	Engine oil temperature	—	°C, °F	EOT
ECT1_SUP	Engine coolant temperature No.1 support	—	No/Yes	—
ECT2_SUP	Engine coolant temperature No.2 support	—	No/Yes	—
ECT1	Engine coolant temperature No.1	—	°C, °F	ECT
ECT2	Engine coolant temperature No.2	—	°C, °F	—
IAT12	Intake air temperature No.2	—	°C, °F	—
TAC_A_CMD	Commanded throttle valve actuator control	—	%	—
TP_A_REL	Relative throttle valve position	—	%	—
FRP_A_CMD	Commanded fuel pressure at common rail	—	KPa {MPa}, mBar {Bar}, psi, in H2O	FRP
FRP_A	Fuel pressure at common rail	—	KPa {MPa}, mBar {Bar}, psi, in H2O	FRP
FRT	Fuel temperature at common rail	—	°C, °F	FRT
TCA_CINP	Manifold absolute pressure No.1 value	—	KPa {MPa}, mBar {Bar}, psi, in H2O	TCA_CINP
TCB_CINP	Manifold absolute pressure No.1 value	—	KPa {MPa}, mBar {Bar}, psi, in H2O	—
BP_A_CMD	Commanded manifold absolute pressure No.2	—	KPa {MPa}, mBar {Bar}, psi, in H2O	MAP
BP_A_ACT	Manifold absolute pressure No.2 value	—	KPa {MPa}, mBar {Bar}, psi, in H2O	MAP
BP_A_ST	Manifold absolute pressure No.2 control status	—	Open Loop/ Closed Loop/ Fault present	MAP
EP_1	Exhaust gas pressure sensor No.1 value	—	KPa {MPa}, mBar {Bar}, psi, in H2O	EXHPRES1
CACT12	Boost air temperature sensor value	—	°C, °F	CACT12
EXHTEMP1	Exhaust gas temperature sensor No.1 value	—	°C, °F	EXHTEMP
EXHTEMP2	Exhaust gas temperature sensor No.2 value	—	°C, °F	EXHTEMP1
EXHTEMP3	Exhaust gas temperature sensor No.3 value	—	°C, °F	EXHTEMP2
EXHPRESS_DIF	Exhaust gas pressure sensor No.2 value	—	KPa {MPa}, mBar {Bar}, psi, in H2O	EXHPRESS_DIF

#### On-Board System Readiness Tests Access Procedure

1. Connect the M-MDS to the DLC-2.
2. After the vehicle is identified, select the following items from the initialization screen of the M-MDS.
  - (1) Select "Powertrain".
  - (2) Select "OBD Test Modes".
  - (3) Select "Mode 1 Powertrain Data".
  - (4) Select "PCM".
3. Then, select the "\*\*\*\*SUP" and "\*\*EVAL" PIDs in the PID selection screen.
4. Monitor those PIDs and verify that the system monitor is completed.

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**Note**

- If the on-board system readiness tests are not completed the PCM stores DTC P1000.

**PID/DATA Monitor and Record Procedure****Note**

- The PID data screen function is used for monitoring the calculated value of input/output signals in the module. Therefore, if the monitored value of the output parts is not within specification, it is necessary to inspect the monitored value of input parts corresponding to the applicable output part control. In addition, because the system does not display an output part malfunction as an abnormality in the monitored value, it is necessary to inspect the output parts individually.
- When detecting DTCs, PIDs related to a malfunctioning system may not display even if the module is normal. Therefore, if a PID is not displayed, it is necessary to verify the DTC, perform malfunction diagnosis of the DTC that was detected, and do repairs.

1. Connect the M-MDS to the DLC-2.
2. After the vehicle is identified, select the following items from the initialization screen of the M-MDS.
  - (1) Select "DataLogger".
  - (2) Select "Modules".
  - (3) Select "PCM".
3. Select the applicable PID from the PID table.
4. Verify the PID data according to the detections on the screen.

**Diagnostic Monitoring Test Results Access Procedure**

1. Connect the M-MDS to the DLC-2.
2. After the vehicle is identified, select the following items from the initialization screen of the M-MDS.
  - (1) Select "Powertrain".
  - (2) Select "OBD Test Modes".
  - (3) Select "Mode 6 On-Board Test Results".
3. Verify the diagnostic monitoring test result according to the directions on the M-MDS screen.

**Active Command Modes Procedure**

1. Connect the M-MDS to the DLC-2.
2. After the vehicle is identified, select the following items from the initialization screen of the M-MDS.
  - (1) Select "DataLogger".
  - (2) Select "Modules".
  - (3) Select "PCM".
3. Select the simulation items from the PID table.
4. Using the active command modes function, inspect the operation of each part.
  - If the operation of output parts cannot be verified after the active command mode inspection is performed, this could indicate the possibility of an open or short circuit, sticking, or operation malfunction in the output parts.