DTC P0015:00 [SKYACTIV-G 2.0, SKYACTIV-G 2.5]

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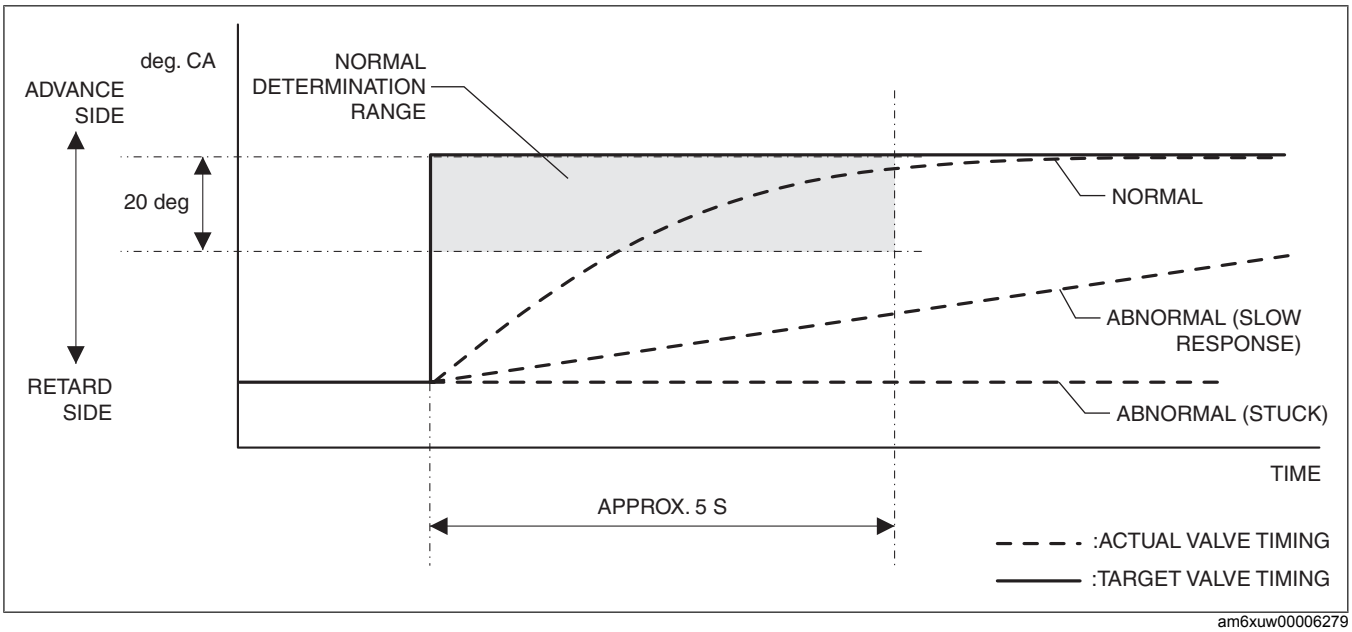
Note
- To determine the malfunctioning part, proceed with the diagnostics from “Function Inspection Using M-MDS”.

Details On DTCs

DESCRIPTION	**Hydraulic variable valve timing control system: over-retarded**	
DETECTION CONDITION	Determination conditions	• A condition in which the actual exhaust valve timing retards (excess retard) compared to the target exhaust valve timing continues for the specified period.
	Preconditions	• Battery voltage: **above 11 V** *1 • Engine speed: **5,000 rpm or less***1 • Engine coolant temperature: **60 °C {140 °F} or more** *1 • Hydraulic variable valve timing control: maximum cam advanced mode • The following DTCs are not detected: — P0335:00, P0365:00 *1: Value can be verified by displaying PIDs using M-MDS
	Malfunction determination period	• **5 s** period
	Drive cycle	• 2
	Self test type	• CMDTC self test
	Sensor used	• CKP sensor • Exhaust CMP sensor
FAIL-SAFE FUNCTION	• Not applicable	
VEHICLE STATUS WHEN DTCs ARE OUTPUT	• Illuminates check engine light.	
POSSIBLE CAUSE	• OCV malfunction — Spool valve in OCV is stuck in retard position • Hydraulic variable valve timing actuator malfunction • Timing chain malfunction — Poor assembly of timing chain — Looseness or jumping • Mis-detection of exhaust CMP sensor • Engine oil malfunction — Use of unspecified engine oil — Low engine oil level — Low engine oil pressure — Engine oil runners are clogged or have leakage • PCM malfunction	

System Wiring Diagram
- Not applicable

Function Explanation (DTC Detection Outline)
- With the preconditions met, the PCM verifies the conformity of the actual timing relative to the target valve timing. If it does not conform to the normal determination range (difference between target valve timing and actual valve timing is **20 degrees or less**) during the malfunction determination period (**approx. 5 s**), even if the target valve timing is set to the advance side, the PCM determines an excess retard malfunction condition and stores a DTC.



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Repeatability Verification Procedure

1. Warm up the engine to allow the engine coolant temperature to reach **80 °C {176 °F} or more**.
2. Shift to 2nd gear and rapidly accelerate the vehicle to **50 km/h {31 mph}** (to operate hydraulic variable valve timing control).
3. Decelerate to idling.
4. Shift to 2nd gear and rapidly accelerate the vehicle to **50 km/h {31 mph}** again.

PID Item/Simulation Item Used In Diagnosis

PID/DATA monitor item table

Item	Definition	Unit/ Condition	Condition/Specification (Reference)
VT EX_DES	Desired exhaust valve timing	° (deg)	• Displays desired exhaust valve timing
VT_EX_ACT	Actual exhaust valve timing	° (deg)	• Displays actual exhaust valve timing

Simulation item table

Item	Applicable component	Unit/ Condition	Operation
VT EX_DES	OCV	° (deg)	• Changes ° (deg) and forcibly drives/stops OCV.

Function Inspection Using M-MDS

STEP	INSPECTION	RESULTS	ACTION
1	**PURPOSE: VERIFY RELATED SERVICE INFORMATION AVAILABILITY** • Verify related Service Information availability. • Is any related Service Information available?	Yes	Perform repair or diagnosis according to the available Service Information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
2	**PURPOSE: RECORD VEHICLE STATUS AT TIME OF DTC DETECTION TO UTILIZE WITH REPEATABILITY VERIFICATION** • Has the FREEZE FRAME DATA (Mode 2)/ snapshot data been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA (Mode 2)/snapshot data on the repair order, then go to the next step. **Note** • Recording can be facilitated using the screen capture function of the PC.

STEP	INSPECTION	RESULTS	ACTION
3	**PURPOSE: VERIFY IF DIAGNOSTIC RESULT IS AFFECTED BY OTHER RELATED DTCs OCCURRING** • Perform the Pending Trouble Code Access Procedure and DTC Reading Procedure. (See ON-BOARD DIAGNOSTIC TEST [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Is the PENDING CODE/DTC P0335:00, P0365:00, P2090:00 or P2091:00 also present?	Yes	Go to the applicable PENDING CODE or DTC inspection. (See DTC P0335:00 [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) (See DTC P0365:00 [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) (See DTC P2090:00 [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) (See DTC P2091:00 [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
		No	Go to the next step.
4	**PURPOSE: VERIFY IF DIAGNOSTIC RESULT IS AFFECTED BY DTC OCCURRING FROM OIL PRESSURE SWITCH** • Perform the Pending Trouble Code Access Procedure and DTC Reading Procedure. (See ON-BOARD DIAGNOSTIC TEST [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Is the PENDING CODE/DTC P0524:00 also present?	Yes	Go to the applicable PENDING CODE or DTC inspection. (See DTC P0524:00 [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
		No	Go to the next step.
5	**PURPOSE: VERIFY CONFORMITY OF ACTUAL EXHAUST VALVE TIMING AND DETERMINE IF MALFUNCTION IS CAUSED BY OCV OR CONNECTOR RELATED** • Start the engine and idle it. • Access the following PIDs using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) — VT_EX_ACT — VT EX_DES • Perform the following: 1. Race the engine at an engine speed of **3,000 rpm or less**. 2. Run it at idle. 3. Repeat Step 1 and 2 operations above five times in succession. • Does the monitor value of the PID item VT_EX_ACT conform to the VT EX_DES PID value?	Yes	Go to Step 7.
		No	Go to the next step.
6	**PURPOSE: VERIFY IF SPOOL VALVE IN OCV IS STUCK** • Switch the ignition off. • Remove the OCV without disconnect the connector. (See OIL CONTROL VALVE (OCV) REMOVAL/ INSTALLATION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Access the simulation item VT EX_DES using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Using the simulation function, force drive the OCV. • Can the spool valve in OCV operation be verified?	Yes	Go to the troubleshooting procedure to perform the procedure from Step 1.
		No	Replace the OCV. (See OIL CONTROL VALVE (OCV) REMOVAL/ INSTALLATION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) Go to the troubleshooting procedure to perform the procedure from Step 8.

STEP	INSPECTION	RESULTS	ACTION
7	**PURPOSE: VERIFY CONNECTOR CONNECTIONS** • Start the engine. • Access the VT_EX_ACT PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Does the PID value fluctuate when the following connectors are shaken? — OCV — PCM	Yes	Repair or replace the applicable wiring harness or connector parts. Go to the troubleshooting procedure to perform the procedure from Step 8.
		No	Go to the troubleshooting procedure to perform the procedure from Step 3.

Troubleshooting Diagnostic Procedure
Intention of troubleshooting procedure

- Step 1—2
  — Perform an inspection of the hydraulic variable valve timing drive parts.
- Step 3
  — Inspect the exhaust CMP sensor detection areas for adhesion of foreign matter.
- Step 4—7
  — Perform an engine oil related inspection.
- Step 8—9
  — Verify that the primary malfunction is resolved and there are no other malfunctions.

STEP	INSPECTION	RESULTS	ACTION
1	**PURPOSE: DETERMINE INTEGRITY OF HYDRAULIC VARIABLE VALVE TIMING ACTUATOR** • Inspect the hydraulic variable valve timing actuator. (See HYDRAULIC VARIABLE VALVE TIMING ACTUATOR INSPECTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Is there any malfunction?	Yes	Replace the hydraulic variable valve timing actuator, then go to Step 8. (See ELECTRIC VARIABLE VALVE TIMING ACTUATOR, HYDRAULIC VARIABLE VALVE TIMING ACTUATOR REMOVAL/INSTALLATION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
		No	Go to the next step.
2	**PURPOSE: VERIFY ASSEMBLY CONDITION OF TIMING CHAIN** • Verify the condition of the timing chain assembly (exhaust valve timing, looseness, jumping). (See TIMING CHAIN REMOVAL/ INSTALLATION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Is there any malfunction?	Yes	Repair or replace the malfunctioning part. Assemble the timing chain using the correct timing, then go to the Step 8. (See TIMING CHAIN REMOVAL/INSTALLATION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
		No	Go to the next step.
3	**PURPOSE: VERIFY IF FOREIGN MATTER ON EXHAUST CMP SENSOR DETECTION AREA AFFECTS DIAGNOSTIC RESULTS** • Visually inspect for exhaust CMP sensor. (See CAMSHAFT POSITION (CMP) SENSOR INSPECTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Is there foreign matter such as metallic dust on the exhaust CMP sensor detection area?	Yes	Remove the foreign matter, then go to Step 8.
		No	Go to the next step.
4	**PURPOSE: INSPECT IF INSUFFICIENT HYDRAULIC PRESSURE CAUSED BY USE OF UNSPECIFIED ENGINE OIL** • Is the specified engine oil being used?	Yes	Go to the next step.
		No	Replace the engine oil with genuine motor oil, then go to Step 8. (See ENGINE OIL REPLACEMENT [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
5	**PURPOSE: INSPECT ENGINE OIL LEVEL** • Inspect the engine oil level. (See ENGINE OIL LEVEL INSPECTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Is the engine oil level sufficient?	Yes	Go to the next step.
		No	Add genuine motor oil, then go to Step 8. (See ENGINE OIL REPLACEMENT [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)

STEP	INSPECTION	RESULTS	ACTION
6	**PURPOSE: INSPECT ENGINE OIL PRESSURE** • Inspect the engine oil pressure. (See OIL PRESSURE INSPECTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Is there any malfunction?	Yes	Go to the next step.
		No	Go to Step 8.
7	**PURPOSE: VERIFY IF MALFUNCTION RELATED TO ENGINE OIL LEAK OR RESTRICTION AFFECTS DIAGNOSTIC RESULTS** • Start the engine. • Verify if there is engine oil leakage in the oil passage or restriction. • Is there engine oil leakage in the oil passage or restriction?	Yes	Repair or replace the malfunctioning part according to the inspection results. Add genuine motor oil, then go to the next step. (See ENGINE OIL REPLACEMENT [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
		No	Go to the next step.
8	**PURPOSE: VERIFICATION OF VEHICLE REPAIR COMPLETION** • Always reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the M-MDS. (See AFTER REPAIR PROCEDURE [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Implement the repeatability verification procedure. (See Repeatability Verification Procedure.) • Perform the Pending Trouble Code Access Procedure. (See ON-BOARD DIAGNOSTIC TEST [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Is the PENDING CODE for this DTC present?	Yes	Repeat the inspection from Step 1. • If the malfunction recurs, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) Go to the next step.
		No	Go to the next step.
9	**PURPOSE: VERIFY IF THERE IS ANY OTHER MALFUNCTION** • Is any other DTC or pending code stored?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
		No	DTC troubleshooting completed.