Note

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

Details On DTCs

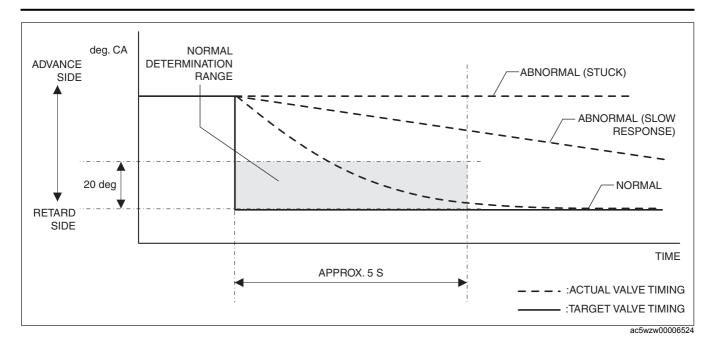
DESCRIPTION	Hydraulic variable valve timing control system: over-advanced					
	Determination	A condition in which the actual exhaust valve timing advances (excess advance)				
	conditions	compared to the target exhaust valve timing continues for the specified period.				
		*Battery voltage: above 11 V *1				
		* Engine speed: 5,000 rpm or less*1				
DETECTION CONDITION	Preconditions	 Engine coolant temperature: 60 °C {140 °F} or more *1 Hydraulic variable valve timing control: feedback mode The following DTCs are not detected: — P0335:00, P0365:00 				
	NA - IS C	*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 er	ngine light.				
	OCV malfunction					
POSSIBLE CAUSE	 — Spool valve in OCV is stuck in advanced 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 retard side, the PCM determines an excess advance malfunction condition and stores a DTC.



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

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 DIACNOSTIC TEST: [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) - Is the PENDING CODE/DTC P0335:00, P2090:00 or P2091:00 also present? 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 DIACNOSTIC TEST: [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) - Is the PENDING CODE/DTC P0524:00 also present? 5 PURPOSE: VERIFY IF DIAGNOSTIC RESULT (See DTC P2091:00 [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) - Is the PENDING CODE/DTC P0524:00 also present? 5 PURPOSE: VERIFY CONFORMITY OF ACTUAL EXHAUST VALVE TIMING AND DETERMINE! FMALEVOCTION IS CAUSED BY OCV OR CONNECTOR RELATED - Start the engine and idle it Access the following: - Nace the engine at an engine speed of 3,000 rpm or less Repeat Step 1 and 2 operations above five times in succession Does the monitor value of the PID item VT_EX_ACT - VT_EX_ACT - VT_EX_ACT - VT_EX_ACT - VT_EX_ACT - VT_EX_ACT - VT_EX_COLORNOLIC TEST [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) - 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? 6 PURPOSE: VERIFY IF SPOOL VALVE IN OCV IS STUCK - SVICK - SVICK - SVIKACTIV-G 2.0, SKYACTIV-G	STEP	INSPECTION	RESULTS	ACTION
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Is the PENDING CODE/DTC P0335:00, P0365:00, P0365:00, P2090:00 or P2091:00 also present? Separate		(See ON-BOARD DIAGNOSTIC TEST		2.5].)
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OCV.				
		_		
• Can the spool valve in OCV operation be		Can the spool valve in OCV operation be		
verified?				

STEP	INSPECTION	RESULTS	ACTION
7	PURPOSE: VERIFY CONNECTOR	Yes	Repair or replace the applicable wiring harness or
	CONNECTIONS		connector parts.
	Start the engine.		Go to the troubleshooting procedure to perform the
	• Access the VT_EX_ACT PID using the M-MDS.		procedure from Step 8.
	(See ON-BOARD DIAGNOSTIC TEST	No	Go to the troubleshooting procedure to perform the
	[SKYACTIV-G 2.0, SKYACTIV-G 2.5].)		procedure from Step 4.
	Does the PID value fluctuate when the following		• If a malfunction occurs, perform diagnosis from Step 3
	connectors are shaken?		of the malfunction diagnostic procedure.
	— OCV		
	— PCM		

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	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].)
	ACTUATOR INSPECTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Is there any malfunction?	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/	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].)
	INSTALLATION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Is there any malfunction?	No	Go to the next step.
3	PURPOSE: VERIFY IF FOREIGN MATTER ON	Yes	Remove the foreign matter, then go to Step 8.
	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?	No	Go to the next step.
4	PURPOSE: INSPECT IF INSUFFICIENT	Yes	Go to the next step.
	HYDRAULIC PRESSURE CAUSED BY USE OF UNSPECIFIED ENGINE OIL • Is the specified engine oil being used?	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	Yes	Go to the next step.
	 Inspect the engine oil level. (See ENGINE OIL LEVEL INSPECTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) Is the engine oil level sufficient? 	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	Yes	Go to the next step.
	Inspect the engine oil pressure. (See OIL PRESSURE INSPECTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) Is there any malfunction?	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	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].)
	 verify if there is engine oil leakage in the oil passage or restriction. Is there engine oil leakage in the oil passage or restriction? 	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.	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.
	(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?	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.