

## DL: Cylinder Head Temperature (CHT) Sensor

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### DL1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Are DTCS P0116, P0119, P0125, P0128, P1116, P1285, P1288, P1289, P128A, P1290, or P1299 present?

Yes	No
For DTCS P1116 or P1288, GO to <a href="#">DL2</a> . For KOEO and KOER DTCS P1289 or P1290, GO to <a href="#">DL8</a> . For continuous memory DTCS P0119, P1289, P128A, or P1290, GO to <a href="#">DL15</a> . For KOEO or continuous memory DTC P1299, GO to <a href="#">DL21</a> . For continuous memory DTCS P0125 or P0128, GO to <a href="#">DL22</a> . For continuous memory DTC P0116, GO to <a href="#">DL24</a> . For DTC P1285, GO to <a href="#">DL18</a> .	For Temperature Warning Indicator Lamp or Gauge (applications with CHT sensor only) symptom, GO to <a href="#">DL29</a> . For all others, GO to Section 4, <a href="#">Diagnostic Trouble Code (DTC) Charts and Descriptions</a> .

### DL2 SELF-TEST DTCS P1288 OR P1116: CHECK THE COOLING SYSTEM



**WARNING: TO AVOID PERSONAL INJURY DO NOT UNSCREW THE COOLANT PRESSURE RELIEF CAP WHILE THE ENGINE IS OPERATING OR HOT. THE COOLING SYSTEM IS UNDER PRESSURE. STEAM AND HOT LIQUID CAN COME OUT FORCEFULLY WHEN THE CAP IS LOOSEMED SLIGHTLY. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.**

- The DTC indicates the temperature sensor is out of self-test range. The engine is not at normal operating temperature.
- Check the vehicle coolant level.

Is the cooling system OK?

Yes	No
GO to <a href="#">DL3</a> .	REFER to the Workshop Manual Section 303-03, Engine Cooling, for loss of coolant diagnosis. REPAIR as necessary. CLEAR the DTCS. REPEAT the self-test.

### DL3 CHECK IF THE VEHICLE ENGINE STARTS

- Attempt to start the engine.

**Does the engine start and run normally?**

Yes	No
GO to <a href="#">DL6</a> .	GO to <a href="#">DL4</a> .

**DL4 CHECK THE RESISTANCE OF THE CHT SENSOR WITH THE ENGINE OFF**

**Note:** Refer to the chart at the beginning of this test for the resistance specifications.

- Ignition OFF.
- CHT Sensor connector disconnected.
- Measure the resistance between:

( + ) CHT Sensor Connector, Component Side	( - ) CHT Sensor Connector, Component Side
CHT	SIGRTN

**Is the resistance within specification?**

Yes	No
GO to <a href="#">DL5</a> .	<p>INSTALL a new CHT sensor.</p> <p>REFER to the Workshop Manual Section 303-14, Electronic Engine Controls.</p> <p>CLEAR the DTCs. REPEAT the self-test.</p>

**DL5 CHECK THE CIRCUIT FROM THE MODULE TO THE COMPONENT**

**Note:** Refer to the chart at the beginning of this test for the resistance specifications.

- CHT Sensor connector connected.
- Ignition ON, engine OFF.
- Access the PCM and monitor the CHT PID.
- Using the data collected from the previous step, compare temperature resistance measured at the sensor to the PID temperature voltage measured at the PCM.

**Does the measured value at the sensor agree with measured PID value at the PCM?**

Yes	No
The concern is elsewhere. RETURN to Section 3, <a href="#">No Diagnostic Trouble Codes (DTCs) Present Symptom Chart Index</a> , for further direction.	GO to <a href="#">DL12</a> .

**DL6 CHECK THE CHT SENSOR OPERATION**

- Run the engine until the engine temperature stabilizes.
- Verify the radiator hoses are hot and the cooling system is pressurized.
- Carry out the PCM self-test.

**Are DTCs P1116 or P1288 present?**

Yes	No

GO to [DL7](#).

The engine temperature was not stabilized.  
REPAIR any other DTCs as necessary.

## DL7 CHECK THE RESISTANCE OF THE CHT SENSOR

**Note:** Refer to the chart at the beginning of this test for the resistance specifications.

- The vehicle must be at normal operating temperature.
- Ignition OFF.
- CHT Sensor connector disconnected.
- Measure the resistance between:

( + ) CHT Sensor Connector, Component Side	( - ) CHT Sensor Connector, Component Side
CHT	SIGRTN

Is the resistance within specification?

Yes	No
GO to <a href="#">DL31</a> .	INSTALL a new CHT sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. CLEAR the DTCs. REPEAT the self-test.

## DL8 DTCS P1289 OR P1290: ACCESS THE CHT PID AND CHECK THE VOLTAGE

- Ignition ON, engine OFF.
- Access the PCM and monitor the CHT PID.

Is the voltage less than 0.2 V?

Yes	No
GO to <a href="#">DL9</a> .	GO to <a href="#">DL10</a> .

## DL9 CHECK FOR A GROUNDED CIRCUIT

- CHT Sensor connector disconnected.
- Ignition ON, engine OFF.
- Access the PCM and monitor the CHT PID.

Is the voltage greater than 4.6 V?

Yes	No
INSTALL a new CHT sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. CLEAR the DTCs. REPEAT the self-test.	GO to <a href="#">DL14</a> .

## DL10 CHECK THE CHT CIRCUIT FOR A SHORT TO VOLTAGE

- CHT Sensor connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

( + ) CHT Sensor Connector, Harness Side	( - )
CHT	Ground

Is the voltage greater than 5.5 V?

Yes	No
REPAIR the short circuit to PWR. CHECK the CHT sensor for damage. GO to <a href="#">DL11</a> .	GO to <a href="#">DL11</a> .

## DL11 CHECK THE RESISTANCE OF THE CHT SENSOR WITH THE ENGINE OFF

**Note:** Refer to the chart at the beginning of this test for the resistance specifications.

- Ignition OFF.
- CHT Sensor connector disconnected.
- Measure the resistance between:

( + ) CHT Sensor Connector, Component Side	( - ) CHT Sensor Connector, Component Side
CHT	SIGRTN

Is the resistance within specification?

Yes	No
GO to <a href="#">DL12</a> .	INSTALL a new CHT sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls.  CLEAR the DTCs. REPEAT the self-test.

## DL12 CHECK THE SIGNAL AND SIGRTN CIRCUITS FOR AN OPEN IN THE HARNESS

- PCM connector disconnected.
- Measure the resistance between:

( + ) CHT Sensor Connector, Harness Side	( - ) PCM Connector, Harness Side
CHT	CHT
SIGRTN	SIGRTN

Are the resistances less than 5 ohms?

Yes	No
GO to <a href="#">DL13</a> .	REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.

## DL13 CHECK THE SENSOR SIGNAL FOR A SHORT TO VREF

- Ignition OFF.
- PCM connector disconnected.
- Measure the resistance between:

( + ) PCM Connector, Harness Side	( - ) PCM Connector, Harness Side
CHT	VREF

Is the resistance greater than 10K ohms?

Yes	No
GO to <a href="#">DL31</a> .	REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.

## DL14 CHECK THE SENSOR SIGNAL FOR A SHORT TO GROUND

- Ignition OFF.
- PCM connector disconnected.
- Measure the resistance between:

( + ) PCM Connector, Harness Side	( - ) PCM Connector, Harness Side
CHT	SIGRTN

- Measure the resistance between:

( + ) PCM Connector, Harness Side	( - ) 12 Volt Vehicle Battery
CHT	Negative terminal

Is the resistance greater than 10K ohms?

Yes	No
GO to <a href="#">DL31</a> .	REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.

## DL15 DTCS P0119, P1289, P1290 OR P128A: INTERMITTENT CHECK

- Ignition ON, engine OFF.
- Access the PCM and monitor the CHT PID.
- While observing the PID, carry out the following:
  - Tap on the sensor to simulate road shock
  - Wiggle the sensor connector

Is there a large change in the voltage reading?

Yes	No
DISCONNECT and INSPECT the connector. If OK, INSTALL a new CHT sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls.  CLEAR the DTCs. REPEAT the self-test.	GO to <a href="#">DL16</a> .

## DL16 CHECK THE ELECTRONIC ENGINE CONTROL (EEC) WIRING HARNESS

- Access the PCM and monitor the CHT PID.
- While observing the PID, wiggle, shake, and bend small sections of the wiring harness while working from the sensor to the PCM.

Is there a large change in the voltage reading?

Yes	No
ISOLATE the concern. REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test.	GO to <a href="#">DL17</a> .

## DL17 CHECK THE PCM AND VEHICLE HARNESS CONNECTORS

- PCM connector disconnected.
- CHT Sensor connector disconnected.

Are the connectors and terminals OK?

Yes	No
GO to <a href="#">DL31</a> .	REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test.

## DL18 SELF-TEST DTC P1285: EARLY WARNING OF ENGINE OVERHEAT CONDITION



**WARNING: TO AVOID PERSONAL INJURY DO NOT UNSCREW THE COOLANT PRESSURE RELIEF CAP WHILE THE ENGINE IS OPERATING OR HOT. THE COOLING SYSTEM IS UNDER PRESSURE. STEAM AND HOT LIQUID CAN COME OUT FORCEFULLY WHEN THE CAP IS LOOSENED SLIGHTLY. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.**

**Note:** If the electric cooling fan does not operate, return to Section 4, [Diagnostic Trouble Code \(DTC\) Charts and Descriptions](#) for electric cooling fan DTC. Return to Section 3, [No Diagnostic Trouble Codes \(DTCs\) Present Symptom Chart Index](#) for symptom diagnosis.

- An engine overheat condition is sensed by the CHT sensor.
- Check the cooling system for:
  - correct coolant level
  - internal or external coolant leaks
  - blockage of the radiator
  - cooling fan operation

Is the cooling system OK?

Yes	No
GO to <a href="#">DL19</a> .	REFER to the Workshop Manual Section 303-03, Engine Cooling, for loss of coolant diagnosis.

REPAIR as necessary.
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CLEAR the DTCs. REPEAT the self-test.
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## DL19 CHECK THE OPERATION OF THE CYLINDER HEAD TEMPERATURE SENSOR

- Run the engine until the engine temperature stabilizes.
- Verify the radiator hoses are hot and the cooling system is pressurized.
- Carry out the self-test.

Is DTC P1285 present?

Yes	No
GO to <a href="#">DL20</a> .	An engine overheat temperature was not detected. REPAIR any other DTCs as necessary.

## DL20 CHECK THE RESISTANCE OF THE CHT SENSOR

**Note:** Refer to the chart at the beginning of this test for the resistance specifications.

- The vehicle must be at normal operating temperature.
- Ignition OFF.
- CHT Sensor connector disconnected.
- Measure the resistance between:

( + ) CHT Sensor Connector, Component Side	( - ) CHT Sensor Connector, Component Side
CHT	SIGRTN

Is the resistance within specification?

Yes	No
GO to <a href="#">DL31</a> .	INSTALL a new CHT sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls.  CLEAR the DTCs. REPEAT the self-test.

## DL21 SELF-TEST DTC P1299: INDICATES AN ENGINE OVERHEAT CONDITION



**WARNING: TO AVOID PERSONAL INJURY DO NOT UNSCREW THE COOLANT PRESSURE RELIEF CAP WHILE THE ENGINE IS OPERATING OR HOT. THE COOLING SYSTEM IS UNDER PRESSURE. STEAM AND HOT LIQUID CAN COME OUT FORCEFULLY WHEN THE CAP IS LOOSENED SLIGHTLY. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.**

**Note:** Refer to Section 4, [Diagnostic Trouble Code \(DTC\) Charts and Descriptions](#) for possible causes and additional DTC description information.

- Check the engine coolant level.

Is the engine coolant fill level correct?

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Yes	No
REFER to the Workshop Manual Section 303-03, Engine Cooling, to DIAGNOSE the engine overheating condition. REPAIR as necessary.	REFER to the Workshop Manual Section 303-03, Engine Cooling, to DIAGNOSE the loss of coolant. REPAIR as necessary.
CLEAR the DTCs. REPEAT the self-test.	CLEAR the DTCs. REPEAT the self-test.

## DL22 SELF-TEST DTCS P0125 OR P0128: CHECK THE ENGINE COOLANT LEVEL



**WARNING: TO AVOID PERSONAL INJURY DO NOT UNSCREW THE COOLANT PRESSURE RELIEF CAP WHILE THE ENGINE IS OPERATING OR HOT. THE COOLING SYSTEM IS UNDER PRESSURE. STEAM AND HOT LIQUID CAN COME OUT FORCEFULLY WHEN THE CAP IS LOOSENED SLIGHTLY. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.**

**Note:** DTC P0125 or P0128 indicates the engine coolant temperature has not achieved the required engine operation temperature level, since start-up within a specified amount of time.

- Check the engine coolant level.

Is the engine coolant fill level correct?

Yes	No
GO to <a href="#">DL23</a> .	REFER to the Workshop Manual Section 303-03, Engine Cooling, to DIAGNOSE the loss of coolant. REPAIR as necessary.  CLEAR the DTCs. REPEAT the self-test.

## DL23 CHECK THE SENSOR OPERATION

- Run the engine until the engine temperature stabilizes.
- Verify the radiator hoses are hot and the cooling system is pressurized.
- Access the PCM and monitor the CHT PID.

Is the temperature greater than 77°C (170.6°F)?

Yes	No
The test is complete.  CLEAR the DTCs. REPEAT the self-test.	REFER to the Workshop Manual Section 303-03, Engine Cooling, to DIAGNOSE the engine not reaching normal operating temperature.  REPAIR as necessary.  CLEAR the DTCs. REPEAT the self-test.

## DL24 DTC P0116: CHECK THE RESISTANCE OF THE CHT SENSOR WITH THE ENGINE OFF

**Note:** Verify the engine temperature is at ambient room temperature before continuing with this test. A soak period of 6 hours may be required. Refer to Section 4, [Diagnostic Trouble Code \(DTC\) Charts and Descriptions](#) for information concerning P0116.

- Ignition OFF.



- CHT Sensor connector disconnected.
- Measure the resistance between:

( + ) CHT Sensor Connector, Component Side	( - ) CHT Sensor Connector, Component Side
CHT	SIGRTN

- Refer to the chart at the beginning of this test for the resistance specifications.

**Is the resistance within specification?**

Yes	No
GO to <a href="#">DL25</a> .	INSTALL a new CHT sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls.  CLEAR the DTCs. REPEAT the self-test.

**DL25 DTC P0116: CHECK THE RESISTANCE OF THE CHT SENSOR**

**Note:** Verify the engine is at operating temperature before taking the CHT reading.

- CHT Sensor connector connected.
- Run the engine until the engine temperature stabilizes.
- Ignition OFF.
- CHT Sensor connector disconnected.
- Measure the resistance between:

( + ) CHT Sensor Connector, Component Side	( - ) CHT Sensor Connector, Component Side
CHT	SIGRTN

- Refer to the chart at the beginning of this test for the resistance specifications.

**Is the resistance within specification?**

Yes	No
The concern is not present at this time. CARRY OUT the OBD drive cycle to determine if fuel, HO2S, catalyst and misfire monitors can be executed. REFER to Section 2, <a href="#">On Board Diagnostic (OBD) Drive Cycle</a> . REPEAT the PCM self-test if necessary.	INSTALL a new CHT sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls.  CLEAR the DTCs. REPEAT the self-test.

**DL26 DTC P0298: ENGINE OIL OVER TEMPERATURE CONDITION**

**Note:** The engine oil temperature protection strategy in the PCM has been activated. This protects the engine against mechanical damage due to overheating. Refer to Section 4, [Diagnostic Trouble Code \(DTC\) Charts and Descriptions](#) for possible causes and additional DTC description information.

- Check for an overheating condition and base engine concerns.

**Are there any overheating or base engine concerns?**

Yes	No
ISOLATE the concern. REPAIR as necessary.	GO to <a href="#">DL27</a> .

CLEAR the DTCs. REPEAT the self-test.	
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## DL27 CHECK FOR CHT DTCS

- Carry out the self-test.

Are DTCs P1285, P1288, P1289 or P1299 present?

Yes	No
DISREGARD the engine oil temperature (EOT) diagnostic trouble code (DTC) at this time. ADDRESS the next DTC. GO to Section 4, <a href="#">Diagnostic Trouble Code (DTC) Charts and Descriptions</a> .	GO to <a href="#">DL28</a> .

## DL28 ROAD TEST THE VEHICLE AND MONITOR FOR ENGINE OVER TEMPERATURE

- Access the freeze frame data (if available) and record the DTC conditions.
- Access the PCM and monitor the CHT PID.
- Test drive the vehicle and allow the engine to reach normal operating temperature.
- Observe CHT PID.

Does the engine overheat?

Yes	No
REFER to the Workshop Manual Section 303-03, Engine Cooling to diagnose the overheat symptom. REPAIR as necessary.  REPAIR as necessary.  CLEAR the DTCs. REPEAT the self-test.	Unable to duplicate or identify the concern at this time.

## DL29 ENGINE TEMPERATURE WARNING INDICATOR LAMP ON OR TEMPERATURE GAUGE INDICATES HOT, BUT ENGINE IS NOT OVERHEATING

**Note:** The PCM self-test must be carried out prior to entering this pinpoint test.

Was the PCM self-test carried out prior to entering this pinpoint test?

Yes	No
GO to <a href="#">DL30</a> .	The concern is elsewhere. RETURN to Section 3, GO to Pinpoint Test <a href="#">QT</a> for further direction.

## DL30 ENGINE TEMPERATURE INDICATOR LAMP ON OR TEMPERATURE GAUGE INDICATES HOT WITH NO DTCS

**Note:** The engine temperature warning indicator (gauge or lamp) is a warning system that gives the driver information during an engine overheating condition. The PCM monitors the CHT sensor and determines if fail-safe cooling mode is needed. If fail-safe cooling mode is needed, the PCM sends a controller area network (CAN) message to the instrument cluster to signal an overheating condition. This causes the instrument cluster indicator to illuminate and forces the temperature gauge to the H (hot) zone. DTC

P1285 is stored in the PCM.

**Note:** For Engine Temperature Warning Indicator system problems, refer to the Workshop Manual Section 413-01, Instrument Cluster.

- PCM connector disconnected.
- Ignition ON, engine OFF.

**Does the engine temperature warning indicator lamp turn OFF (prove out) and/or the temperature gauge return to the normal zone with the PCM disconnected?**

Yes	No
REFER to the Workshop Manual Section 303-03, Engine Cooling, to DIAGNOSE the overheat symptom. REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test.	REFER to the Workshop Manual Section 413-01, Instrument Cluster, to DIAGNOSE the incorrect temperature gauge. REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test.

### DL31 CHECK FOR CORRECT PCM OPERATION

- Disconnect all the PCM connectors.
- Visually inspect for:
  - pushed out pins
  - corrosion
- Connect all the PCM connectors and make sure they seat correctly.
- Carry out the PCM self-test and verify the concern is still present.

**Is the concern still present?**

Yes	No
INSTALL a new PCM. REFER to Section 2, <a href="#">Flash Electrically Erasable Programmable Read Only Memory (EEPROM)</a> , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

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