

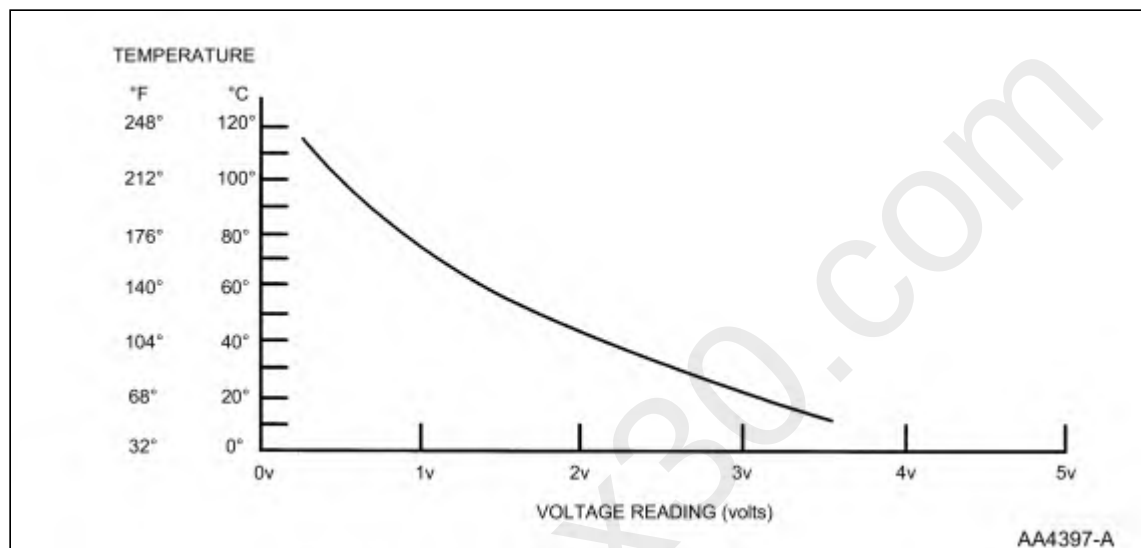
DX: Engine Coolant Temperature (ECT) Sensor

Note: Engine coolant temperature must be greater than 10°C (50°F) to pass the KOEO self-test and greater than 82°C (180°F) to pass the KOER self-test.

This pinpoint test is intended to diagnose the following:

- ECT sensor (12A648)
- harness circuits: ECT and SIGRTN
- powertrain control module (PCM) (12A650)

Voltage values calculated for VREF equals 5 volts. These values may vary by 15% due to sensor and VREF variations.

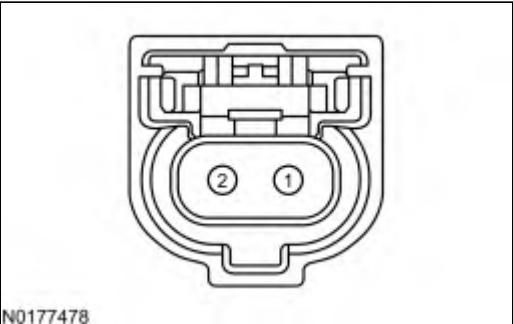
**TEMPERATURE SENSOR VOLTAGE AND RESISTANCE SPECIFICATIONS**

Temperature		Temperature Sensor Values
°C	°F	Resistance (K ohms)
120	248	1.18
110	230	1.55
100	212	2.07
90	194	2.80
80	176	3.84
70	158	5.37
60	140	7.70
50	122	10.97
40	104	16.15
30	86	24.27
20	68	37.30
10	50	58.75
0	32	95.85

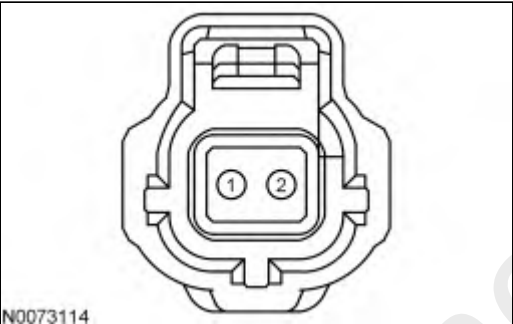
Temperature		Temperature Sensor Values
°C	°F	Resistance (K ohms)
-10	14	160.31

Engine Coolant Temperature (ECT) Sensor Connector

A



B



Vehicle	Connector	Pin	Circuit
Aviator, Corsair 2.0L, Corsair 2.3L, Escape/Kuga 1.5L, Escape/Kuga 2.0L, Explorer, Transit Connect 1.0L	A	2 1	SIGRTN ECT
All other vehicles	B	2 1	SIGRTN ECT

Powertrain Control Module (PCM) Connector

For PCM connector views or reference values, refer to Section 6, Reference Values.

Vehicle	Connector	Pin	Circuit
Aviator, Explorer 3.0L, Explorer 3.3L	306 PIN	E13 E29	SIGRTN ECT
Continental 2.0L, EcoSport 2.0L, Fusion 2.0L	198 PIN	E20 E46	SIGRTN ECT
Continental 2.7L, Continental 3.0L, Fusion 2.7L, MKZ 3.0L	198 PIN	E20 E37	SIGRTN ECT
EcoSport 1.0L Automatic Transmission	198 PIN	E20 E35	SIGRTN ECT
EcoSport 1.0L Manual Transmission	198 PIN	E10 E23	SIGRTN ECT
EcoSport 1.5L Automatic Transmission, KA 1.5L Automatic Transmission	198 PIN	E12 E33	SIGRTN ECT
EcoSport 1.5L Manual Transmission, KA 1.2L	112 PIN	E3 E23	SIGRTN ECT
Edge 2.0L, Nautilus 2.0L	198 PIN	E20 E38	SIGRTN ECT
Edge 2.7L, Nautilus 2.7L	306 PIN	E20 E29	SIGRTN ECT
F-150	306 PIN	E92 E29	SIGRTN ECT
Fusion 1.5L, MKZ 2.0L	198 PIN	E20 E36	SIGRTN ECT
KA 1.0L	128 PIN	E15 E27	SIGRTN ECT
KA 1.5L Manual Transmission	112 PIN	E23 E23	SIGRTN ECT
Ranger 2.5L	128 PIN	E3 E31	SIGRTN ECT
Transit Connect 2.0L	198 PIN	E13	SIGRTN
All other vehicles	198 PIN	E13 E38	SIGRTN ECT

DX1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Are DTCs P0116, P0117, P0118, P0119, P011E, P0125, P0128, P1117, or P111B present?

Yes	For DTCs P0125, P0128 or P111B, GO to DX10 .
	For all others, GO to DX2 .

No	For symptoms without DTCs, GO to DX2 . For all others, RETURN to Section 3, Symptom Charts for further direction.
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DX2 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 loosened slightly. Failure to follow these instructions may result in personal injury.

Note: Verify cooling fan operation before proceeding with this test.

- Check the cooling system for any loss of coolant or overheating concerns.

Is the cooling system OK?

Yes	GO to DX3 .
No	REFER to the Workshop Manual Section 303-03, Engine Cooling for cooling system diagnosis. Clear the PCM DTCs. REPEAT the self-test.

DX3 CHECK THE RESISTANCE OF THE ECT SENSOR WITH THE ENGINE OFF

Note: Refer to the Temperature Sensor Voltage And Resistance Specifications chart for the resistance specifications.

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

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

Is the resistance within specification?

Yes	GO to DX4 .
No	INSTALL a new ECT sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. RESET the keep alive memory (KAM), REFER to Section 2, Resetting The Keep Alive Memory (KAM) . REPEAT the self-test.

DX4 CHECK FOR AN OPEN CIRCUIT

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

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

Are the resistances less than 5 ohms?

Yes	GO to DX5 .
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

DX5 CHECK FOR A SHORT CIRCUIT

- Measure the resistance between:

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

- Measure the resistance between:

(+) ECT Sensor Connector, Harness Side	(-) ECT Sensor Connector, Harness Side
ECT	SIGRTN

Are the resistances greater than 10K ohms?

Yes	GO to DX6 .
No	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

DX6 CHECK FOR A SHORT TO VOLTAGE

- Ignition ON, engine OFF.
- Measure the voltage between:

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

Is any voltage present?

Yes	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.
No	GO to DX7 .

DX7 INTERMITTENT CHECK

Note: All PIDs may not be available on all vehicles.

- Ignition OFF.
- PCM connector connected.
- ECT Sensor connector connected.
- Ignition ON, engine OFF.
- Access the PCM and monitor the ECT (TEMP) and ECT1 (TEMP) PIDs.
- While observing the PID, wiggle, shake, and bend small sections of the wiring harness while working from the sensor to the PCM.
- Lightly tap on the ECT sensor and wiggle the harness and connector to simulate road shock.

Does the PID reading change?

Yes	REPAIR as necessary or INSTALL a new ECT sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. RESET the keep alive memory (KAM), REFER to Section 2, Resetting The Keep Alive Memory (KAM) . REPEAT the self-test.

No	GO to DX8 .
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DX8 CHECK ENGINE COOLANT TEMPERATURE AND AMBIENT AIR TEMPERATURE CORRELATION

Note: Check temperature values while engine is at ambient temperature, cold soak the engine for a minimum of 6 hours if necessary. Make sure the vehicle has not been in direct sunlight.

Note: All PIDs may not be available on all vehicles.

- Access the PCM and monitor the AAT (TEMP), ECT (TEMP) and ECT1 (TEMP) PIDs.

Are the temperature readings within 18°C (32.2°F) of each other?

Yes	GO to DX9 .
No	INSTALL a new ECT sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. RESET the keep alive memory (KAM), REFER to Section 2, Resetting The Keep Alive Memory (KAM) . REPEAT the self-test.

DX9 CHECK THE ECT CIRCUIT VOLTAGE CYCLING INTEGRITY

Note: All PIDs may not be available on all vehicles.

- Ignition OFF.
- ECT Sensor connector disconnected.
- Ignition ON, engine OFF.
- Access the PCM and monitor the ECT (TEMP) and ECT1 (TEMP) PIDs.
- Record the PID value.
- Connect a 5 amp fused jumper wire between the following:

Point A ECT Sensor Connector, Harness Side	Point B ECT Sensor Connector, Harness Side
ECT	SIGRTN

- Record the PID value.

Does the PID value change when the jumper is connected?

Yes	INSTALL a new ECT sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. RESET the keep alive memory (KAM), REFER to Section 2, Resetting The Keep Alive Memory (KAM) . REPEAT the self-test.
No	GO to DX12 .

DX10 CHECK FOR OTHER DTCS

- Carry out the PCM self-test.

Are any other DTCS present?

Yes	DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to Section 4, Diagnostic Trouble Code (DTC) Charts and Descriptions .
No	GO to DX11 .

DX11 CHECK FOR COOLING SYSTEM CONCERNS

- Verify the engine cooling system is operating correctly. Refer to the Workshop Manual Section 303-03, Engine Cooling.

Check for:

- the engine overheats
- the engine does not reach normal operating temperature

Is a concern present?

Yes	REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.
No	GO to DX12 .

DX12 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.
- Verify the concern is still present.

Is the concern still present?

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