



Intel® Ethernet Controller E610

How to Read the Internal Thermal Sensor Using the LANConf Utility

Application Note

Networking Division (ND)

April 2025

Intel Confidential



Revision History

Revision	Date	Comments
1.0	April 22, 2025	Initial release (Intel Confidential).



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1.0 Introduction

This Application Note provides step-by-step instructions for reading the temperature of the Intel® Ethernet Controller E610-XAT or E610-XAT, or E610-IAT, via its internal Thermal Sensor.¹

The following are the summary steps:

1. Obtain, install, and run LANConf.²
2. Read the *Global Thermal Status 1* PHY register.^{3,4}
3. Convert the hexadecimal register value to a temperature in °C.⁵

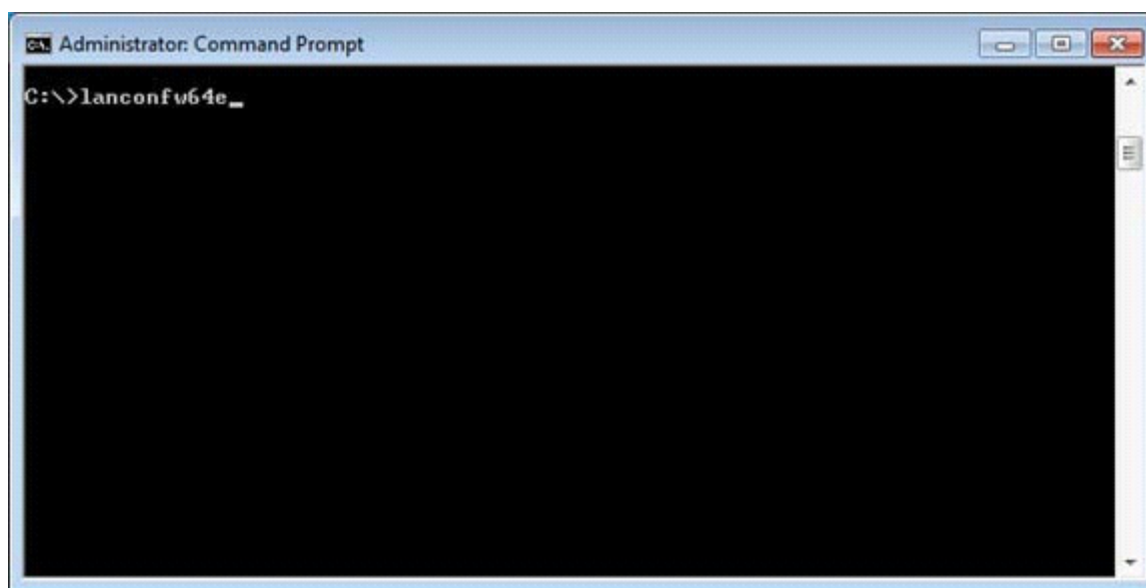
Note: Examples shown in this document are from a Windows* 64-bit operating system.

2.0 Detailed Procedure

The following is the detailed procedure:

1. Open a DOS window (and "Run as Administrator").
2. Navigate to the folder where LANConf was installed.
3. Type `lanconfw64e` and press **Enter**.

Note: Run LANConf with the **zeroinit** option (`lanconfw64e /zeroinit`), if you want to monitor the temp non-intrusively (not affect other applications).



-
1. There is only one Thermal Sense circuit and corresponding *Global Thermal Status 1* PHY register that accommodates both single-port (E610-AT) and dual-port (E610-AT2, E610-BT2) packages.
 2. LANConf is available from Intel® Network Connections Tools release 20.6 (or later), CDI/IBP document #348742, available at: <https://cdrd.intel.com/v1/dl/getContent/348742.htm>
 3. Intel® Ethernet Controller E610 Datasheet, Revision 2.0 (or later) available at: <http://www.intel.com/content/www/us/en/embedded/products/networking/ethernet-controller-E610-family-documentation.html>
 4. See the Intel® Ethernet Controller E610 Datasheet, Revision 2.0 (or later), Section 10.6.29.
 5. A 2's complement converter is available at: <http://www.exploringbinary.com/twos-complement-converter/>.

4. Select the E610-based adapter or LOM device from which you want to read the temperature, and press **Enter**.

```

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[Select a Device]

```

Num	Description	Device-Id	Location
01)	Intel(R) Ethernet Connection (2) I219-V	8086-15B8	0:31.6
02)	Intel(R) Ethernet Controller E610 for 10GBASE-T	8086-57B0	179:00.0
03)	Intel(R) Ethernet Controller E610 for 10GBASE-T	8086-57B0	179:00.1
	Exit		

```

Select = Up/Down/[Enter]  Exit = X    Blink Adapter = B    Impersonate = I
Switch Description = N    LANConf v1.42.27.0

```

5. Select **SV Menu**, and press **Enter**.

```

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[ LANConf Menu ]
Registers (MAC and PHY)
Transmit and Receive
IEEE Tests
EEPROM/FLASH
Adapter Diagnostic Tests
PCI/Bus Configuration Menu
SV Menu
Keystroke Scripts

```

```

[Action Description]
Additional SV options (advanced)

LANConf v1.42.27.0 DI:57B0 (B/D/F:179:00.0) [F1]-Help [F2]-Quick Menu

```

6. Select **Admin Queue Menu**, and press **Enter**.

```

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[ SV Menu ]
Toggle I/O Mode (Current = Mem Map)
Register Scripts
Advanced Cable Diagnostics
Set Link Mode (Current: Copper)
Show Ult Data
IOV VMM Menu
Admin Queue Menu
Reset Menu
PHY SV Menu
DDP Package
Update Minimum Security Revision
FW Debug
CGU Menu

[Action Description]
TX/RX Admin Queue commands

LANConf v1.42.27.0 DI:57B0 (B/D/F:179:00.0) [F1]-Help [F2]-Quick Menu

```

7. Select **Specific Opcode 0682**, with SI, BUF, DF as 1. and press **Enter**.

```

[Admin Queue - TX [H: 0x0, T: 0x0]]

Opcode          0682          Postpone: No
                F E S B V R L - - - - V E C D
                E I I U F D B      F R M D
                F C      E R P
Flags           0 0 1 1 0 1 0 0 0 0 0 0 0 0 0 0
Data len        0010
Return Value    0000
Cookie High     00000000
Cookie Low      00000000
Param 0         11290000
Param 1         00000000
Data Address High 00000000
Data Address Low  00000000

<- Prev Page [PgUp]          1/2          [PgDn] Next Page ->

[Commands]
[F3]=save desc.  [F5]=edit buffer  [F7]=clear desc.  [F10]=send
[F4]=load desc.  [F6]=load buffer  [F8]=clear buffer  [ESC]=quit

LANConf v1.42.24.2 DI:57B0 (B/D/F:52:00.0) [F1]-Help [F2]-Quick Menu

```

8. Select Specific Data Len as 0010, and press **Enter**.

```

[Admin Queue - TX [H: 0x0, T: 0x0]]
Opcode          0000                      Postpone: No
               F E S B V R L - - - - V E C D
               E I I U F D B           F R M D
               F C                     E R P
Flags          0 0 1 1 0 1 0 0 0 0 0 0 0 0 0 0
Data len       0000
Return Value   0000
Cookie High    0000
Cookie Low     0000
Param 0        0000
Param 1        0000
Data Address High 0000
Data Address Low 00000000

Hex: 0010
Bin: 0000 0000 0000 0000
Bit# 12 08 04 00
[ENTER]=save [ESC]=quit

← Prev Page [PgUp]          1/2          [PgDn] Next Page →

[Commands]
[F3]=save desc. [F5]=edit buffer [F7]=clear desc. [F10]=send
[F4]=load desc. [F6]=load buffer [F8]=clear buffer [ESC]=quit

LANConf v1.42.27.0 DI:57B0 (B/D/F:179:00.0) [F1]-Help [F2]-Quick Menu
  
```

9. And Param 0 as 11290000, and press **Enter**.

```

[Admin Queue - TX [H: 0x0, T: 0x0]]
Opcode          0000                      Postpone: No
               F E S B V R L - - - - V E C D
               E I I U F D B           F R M D
               F C                     E R P
Flags          0 0 1 1 0 1 0 0 0 0 0 0 0 0 0 0
Data len       0010
Return Value   0000
Cookie High    00000000
Cookie Low     00000000
Param 0        00000000
Param 1        00000000
Data Address High 00000000
Data Address Low 00000000

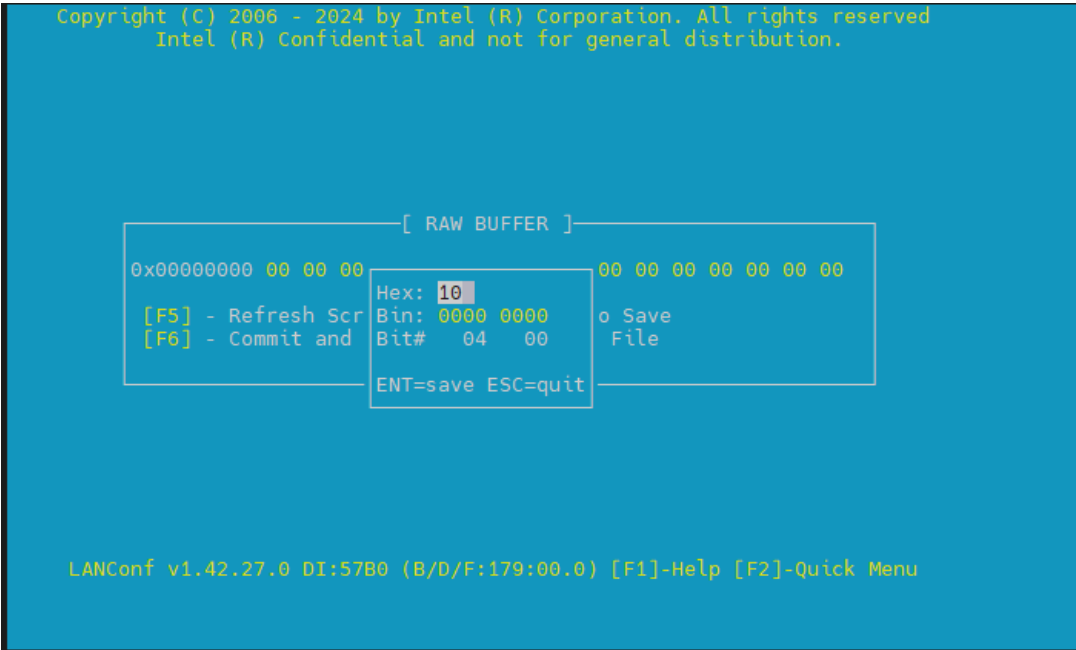
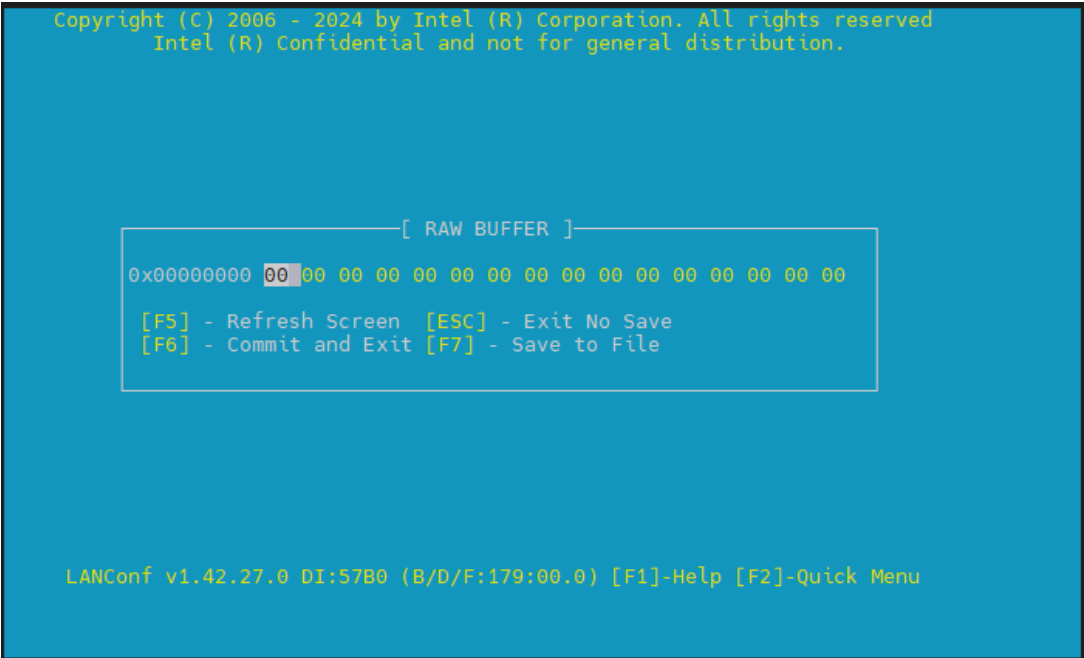
Hex: 11290000
Bin: 0000 0000 0000 0000 0000 0000 0000 0000
Bit# 28 24 20 16 12 08 04 00
[ENTER] on hex=save [ESC]=quit no save

← Prev Page [PgUp]

[Commands]
[F3]=save desc. [F5]=edit buffer [F7]=clear desc. [F10]=send
[F4]=load desc. [F6]=load buffer [F8]=clear buffer [ESC]=quit

LANConf v1.42.27.0 DI:57B0 (B/D/F:179:00.0) [F1]-Help [F2]-Quick Menu
  
```

10. Then F5 for RAW buffer data, and fill out the on the 3rd 10 for Port 0 or 11 for Port 1 and then F6 to send.



```

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[ RAW BUFFER ]
0x00000000 00 00 10 01 00 00 00 00 00 00 00 00 00 00 00
[F5] - Refresh Screen [ESC] - Exit No Save
[F6] - Commit and Exit [F7] - Save to File

LANConf v1.42.24.2 DI:57B0 (B/D/F:52:00.0) [F1]-Help [F2]-Quick Menu

```

11. Then send the command by F10.

```

[Admin Queue - TX [H: 0x0, T: 0x0]]
Opcode          0682                               Postpone: No
               F E S B V R L - - - - V E C D
               E I I U F D B           F R M D
               F C                     E R P
Flags           0 0 1 1 0 1 0 0 0 0 0 0 0 0 0 0
Data len        0010
Return Value    0000
Cookie High     00000000
Cookie Low      00000000
Param 0         11290000
Param 1         00000000
Data Address High 00000000
Data Address Low  00000000

← Prev Page [PgUp]           1/2           [PgDn] Next Page →

[Commands]
[F3]=save desc.  [F5]=edit buffer  [F7]=clear desc.  [F10]=send
[F4]=load desc.  [F6]=load buffer  [F8]=clear buffer [ESC]=quit

LANConf v1.42.27.0 DI:57B0 (B/D/F:179:00.0) [F1]-Help [F2]-Quick Menu

```

12. Go to next page and if there are no errors then check buffer.

```

[Admin Queue - TX WB [H: 0x0, T: 0x0]]
Opcode          0682                               Postpone: No
               F E S B V R L - - - - V E C D
               E I I U F D B           F R M D
               F C                       E R P
Flags           0 0 1 1 0 1 0 0 0 0 0 0 0 0 1 1
Data len        0010
Return Value     0000
Cookie High     00000000
Cookie Low      00000000
Param 0         11290000
Param 1         00000000
Data Address High 00000000
Data Address Low  00000000

← Prev Page [PgUp]                2/2                [PgDn] Next Page →

[Commands]
[F3]=save desc.   [F5]=edit buffer  [F7]=clear desc.  [F10]=send
[F4]=load desc.  [F6]=load buffer  [F8]=clear buffer [ESC]=quit

LANConf v1.42.27.0 DI:57B0 (B/D/F:179:00.0) [F1]-Help [F2]-Quick Menu

```

13. Use F5 to access Buffer, and the temp value is the first Byte in this case 0x49 that is 73°C.

```

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[ RAW BUFFER ]
0x00000000 49 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
[F5] - Refresh Screen  [ESC] - Exit No Save
                        [F7] - Save to File

LANConf v1.42.24.2 DI:57B0 (B/D/F:52:00.0) [F1]-Help [F2]-Quick Menu

```

Another option is to read the PHY register. Based on MTD API the temperature is stored in 0xDB0C register on page 3. You need to enter the same menu as on X550, then set up the register data:

1. Select **Registers <MAC and PHY>**, and press **Enter**.

```
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[ LANConf Menu ]
Registers (MAC and PHY)
Transmit and Receive
IEEE Tests
EEPROM/FLASH
Adapter Diagnostic Tests
PCI/Bus Configuration Menu
SV Menu
Keystroke Scripts

[Action Description]
View/Edit the MAC and PHY registers

LANConf v1.42.27.0 DI:57B0 (B/D/F:179:00.0) [F1]-Help [F2]-Quick Menu
```

2. Select **PHY Registers**, and press **Enter**.

```
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[ Register Menu - IXGBE ]
General Registers
NVM Registers
Interrupt Registers
Transmit and Receive Registers
Statistics Registers
Management Registers
Packet Buffer FIFO Menu
PCI-E Registers
MAC Registers
PHY Registers
Diagnostic Registers
Specific MAC Offset Location
Specific Device Memory Location
Specific System Memory Location
Show MSIx Memory
Alternate RAM
Dump MAC Registers

[Action Description]
View/Edit the PHY Registers

LANConf v1.42.27.0 DI:57B0 (B/D/F:179:00.0) [F1]-Help [F2]-Quick Menu
```

3. Select Specific **Copper/MDIO PHY** Register, and press Enter.

```
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[ PHY Registers Menu ]
Formatted Copper/MDIO Phy Registers
Raw Copper/MDIO PHY Registers
Specific Copper/MDIO PHY Register
Dump PHY registers
Specific MAUI Phy Register

[Action Description]
Read/Write a specific Copper/MDIO PHY Device register

LANConf v1.42.27.0 DI:57B0 (B/D/F:179:00.0) [F1]-Help [F2]-Quick Menu
```

4. Select **PHY Page 003**, and press **Enter**.

```
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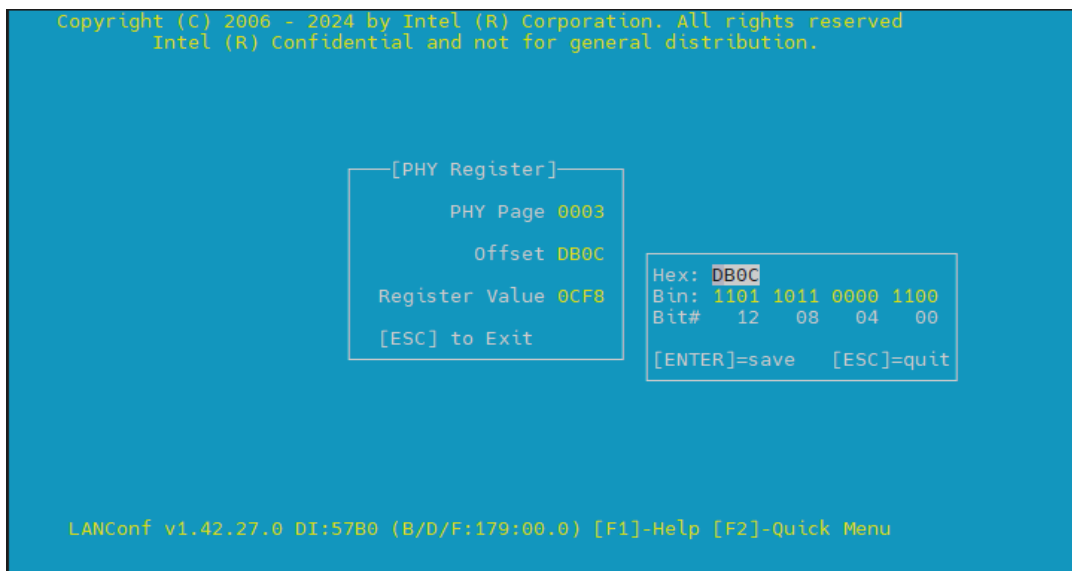
[PHY Register]
PHY Page 0001
Offset 0000
Register Value 2040
[ESC] to Exit

Hex: 0003
Bin: 0000 0000 0000 0001
Bit# 12 08 04 00

[ENTER]=save [ESC]=quit

LANConf v1.42.27.0 DI:57B0 (B/D/F:179:00.0) [F1]-Help [F2]-Quick Menu
```

5. Select **Offset**, type "DB0C", and press **Enter**.



6. Then the user need to calculate using the equations below.

```

/* convert 12-bit signed integer to 32-bit */
temp &= 0xFFF;
temp32 = (temp & 0x800) ? (0xFFFFF000 | (MTD_U32)temp) : (MTD_U32)temp;
stemp32 = (MTD_32)temp32;

/* convert to Celsius, ref to TESNE doc but scale up 10000 to avoid float type */
tesneCelsius = (stemp32 * 905 + 1122000) / 10000;

```

7. This is how it looks like for value read.

```

/* Example calculation for temp = 0xe58 */
/* temp = 0xe58 -> 12-bit signed integer = -424 (0xFFFFE58 in 32-bit signed) */
/* stemp32 = -424 */
/* tesneCelsius = (-424 * 905 + 1122000) / 10000 = 73°C */

```



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