



ERX610

5th/4th Gen Intel® Xeon® Scalable Family
User's Manual

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FCC and DOC Statement on Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio TV technician for help.

Notice:

1. The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
2. Shielded interface cables must be used in order to comply with the emission limits.

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About this Manual

This manual can be downloaded from the website.

The manual is subject to change and update without notice, and may be based on editions that do not resemble your actual products. Please visit our website or contact our sales representatives for the latest editions.

Warranty

1. Warranty does not cover damages or failures that occur from misuse of the product, inability to use the product, unauthorized replacement or alteration of components and product specifications.
2. The warranty is void if the product has been subjected to physical abuse, improper installation, modification, accidents or unauthorized repair of the product.
3. Unless otherwise instructed in this user's manual, the user may not, under any circumstances, attempt to perform service, adjustments or repairs on the product, whether in or out of warranty. It must be returned to the purchase point, factory or authorized service agency for all such work.
4. We will not be liable for any indirect, special, incidental or consequential damages to the product that has been modified or altered.

Static Electricity Precautions

It is quite easy to inadvertently damage your PC, system board, components or devices even before installing them in your system unit. Static electrical discharge can damage computer components without causing any signs of physical damage. You must take extra care in handling them to ensure against electrostatic build-up.

1. To prevent electrostatic build-up, leave the system board in its anti-static bag until you are ready to install it.
2. Wear an antistatic wrist strap.
3. Do all preparation work on a static-free surface.
4. Hold the device only by its edges. Be careful not to touch any of the components, contacts or connections.
5. Avoid touching the pins or contacts on all modules and connectors. Hold modules or connectors by their ends.



Important:

Electrostatic discharge (ESD) can damage your processor, disk drive and other components. Perform the upgrade instruction procedures described at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis. If a wrist strap is unavailable, establish and maintain contact with the system chassis throughout any procedures requiring ESD protection.

Safety Measures

- To avoid damage to the system, use the correct AC input voltage range.
- To reduce the risk of electric shock, unplug the power cord before removing the system chassis cover for installation or servicing. After installation or servicing, cover the system chassis before plugging the power cord.

About the Package

The package contains the following items. If any of these items are missing or damaged, please contact your dealer or sales representative for assistance.

- ERX610-C741 Motherboard
- 2 M.2 Screw
- 2 M.2 Standoff
- 1 IO Shield
- 1 Serial ATA data cable (Length: 500mm)
- 1 Cooler carrier

The board and accessories in the package may not come similar to the information listed above. This may differ in accordance with the sales region or models in which it was sold. For more information about the standard package in your region, please contact your dealer or sales representative.

Before Using the System Board

When installing the system board in a new system, you will need at least the following internal components.

- Memory module
- Storage device such as a hard disk drive.
- Power supply

External system peripherals may also be required for navigation and display, including at least a keyboard, a mouse and a video display monitor.

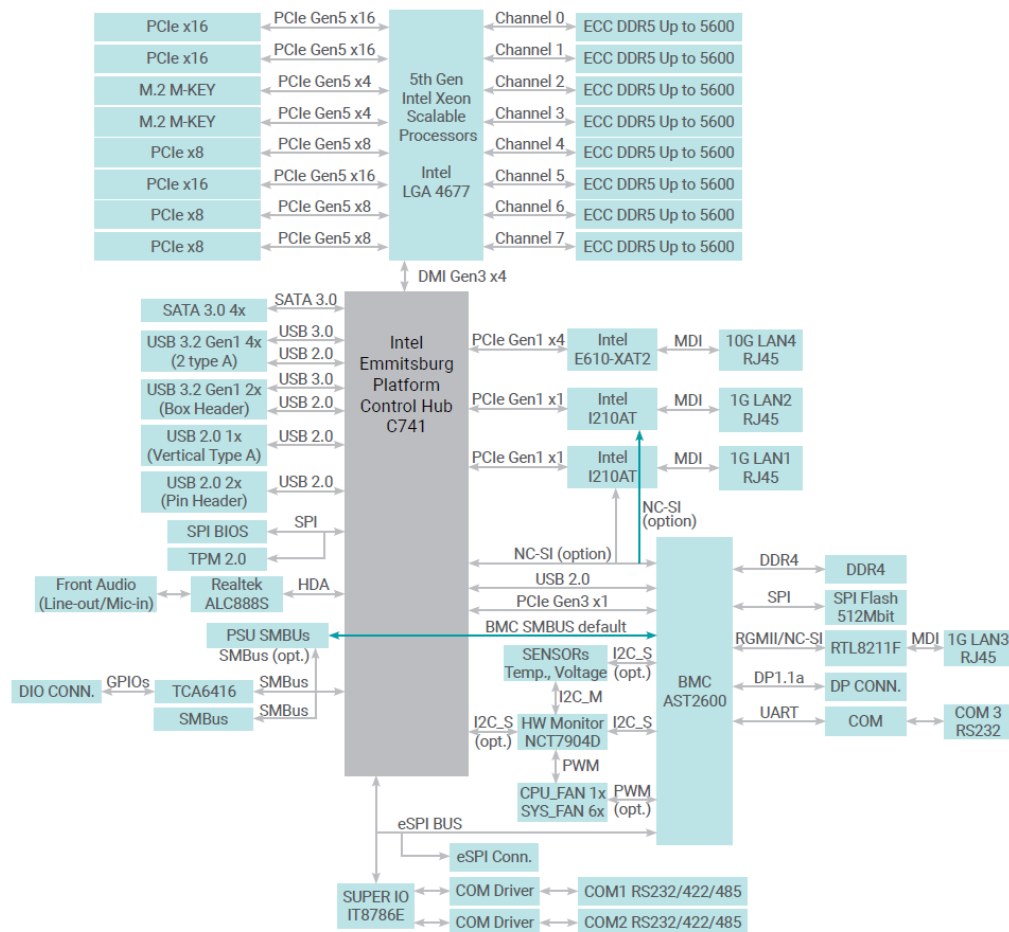
Chapter 1 - Introduction

► Specifications

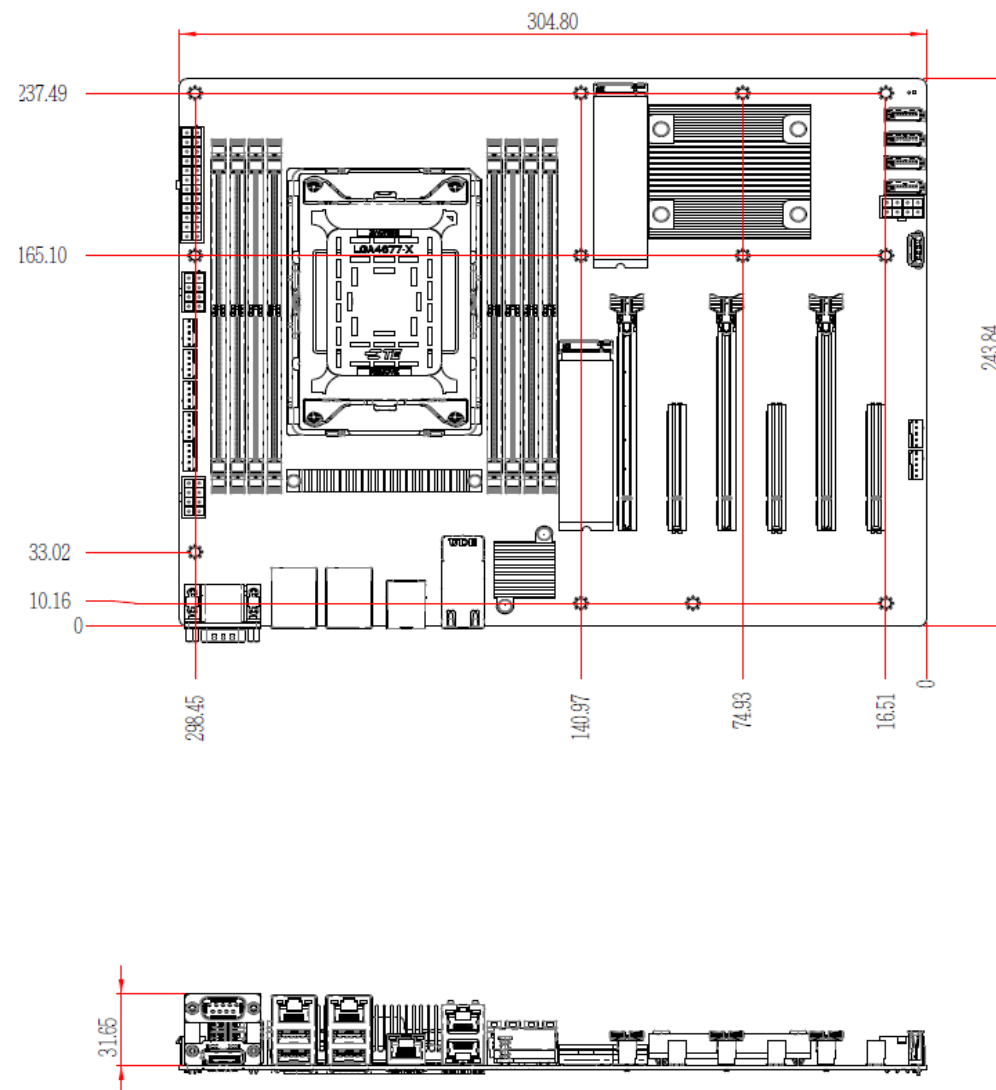
SYSTEM	Processor	5th Generation Intel® Xeon® Scalable Processor Family, LGA 4677 Socket, TDP upto 270W: Intel® Xeon® Gold 6548Y+ Processor (32 Cores, 60 MB Cache, up to 4.1 GHz); 250W Intel® Xeon® Gold 6548N Processor (32 Cores, 60 MB Cache, up to 4.1 GHz); 250W Intel® Xeon® Gold 6538N Processor (32 Cores, 60 MB Cache, up to 4.1 GHz); 205W Intel® Xeon® Gold 6530 Processor (32 Cores, 160 MB Cache, up to 4 GHz); 270W Intel® Xeon® Gold 6526Y Processor (16 Cores, 37.5 MB Cache, up to 3.9 GHz); 195W Intel® Xeon® Gold 5520+ Processor (28 Cores, 52.5 MB Cache, up to 4 GHz); 205W Intel® Xeon® Gold 5515+ Processor (8 Cores, 22.5 MB Cache, up to 4.1 GHz); 165W Intel® Xeon® Silver 4516Y+ Processor (24 Cores, 45 MB Cache, up to 3.7 GHz); 185W Intel® Xeon® Silver 4514Y Processor (16 Cores, 30 MB Cache, up to 3.4 GHz); 150W Intel® Xeon® Silver 4510 Processor (12 Cores, 30 MB Cache, up to 4.1 GHz); 150W Intel® Xeon® Silver 4510T Processor (12 Cores, 30 MB Cache, up to 3.7 GHz); 115W Intel® Xeon® Silver 4509Y Processor (8 Cores, 22.5 MB Cache, up to 4.1 GHz); 125W 4th Generation Intel® Xeon® Scalable Processor Family, LGA 4677 Socket, TDP upto 270W: Intel® Xeon® Gold 6448Y Processor (32 Cores, 60 MB Cache, up to 4.10 GHz); 225W Intel® Xeon® Gold 6438N Processor (32 Cores, 60 MB Cache, up to 3.60 GHz); 205W Intel® Xeon® Gold 6430 Processor (32 Cores, 60 MB Cache, up to 3.40 GHz); 270W Intel® Xeon® Gold 6428N Processor (32 Cores, 60 MB Cache, up to 3.80 GHz); 185W Intel® Xeon® Gold 6426Y Processor (16 Cores, 37.5 MB Cache, up to 4.10 GHz); 185W Intel® Xeon® Gold 6418H Processor (24 Cores, 60 MB Cache, up to 4.00 GHz); 185W Intel® Xeon® Gold 5420+ Processor (28 Cores, 52.5 MB Cache, up to 4.10 GHz); 205W Intel® Xeon® Gold 5418N Processor (24 Cores, 45 MB Cache, up to 3.80 GHz); 165W Intel® Xeon® Gold 5418Y Processor (24 Cores, 45 MB Cache, up to 3.80 GHz); 185W Intel® Xeon® Gold 5415+ Processor (8 Cores, 22.5 MB Cache, up to 4.10 GHz); 150W Intel® Xeon® Silver 4416+ Processor (20 Cores, 37.5 MB Cache, up to 3.90 GHz); 165W Intel® Xeon® Silver 4410T Processor (10 Cores, 26.25 MB Cache, up to 4.00 GHz); 150W Intel® Xeon® Silver 4410Y Processor (12 Cores, 30 MB Cache, up to 3.90 GHz); 150W
	Chipset	Intel® C741 Chipset
	Memory	8 x ECC-RDIMM up to 1024GB DDR5 Max. 5600MHz
	BIOS	Insyde
GRAPHICS	Controller	BMC AST2600
	Single Display	DP
EXPANSION	Interface	3 x PCIe x16 (Gen 5) 3 x PCIe x8 (Gen5) 2 x M.2 M key 2280

AUDIO	Audio Codec	Realtek ALC888S
ETHERNET	Controller	2 x Intel® I210AT + 2 x Intel® E610-XAT2 IPMI: RTL8211F
REAR I/O	Serial	1 x RS-232/422/485 (DB-9)
	Ethernet	2 x GbE + 2 x 10GbE 1 x Dedicated IPMI LAN
	USB	4 x USB 3.2 Gen1
	Display	1 x DP
INTERNAL I/O	Serial	1 x RS-232/422/485
	USB	2 x USB 3.2 Gen1 2 x USB 2.0 1 x Vertical USB 2.0
	Audio	1 x Front Audio
	DIO	16-bit DIO
	SATA	4 x SATA 3.0 RAID 0/1/5/10
	SMBus	1 x SMBus
SECURITY	TPM	TPM 2.0
POWER	Type	ATX
ENVIRONMENT	Temperature	Operating: 0 to 60°C
MECHANICAL	Dimensions	305 x 244 mm
	Height	PCB: TBD Top Side: TBD Bottom Side: TBD

► Block Diagram

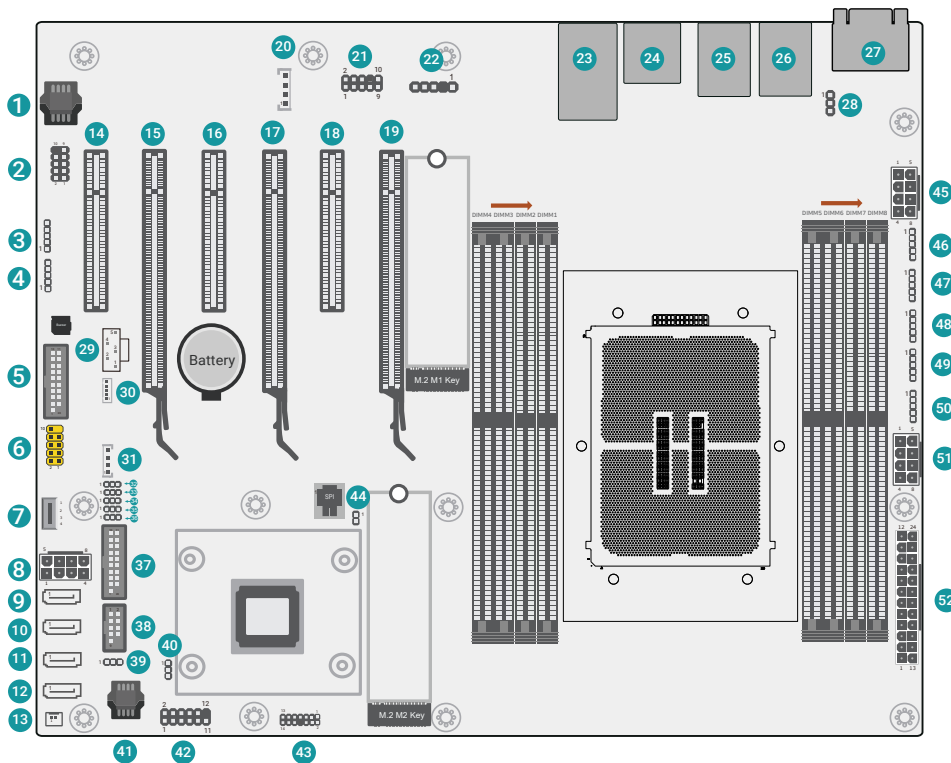


► Dimension



Chapter 2 - Hardware Installation

► Board Layout



- | | |
|----------------|--------------------------------|
| 1 BMC Flash | 21 Front Audio |
| 2 COM3 | 22 S/PDIF |
| 3 System Fan4 | 23 ▲10G LAN1
▼10G LAN2 |
| 4 System Fan3 | 24 LAN3 |
| 5 USB3 / USB2 | ▲LAN2
▼USB2_3/4
USB3_3/4 |
| 6 USB2 | ▲LAN1
▼USB2_1/2
USB3_1/2 |
| 7 USB 2.0_P9 | ▲COM1
▼DP |
| 8 2x4 12V_CONN | 28 COM1 RI Select |
| 9 SATA0 | 29 PSU SMBus |
| 10 SATA1 | 30 SMBus Header |
| 11 SATA2 | 31 DIO Power |
| 12 SATA3 | 32 DIO Power Select (5V_DIO) |
| 13 RTC Header | 33 DIO signal PU/PD Select |
| 14 PCIe x8 | 34 DIO signal PU/PD Select |
| 15 PCIe x16 | 35 DIO signal PU/PD Select |
| 16 PCIe x8 | 36 DIO signal PU/PD Select |
| 17 PCIe x16 | 37 DIO |
| 18 PCIe x8 | 38 COM2 |
| 19 PCIe x16 | 39 COM2 RI Select |
| 20 BMC UART | 40 Clear CMOS |

41	BIOS Flash
42	Front Panel
43	ESPI Debug Header
44	Case Open
45	2x4 12V_CONN
46	CPU FAN
47	System Fan1
48	System Fan2
49	System Fan5
50	System Fan6
51	2x4 12V_CONN
52	2x12 ATX CONN

► CPU

Installing the CPU, Fan and Cooler

The system board is equipped with a surface mount LGA 4677 socket.
This socket is exclusively designed for installing a LGA 4677 packaged Intel CPU.

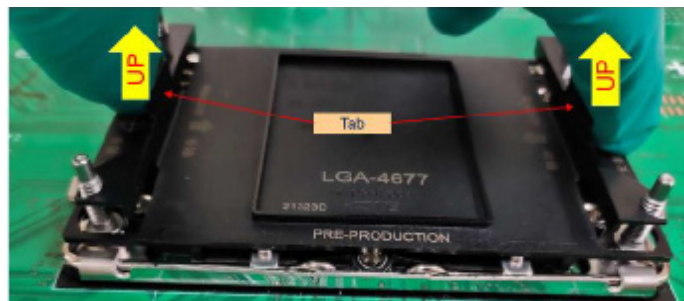


Important:

- Before you proceed, make sure:
 - the LGA 4677 socket comes with a protective cover,
 - the protective cover is not damaged and the socket's contact pins are not bent.
 If the protective cover is missing or contact pins are damaged, contact your dealer immediately.
- Make sure to keep the protective cover. RMA requests will be accepted and processed only if the LGA 4677 socket comes with the protective cover.

Step 1:

To remove the cover, press both tabs inward with your fingers.

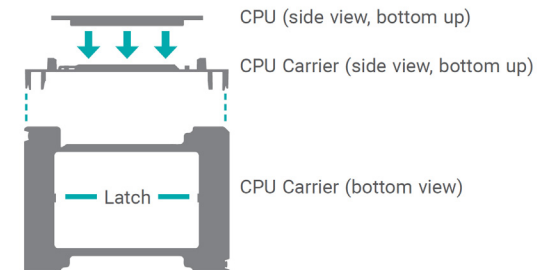
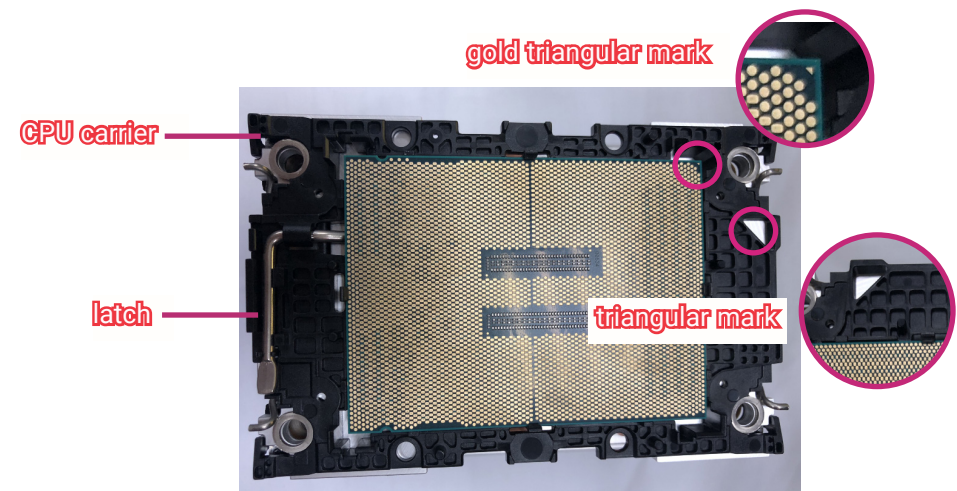


CAUTION:

The CPU must be kept cool by using a CPU fan with heat sink.
Without sufficient air circulation across the CPU and heat sink, the CPU will overheat damaging both the CPU and system board.

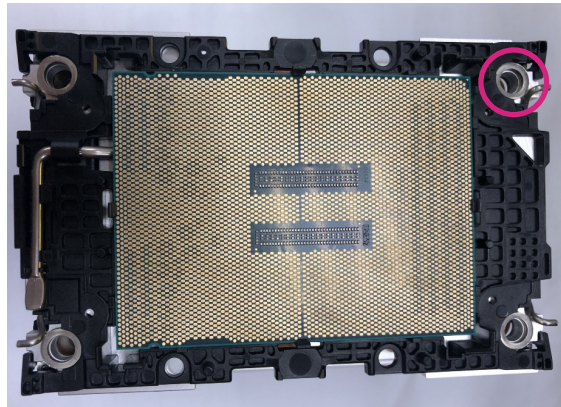
Step 2:

To insert the CPU into the CPU carrier, please first locate the gold triangular mark on the CPU. The triangular mark must align with the triangular corner of the CPU carrier shown on the photo. Without touching the pins, press the CPU onto the carrier until the CPU is retained by the latch.

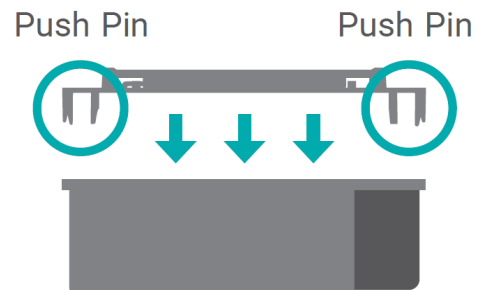


Step 3:

1. Before placing the CPU carrier assembly onto the heatsink, apply thermal paste to the heatsink contact surface. The thermal compound will spread evenly once the CPU carrier assembly is installed.
2. Some heatsinks come with a patch of pre-applied thermal paste. Do not apply thermal paste if the fan with a heatsink already has a patch of thermal paste on its underside. Peel the strip that covers the paste before you place the CPU on top of the heatsink.
3. Place the CPU carrier assembly on top of the heatsink. Align mounting hole #1 with the corresponding guide post on the heatsink. Press the push pins down until a “click” sound is heard, indicating that the carrier is securely locked in place..

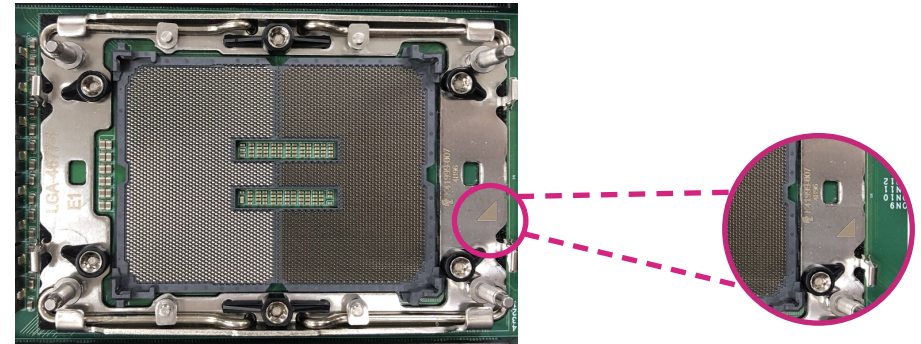


mounting hole #1



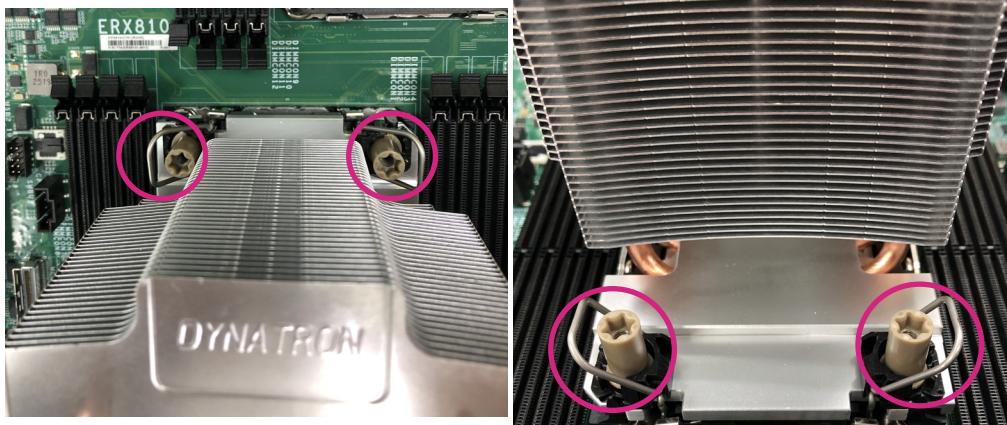
Step 4:

Align the Pin 1 triangle on the CPU carrier with the Pin 1 marker on the socket. Carefully place the CPU/heatsink assembly onto the socket.



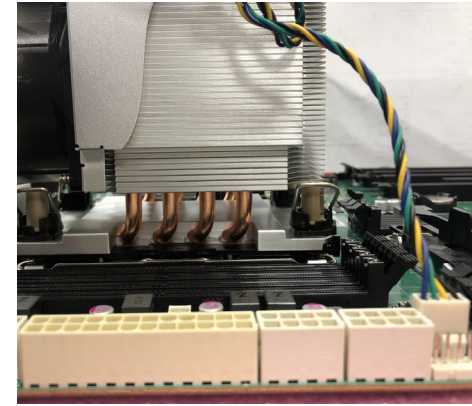
Step 5:

Carefully place the CPU/heatsink assembly onto the socket. Align the four retention clips with the CPU socket frame. Press the clips outward until the hooks latch onto the outer edges of the socket frame, tighten the 4 screws to secure the heatsink assembly firmly in place.



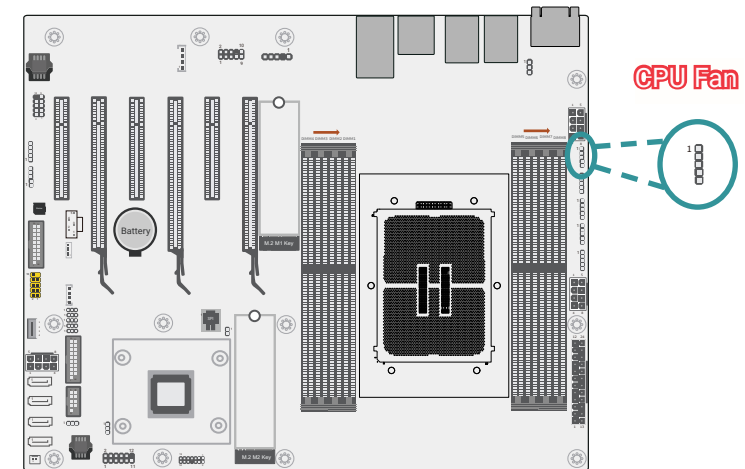
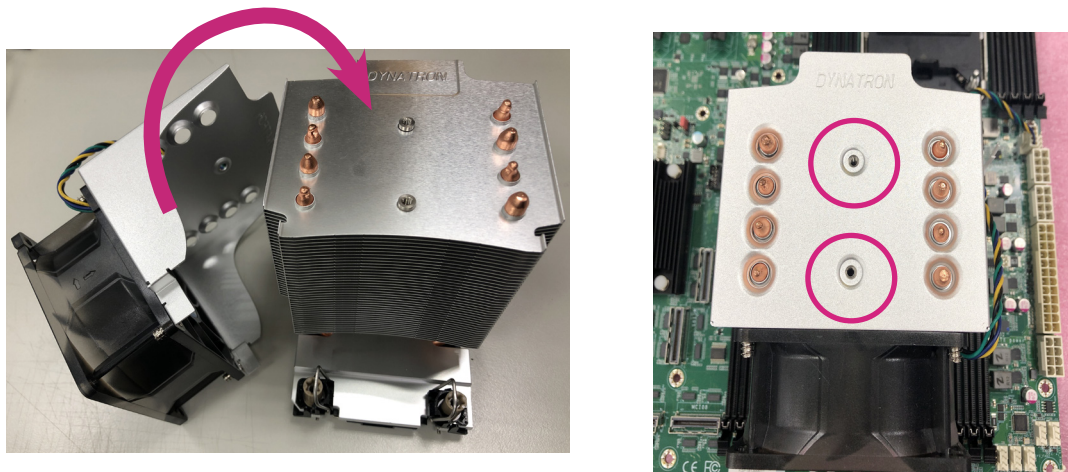
Step 7:

Connect the CPU fan power cable to the CPU fan connector on the system board.



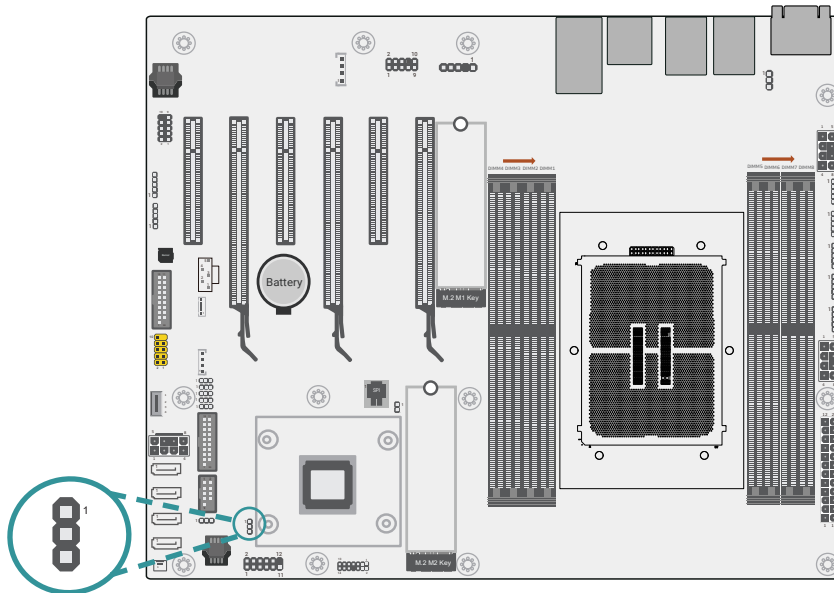
Step 6:

Attach the cooling fan to the heatsink and secure it on top of the heatsink with two screws.



► Jumper Settings

Clear CMOS (JP15)

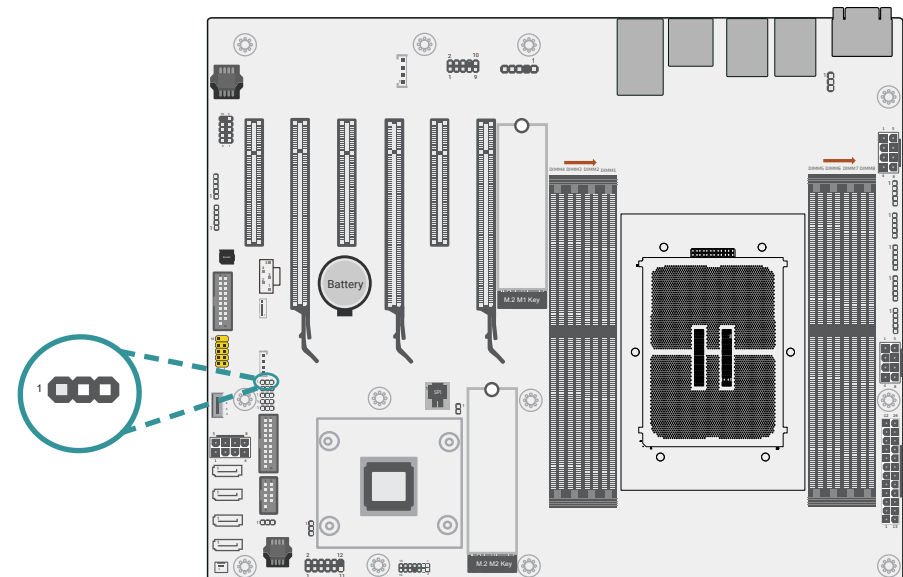


■ 1-2 On: Normal (default)



■ 2-3 On: Clear RTC Registers

DIO Power Select (5V_DIO) (JP3)

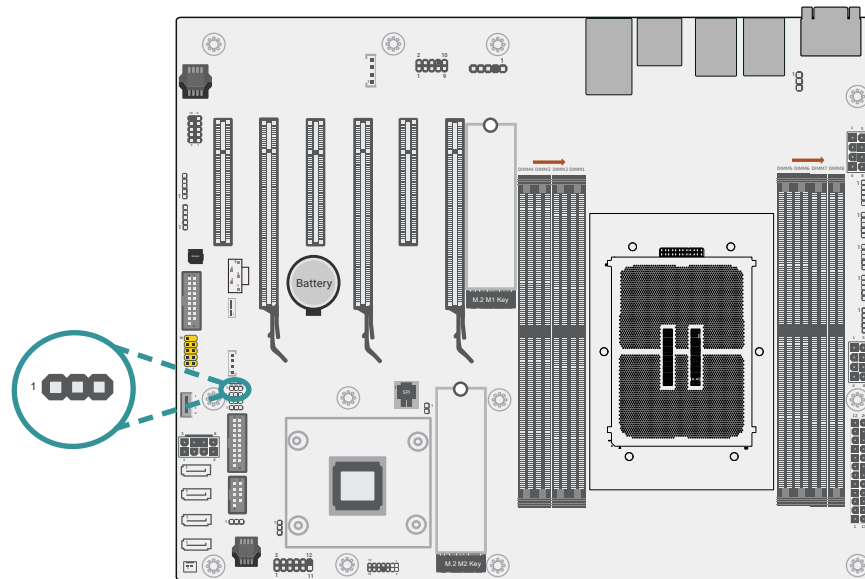


■ 1-2 On: 5VDU (default)



■ 2-3 On: 5V

DIO Signal PU/PD Select (JP5)

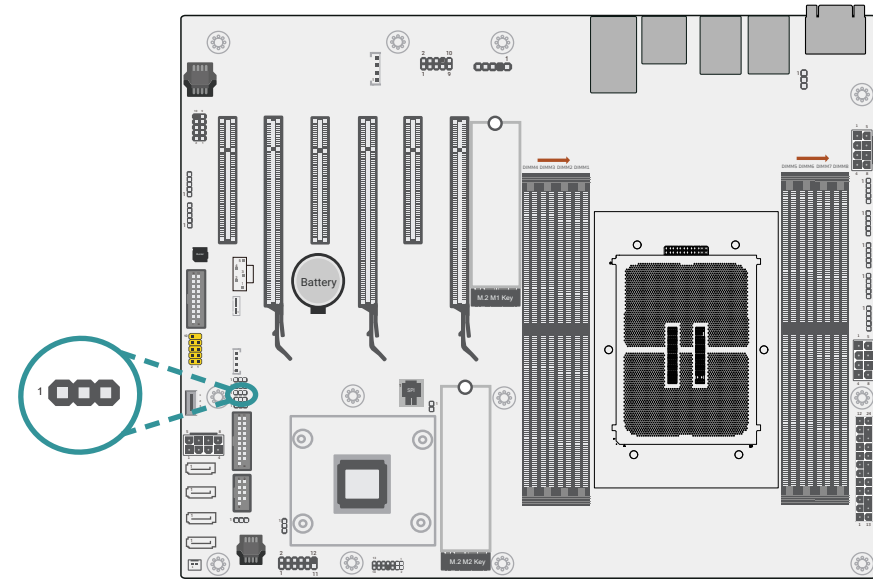


■ 1-2 On: 5V (default)



■ 2-3 On: GND

DIO Signal PU/PD Select (JP6)

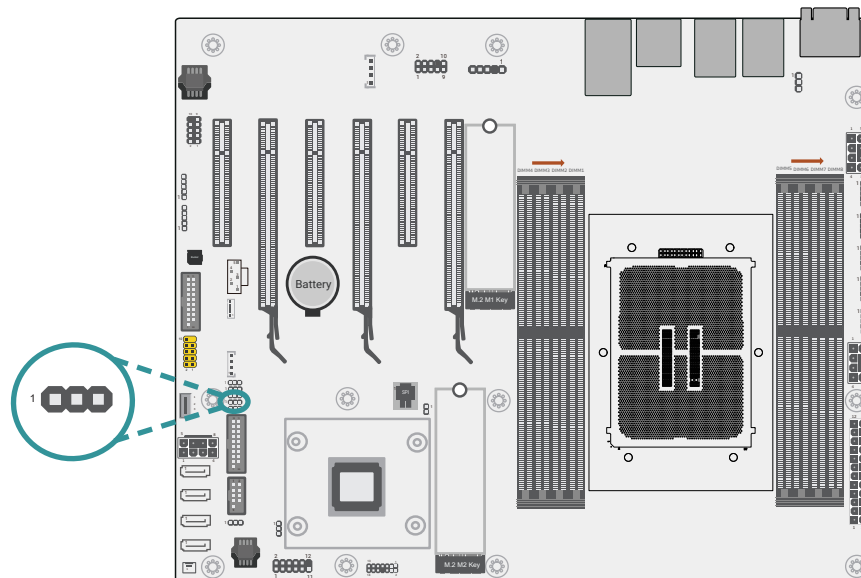


■ 1-2 On: 5V (default)



■ 2-3 On: GND

DIO Signal PU/PD Select (JP2)

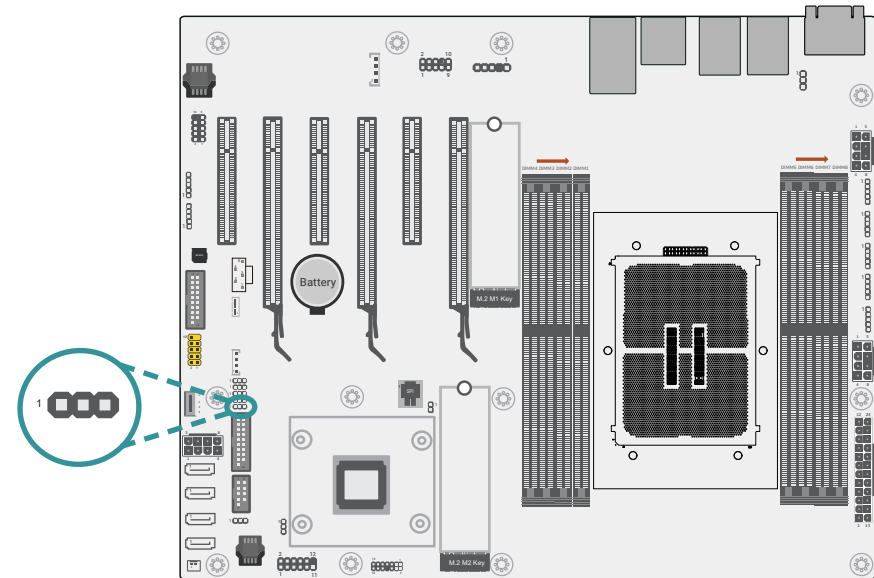


■ 1-2 On: 5V (default)



■ 2-3 On: GND

DIO Signal PU/PD Select (JP4)

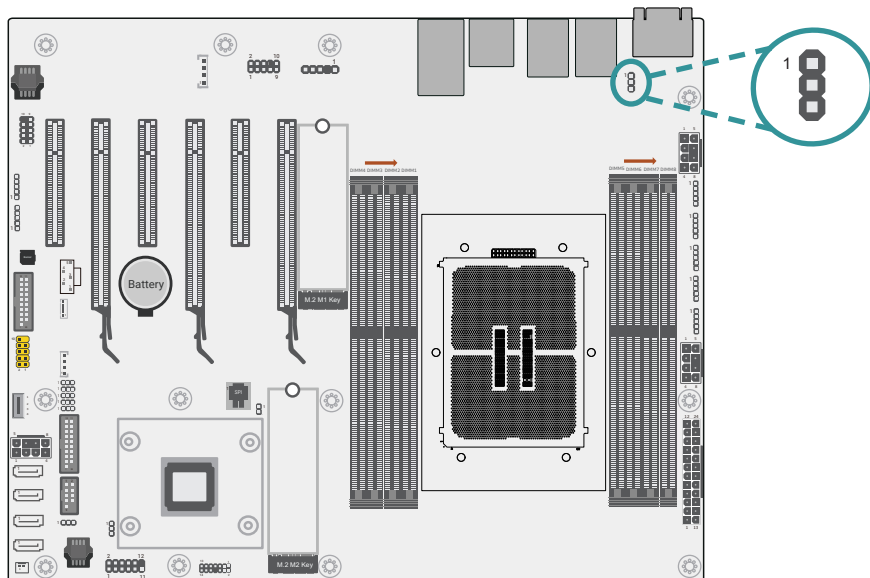


■ 1-2 On: 5V (default)



■ 2-3 On: GND

COM1 RI Select (JP34)

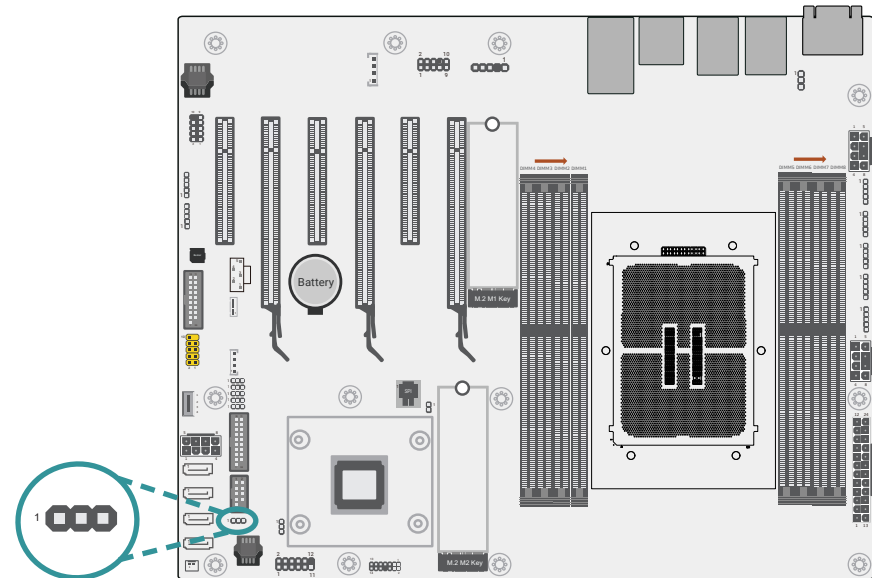


■ 1-2 On: 5V (default)



■ 2-3 On: 12V

COM2 RI Select (JP35)



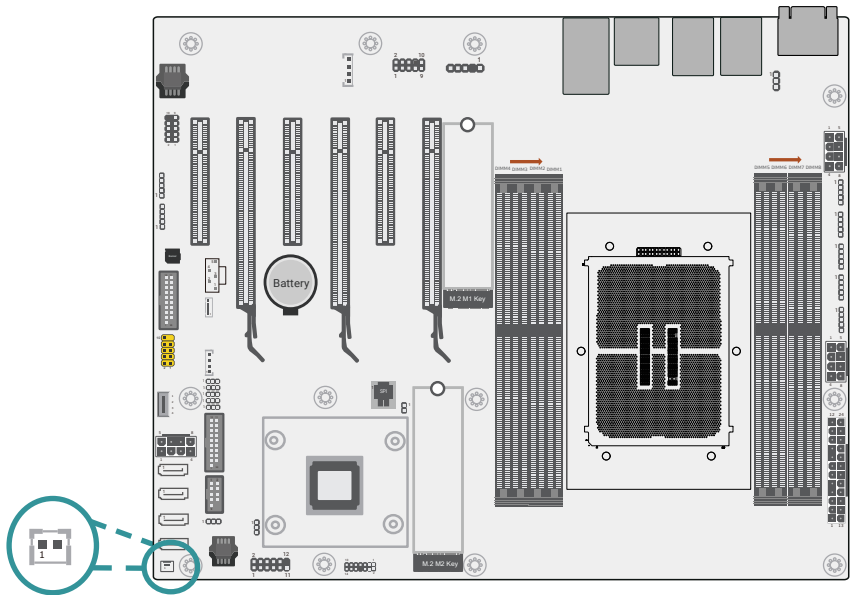
■ 1-2 On: 5V (default)



■ 2-3 On: 12V

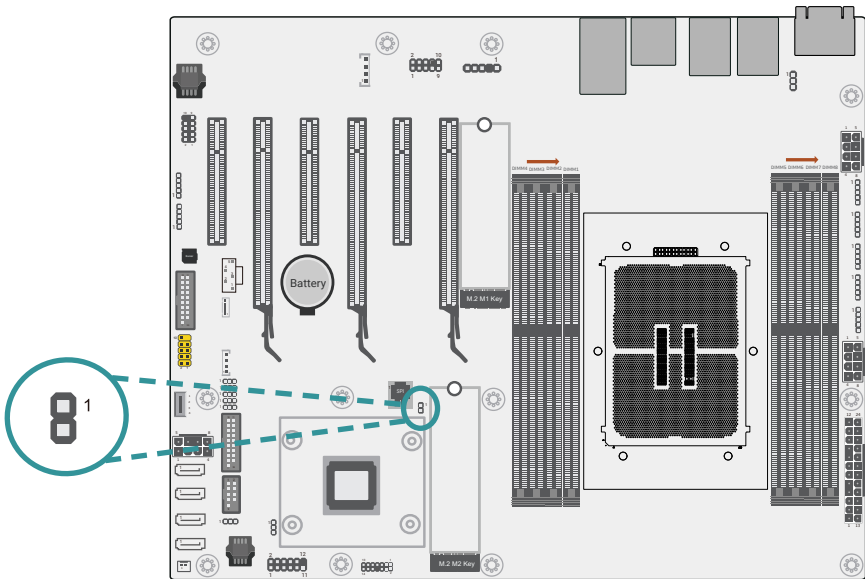
► Pin Assignment

RTC Battery (J2)



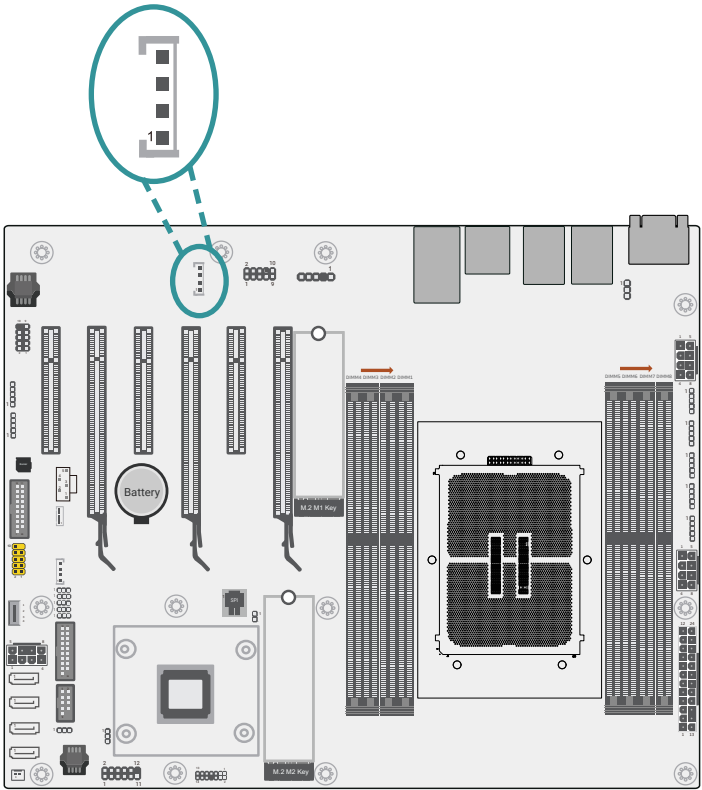
Pin	Assignment
1	Power
2	GND

Case Open (SOJ1)



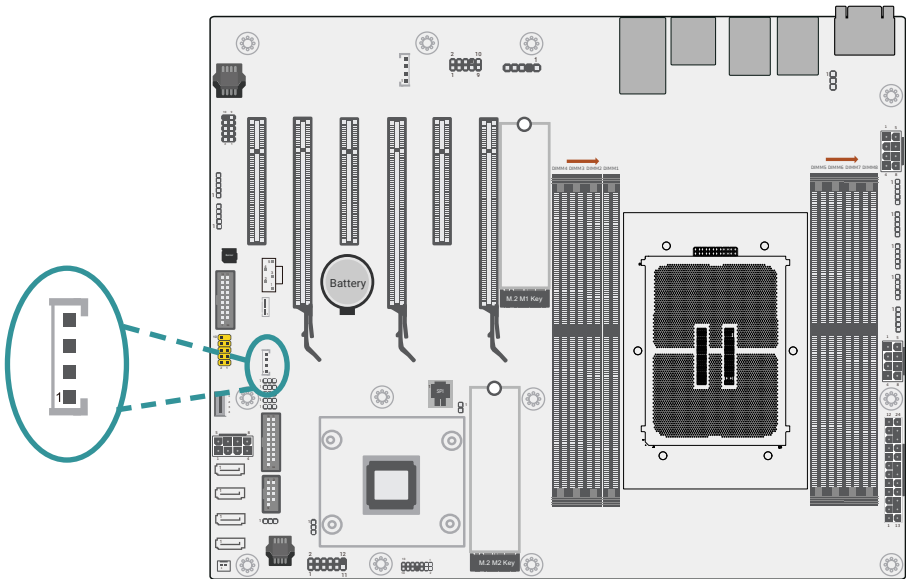
Pin	Assignment
1	Caseopen
2	GND

BMC UART (J4)



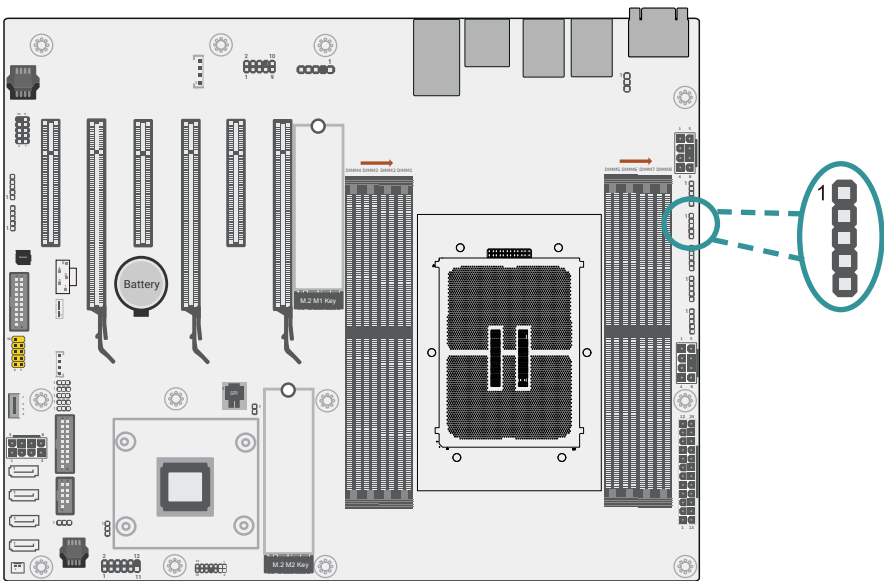
Pin	Assignment
1	3V3
2	RX
3	TX
4	GND

DIO Power (J20)



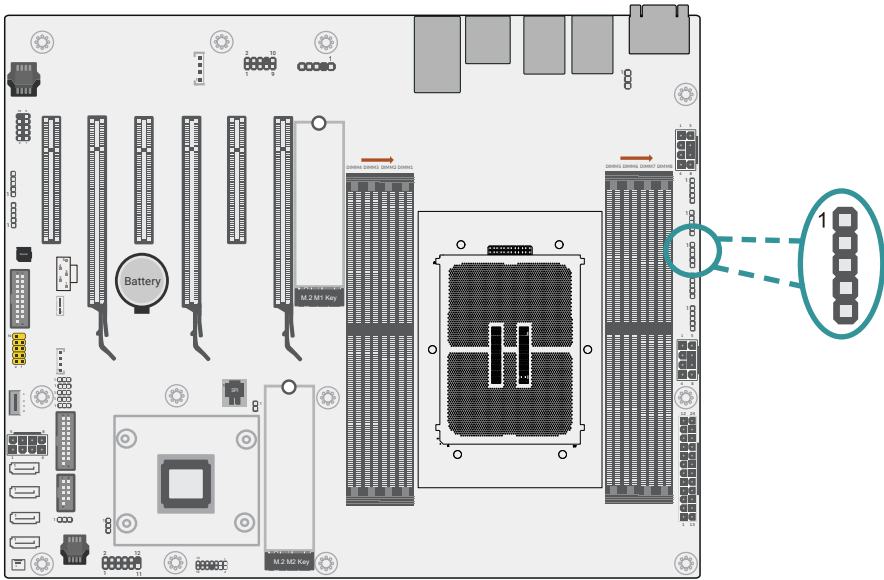
Pin	Assignment
1	12V
2	GND
3	5VDU
4	5V

System Fan1 (J11)



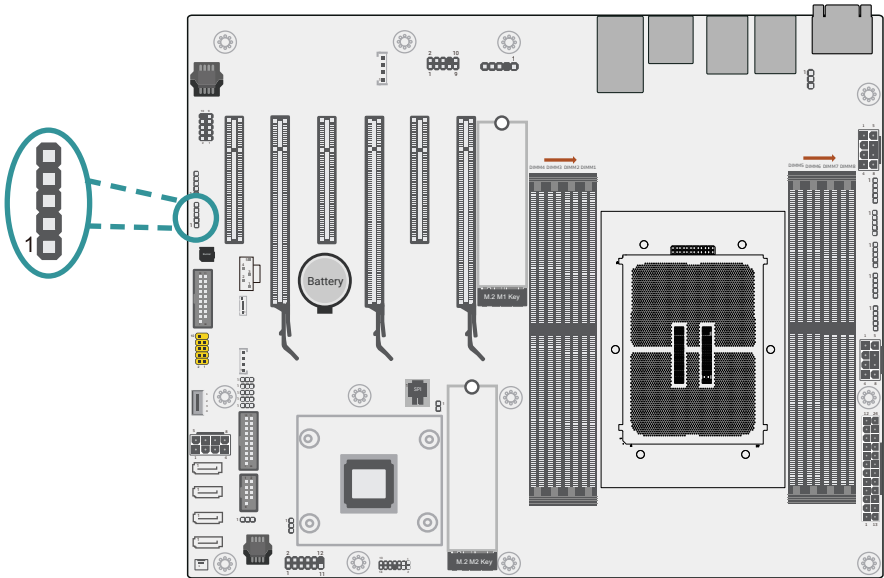
Pin	Assignment
1	GND
2	12V
3	RPM1
4	CTRL
5	RPM2

System Fan2 (J13)



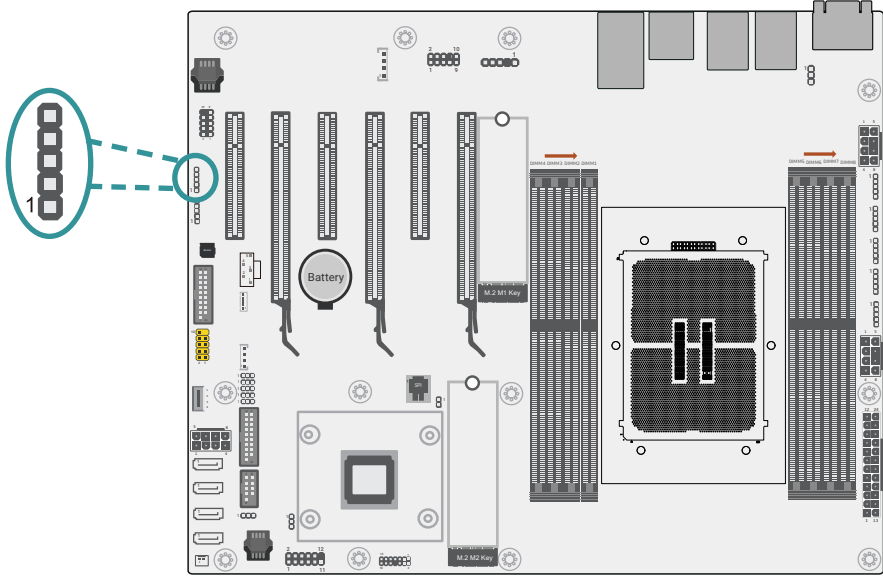
Pin	Assignment
1	GND
2	12V
3	RPM1
4	CTRL
5	RPM2

System Fan3 (J12)



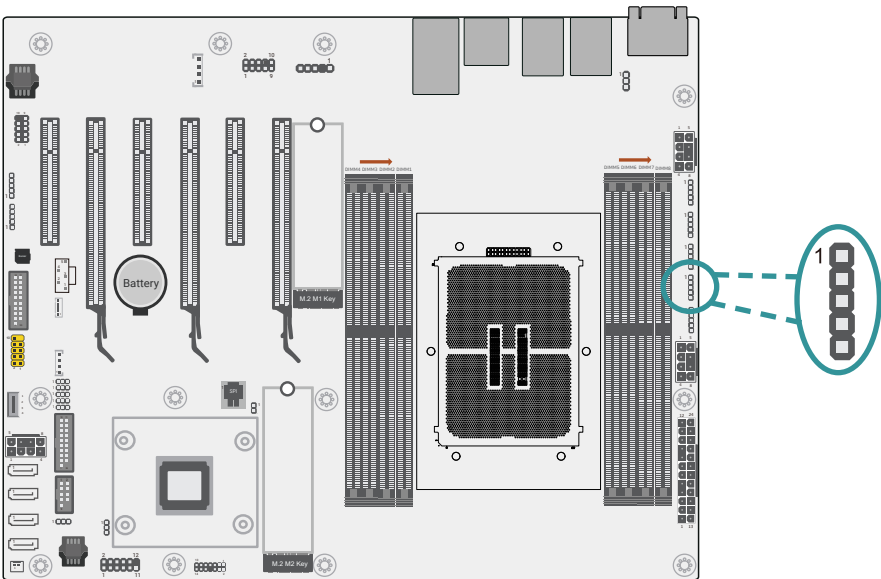
Pin	Assignment
1	GND
2	12V
3	RPM1
4	CTRL
5	RPM2

System Fan4 (J14)



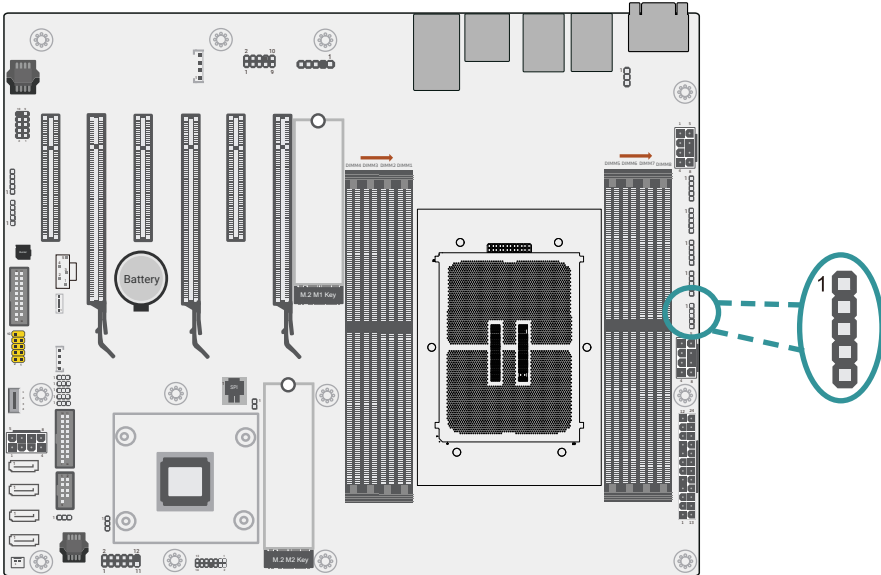
Pin	Assignment
1	GND
2	12V
3	RPM1
4	CTRL
5	RPM2

System Fan5 (J23)



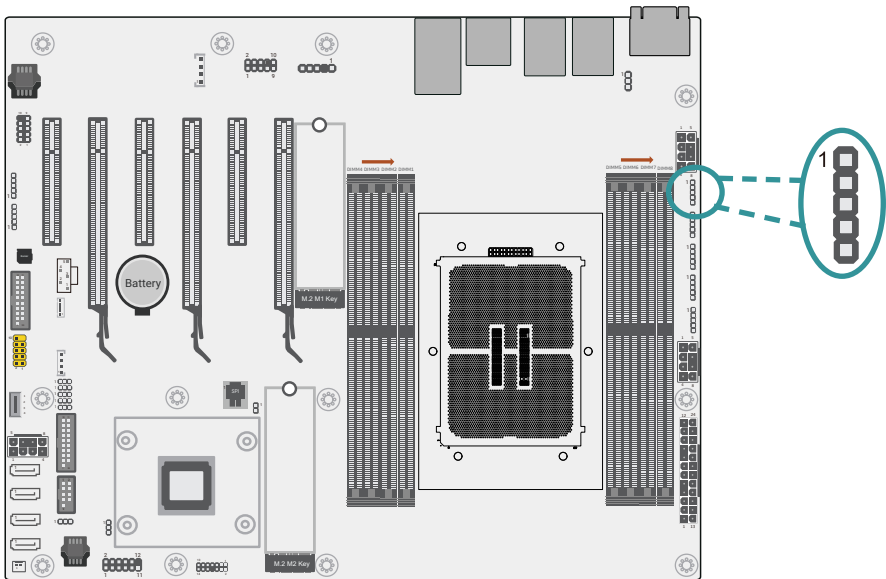
Pin	Assignment
1	GND
2	12V
3	RPM1
4	CTRL
5	RPM2

System Fan6 (J26)



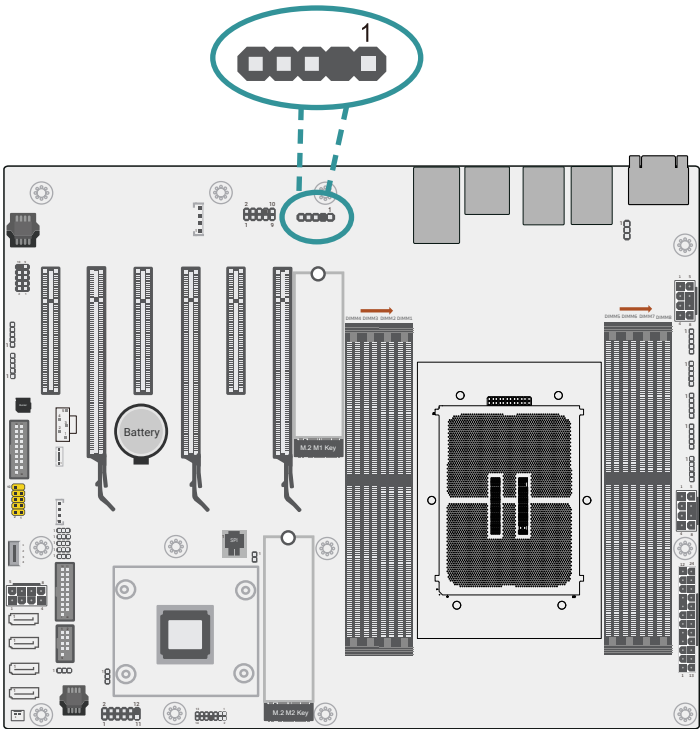
Pin	Assignment
1	GND
2	12V
3	RPM1
4	CTRL
5	RPM2

CPU Fan (J9)



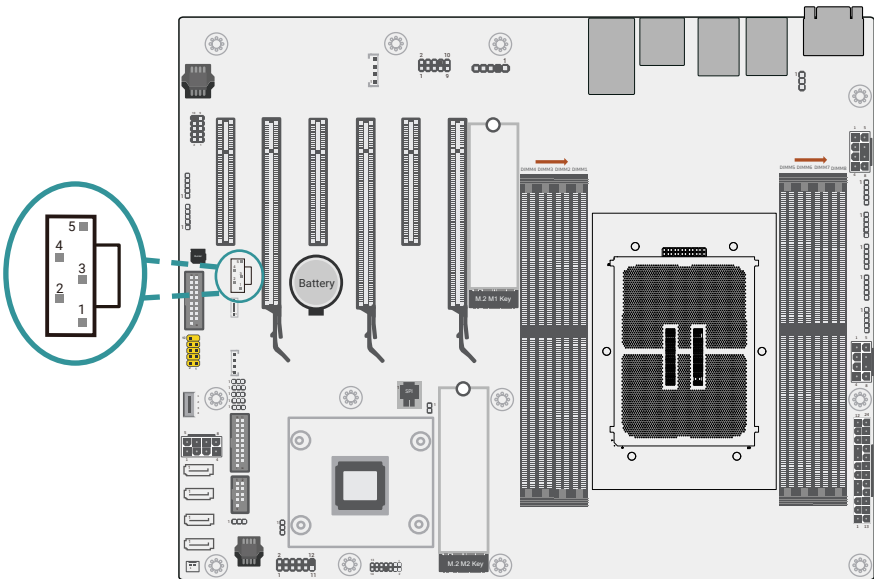
Pin	Assignment
1	GND
2	12V
3	RPM1
4	CTRL
5	RPM2

S/PDIF (AUJ1)



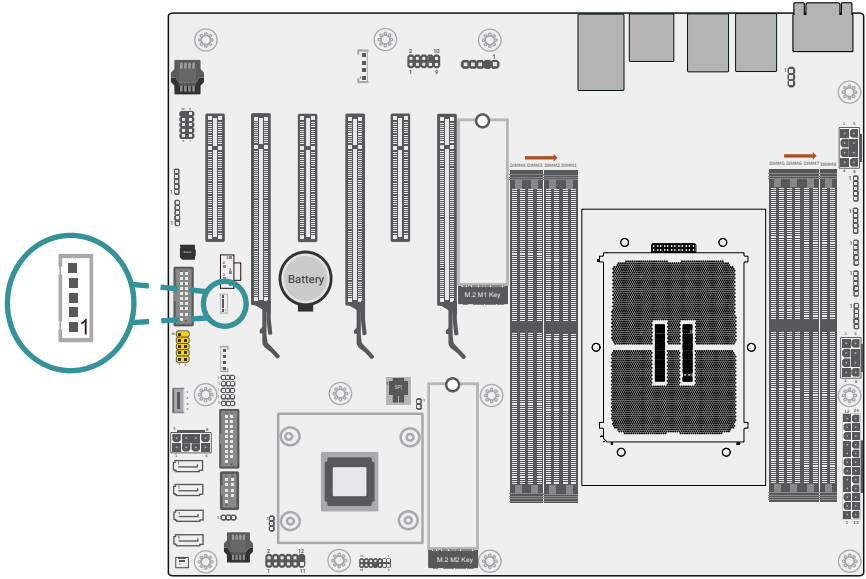
Pin	Assignment
1	5V
2	---
3	SPDIF-OUT
4	GND
5	SPDIF-IN

PMBus (J22)



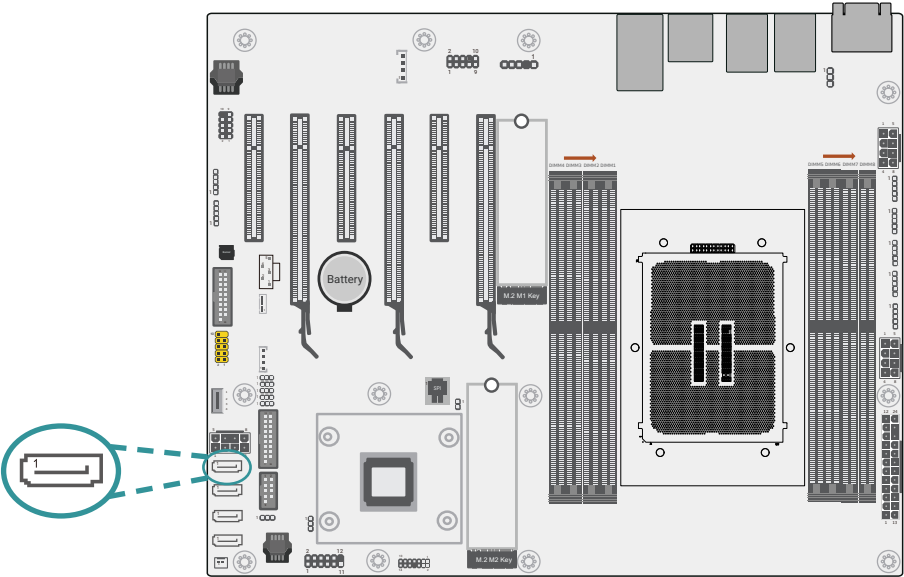
Pin	Assignment
1	SCL
2	SDA
3	ALERT
4	GND
5	(NC)

SMBus (J25)



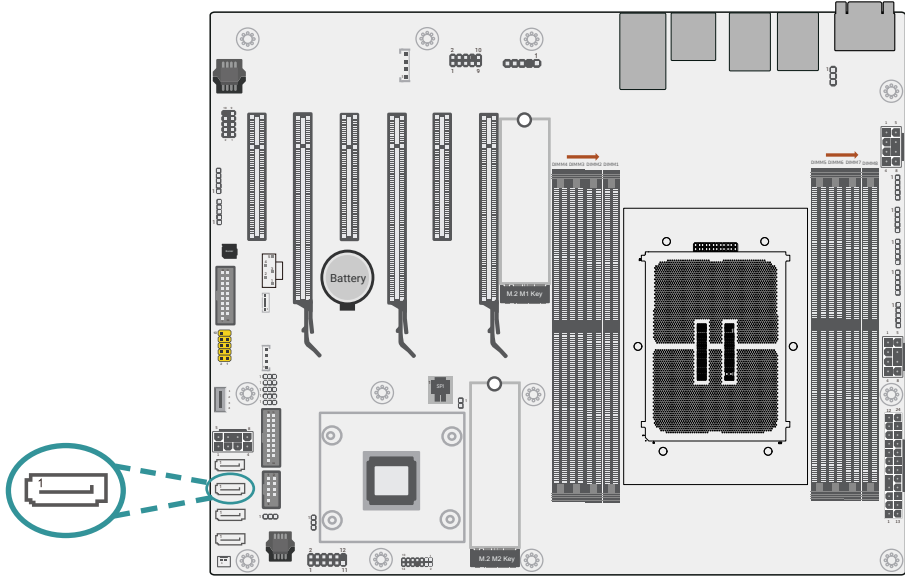
Pin	Assignment	Pin	Assignment
1	3V3	2	GND
3	SMB_CLK	4	SMB_DATA
5	SMB_ALERT	6	---

SATA0 (J16)



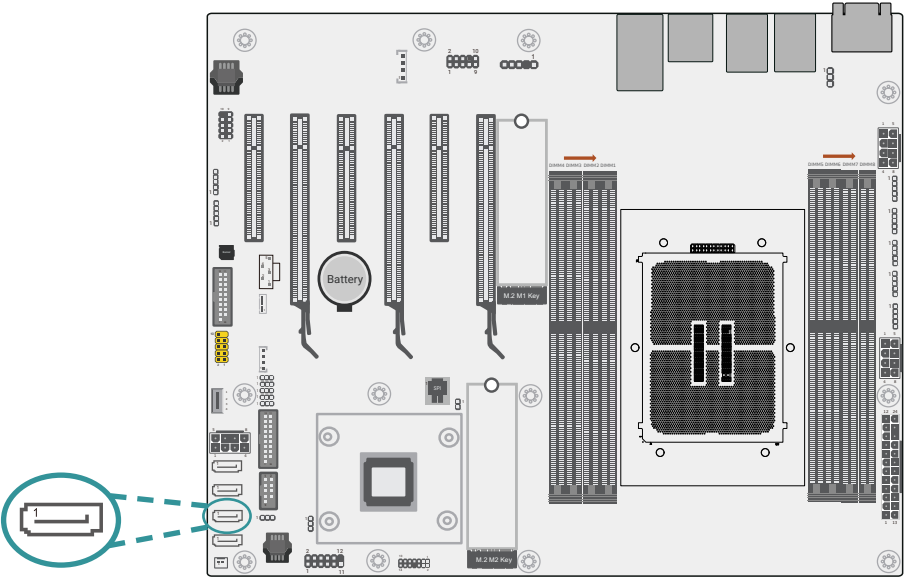
Pin	Assignment
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND

SATA1 (J17)



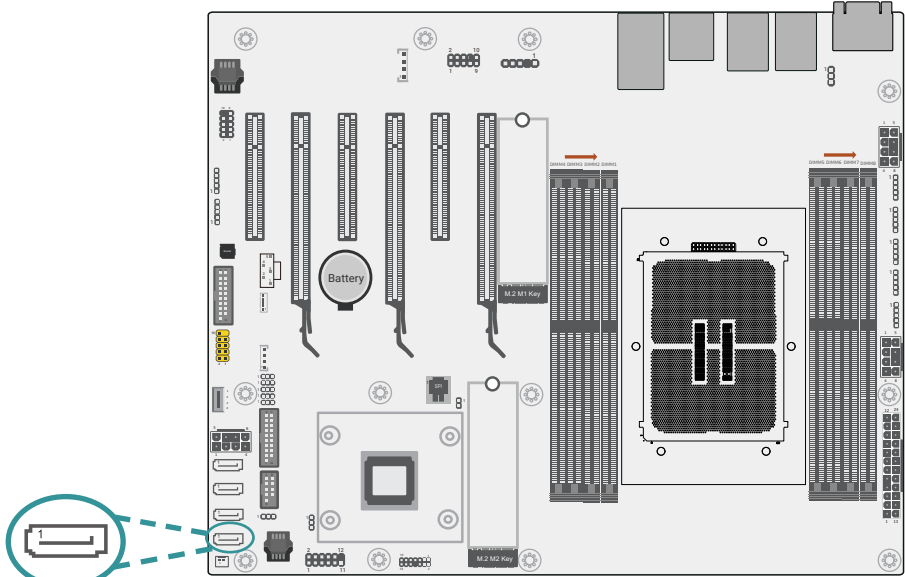
Pin	Assignment
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND

SATA2 (J18)



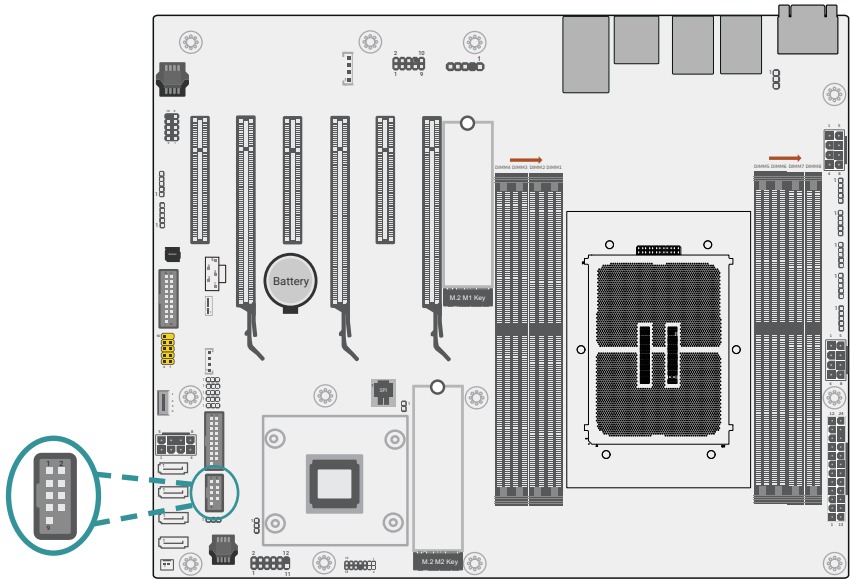
Pin	Assignment
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND

SATA3 (J19)



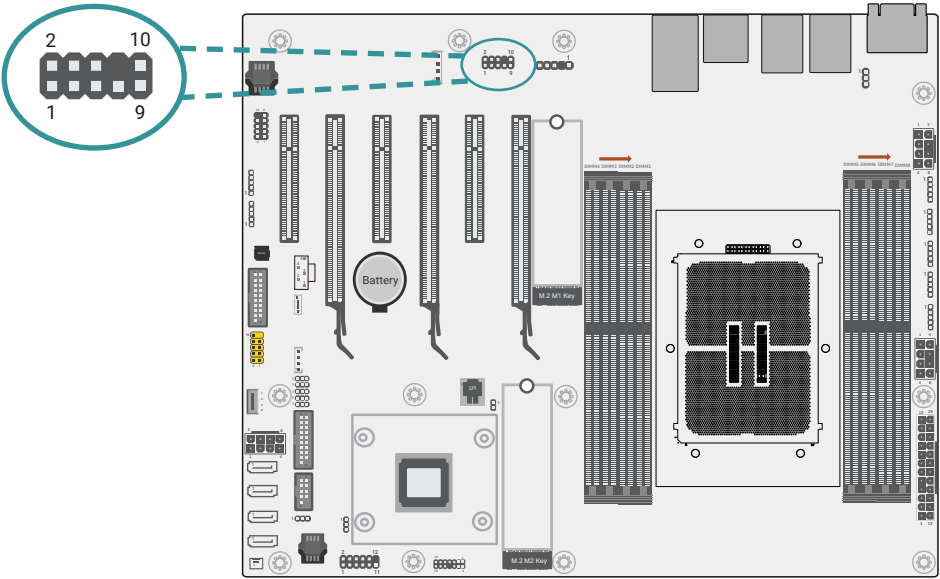
Pin	Assignment
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND

COM2 (TSJ1)



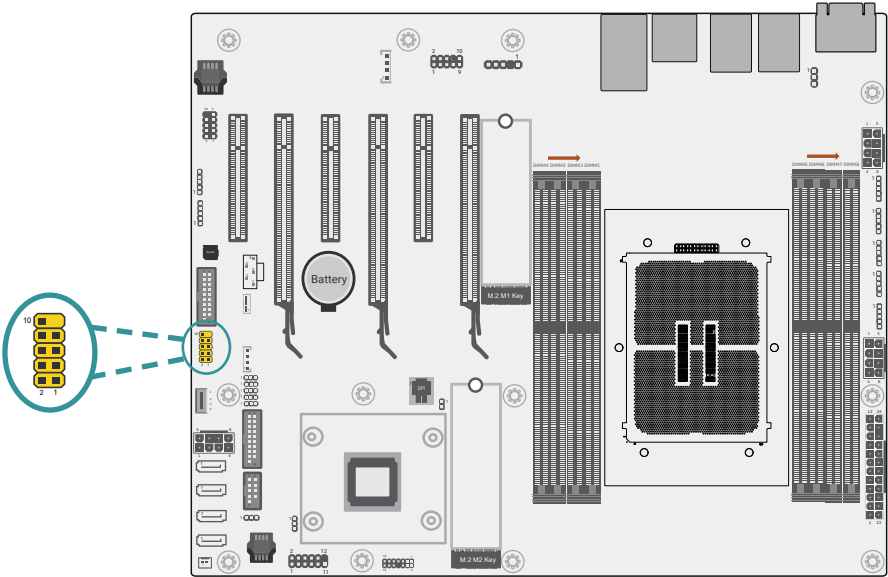
Pin	Assignment	Pin	Assignment
1	MDCD-	2	MSIN-
3	MSO-	4	MDTR-
5	GND	6	MDSR-
7	MRTS-	8	MCTS-
9	MRI-	10	---

Front Audio (AUJ2)



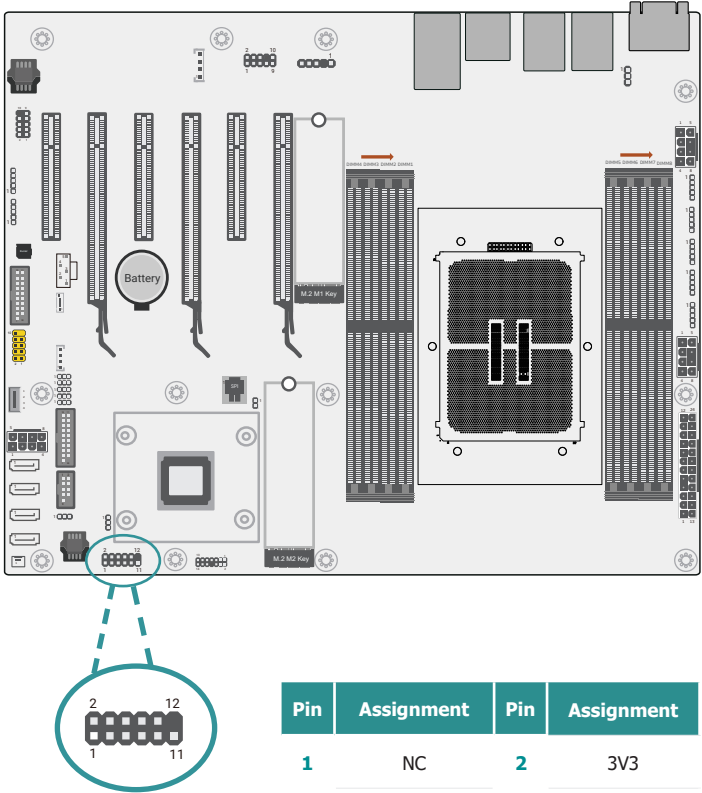
Pin	Assignment	Pin	Assignment
1	MIC2-L	2	GND
3	MIC2-R	4	(NC)
5	LINE2-R	6	MIC2-JD
7	GND	8	---
9	LINE2-L	10	LINE2-JD

USB2 (UBJ3)



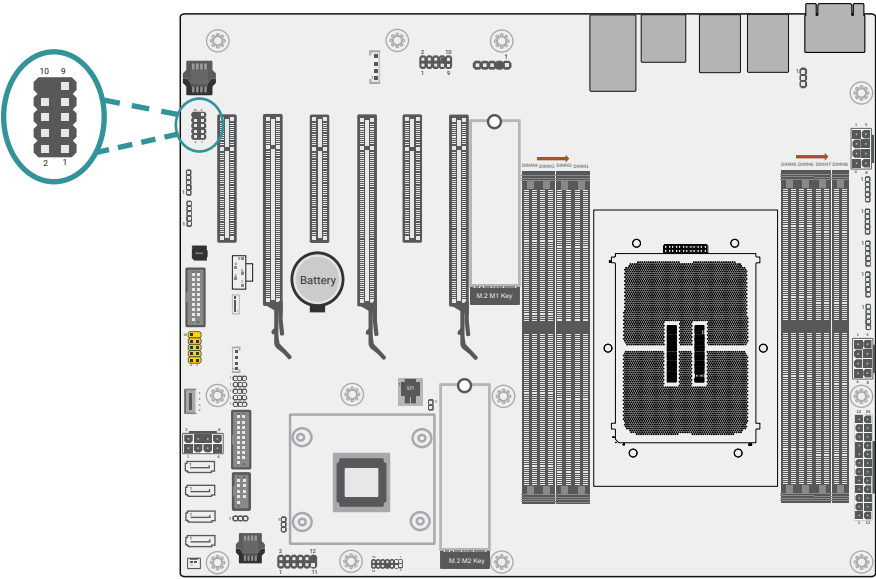
Pin	Assignment	Pin	Assignment
1	5V	2	5V
3	USB2_P10_RN	4	USB2_P11_RN
5	USB2_P10_RP	6	USB2_P11_RP
7	GND	8	GND
9	---	10	GND

Front Panel (J8)



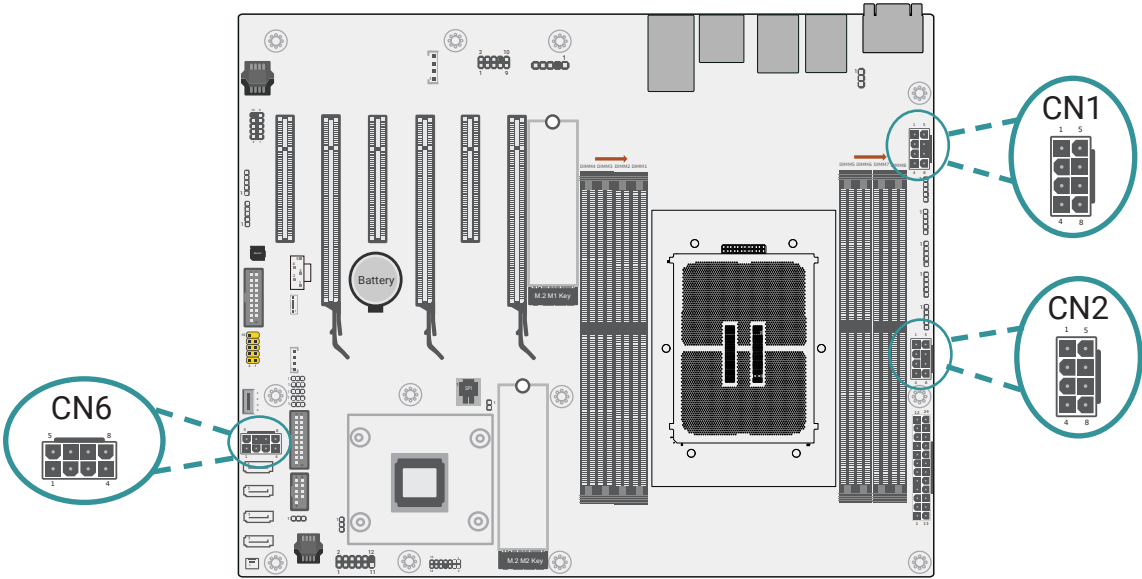
Pin	Assignment	Pin	Assignment
1	NC	2	3V3
3	3V3	4	3V3
5	HDD_LED	6	Power_LED
7	GND	8	GND
9	SYS_RST-	10	PWR_BTN-
11	NC	12	---

BMC COM (J15)



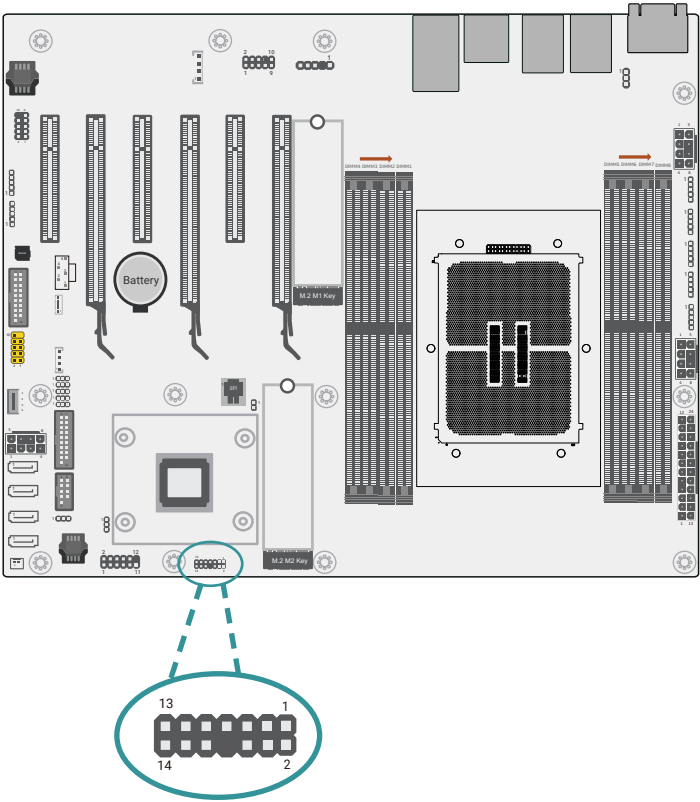
Pin	Assignment	Pin	Assignment
1	MDCD-	2	MSIN-
3	MSO-	4	MDTR-
5	GND	6	MDSR-
7	MRTS-	8	MCTS-
9	MRI-	10	---

12V Power (CN1, CN2, CN6)



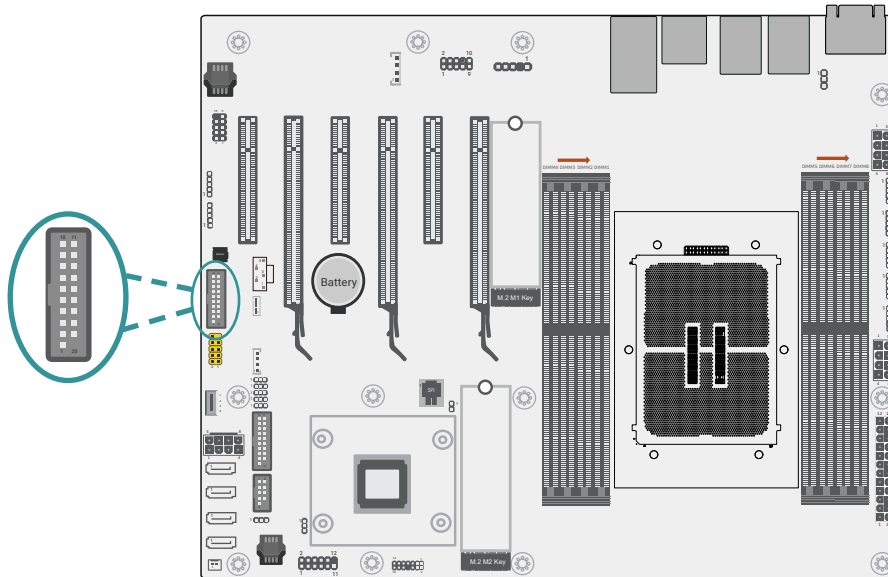
Pin	Assignment	Pin	Assignment
1	GND	5	12V
2	GND	6	12V
3	GND	7	12V
4	GND	8	12V

eSPI debug Header (J6)



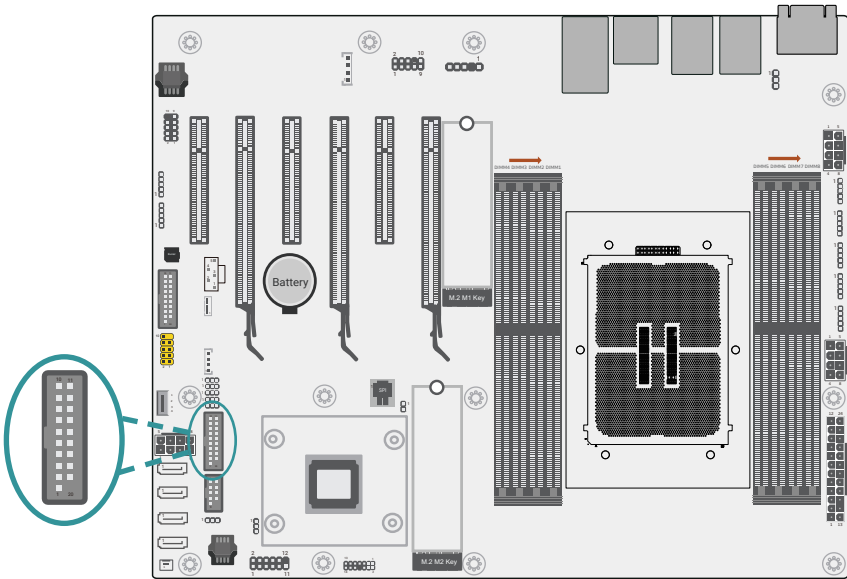
Pin	Assignment	Pin	Assignment
1	3V3	2	ESPI_CLK
3	ESPI_RESET	4	GND
5	ESPI_ALERT	6	GND
7	ESPI_D0	8	---
9	ESPI_D1	10	ESPI_CS
11	ESPI_D2	12	3V3
13	ESPI_D3	14	3V3

USB3 / USB2 (UBJ1)



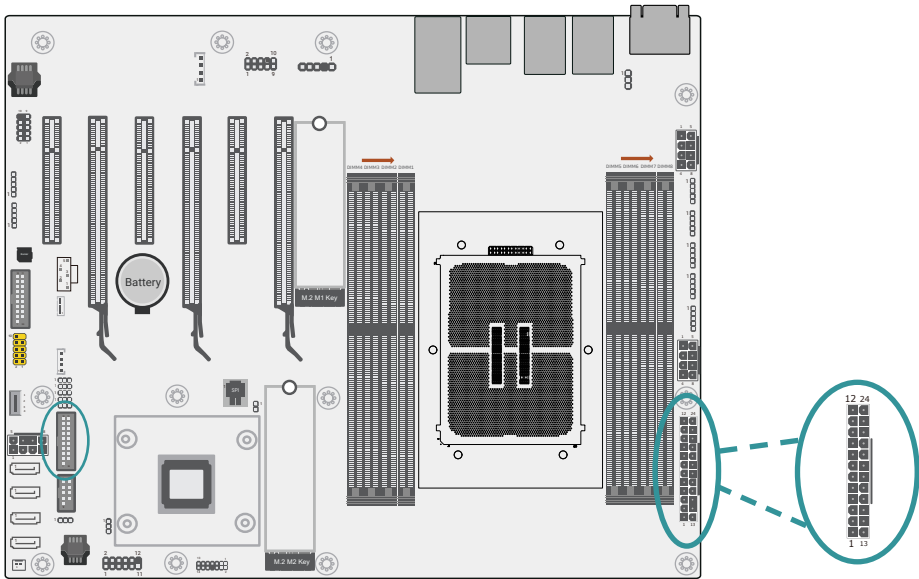
Pin	Assignment	Pin	Assignment
1	5V	11	USB2_P8_R_P
2	USB3_P5_RX_R_N	12	USB2_P8_R_N
3	USB3_P5_RX_R_P	13	GND
4	GND	14	USB3_P6_TX_C_R_P
5	USB3_P5_TX_C_R_N	15	USB3_P6_TX_C_R_N
6	USB3_P5_TX_C_R_P	16	GND
7	GND	17	USB3_P6_RX_R_P
8	USB2_P7_R_N	18	USB3_P6_RX_R_N
9	USB2_P7_R_P	19	5V
10	NC	20	---

DIO (J21)



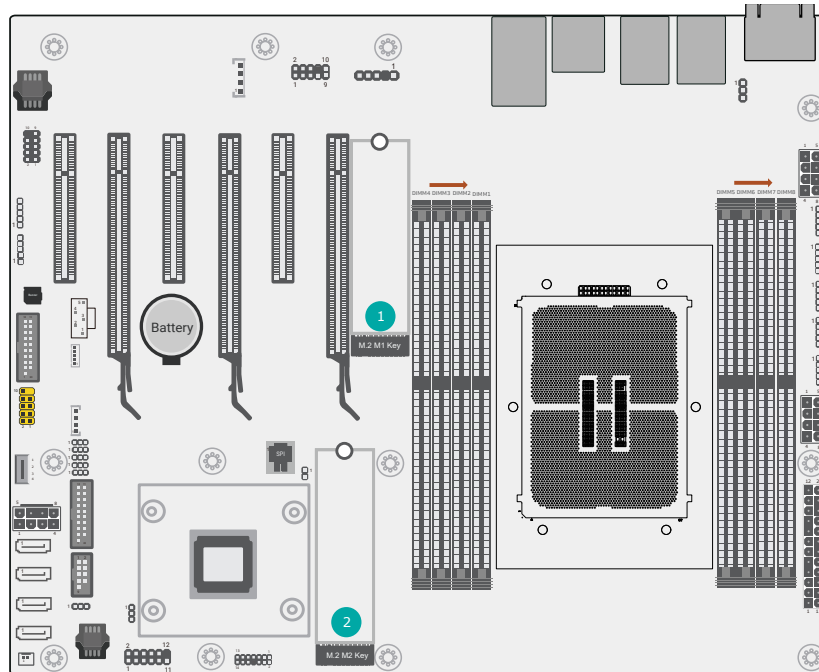
Pin	Assignment	Pin	Assignment
1	GND	11	DIO8
2	GND	12	DIO9
3	DIO7	13	DIO10
4	DIO6	14	DIO11
5	DIO5	15	DIO12
6	DIO4	16	DIO13
7	DIO3	17	DIO14
8	DIO2	18	DIO15
9	DIO1	19	GND
10	DIO0	20	---

2x12 ATX Power (CN3)



Pin	Assignment	Pin	Assignment
1	3V3	13	3V3
2	3V3	14	-12V
3	GND	15	GND
4	5V	16	PSON
5	GND	17	GND
6	5V	18	GND
7	GND	19	GND
8	POK	20	(NC)
9	5VSB	21	5V
10	12V	22	5V
11	12V	23	5V
12	3V3	24	GND

► Expansion Slots



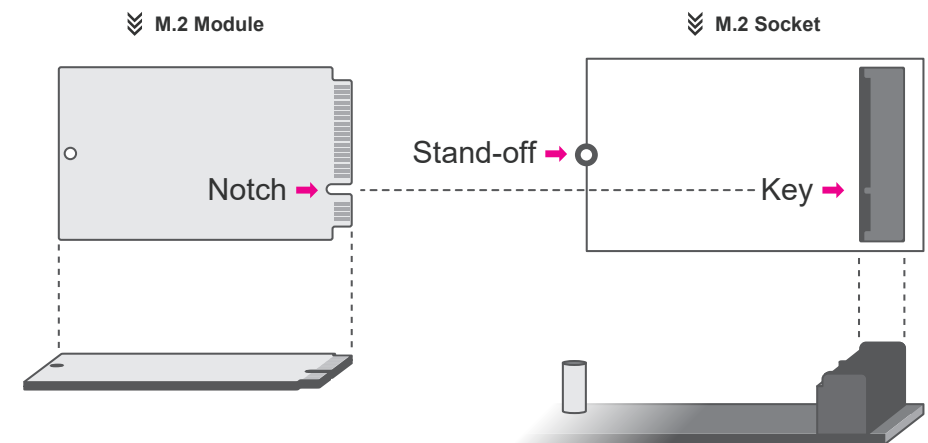
1 M.2 M1-Key

2 M.2 M2-Key

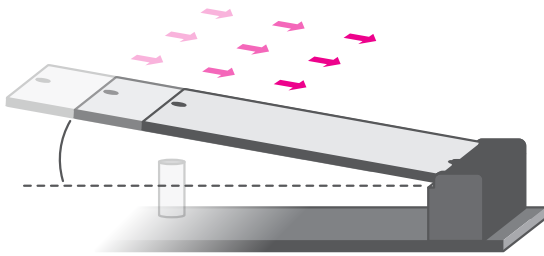
Installing the M.2 Module

Before installing the M.2 module into the M.2 socket, please make sure that the following safety cautions are well-attended.

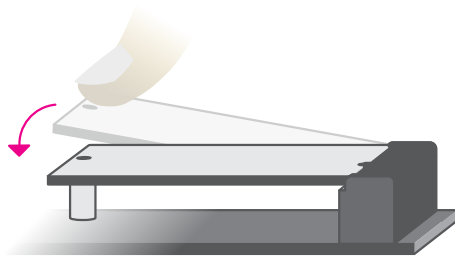
1. Make sure the PC and all other peripheral devices connected to it has been powered down.
2. Disconnect all power cords and cables.
3. Locate the M.2 socket on the system board
4. Make sure the notch on card is aligned to the key on the socket.
5. Make sure the standoff screw is removed from the standoff.



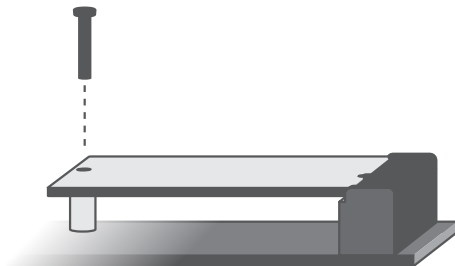
Please follow the steps below to install the card into the socket.



Step 1:
Insert the card into the socket at an angle while making sure the notch and key are perfectly aligned.



Step 2:
Press the end of the card far from the socket down until against the stand-off.

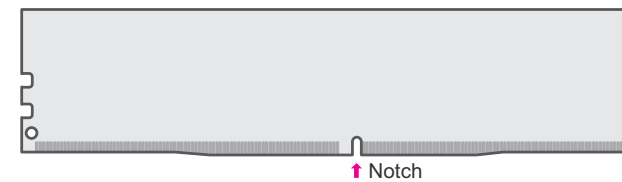
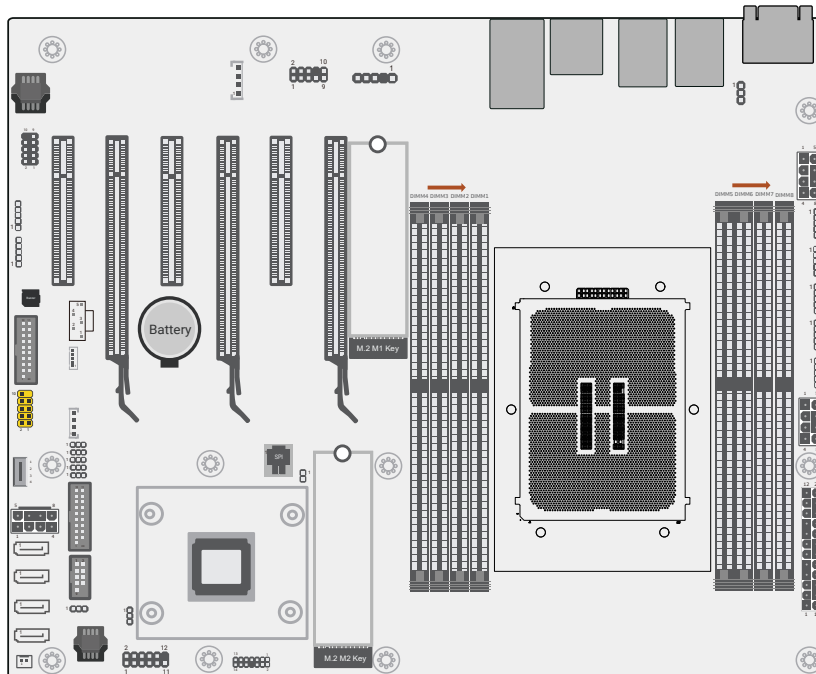


Step 3:
Screw tight the card onto the stand-off with a screw driver and a stand-off screw until the gap between the card and the stand-off closes up. The card should be lying parallel to the board when it's correctly mounted.

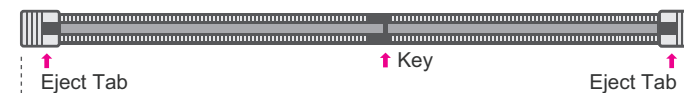
Installing the DIMM Module

Before installing the memory module, please make sure that the following safety cautions are well-attended.

1. Make sure the PC and all other peripheral devices connected to it has been powered down.
2. Disconnect all power cords and cables.
3. Locate the DIMM socket on the system board
4. Make sure the notch on memory card is aligned to the key on the socket.



Memory Module



Socket Top View



Socket Side View

Please follow the steps below to install the memory card into the socket.

Step 1:

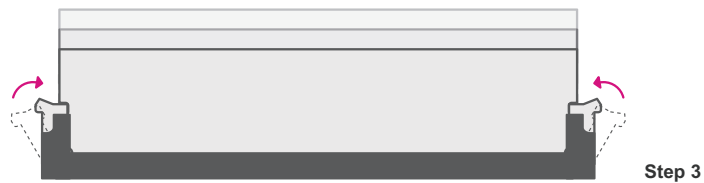
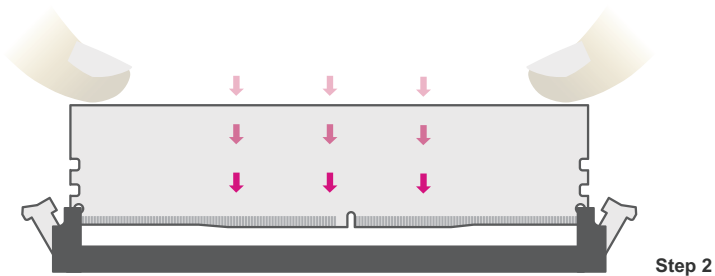
Press the eject tabs at both ends of the socket outward and downward to release them from the locked position.

Step 2:

Insert the memory card into the slot while making sure the notch and the key are aligned. Press the card down firmly with fingers while applying and maintaining even pressure on both ends.

Step 3:

The tabs snap automatically to the edges of the card and lock the card in place.



Removing the DIMM Module

Please follow the steps below to remove the memory card from the socket.

Step 1:

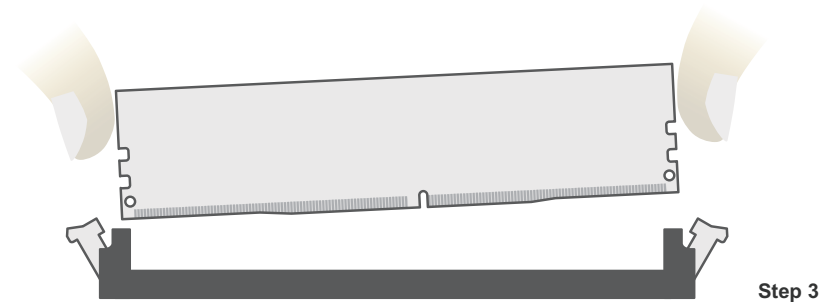
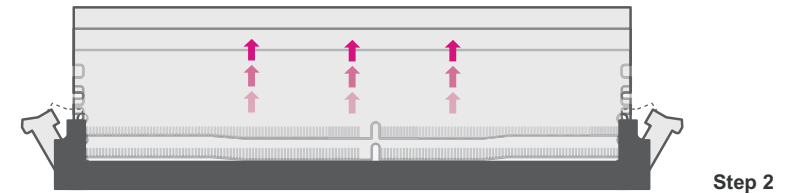
Press the eject tabs at both ends of the socket outward and downward to release them from the locked position.

Step 2:

The memory card ejects from the slot automatically.

Step 3:

Hold the card by its edges and remove it from the slot.



Chapter 3 - BIOS Settings

► Overview

The BIOS is a program that takes care of the basic level of communication between the CPU and peripherals. It contains codes for various advanced features found in this system board.

The BIOS allows you to configure the system and save the configuration in a battery-backed CMOS so that the data retains even when the power is off. In general, the information stored in the CMOS RAM of the EEPROM will stay unchanged unless a configuration change has been made such as a hard drive replaced or a device added.

It is possible that the CMOS battery will fail causing CMOS data loss. If this happens, you need to install a new CMOS battery and reconfigure the BIOS settings.

**Note:**

The BIOS is constantly updated to improve the performance of the system board; therefore the BIOS screens in this chapter may not appear the same as the actual one. These screens are for reference purpose only.

Default Configuration

Most of the configuration settings are either predefined according to the Load Optimal Defaults settings which are stored in the BIOS or are automatically detected and configured without requiring any actions. There are a few settings that you may need to change depending on your system configuration.

Entering the BIOS Setup Utility

The BIOS Setup Utility can only be operated from the keyboard and all commands are keyboard commands. The commands are available at the right side of each setup screen.

The BIOS Setup Utility does not require an operating system to run. After you power up the system, the BIOS message appears on the screen and the memory count begins. After the memory test, the message "Press DEL to run setup" will appear on the screen. If the message disappears before you respond, restart the system or press the "Reset" button. You may also restart the system by pressing the <Ctrl> <Alt> and keys simultaneously.

Legends

Keys	Function
Right / Left arrow	Move the highlight left or right to select a menu
Up / Down arrow	Move the highlight up or down between submenus or fields
<Enter>	Enter the highlighted submenu
+ (plus key)/F6	Scroll forward through the values or options of the highlighted field
- (minus key)/F5	Scroll backward through the values or options of the highlighted field
<F1>	Display general help
<F2>	Display previous values
<F9>	Optimized defaults
<F10>	Save and Exit
<Esc>	Return to previous menu

Scroll Bar

When a scroll bar appears to the right of the setup screen, it indicates that there are more available fields not shown on the screen. Use the up and down arrow keys to scroll through all the available fields.

Submenu

When "►" appears on the left of a particular field, it indicates that a submenu which contains additional options are available for that field. To display the submenu, move the highlight to that field and press <Enter>.

► Main

The Main menu is the first screen that you will see when you enter the BIOS Setup Utility.



System Date

The date format is <month>, <date>, <year>. Press "Tab" to switch to the next field and press "-" or "+" to modify the value.

System Time

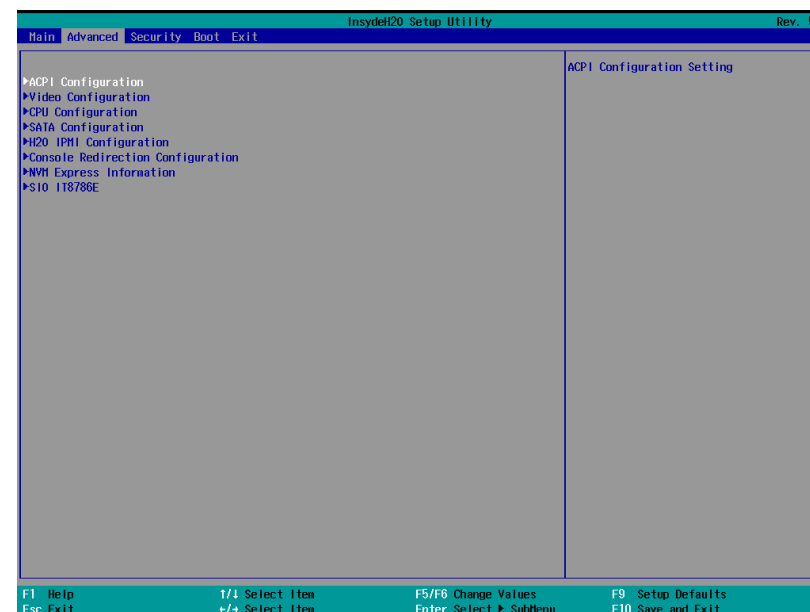
The time format is <hour>, <minute>, <second>. The time is based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00. Hour displays hours from 00 to 23. Minute displays minutes from 00 to 59. Second displays seconds from 00 to 59.

► Advanced

The Advanced menu allows you to configure your system for basic operation. Some entries are defaults required by the system board, while others, if enabled, will improve the performance of your system or let you set some features according to your preference.

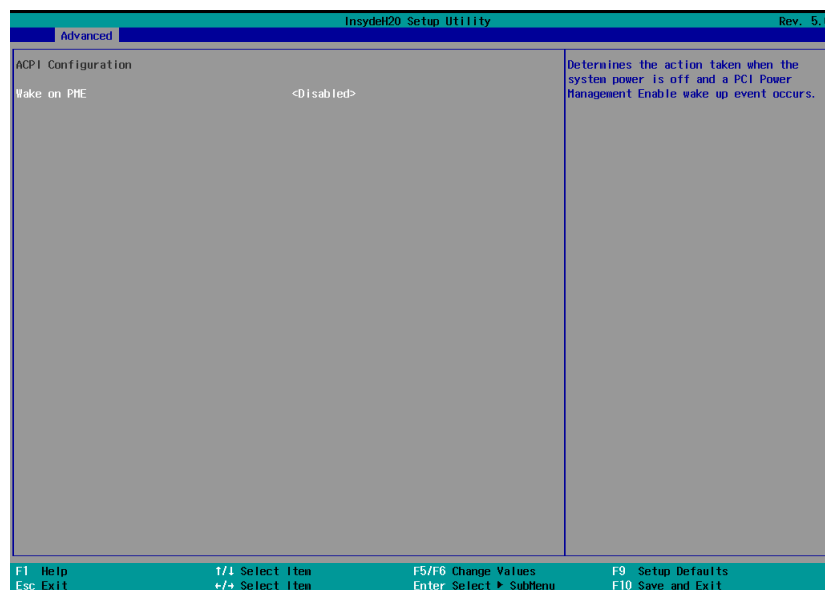


Important:
Setting incorrect field values may cause the system to malfunction.



► Advanced

ACPI Configuration

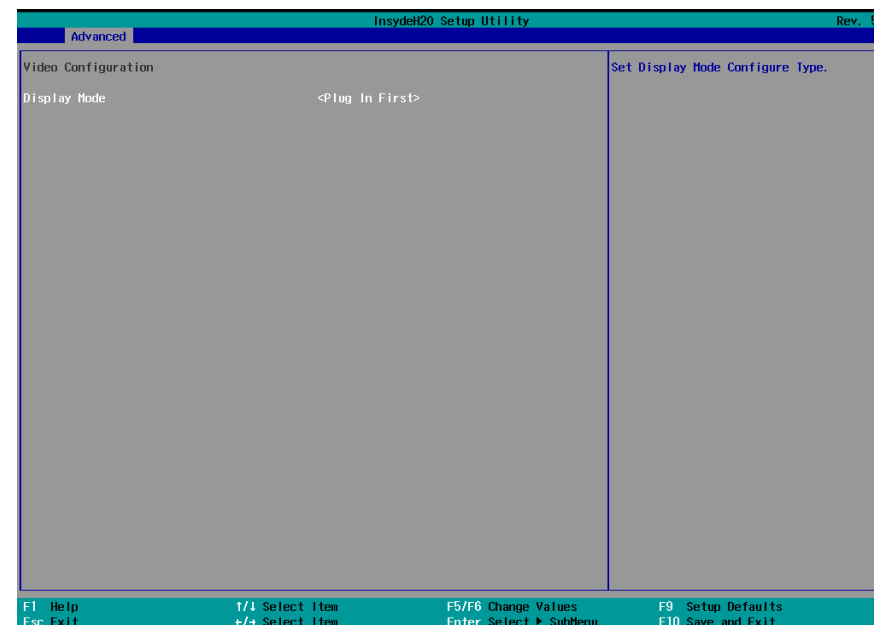


Wake on PME

This field determines the action taken when the system power is off and a PCI Power Management Enable wake up event occurs.

► Advanced

Video Configuration

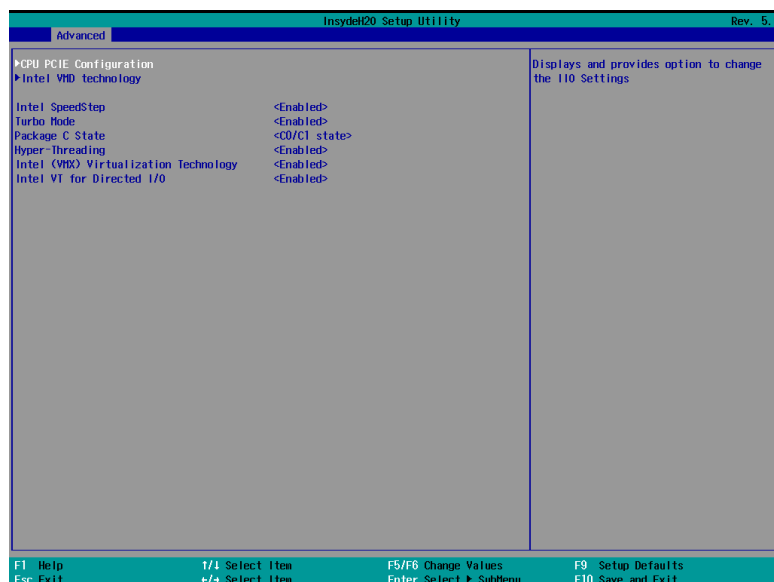


Display Mode

Select among On Board First and Plug In First to specify the display I/O source.

► Advanced

CPU Configuration

**CPU PCIE Configuration**

Displays and provides option to change the I/O settings.

Intel VMD Technology

Enable or disable turbo mode of the processor. This field will only be displayed when "Intel Speed Step" is enabled. This field is not available when the equipped CPU does not support Turbo Mode.

Intel SpeedStep

This field is used to enable or disable the Enhanced Intel SpeedStep® Technology (EIST), which helps optimize the balance between system's power consumption and performance. After it is enabled in the BIOS, EIST features can then be enabled via the operating system's power management.

Turbo Mode

Enable or disable turbo mode of the processor. This field will only be displayed when "Intel Speed Step" is enabled. This field is not available when the equipped CPU does not support Turbo Mode.

Package C State

Package C state limit, the state Auto maps is program specific.

Hyper Threading

Enable or disable Hyper-threading. When it is enabled, a physical core will perform as two logical processors, and the user may experience better computational efficiency of the system. Please make sure that the OS operating on your system is optimized for Hyper-Threading, e.g. Windows and Linux. This field is not available when the equipped CPU does not support Hyper-threading.

Intel <VMX> Virtualization Technology

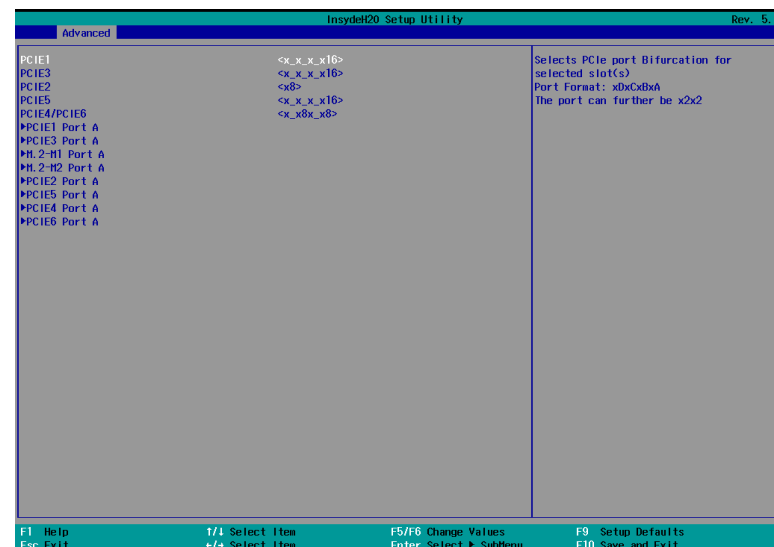
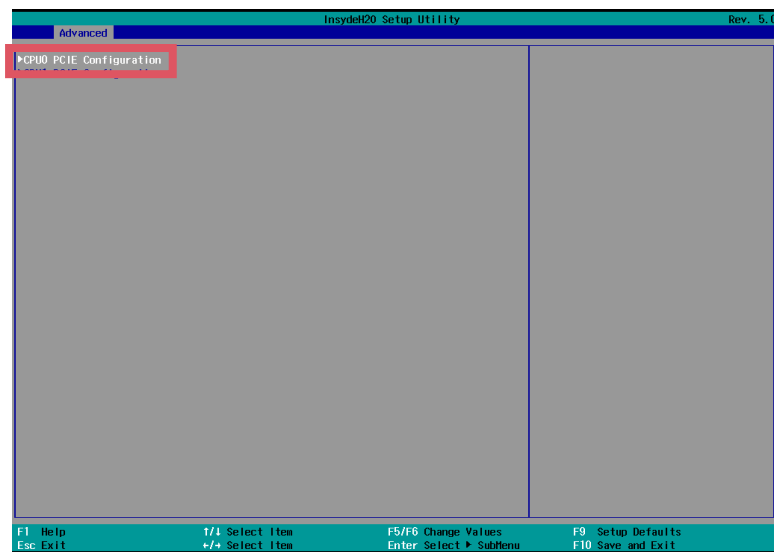
When this field is set to Enabled, the VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

Intel VT for Directed I/O

Enable/Disable Intel VirtualizationTechnology for Directed I/O (VT-d) by reporting the I/O device assignment to VMM through DMAR ACPI Tables. To disable VT-d, X2APIC must also be disabled.

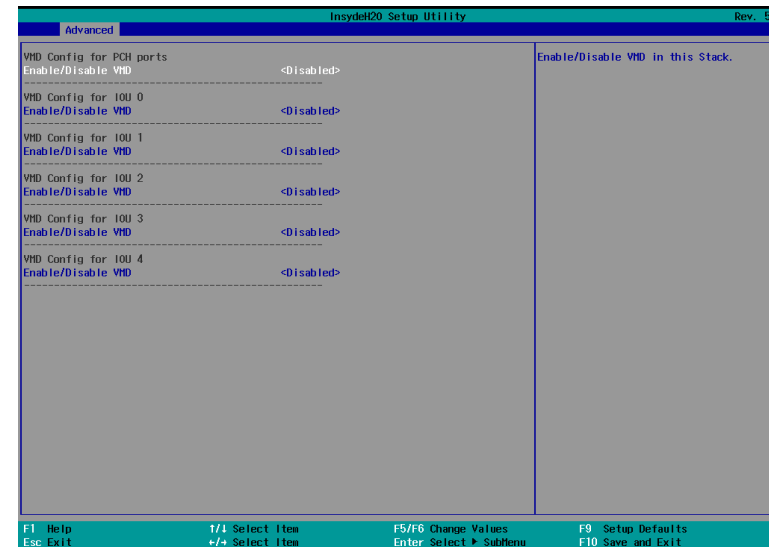
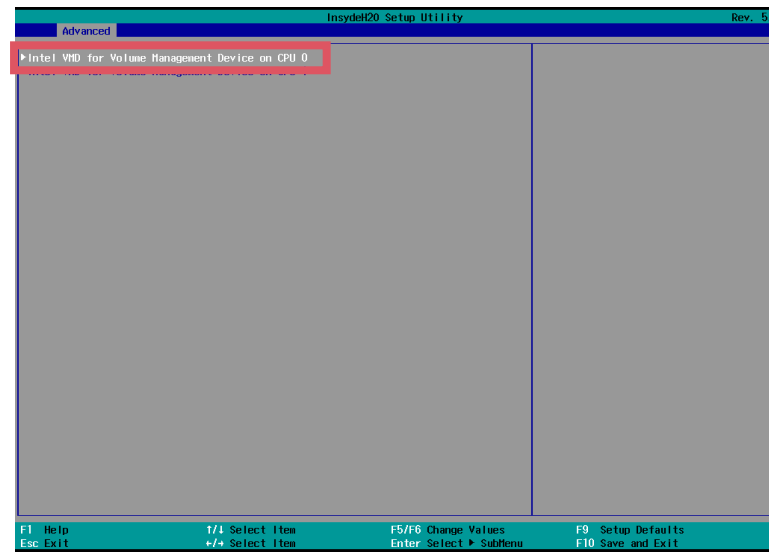
► Advanced

CPU Configuration ► CPU0 PCIe Configuration



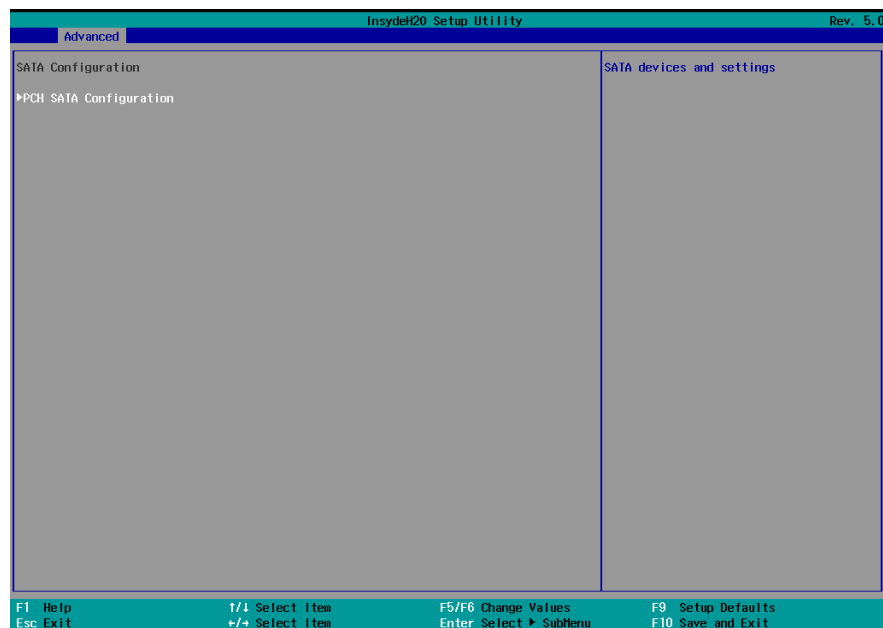
► Advanced

CPU Configuration ► Intel VMD for Volume Management Device on CPU0



► Advanced

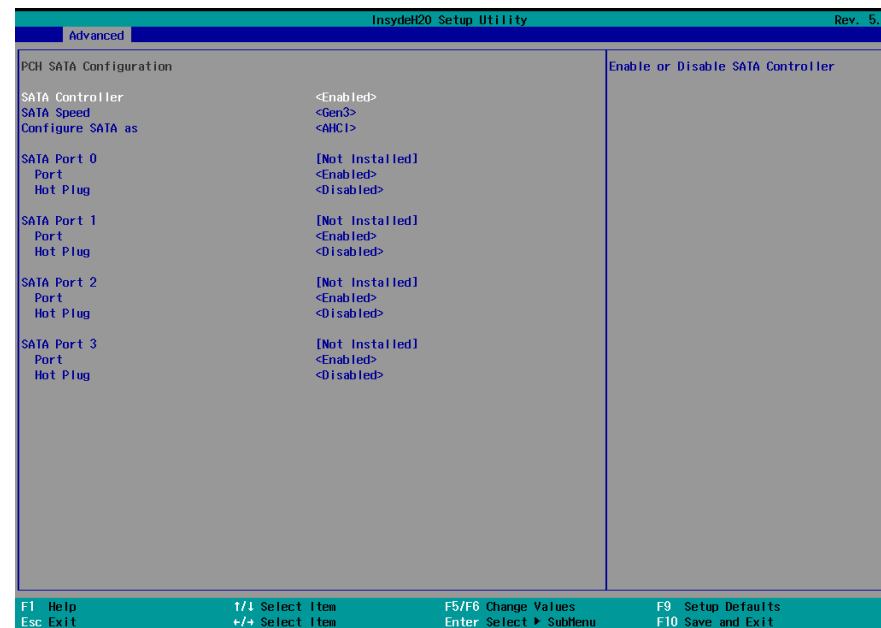
SATA Configuration

**PCH SATA Configuration**

Press Enter to enter the sub-menu and configure on-board SATA 3.0 controllers.

► Advanced

SATA Configuration ► PCH SATA Configuration

**SATA Controller(s)**

Enable or disable the Serial ATA controller. This following fields will only be displayed when this field is enabled.

SATA Speed

Select Serial ATA controller(s) speed — Auto, Gen1 (1.5 Gbit/s), Gen2 (3 Gbit/s) or Gen 3 (6 Gbit/s).

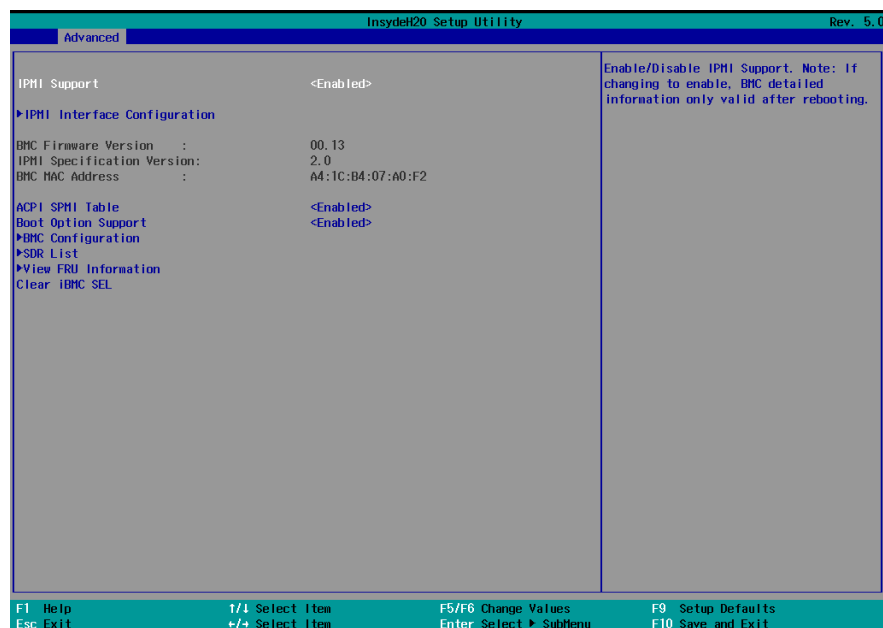
SATA Port 0-3/Hot Plug

Enable or disable each Serial ATA port and its hot plug function.

► Advanced

H2O IPMI Configuration

Configure IPMI settings in the submenu.



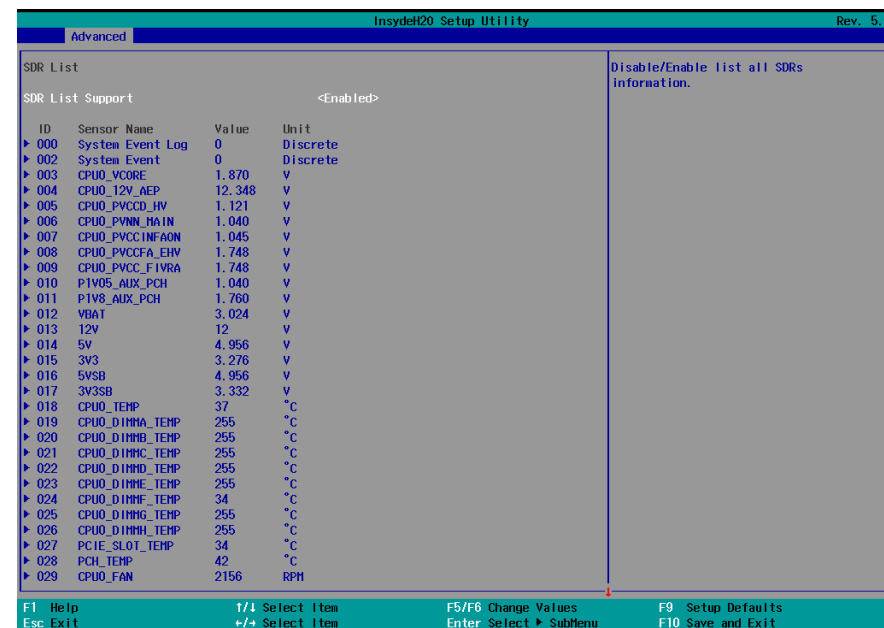
IPMI Support

Enable/Disable IPMI Support.

Note: If changing to enable, BMC detailed information only valid after rebooting.

► Advanced

H2O IPMI Configuration ► SDR List



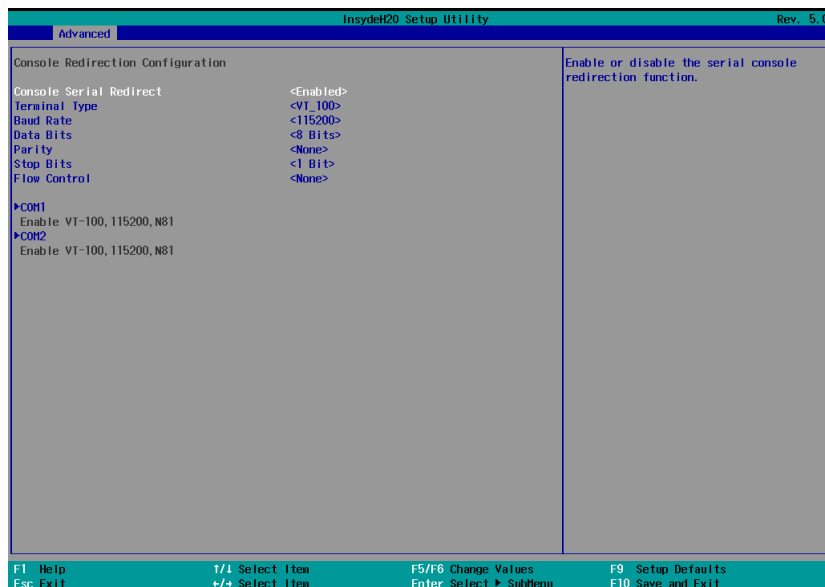
SDR List

Enable/Disable all SDRs information.

► Advanced

Console Redirection

Configure COM port serial settings in the submenu.



Console Serial Redirect

Enable/Disable the serial console redirection function.

Terminal Type

Select terminal type – VT_100, VT_100+, VT_UTF8 or PC_ANSI.

Baud Rate

Select baud rate – 115200, 57600, 38400, 19200, 9600, 4800, 2400 or 1200.

Data Bits

Select data bits – 7 bits or 8 bits.

Parity

Select parity bits – none, even or odd.

Stop Bits

Select stop bits – 1 bit or 2 bits.

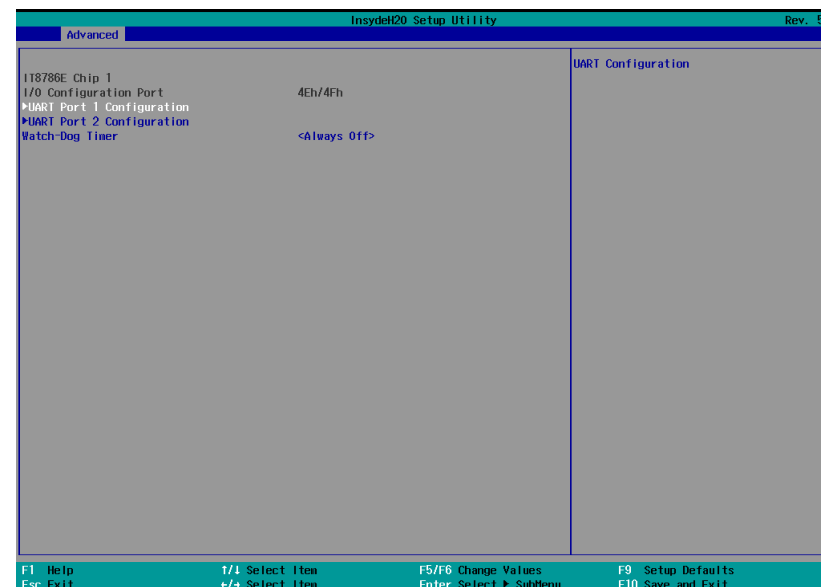
Flow Control

Select flow control type – none, RTS/CTS or XON/XOFF.

► Advanced

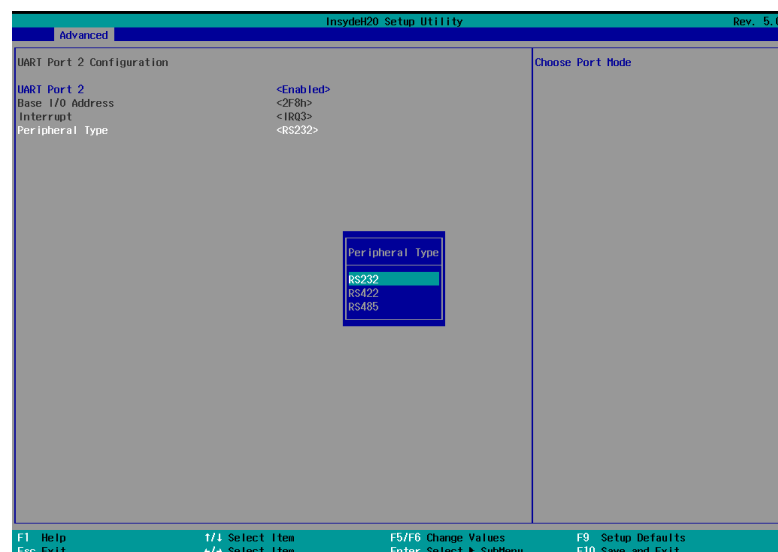
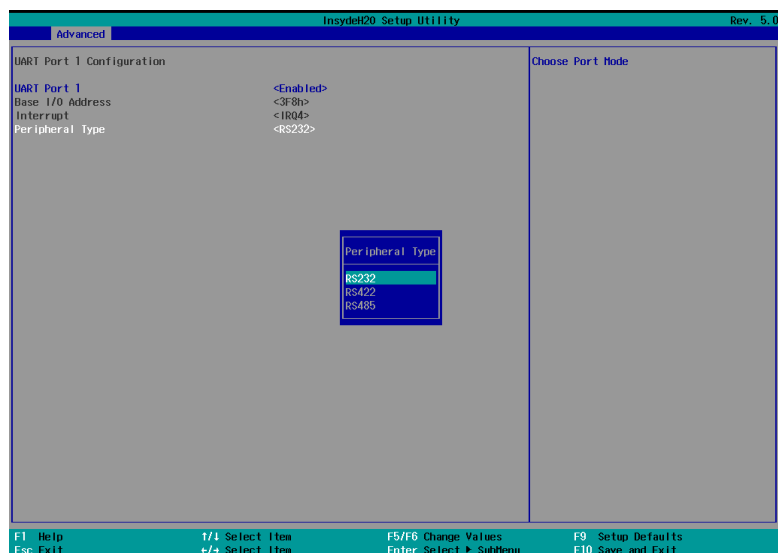
SIO IT8786E

Configure Super I/O settings in this submenu. Scroll by moving the cursor up or down to reveal more options.



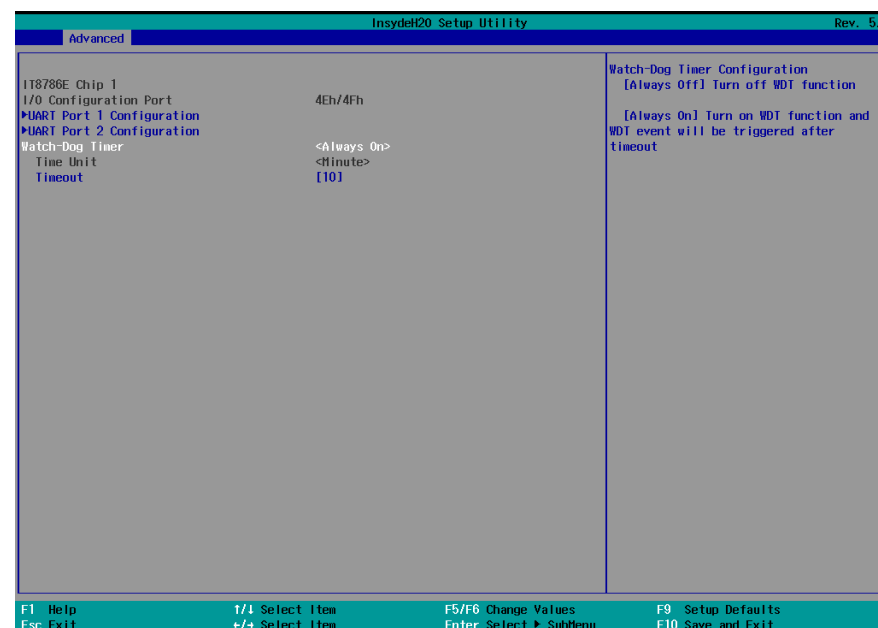
► Advanced

SIO IT8786E ► UART Port 1 / 2 Configuration



► Advanced

SIO IT8786E ► Watch-Dog Timer



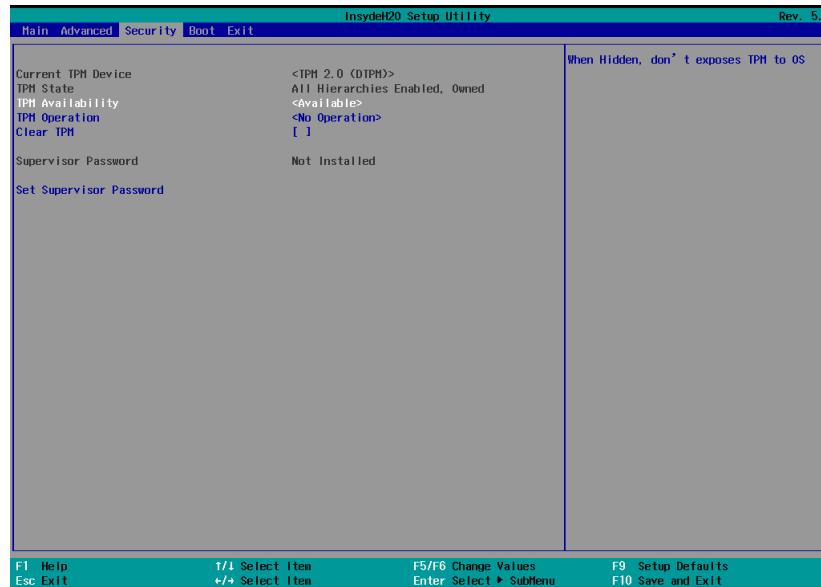
Watch-Dog Timer

Watch-Dog Timer Configuration

[Always Off] Turn off WDT function

[Always On] Turn on HDT function and WDT event will be triggered after timeout

► Security



TPM Availability

Show or hide the TPM availability and its configurations.

TPM Operation

Select one of the supported operation to change TPM2 state — No Operation, Enable, or Disable.

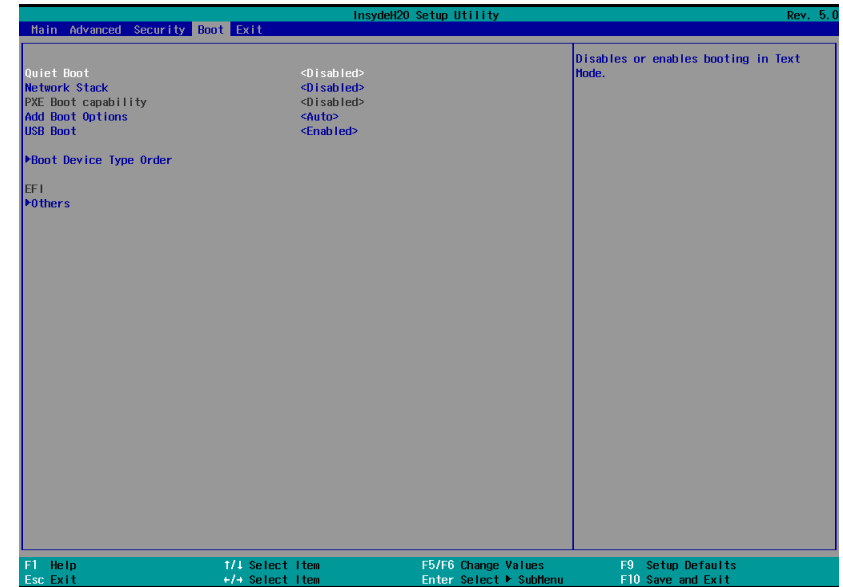
Clear TPM

Remove all TPM context associated with a specific Owner.

Set Supervisor Password

Set the supervisor's password. The length of the password must be greater than one character.

► Boot



Quiet Boot

Enable or disable booting in text mode.

Network Stack

Network Stack Support:

Windows 8 BitLocker Unlock

UEFI IPv4/IPv6 PXE

Legacy PXE OPROM

Add Boot Options

Position in Boot Order for Shell, Network and Removables

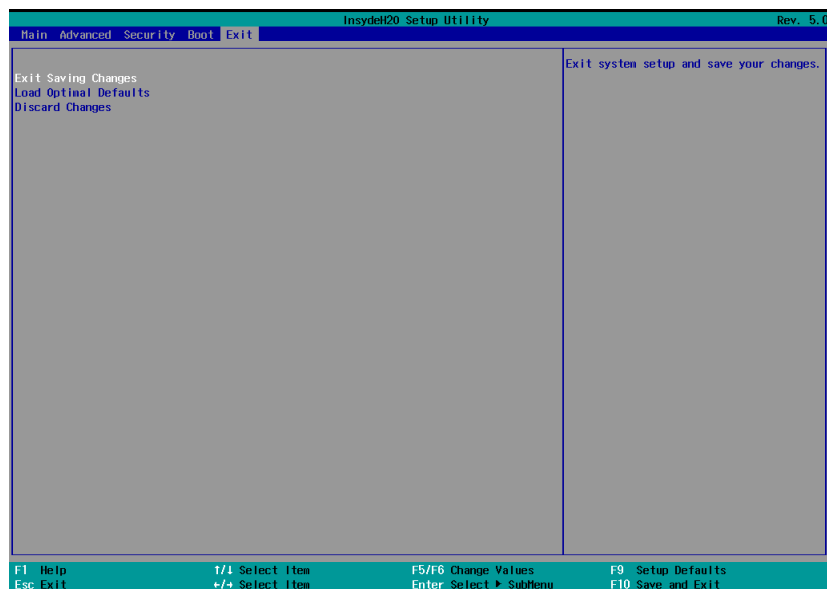
USB Boot

Enable or disable booting to USB boot devices.

Boot Device Type Order

Change boot device type order.

► Exit



Exit Saving Changes

Select Yes and press <Enter> to exit the system setup and save your changes.

Load Optimal Defaults

Select YES and press <Enter> to load optimal defaults.

Discard Changes

Select YES and press <Enter> to exit the system setup without saving your changes.

► Updating the BIOS

To update the BIOS, you will need the new BIOS file and a flash utility. Please contact technical support or your sales representative for the files and specific instructions about how to update BIOS with the flash utility.

► Notice: BIOS SPI ROM

1. The Intel® Management Engine has already been integrated into this system board. Due to the safety concerns, the BIOS (SPI ROM) chip cannot be removed from this system board and used on another system board of the same model.
2. The BIOS (SPI ROM) on this system board must be the original equipment from the factory and cannot be used to replace one which has been utilized on other system boards.
3. If you do not follow the methods above, the Intel® Management Engine will not be updated and will cease to be effective.



Note:

- a. You can take advantage of flash tools to update the default configuration of the BIOS (SPI ROM) to the latest version anytime.
- b. When the BIOS IC needs to be replaced, you have to populate it properly onto the system board after the EEPROM programmer has been burned and follow the technical person's instructions to confirm that the MAC address should be burned or not.
- c. After updating unique MAC Address from manufacturing, NVM will be protected immediately after power cycle. Users cannot update NVM or MAC address.

Chapter 4 - RAID

The system board allows configuring RAID on Serial ATA drives. It supports RAID 0, RAID 1, RAID 5 and RAID 10.

► RAID Levels

RAID 0 (Striped Disk Array without Fault Tolerance)

RAID 0 uses two new identical hard disk drives to read and write data in parallel, interleaved stacks. Data is divided into stripes and each stripe is written alternately between two disk drives. This improves the I/O performance of the drives at different channel; however it is not fault tolerant. A failed disk will result in data loss in the disk array.

RAID 1 (Mirroring Disk Array with Fault Tolerance)

RAID 1 copies and maintains an identical image of the data from one drive to the other drive. If a drive fails to function, the disk array management software directs all applications to the other drive since it contains a complete copy of the drive's data. This enhances data protection and increases fault tolerance to the entire system. Use two new drives or an existing drive and a new drive but the size of the new drive must be the same or larger than the existing drive.

RAID 5

RAID 5 stripes data and parity information across hard drives. It is fault tolerant and provides better hard drive performance and more storage capacity.

RAID 10 (Mirroring and Striping)

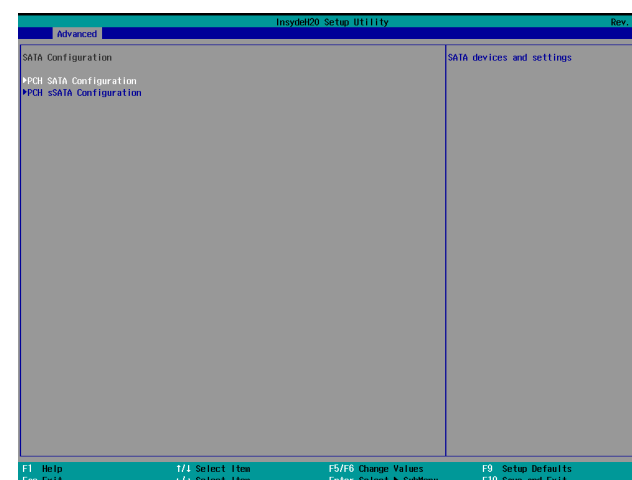
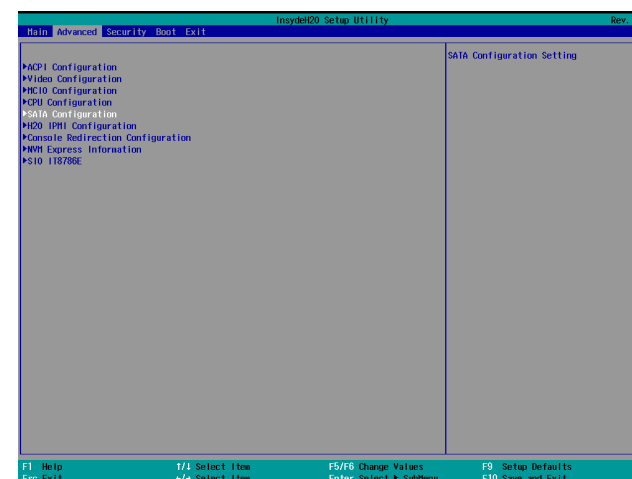
RAID 10 is a combination of data striping and data mirroring providing the benefits of both RAID 0 and RAID 1. Use four new drives or an existing drive and three new drives for this configuration.

RAID Level	Min. Drives	Protection	Description
RAID 0	2	None	Data striping without redundancy
RAID 1	2	Single Drive Failure	Disk mirroring
RAID 5	3	Single Drive Failure	Block-level data striping with distributed parity
RAID 10	4	1 Disk Per Mirrored Stripe (not same mirror)	Combination of RAID 0 (data striping) and RAID 1 (mirroring)

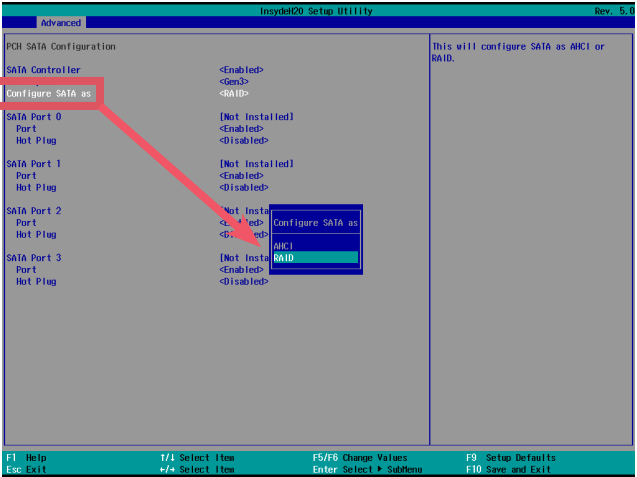
► Setup Procedure

Step 1: Enable RAID in the Insyde BIOS

1. Power on the system, then press to enter the Insyde BIOS main menu.
2. Go to the **Advanced** menu and select **SATA Configuration**.
3. Select **PCH SATA Configuration**.

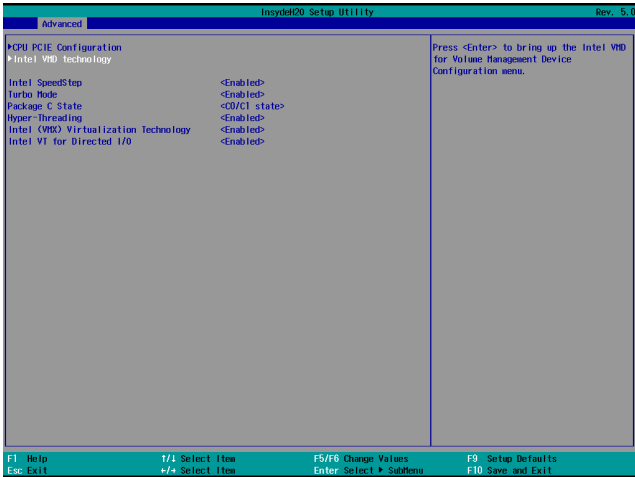
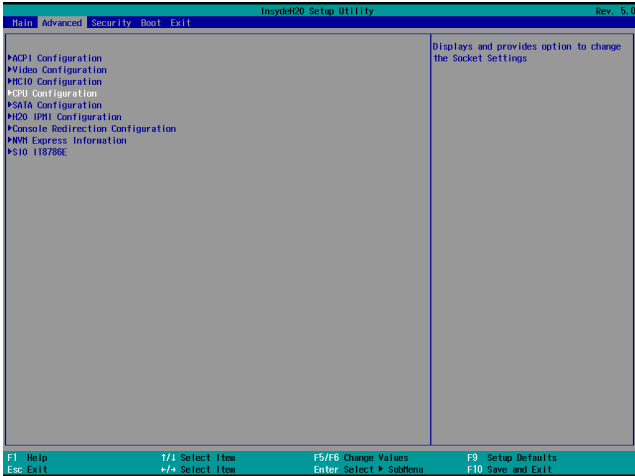


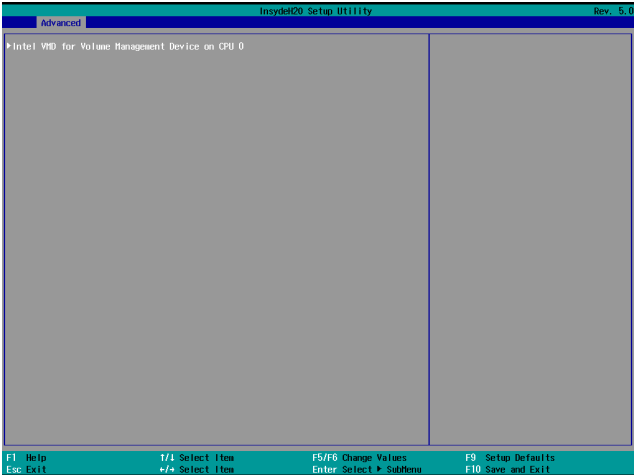
4. Change **Configure SATA** as to **RAID**.
5. Save the changes from the **Exit** menu and reboot the system, or press <F10> and select **Yes**.



Step 2: Enable VMD Function

1. Go to the **Advanced** menu and select **CPU Configuration**.
2. Select **Intel VMD Technology** -> **Intel VMD for Volume Management Device on CPU 0**.



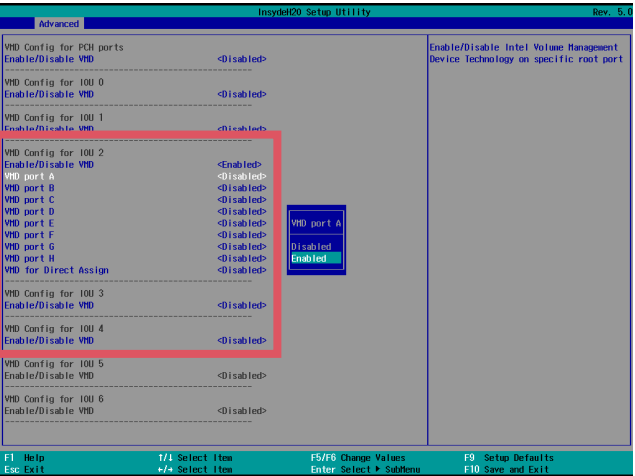


3. Navigate to each VMD Config for IOU 2 ~ IOU 4 menu and set the following items to Enabled:

- Enable/Disable VMD
- VMD Port A ~ H
- VMD for Direct Assign

If the NVMe/SATA routing configuration is uncertain, it is recommended to enable all available VMD ports and direct assign options.
The screenshot below uses IOU2 as an example for reference.

4. Save the changes from the **Exit** menu and reboot the system, or press <F10> and select **Yes**.

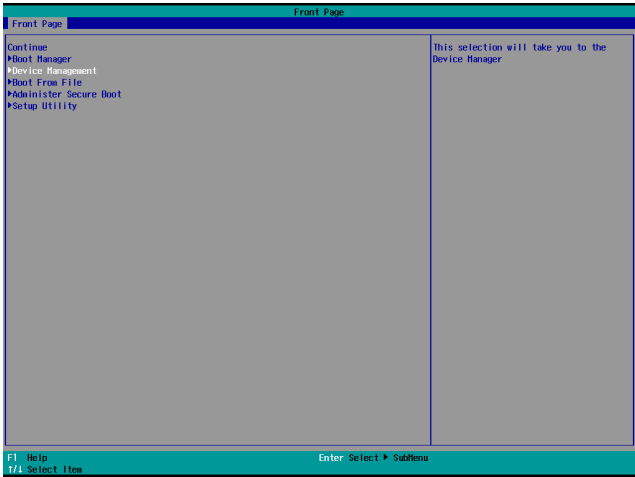


Note:

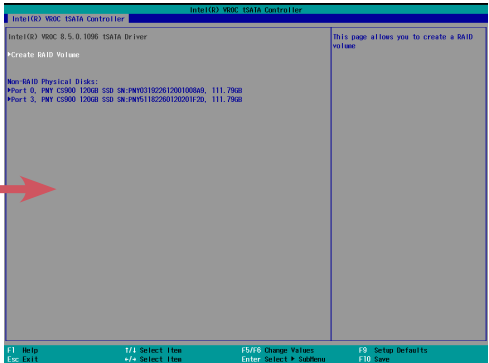
The BIOS setup screens shown in this document are for reference only.
Actual options may vary depending on the platform configuration.

Step 3: Create a RAID Volume

1. Press <Esc> to go to front page.
2. Select **Device Management**.



3. Select **Intel(R) VROC tSATA Controller**.
4. Select **Create RAID Volume** and configure the RAID settings as needed.
5. Press <F10> to save the changes and reboot the system.



Appendix A- Mating Connectors

► The Mating Connectors List

Please refer to the following list of the mating connectors.

Function	Location	Connector information
BMC COM	J15	PIN PLUG 2*5-1(K10)/2.0mm SMD W/cap,222-97-05GBEA(R)(PINREX),RoHS
Front Panel	J8	PIN PLUG 2*6-1(K12),2.54mm,M,H=8.6mm,180D,DIP,210-92-06GB02(PINREX),RoHS
COM2	TSJ1	BOX HEADER 2*5-1(K10),2.54mm,M,H=9.05mm,180D,DIP,BLACK,510-90-10GB04(PINREX),RoHS
DIO Power	J20	WAFER 1*4,2.0mm,M,H=6.2mm,180D,DIP,WHITE,88323-041N-3(ACES)RoHS
DIO	J21	BOX HEADER 2*10-1(K20),2.0mm,M,H=6.3mm,180D,DIP,BLACK,52X-80-20GB52(PINREX)RoHS
eSPI Header	J6	PIN PLUG, 2*7P-1(K8)/2.0mm, M, G/F, BLACK, 180D, DIP, 220-97-07GB18(PINREX)RoHS
USB 3.0_P5/P6	UBJ1	BOX HEADER 2*10-1(K20),2.0mm,M,H=6.3mm,180D,DIP,BLACK,52X-80-20GB52(PINREX)RoHS
Front Audio	AUJ2	PIN PLUG 2*5-1(K8),2.54mm,M,H=8.6mm,180D,DIP,210-92-05GB06(PINREX)
OOB I2C	J5	BOX HEADER, 1*5P/1.0mm, F, NATURAL, 180D, SMT, BM05B-SRSS-TB1(LF)(SN)(JST)RoHS
CPLD JTAG	J3	PIN PLUG 2*4,2.54mm,M,H=8.6mm,180D,DIP,210-92-04GB01(PINREX)RoHS
Intel® VROC hardware key box header	J24	BOX HEADER, 1*4P/1.25mm, F, WHITE, 180D, SMT, 712-73-045WE0(PINREX)RoHS
USB2.0_P10/P11	UBJ3	PIN PLUG 2*5-1(K9),2.54mm,M,H=8.6mm,180D,DIP,210-92-05GY32(PINREX),(YELLOW)
RTC Battery	J2	WAFER 1*2,2.0mm,M,H=6.1mm,180D,DIP,WHITE,721-81-02TW00(PINREX)RoHS
System Fan2	J13	WAFER, 1*5P/2.54mm, 3pin, F, WHITE, 180D, DIP, 744-H81-055W1V(PINREX)HF
PMBus (Power Management Bus)	J22	BOX HEADER, 1*5P/2.54mm, M, BLACK, 180D, SMD, 74099-0605(MOLEX)RoHS