



X13DAI-T

USER'S MANUAL

Revision 1.2

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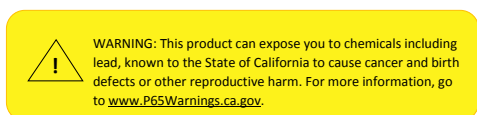
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Manual Revision 1.2

Release Date: June 24, 2026

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Preface

About This Manual

This manual is written for system integrators, IT technicians, and knowledgeable end users. It provides information for the installation and use of the X13DAI-T motherboard.

About This Motherboard

The Supermicro X13DAI-T supports dual 5th/4th Generation Intel® Xeon® Scalable Processors (in Socket E LGA 4677) with four Ultra Path Interconnects (UPIs), up to 64 CPU cores, and a thermal design power (TDP) of up to 350 W. Built with the Intel C741 chipset, the X13DAI-T supports up to 4 TB 3DS RDIMM/RDIMM DDR5 ECC memory with speeds of up to 5600 MT/s in 16 DIMM slots (1DPC configuration). This motherboard features superior I/O expandability and flexibility, including five PCIe 5.0 x16/CXL slots, one PCIe 5.0 x8/CXL slot, two PCIe 5.0 x8 MCIO NVMe connectors (with support of four connections), ten SATA 3.0 connections (eight via one SlimSAS connector; two with support of SuperDOM devices), two PCIe 5.0 NVMe M.2 slots, two USB 2.0 connections (via one header), four USB 3.0 ports, two USB 3.0 connections (via one header), and one internal USB 3.1 Gen 2 connector. It also offers the most advanced data protection capability that provides the Trusted Platform Module (TPM) 2.0 support. The X13DAI-T is optimized for future PCIe specifications with flexible I/O, networking, storage, and Graphics Processing Unit (GPU) (optional) supports. It is ideal for use in general purpose servers with 3D Modeling and Rendering, 3D simulations, editing 8K video, visualization, and High Performance Computing (HPC). Also, the X13DAI-T is optimized for high-performance and high-end computing platforms that address the needs of next generation workstation applications. Please note that this motherboard is intended to be installed and serviced by professional technicians only. For processor/memory updates, please refer to our website at <https://www.supermicro.com/products/>.



Note 1: Memory speed support depends on the processor.

Note 2: Be sure to use processors of the same SKU on a multi-processor motherboard.

Note 3: The 5th Gen. Intel Xeon Scalable processors support four UPIs with 20 GT/s (max.). The 4th Gen. Intel Xeon Scalable processors support four UPIs with 16 GT/s (max.).

Conventions Used in the Manual

Special attention should be given to the following symbols for proper installation and to prevent damage done to the components or injury to yourself.



Warning! Indicates important information given to prevent equipment/property damage or personal injury.



Warning! Indicates high voltage may be encountered while performing a procedure.



Warning! Indicates hazardous moving parts may be encountered while handling a fan or components near a fan.



Important: Important information given to ensure proper system installation or to relay safety precautions.



Note: Additional Information given to differentiate various models or to provide information for proper system setup.

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Chapter 1

Introduction

Congratulations on purchasing your computer motherboard from an industry leader. Supermicro motherboards are designed to provide you with the highest standards in quality and performance.

In addition to the motherboard, several important parts that are included in the retail box are listed below. If anything listed is damaged or missing, please contact your retailer.

1.1 Checklist

Main Parts List		
Description	Part Number	Quantity
Supermicro Motherboard	X13DAI-T	1
I/O Shield	MCP-260-00181-0B	1
SATA Cables	CBL-0044L	2
Quick Reference Guide	MNL-2569-QRG	1
CPU Carrier (E1A for SP XCC)	SKT-1333L-0000-FXC	2
CPU Carrier (E1B for SP MCC)	SKT-1424L-001B-LTS	2

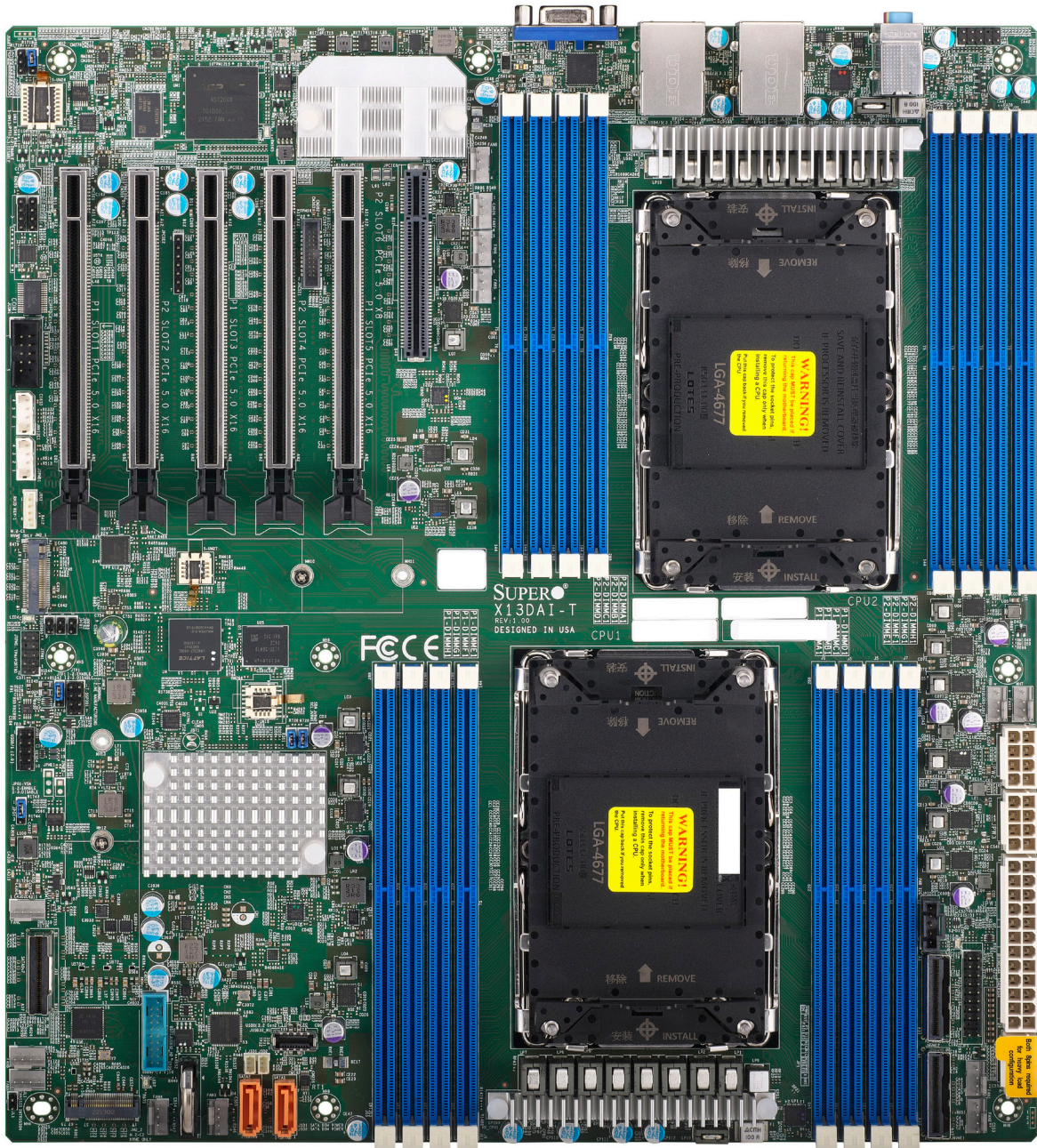
Important Links

For your motherboard to work properly, please follow the links below to download all necessary drivers/utilities and the user's manual for your computer.

- Supermicro product manuals: <https://www.supermicro.com/support/manuals/>
- Product drivers and utilities: <https://www.supermicro.com/wdl/driver>
- Product safety info: https://www.supermicro.com/about/policies/safety_information.cfm
- A secure data deletion tool designed to fully erase all data from storage devices can be found at our website: https://www.supermicro.com/about/policies/disclaimer.cfm?url=/wdl/utility/Lot9_Secure_Data_Deletion_Utility/
- Firmware-related and AOC user's guides: <https://www.supermicro.com/support/manuals/>
- If you have any questions, please contact our support team at: support@supermicro.com

This manual may be periodically updated without notice. Please check the Supermicro website for possible updates to the manual revision level.

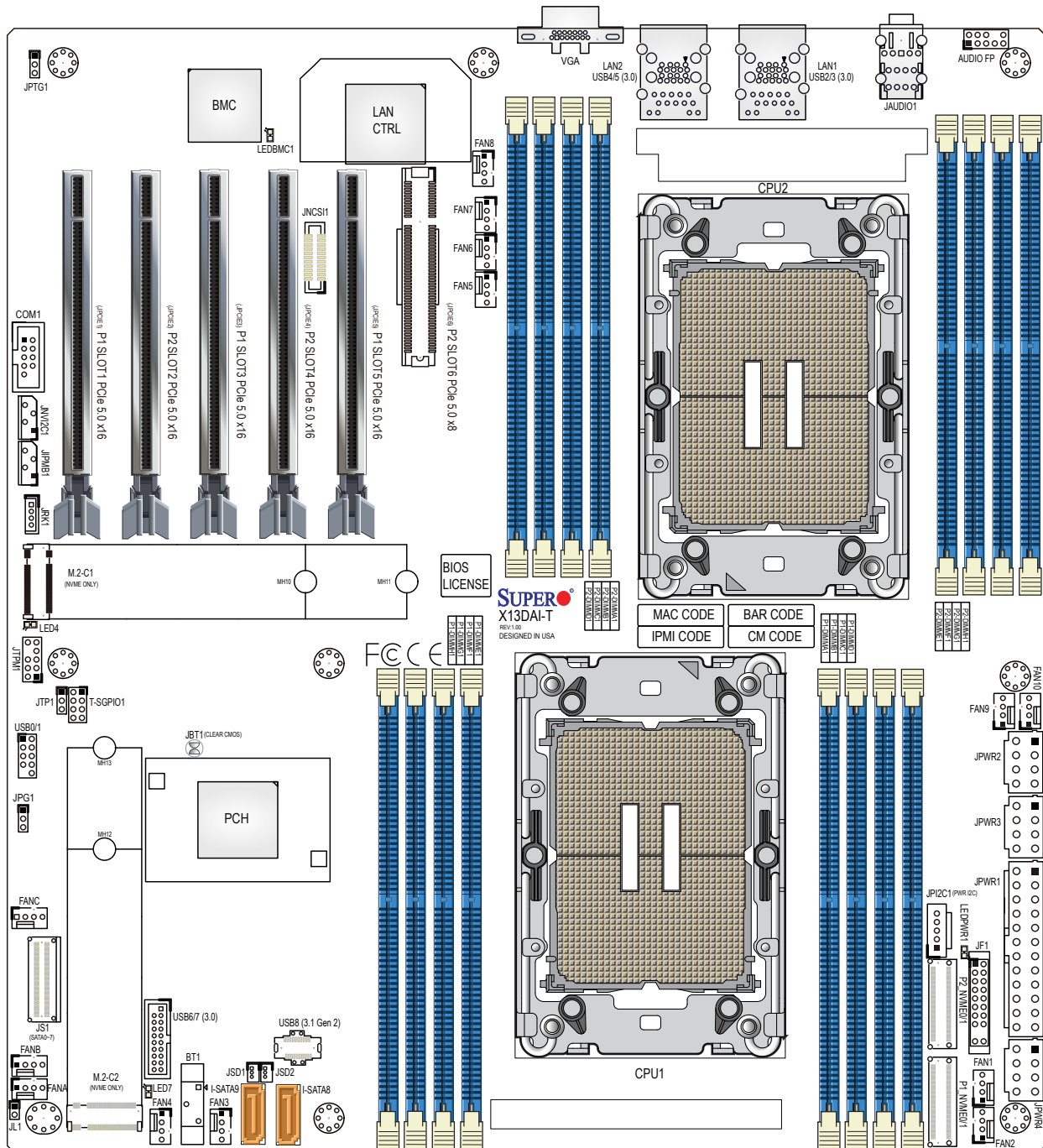
X13DAI-T Motherboard Image



 **Note:** All graphics shown in this manual were based upon the latest PCB revision available at the time of publication of the manual. The motherboard you received may or may not look exactly the same as the graphics shown in this manual.

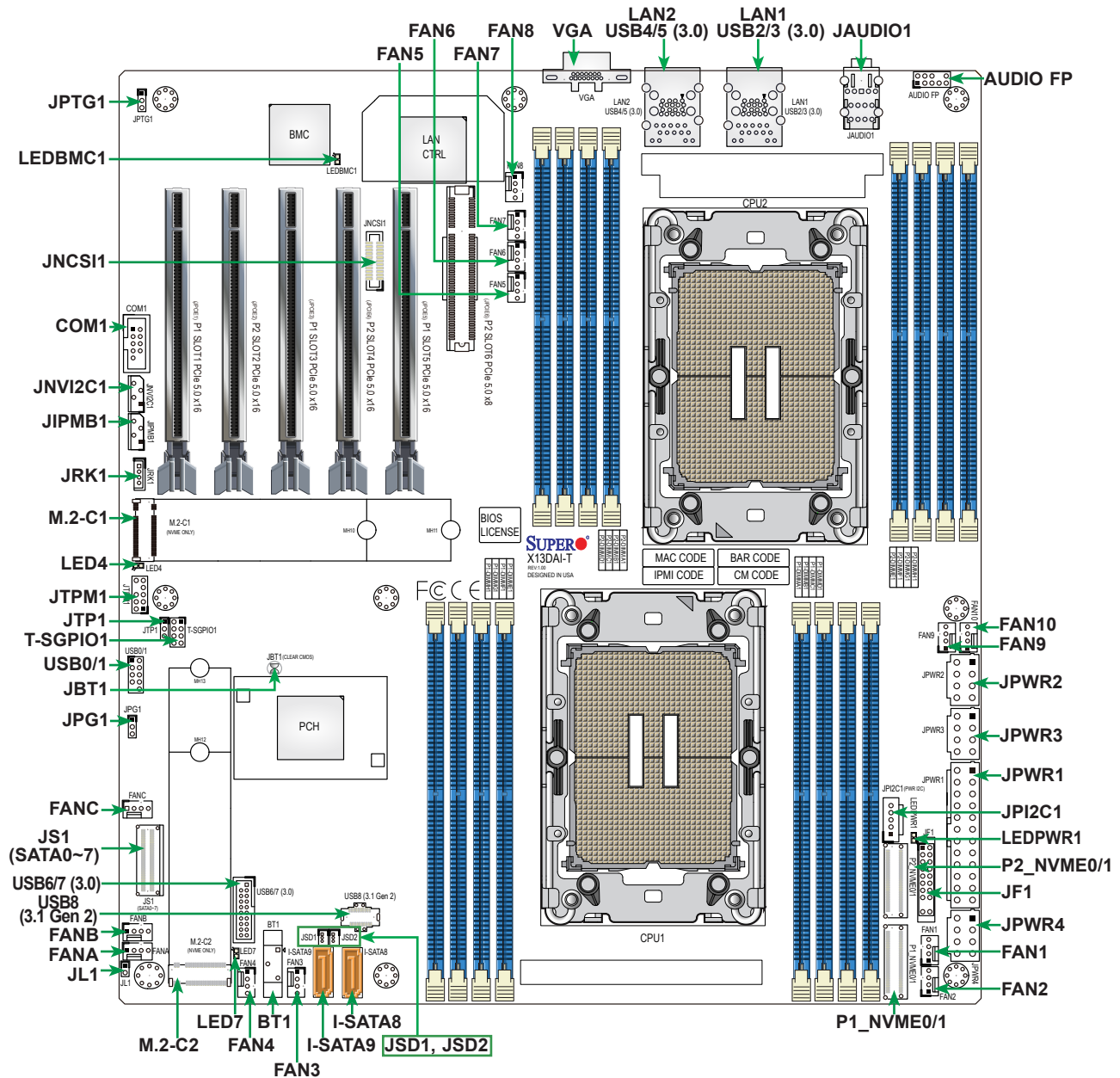
X13DAI-T Motherboard Layout

(not drawn to scale)



Note: Components not documented are for internal testing only.

Quick Reference



Notes:

- See Chapter 2 for detailed information on jumpers, I/O ports, and JF1 front panel connections.
- "■" indicates the location of Pin 1.
- Jumpers/LED indicators not indicated are used for testing only.
- Use only the correct type of onboard CMOS battery as specified by the manufacturer. Do not install the onboard battery upside down to avoid a possible explosion.

Quick Reference Table

Jumper	Description	Default Setting
JBT1	CMOS Clear	Open (Normal)
JPG1	VGA Port Enable/Disable	Pins 1-2 (Enabled)
JPTG1	10 GbE LAN Port Enable/Disable	Pins 1-2 (Enabled)
JTP1	TPM Module Mode	Pins 1-2 (Onboard TPM Module Enabled)
LED	Description	Status
LED4	M.2-C1 LED	Blinking Green: Device Working
LED7	M.2-C2 LED	Blinking Green: Device Working
LEDBMC1	BMC Heartbeat LED	Blinking Green: BMC Normal (Active) Solid Green: During BMC Reset or during a Cold Reboot
LEDPWR1	Power LED	LED On: Onboard Power On
Connector	Description	
AUDIO FP	Front Panel Audio Header	
BT1	Onboard CMOS Battery	
COM1	Front Accessible COM Header	
FAN1 – FAN10, FANA, FANB, FANC	FAN1 – FAN10: CPU Fan Headers FANA, FANB, FANC: System Fan Headers	
I-SATA8, I-SATA9	SATA 3.0 Connectors with support of SuperDOM devices * DOM: Disk on Module	
JAUDIO1	Rear I/O Audio Ports	
JF1	Front Control Panel Header	
JIPMB1	4-pin BMC External I ² C Header	
JL1	Chassis Intrusion Header	
JNCSI1	Network Controller Sideband Interface (NC-SI) Connector	
JNVI2C1	NVMe SMBus I ² C Header used for PCIe SMBus clock and data connections with hot-plug support	
JPI2C1	Power SMBus I ² C Header used for monitoring the power supply, fans, and system temperatures	
JPWR1	24-pin ATX Main Power Supply Connector	
JPWR2, JPWR3, JPWR4	8-pin Power Connectors	
JRK1	Intel VROC Key Header for NVMe RAID support * The Intel VROC solution is used for NVMe/SATA drives to create RAID arrays and only supported on the CPU/PCH with the Intel VMD technology. It is NOT able to cross VMDs when creating a boot RAID. The data RAID is allowed to cross VMDs and processors.	
JS1 (SATA0~7)	SlimSAS LP Connector with support of eight Intel PCH SATA 3.0 connections (Supports RAID 0, RAID 1, RAID 5, and RAID 10)	



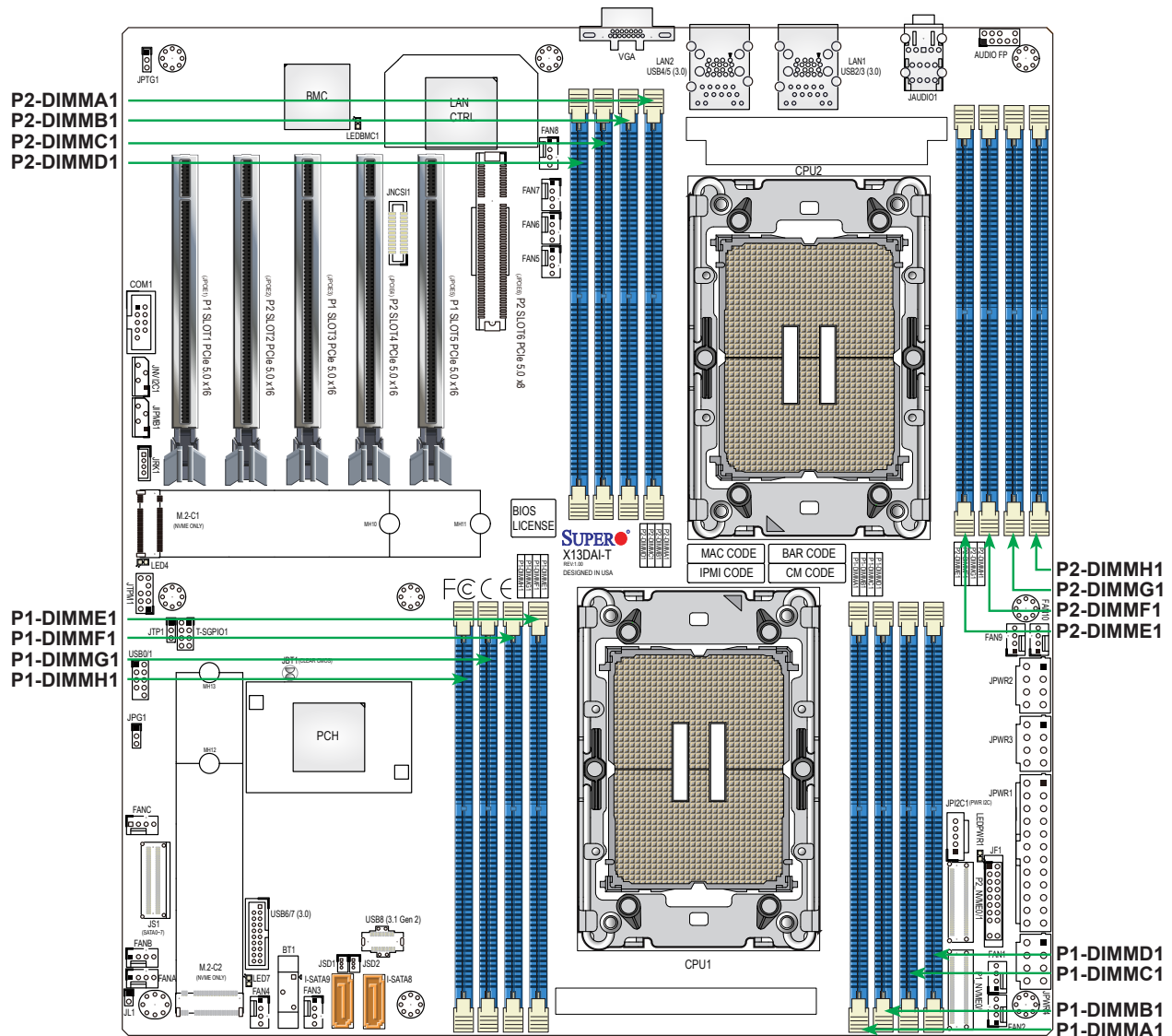
Note: For details on how to configure Network Interface Card (NIC) settings, please refer to the Network Interface Card Configuration User's Guide posted on our website under the link: <https://www.supermicro.com/support/manuals/>.

Connector	Description
JSD1, JSD2	SATA DOM Power Connectors
JTPM1	Trusted Platform Module/Port 80 Header
LAN1, LAN2	Rear I/O 10 GbE LAN Ports (LAN1: shared BMC LAN port)
M.2-C1, M.2-C2	PCIe 5.0 NVMe M.2 Slots (with support of M-Key 2280 and 22110) * The devices connected to the two M.2 slots can NOT be used together to create the Intel VROC boot RAID.
P1 SLOT1/3/5	PCIe 5.0 x16 Slots supported by CPU1
P2 SLOT2/4	PCIe 5.0 x16 Slots supported by CPU2
P2 SLOT6	PCIe 5.0 x8 Slot supported by CPU2
P1_NVME0/1	NVMe PCIe 5.0 x8 MCIO Connector supported by CPU1 with two NVMe connections
P2_NVME0/1	NVMe PCIe 5.0 x8 MCIO Connector supported by CPU2 with two NVMe connections
T-SGPIO1	Serial General Purpose I/O Header
USB0/1	Front-accessible USB 2.0 Header
USB2/3/4/5	Rear I/O USB 3.0 Ports
USB6/7	Front-accessible USB 3.0 Header
USB8	Internal USB 3.1 Gen 2 Connector
VGA	Rear I/O VGA port

Memory Slots

This motherboard contains 16 DIMM slots which support up to 4 TB of DDR5 memory in 16 slots. Please refer to the layout below for the locations of the DIMM slots.

DIMM Slots Supported by CPU1	DIMM Slots Supported by CPU2
P1-DIMMA1	P2-DIMMA1
P1-DIMMB1	P2-DIMMB1
P1-DIMMC1	P2-DIMMC1
P1-DIMMD1	P2-DIMMD1
P1-DIMME1	P2-DIMME1
P1-DIMMF1	P2-DIMMF1
P1-DIMMG1	P2-DIMMG1
P1-DIMMH1	P2-DIMMH1



Motherboard Features

Motherboard Features	
CPU	
Supports dual 5th/4th Gen. Intel Xeon Scalable Processors (in Socket E LGA 4677) with four UPIs (20 GT/s max.), up to 64 CPU cores, and a thermal design power (TDP) of up to 350 W.  Note: Be sure to use processors of the same SKU on a multi-processor motherboard.	
Memory	
Supports up to 4 TB 3DS RDIMM/RDIMM DDR5 (288-pin) ECC memory with speeds of up to 5600 MT/s (1DPC) in 16 DIMM slots.  Note: Memory speed and capacity support depends on the processor.	
DIMM Size	
Up to 256 GB at 1.1 V  Note: For the latest CPU/memory updates, please refer to our website at https://www.supermicro.com/products/motherboard.	
Chipset	
Intel C741	
Expansion Slots	
- Five PCIe 5.0 x16/CXL slots (CPU1 SLOT1/3/5, CPU2 SLOT2/4) - One PCIe 5.0 x8/CXL slot (CPU2 SLOT6) - Two PCIe 5.0 x8 MCIO NVMe connectors with support of four connections (P1_NVME0/1, P2_NVME0/1) - Two PCIe 5.0 NVMe M.2 slots (support M-Key 2280 and 22110)	
Baseboard Management Controller (BMC)/Network	
- ASPEED AST2600 BMC (shared LAN) with RoT 2.0 - Two 10 GbE LAN ports supported by Broadcom BCM57416 controller	
Graphics	
Graphics controller and VGA support via ASPEED AST2600 BMC	
I/O Devices	
- One front accessible COM header (COM1) - One SlimSAS LP connector (JS1: SATA0~7) with support of eight Intel PCH SATA 3.0 connections (RAID 0, RAID 1, RAID 5, and RAID 10 supported); Two Intel PCH powered SATA 3.0 connectors with support of SuperDOM devices (I-SATA8 and I-SATA9) - One VGA port on the rear I/O panel	
Peripheral Devices	
- One front-accessible USB 2.0 header with support of two connections (USB0/1) - Four USB 3.0 ports on the rear I/O panel (USB2/3/4/5) - One front-accessible USB 3.0 header with support of two connections (USB6/7) - One internal USB 3.1 Gen 2 connector (USB8)	

BIOS

- AMI SPI BIOS
- EFI GUI, SPI dual/quad speed control, Real Time Clock (RTC) wakeup, IPMIView, SMCIPMITOOL, IPMI CFG, Redundant power supply unit detection, SPM, SuperServer Automation Assistant (SAA)

Power Management

- ACPI power management
- S1, S5 support
- Power button override mechanism
- Power-on mode for AC power recovery
- Wake-on-LAN
- Power supply monitoring

System Health Monitoring

- Onboard voltage monitoring for +12 V, +5 V / +5 V standby, +3.3 V, and +3.3 V standby, Vcore, Vmem
- Onboard temperature monitoring for CPU, VRM, LAN, PCH, system, and memory
- 7+2 CPU switch phase voltage regulator
- CPU thermal trip support
- Platform Environment Control Interface (PECI)

Fan Control

- Fan status monitoring via BMC connections
- Dual cooling zone
- Low-noise fan speed control
- Thirteen 4-pin fan headers

System Management

- Chassis intrusion header and detection
- Server platform service

Firmware Integrity/System Security

- Trusted Platform Module (TPM) onboard (TPM 9670 and TPM 9672)

LED Indicators

- Power LED
- M.2 LEDs
- LAN activity LEDs
- BMC/CPLD firmware LED

Dimensions

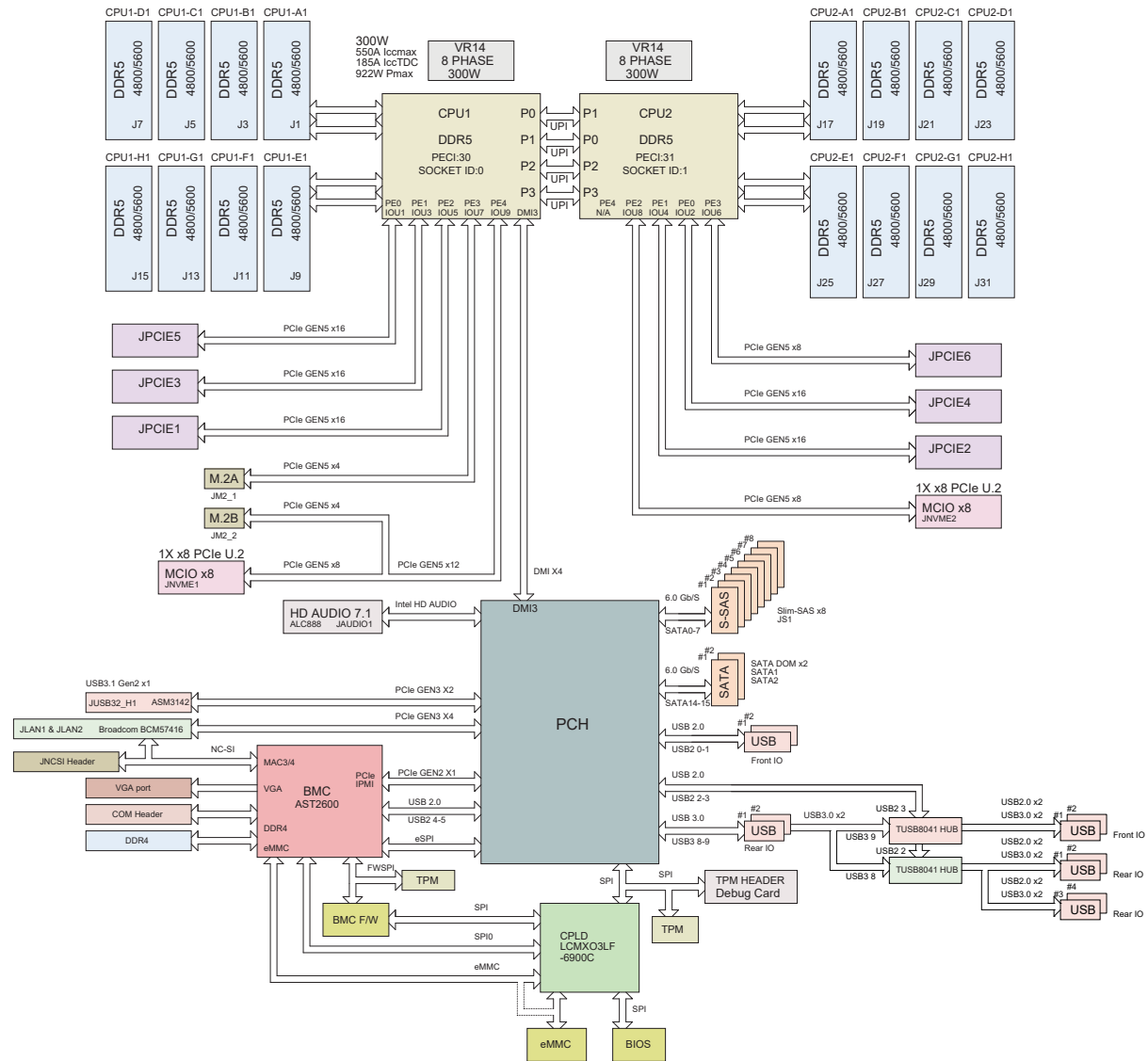
- 12.1" (W) x 13.1" (L) E-ATX (307.34 mm x 332.74 mm)



Note 1: The CPU maximum thermal design power (TDP) is subject to chassis and heatsink cooling restrictions. For proper thermal management, please check the chassis and heatsink specifications.

Note 2: For BMC configuration instructions, please refer to the Embedded BMC Configuration User's Guide available at <https://www.supermicro.com/support/manuals/>.

X13DAI-T



System Block Diagram

 **Note:** This is a general block diagram and may not exactly represent the features on your motherboard. See the previous pages for the actual specifications of your motherboard.

1.2 Processor and Chipset Support

Built upon the functionality and capability of the 5th/4th Gen. Intel Xeon Scalable Processors (Socket E) and the Intel C741 chipset, the X13DAI-T motherboard offers critical, pivotal technological breakthroughs that unleash unprecedented computing capabilities and provides a scalable platform optimized for applications used in Artificial Intelligence (AI) Acceleration, Deep Learning Boost, Network Interconnectivity, and Platform Manageability technologies. The key features supported by the platform include the following:

Processor Features Supported

- Increased, scalable performance with substantial advancements, including UPI speed improvement, memory speed/capacity/utilization enhancement, hardware-based security innovations for virtualization, and platform interconnectivity optimization
- Integrated accelerators optimized for workload enhancement including Advanced Matrix Extensions (IntelAMX), In-Memory Analytics Accelerator (IAX), Data Streaming Accelerator (IntelDSA), and QuickAssist Technology (Intel QAT)
- Breakthroughs in memory and I/O support, including DDR5 (5600 MT/s max., depending on the processor), PCIe 5.0 (80 lanes max.), and CXL 1.1 (four devices per CPU)
- Increased operational and performance efficiency with substantial enhancements in virtualization, network security, and telemetry and power management
- Integrated AI accelerators with support of 3rd Gen. Intel Deep Learning Boost and new Tile Matrix Multiply (AMX/MUL)
- Enhanced Intel Security Boost Software Guard Extensions with Integrity Platform Firmware Resilience support
- Intel Ultra Path Interconnect (Intel UPI) up to four links per processor at 20 GT/s max. (depending on the processor)
- New Compute Express Link (CXL) and Intel Speed Select Technology
- CPU with 52 physical address/57 virtual address support

PCH Features Supported

- Flexible I/O at 20 lanes for PCIe 3.0, SATA and USB, and four DMIs at 8 GT/s

1.3 Special Features

Recovery from AC Power Loss

The Basic I/O System (BIOS) provides a setting that determines how the system will respond when AC power is lost and then restored to the system. You can choose for the system to remain powered off (in which case you must press the power switch to turn it back on), or for it to automatically return to the power-on state. See the Advanced BIOS Setup section for this setting. The default setting is **Last State**.

1.4 System Health Monitoring

Onboard Voltage Monitors

An onboard voltage monitor will scan the voltages of the onboard chipset, memory, and CPU continuously. Once a voltage becomes unstable, a warning is given, or an error message is sent to the screen.

Fan Status Monitor with Firmware Control

The system health monitor embedded in the BMC chip can check the RPM status of the cooling fans. The CPU and chassis fans are controlled via BMC.

Environmental Temperature Control

System Health sensors monitor temperatures and voltage settings of onboard processors and the system in real time via the BMC interface. Whenever the temperature of the CPU or the system exceeds Supermicro's pre-defined threshold, the system and CPU cooling fan speed will increase to prevent the CPU or system from overheating.

 **Note:** To avoid possible system overheating, please be sure to provide adequate air-flow to your system.

1.5 ACPI Features

ACPI stands for Advanced Configuration and Power Interface. The ACPI specification defines a flexible and abstract hardware interface that provides a standard way to integrate power management features throughout a computer system, including its hardware, operating system and application software. This enables the system to automatically turn on and off peripherals such as network cards, hard disk drives and printers.

In addition to enabling operating system-directed power management, ACPI also provides a generic system event mechanism for Plug and Play, and an operating system-independent interface for configuration control. ACPI leverages the Plug and Play BIOS data structures, while providing a processor architecture-independent implementation that is compatible with appropriate Windows operating systems. For detailed information regarding OS support, please refer to the Supermicro website.

1.6 Power Supply

As with all computer products, a stable power source is necessary for proper and reliable operation. It is even more important for processors that have high CPU clock rates where noisy power transmission is present.

The X13DAI-T motherboard accommodates one 24-pin power connector (JPWR1) and three 12 V 8-pin power connectors (JPWR2/JPWR3/JPWR4). Although most power supplies generally meet the specifications required by the CPU, some are inadequate. All these power connections are also required to ensure adequate power supply to the system.

Warning! To avoid damaging the power supply or the motherboard, be sure to use a power supply that contains one 24-pin and three 8-pin power connectors. Be sure to connect the power supply to the 24-pin power connector (JPWR1) and the 8-pin power connectors (JPWR2/JPWR3/JPWR4) on the motherboard. Failure in doing so may void the manufacturer warranty on your power supply and motherboard.

It is strongly recommended that you use a high quality power supply that meets ATX power supply Specification 2.02 or above. It must also be SSI compliant. The recommended power supply for the X13DAI-T motherboard is PWS-2K01-PQ PSU PS2 2000W Multi-output PLATINUM.

1.7 Serial Port

The X13DAI-T motherboard supports one serial communication connection. COM1 header can be used for input/output. The UART provides legacy speeds with a baud rate of up to 115.2 Kbps.

Chapter 2

Installation

2.1 Static-Sensitive Devices

Electrostatic Discharge (ESD) can damage electronic components. To avoid damaging your motherboard, it is important to handle it very carefully. The following measures are generally sufficient to protect your equipment from ESD.

Precautions

- Use a grounded wrist strap designed to prevent static discharge.
- Touch a grounded metal object before removing the motherboard from the antistatic bag.
- Handle the motherboard by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.
- When handling chips or modules, avoid touching their pins.
- Put the motherboard and peripherals back into their antistatic bags when not in use.
- For grounding purposes, make sure that your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the motherboard.
- Use only the correct type of onboard CMOS battery. Do not install the onboard battery upside down to avoid a possible battery explosion.
- When installing the processor and heatsink, ensure a torque driver set to the correct force is used for each screw.

Unpacking

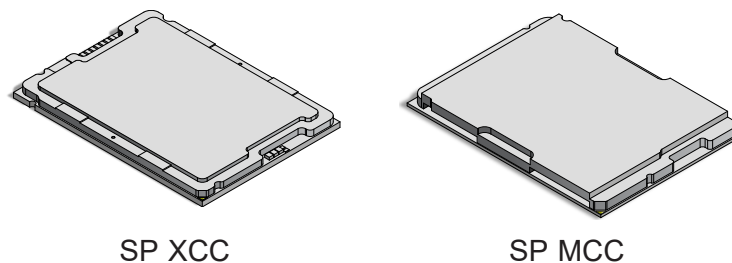
The motherboard is shipped in antistatic packaging to avoid static damage. When unpacking the motherboard, make sure that the person handling it is static protected.

2.2 Processor and Heatsink Installation

The processor (CPU) and processor carrier should be assembled together first to form the processor carrier assembly. This assembly will be then attached to the heatsink to form the processor heatsink module (PHM) before being installed into the CPU socket. Before installation, be sure to perform the following steps:

- Please carefully follow the instructions given on the previous page to avoid ESD-related damages.
- Unplug the AC power cords from all power supplies after shutting down the system.
- Check that the plastic protective cover is on the CPU socket, and none of the socket pins are bent. If they are, contact your retailer.
- When handling the processor, avoid touching or placing direct pressure on the LGA lands (gold contacts). Improper installation or socket misalignment can cause serious damage to the processor or CPU socket, which may require manufacturer repairs.
- Thermal grease is pre-applied on a new heatsink. No additional thermal grease is needed.
- Refer to the Supermicro website for updates on processor and memory support.
- All graphics in this manual are for illustrations only. Your components may look different.

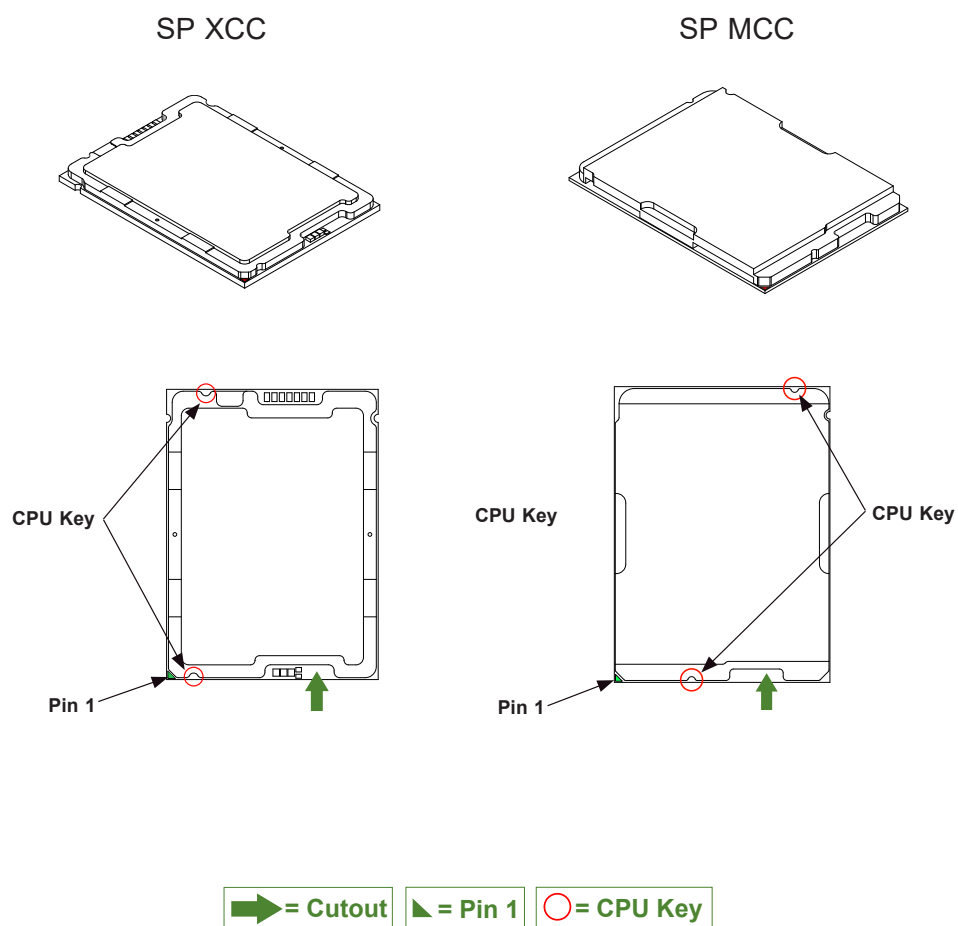
The 5th/4th Gen. Intel Xeon Scalable Processors



Processor Top View

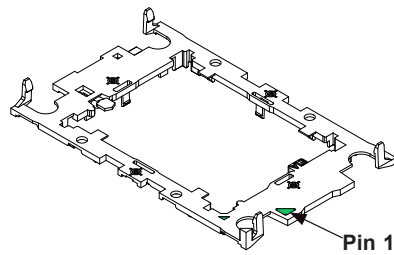
1. The 5th/4th Gen. Intel Xeon Scalable Processors

Processor Top View

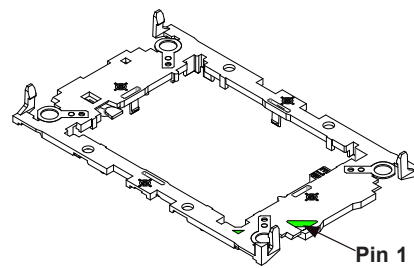


2. The Processor Carrier

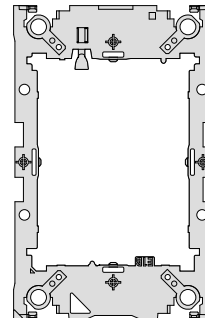
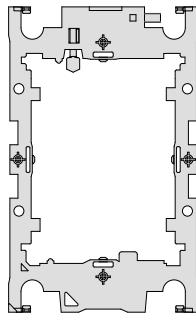
Carrier E1A



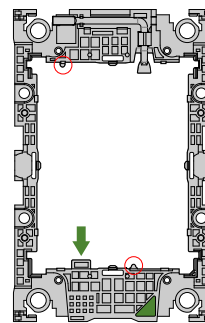
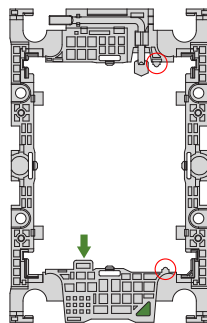
Carrier E1B



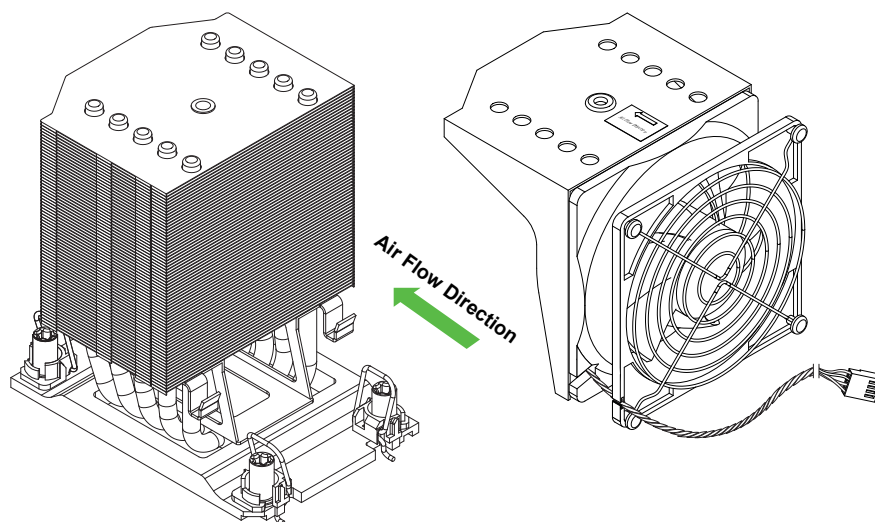
Carrier Top View



Carrier Bottom View



3. 4U Heatsink



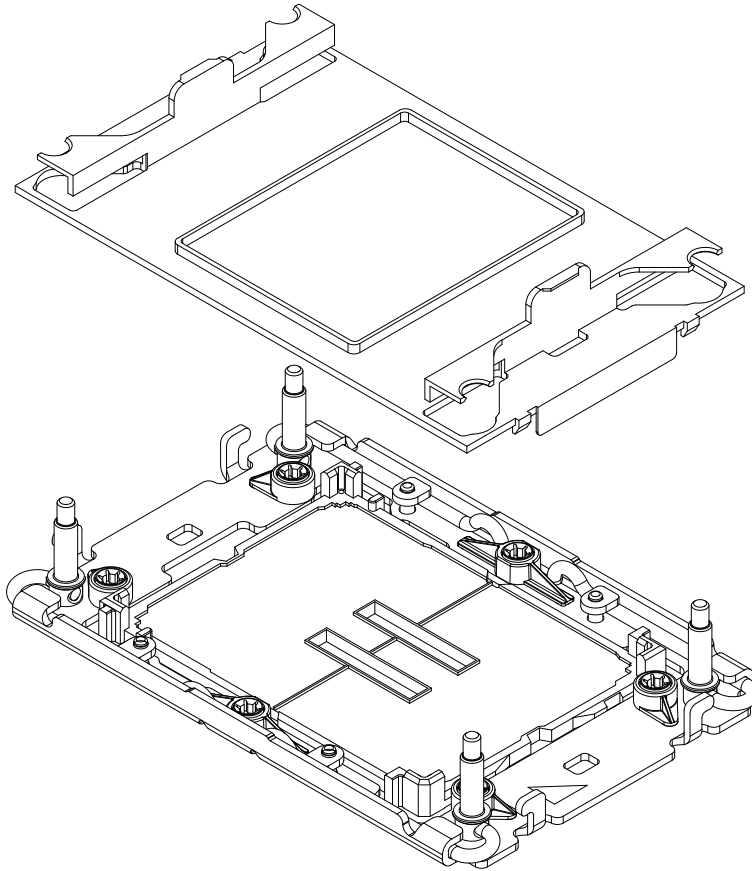
4U Heatsink and Heatsink Fan

 **Note:** Exercise extreme care when handling the heatsink. Pay attention to the edges of heatsink fins, which can be sharp! To avoid damaging the heatsink, please do not apply excessive force on the fins.

Overview of the CPU Socket

The CPU socket is protected by a plastic protective cover.

Plastic Protective Cover



CPU Socket

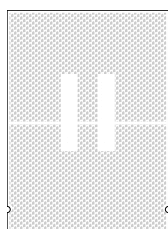
Overview of the Processor Carrier Assembly

The processor carrier assembly contains a 5th/4th Gen. Intel Xeon Scalable processor and a processor carrier. Carefully follow the instructions given in the installation section to place a processor into the carrier to create a processor carrier assembly.

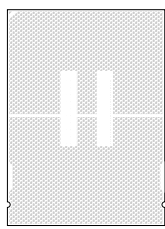
The processor carrier assembly includes a processor and a processor carrier as shown below.

1. The 5th/4th Gen. Intel Xeon Scalable Processors (Component Side)

Processor (2D)

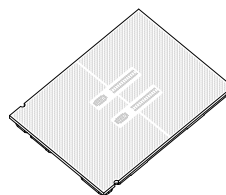


SP XCC

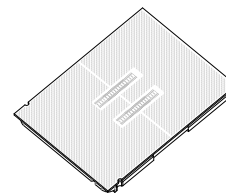


SP MCC

Processor (3D)



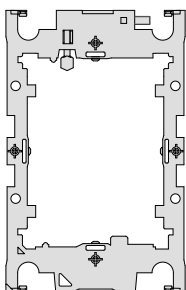
SP XCC



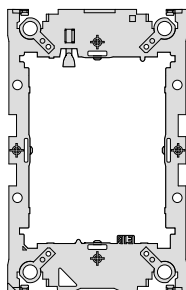
SP MCC

2. Processor Carrier (Top View)

Processor Carrier (2D)

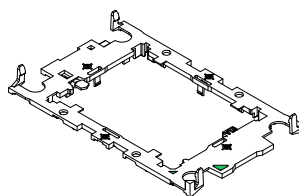


Carrier E1A

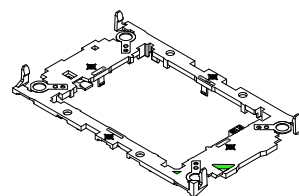


Carrier E1B

Processor Carrier (3D)



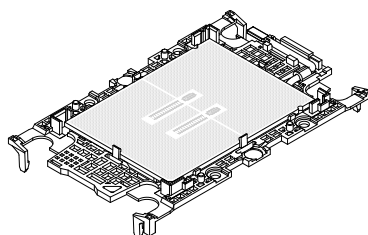
Carrier E1A



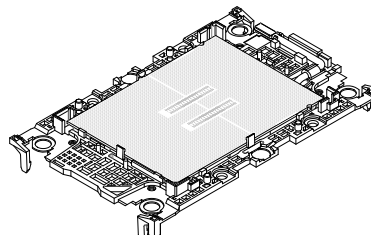
Carrier E1B



3. Processor Carrier Assembly (with processor seated inside the carrier)



Carrier E1A with
SP XCC Installed

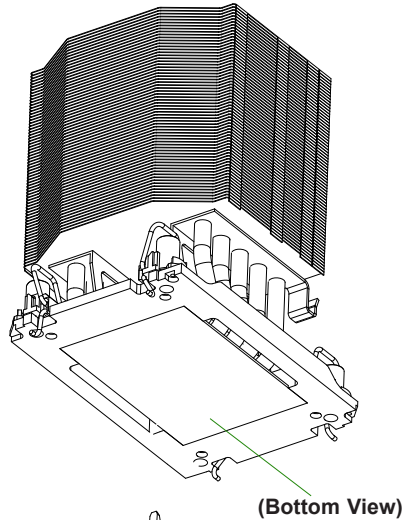


Carrier E1B with
SP MCC Installed

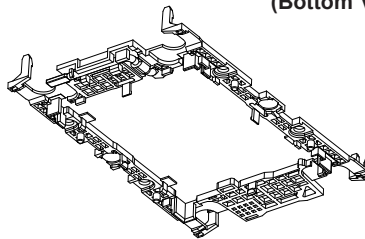
Overview of the Processor Heatsink Module (PHM) with SP XCC and Carrier E1A

The Processor Heatsink Module (PHM) contains a heatsink, a processor carrier, and a 5th/4th Gen. Intel Xeon Scalable processor.

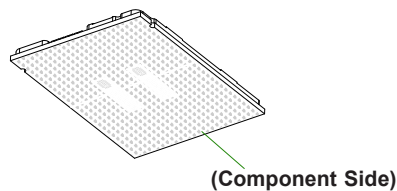
1. Heatsink (4U Heatsink)



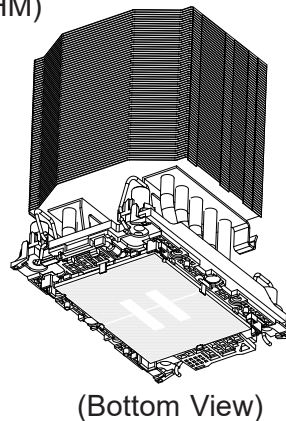
2. Processor Carrier E1A



3. The 5th/4th Gen. Intel Xeon Scalable Processor (SP XCC)



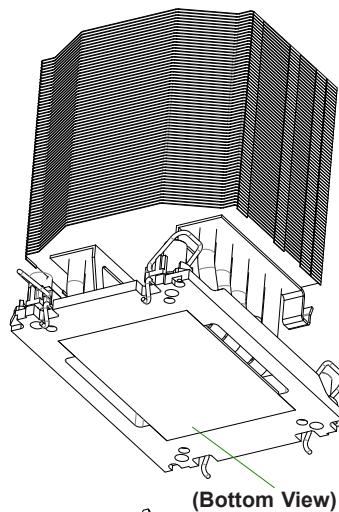
4. Processor Heatsink Module (PHM)



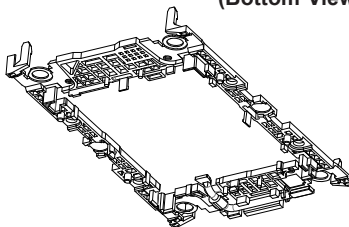
Overview of the Processor Heatsink Module (PHM) with SP MCC and Carrier E1B

The Processor Heatsink Module (PHM) contains a heatsink, a processor carrier, and a 5th/4th Gen. Intel Xeon Scalable processor.

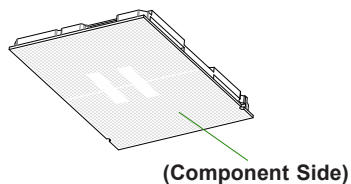
1. Heatsink (4U Heatsink)



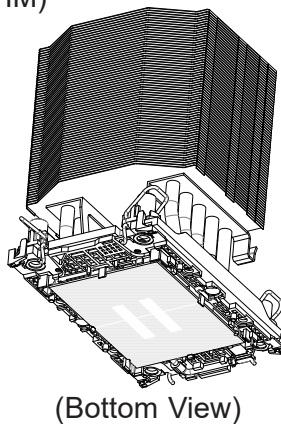
2. Processor Carrier E1B



3. The 5th/4th Gen. Intel Xeon Scalable Processor (SP MCC)



4. Processor Heatsink Module (PHM)



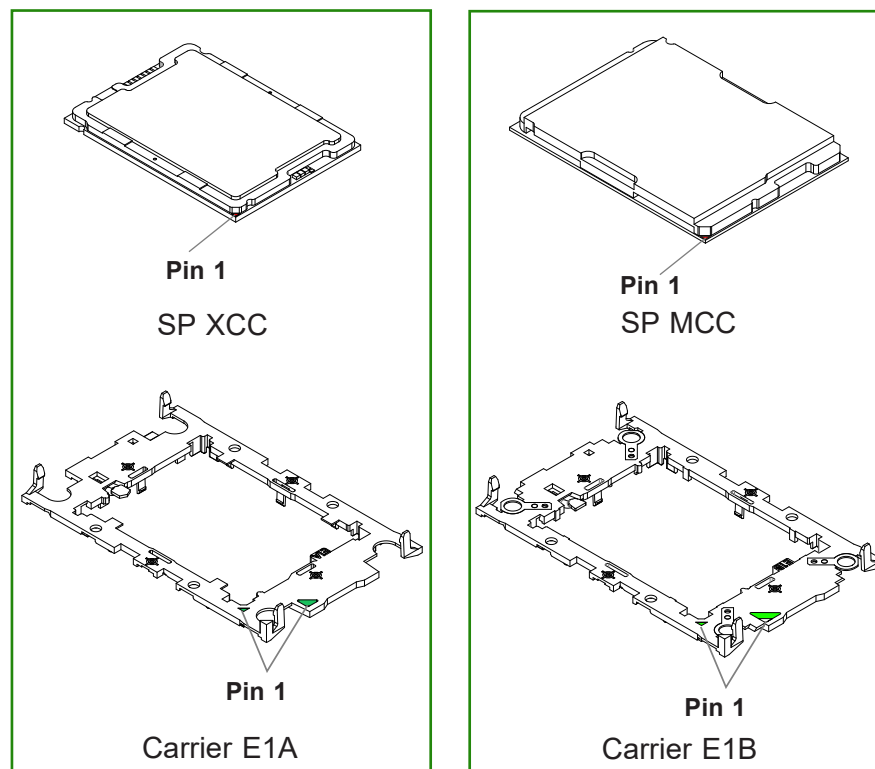
Creating the Processor Carrier Assembly

The processor carrier assembly contains a 5th/4th Gen. Intel Xeon Scalable processor and a processor carrier.

To create the processor carrier assembly, please follow the steps below.

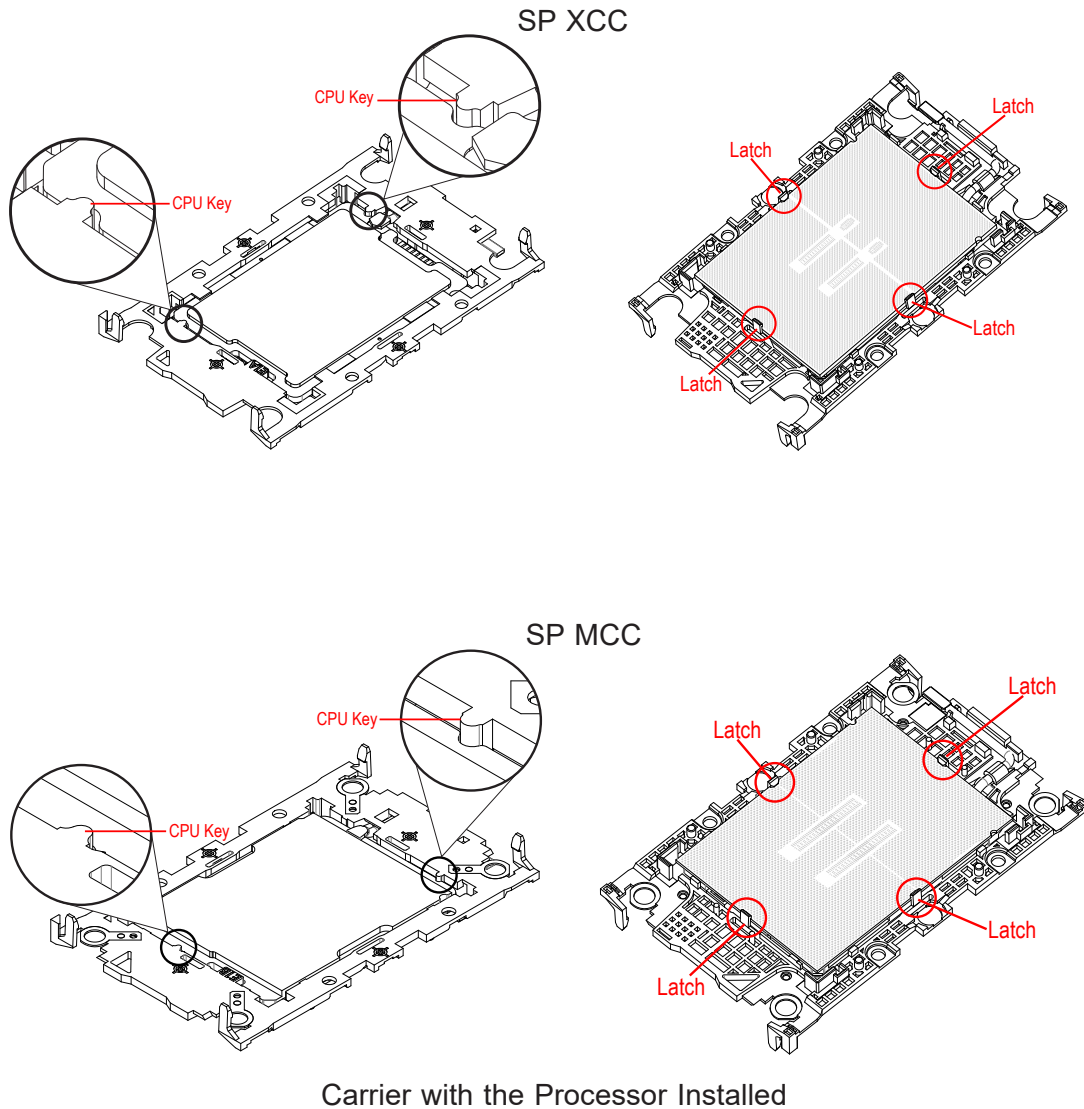
 **Note:** Before installation, be sure to follow the instructions given on pages 1 and 2 of this chapter to properly prepare for installation.

1. Hold the processor with the component side (including the gold contacts) facing down. Locate the small, gold triangle at the corner of the processor and the corresponding hollowed triangle on the processor carrier as shown below. Please note that the triangle indicates the location of Pin 1.

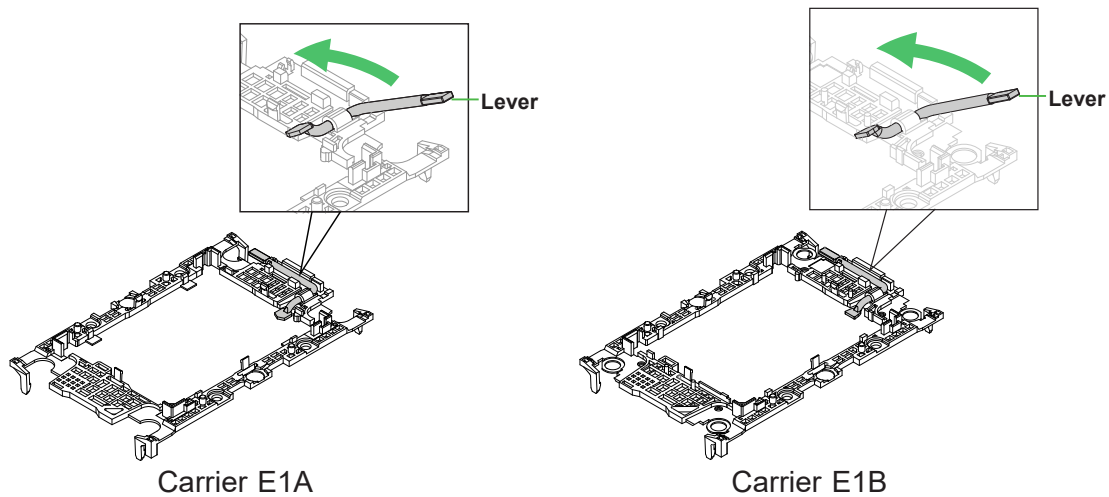


Processor with Matching Carrier

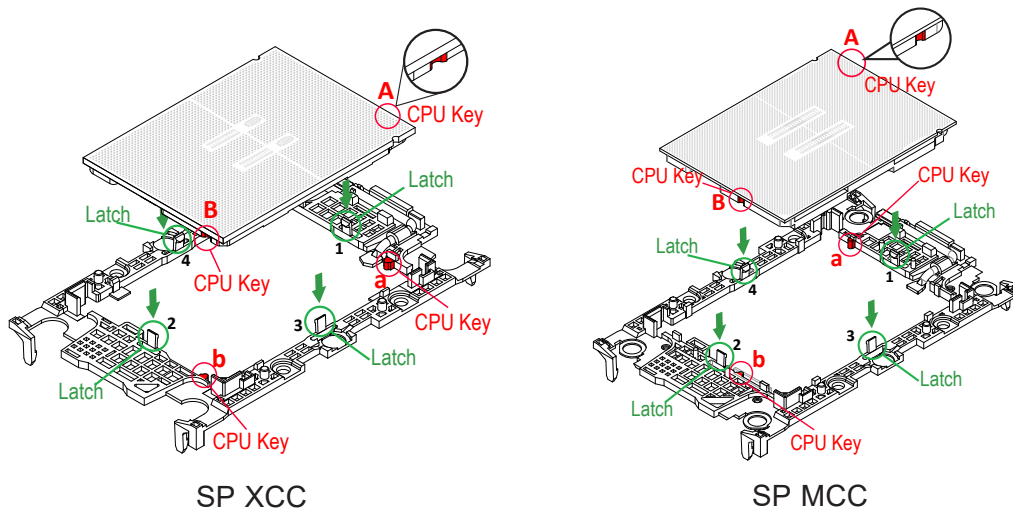
- First, turn over the processor carrier and locate Pin 1 on the CPU and Pin 1 on the carrier. Then, turn the processor over with component side (including the gold contacts) facing up and locate CPU keys on the processor. Finally, locate the CPU keys and four latches on the carrier as shown below.



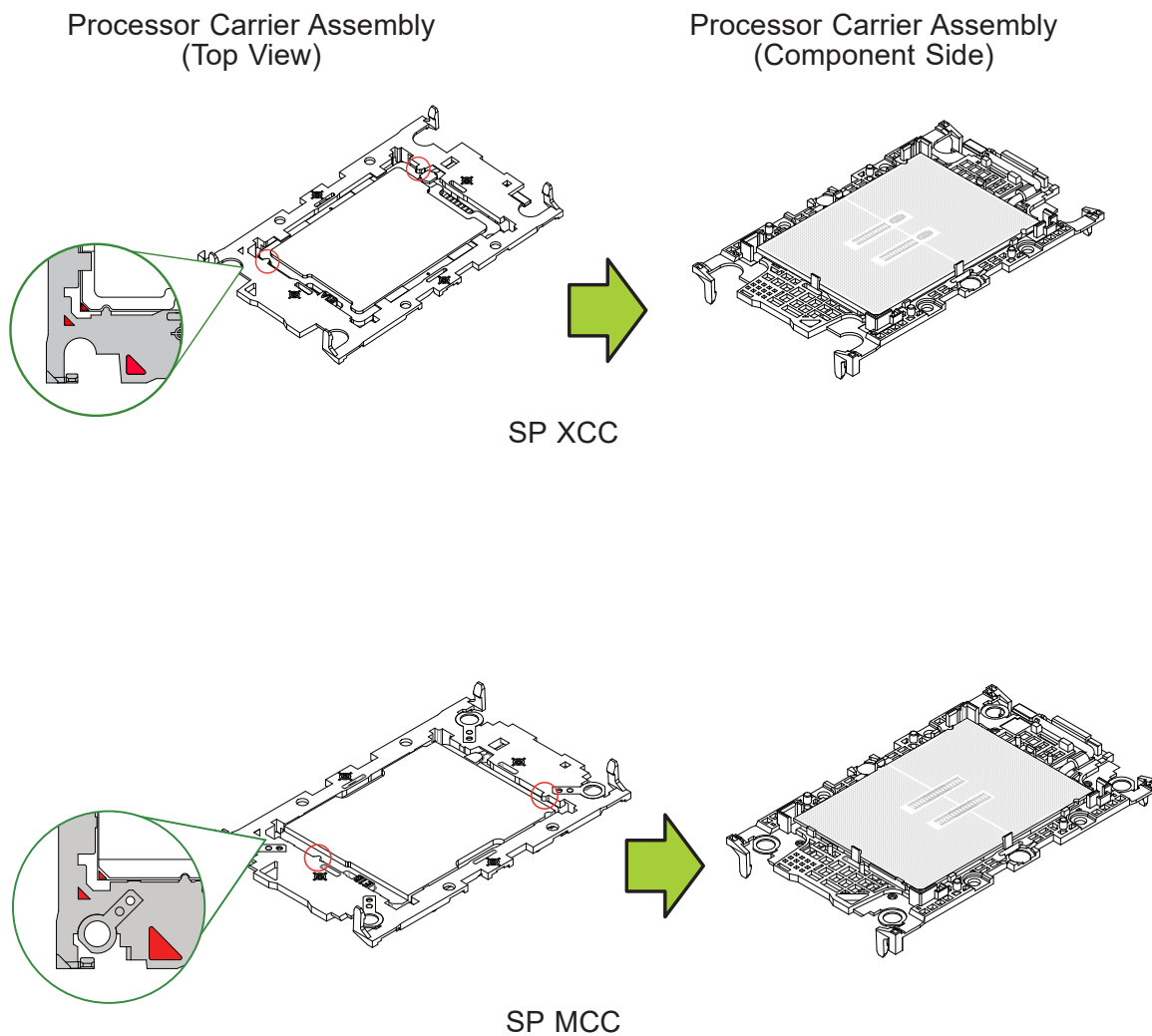
3. Locate the lever on the CPU socket and press it down as shown below.



4. Using Pin 1 as a guide, carefully align the CPU keys (marked A and B) on the processor against the CPU keys on the carrier (marked a and b) as shown below.
5. Once they are properly aligned, carefully insert the CPU into the carrier, making sure that the CPU is properly secured by latches (marked 1, 2, 3, 4).



6. After the processor is placed inside the carrier, examine the four sides of the processor, making sure that the processor is properly seated on the carrier.

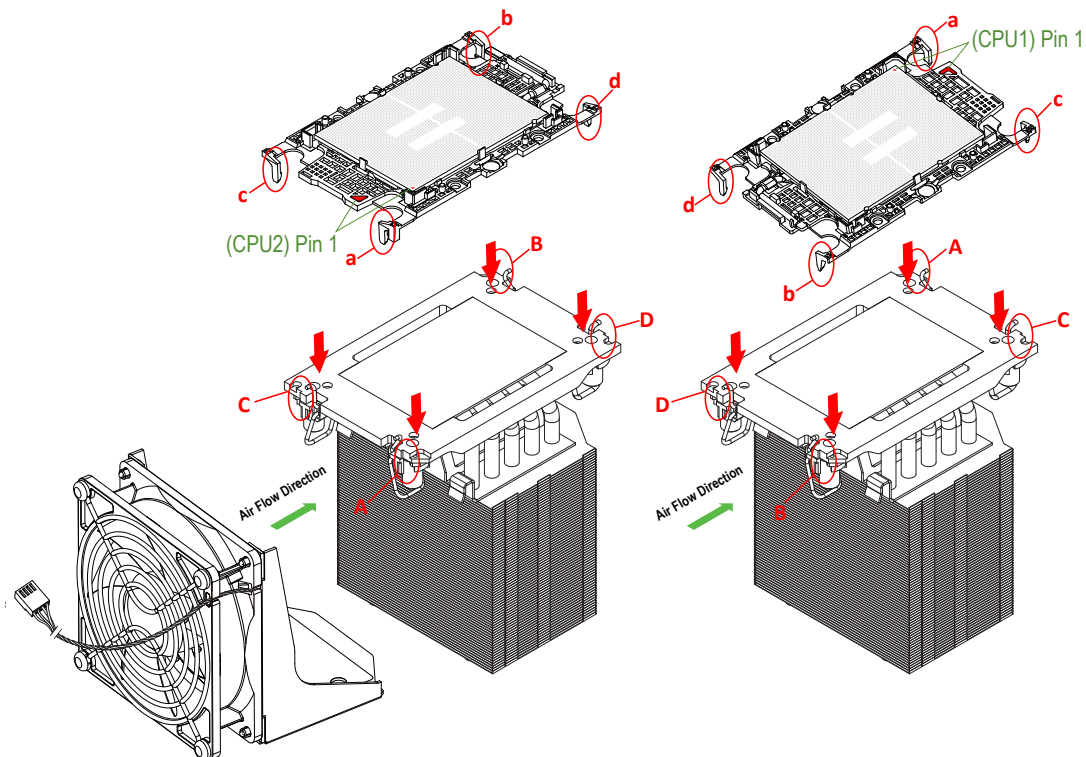


Creating the PHM (4U Heatsink)

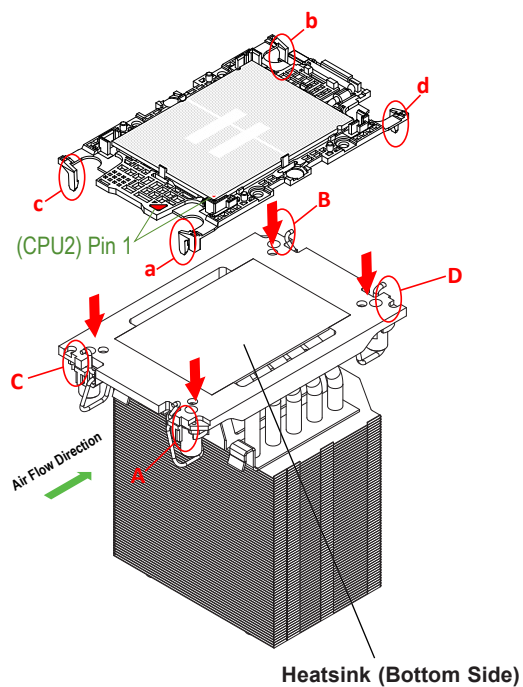
After creating the processor carrier assembly, please follow the instructions below to mount the processor carrier assembly into the heatsink to form the PHM.

 **Note:** If this is a new heatsink, the thermal grease has been pre-applied on the underside. Otherwise, apply the proper amount of thermal grease.

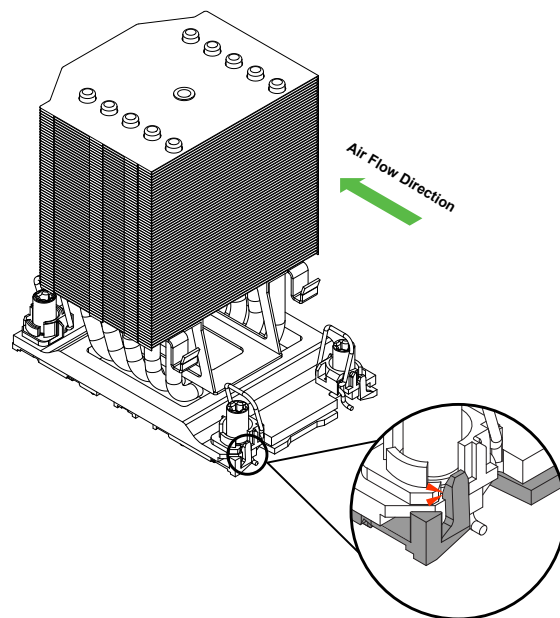
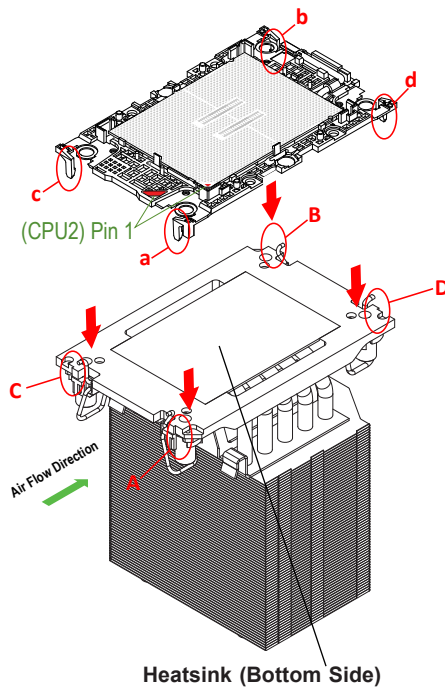
1. Turn the heatsink over with the thermal grease, which is on the bottom side of the heatsink, facing up. Pay attention to the two triangle cutouts (marked A and B) located at the diagonal corners of the heatsink as shown below.
2. Hold the processor carrier assembly with component side facing up, and locate the triangle on the CPU and the triangle on the carrier. (Triangle indicates Pin 1.)
3. Using Pin 1 as a guide, turn the processor carrier assembly over with the gold contacts facing up. Locate the triangle cutout (marked A) on the heatsink and the corner (marked a) on the processor carrier assembly.
4. Align the corner (marked a) on the processor carrier assembly against the triangle cutout (marked A) on the heatsink, and align the corners (marked b, c, d) on the processor carrier assembly against the corners (marked B, C, D) on the heatsink.
5. Once they are properly aligned, place the corners (marked a, b, c, d) on the processor carrier assembly into the corners of the heatsink (marked A, B, C, D), making sure that all plastic clips are properly attached to the heatsink.



**Processor Carrier Assembly
(Component Side)
(SP XCC, Carrier E1A)**



**Processor Carrier Assembly
(Component Side)
(SP MCC, Carrier E1B)**

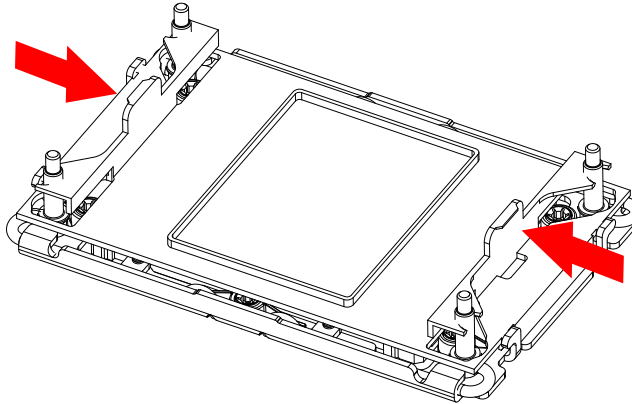


PHM (4U Heatsink)

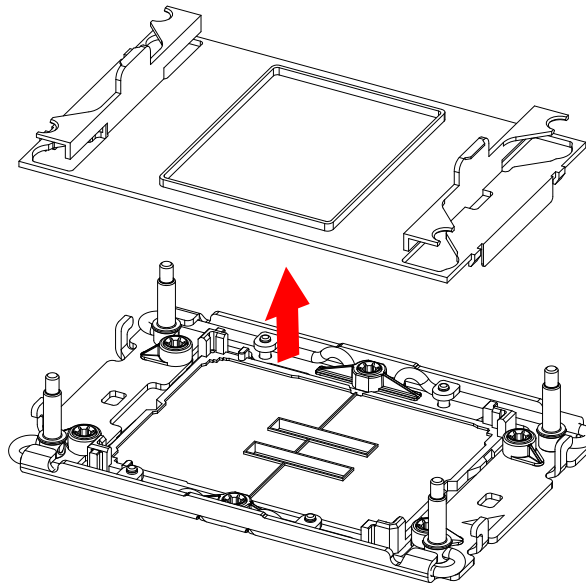
Preparing the CPU Socket for Installation

This motherboard comes with a plastic protective cover installed on the CPU socket. Remove it from the socket by following the instructions below.

1. Press the tabs inward.



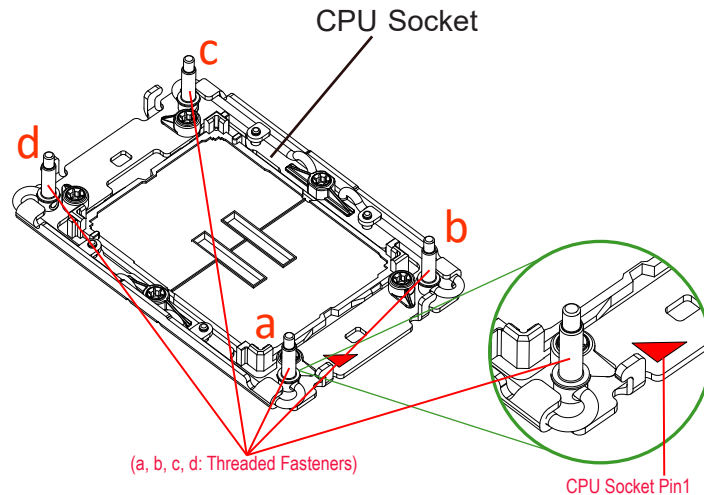
2. Pull up the protective cover from the socket.



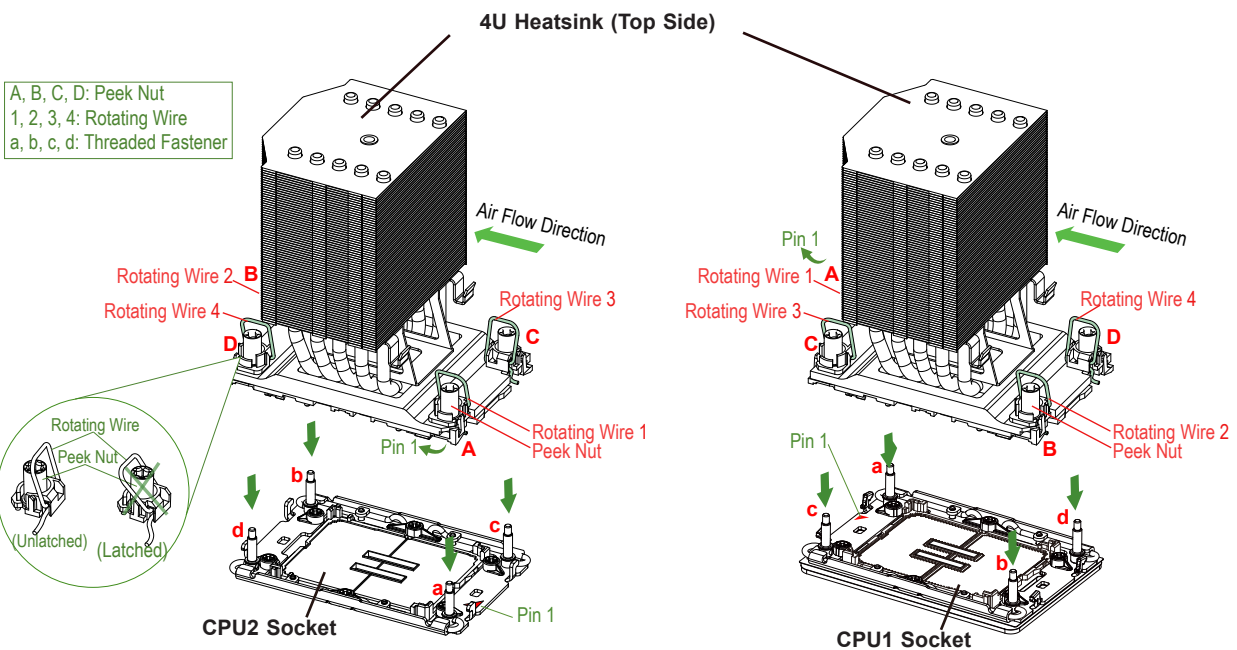
Preparing to Install the PHM into the CPU Socket

After assembling the Processor Heatsink Module (PHM), you are ready to install it into the CPU socket. To ensure the proper installation, please follow the procedures below.

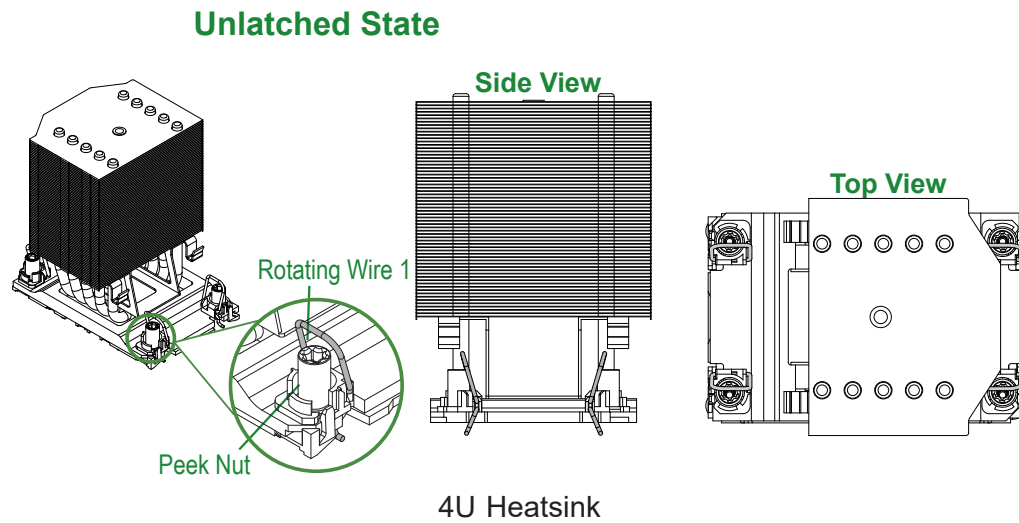
1. Locate four threaded fasteners (marked a, b, c, d) on the CPU socket.



2. Locate four peek nuts (marked A, B, C, D) and four rotating wires (marked 1, 2, 3, 4) on the heatsink as shown below.

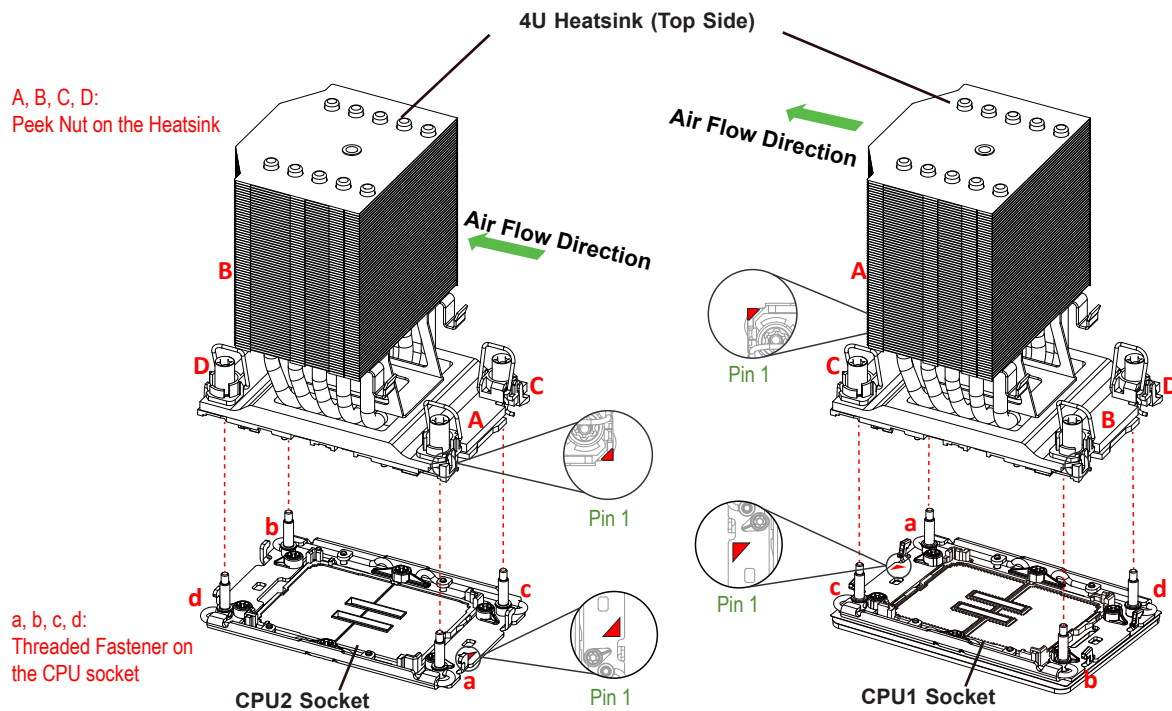


3. Check the rotating wires (marked 1, 2, 3, 4) to make sure that they are at unlatched positions as shown below before installing the PHM into the CPU socket.

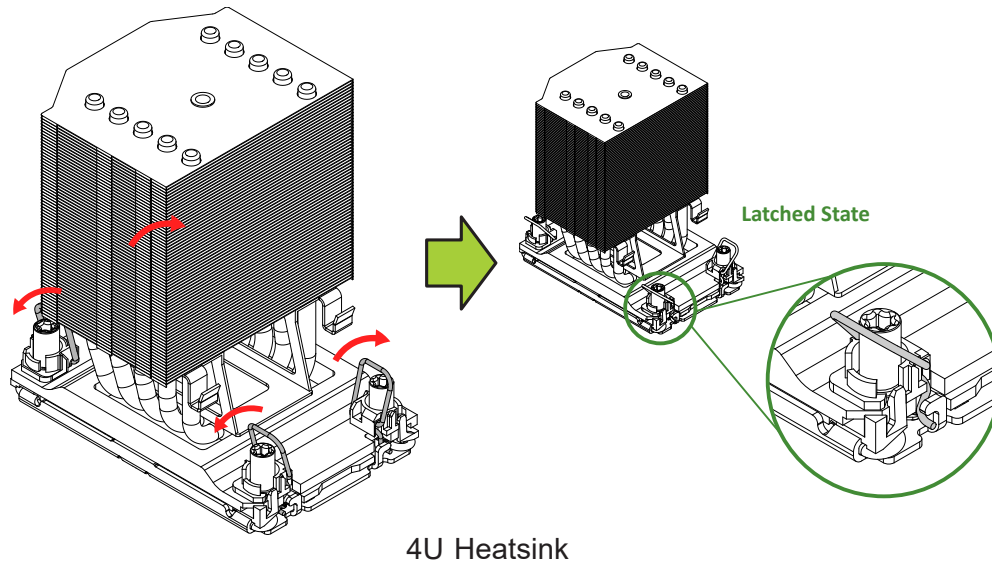


Installing the PHM into the CPU Socket

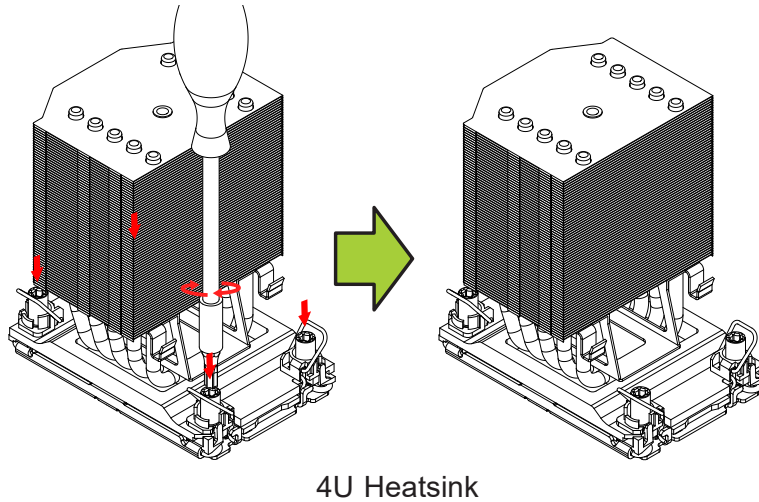
1. Align peek nut (marked A) on the heatsink against threaded fastener (marked a) on the CPU socket. Then align peek nuts (marked B, C, D) on the heatsink against threaded fasteners (marked b, c, d) on the CPU socket, making sure that all peek nuts on the heatsink are properly aligned with the correspondent threaded fasteners on the CPU socket.
2. Once they are aligned, gently place the heatsink on top of the CPU socket, making sure that each peek nut is properly attached to its corresponding threaded fastener.



3. Press all four rotating wires outwards and make sure that the heatsink is securely latched onto the CPU socket.

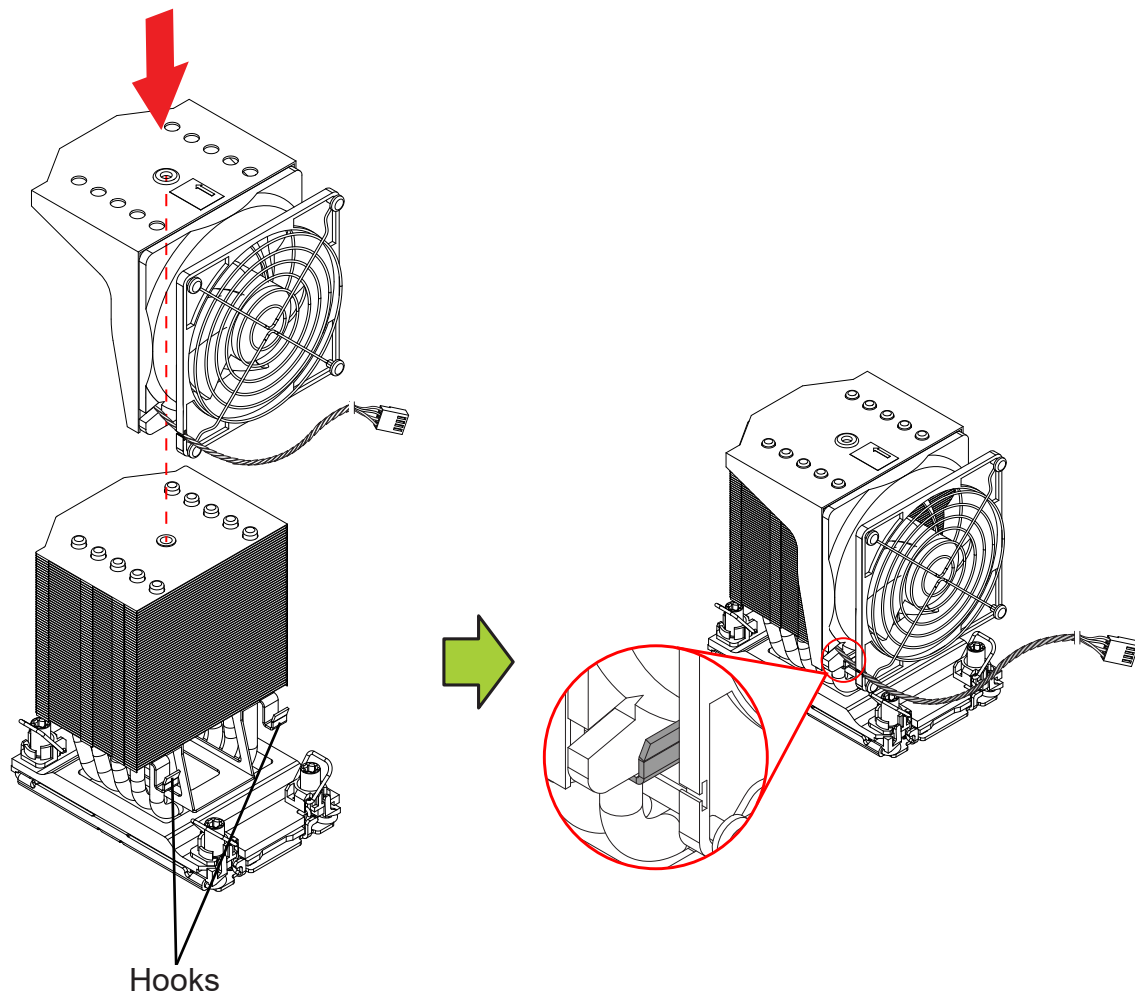


4. With a T30 screwdriver, tighten all peek nuts in the sequence of A, B, C, and D with even pressure. To avoid damaging the processor or socket, do not use excessive force when tightening the peek nuts. (For best durability, 8in-lbf torque is recommended.)
5. Examine all corners of the heatsink to ensure that the PHM is firmly attached to the CPU socket.

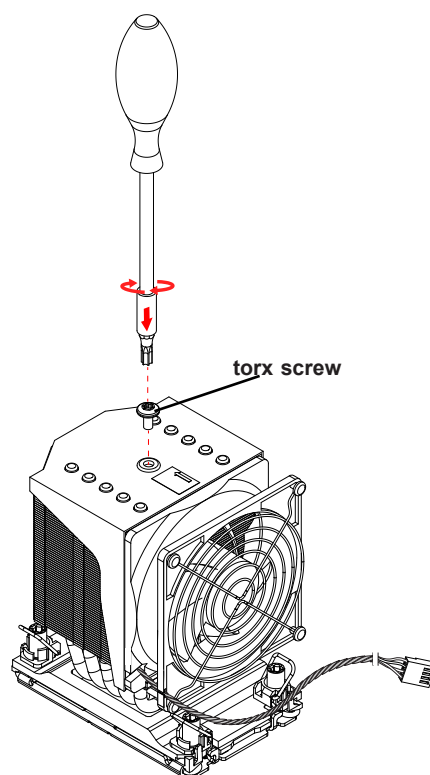


Installing the Fan onto the 4U Heatsink

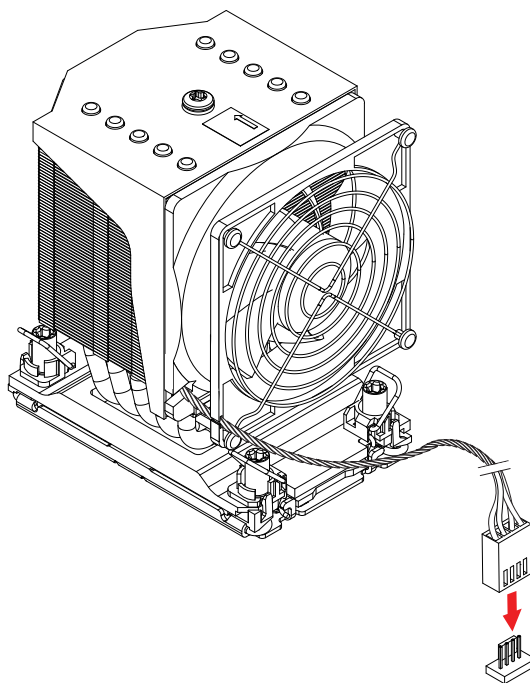
1. Align the aluminum fan shroud against the top of the 4U heatsink. The fan shroud was designed to match perfectly with the top of the heatsink in terms of geometric shape.
2. When the fan shroud and the top of the heatsink are properly aligned, gently push the fan onto the heatsink until the bottom of the fan properly rests on the two hooks of the heatsink as shown below.



3. Insert the torx screw into the screw hole on top the heatsink and turn it clockwise to tighten the screw.

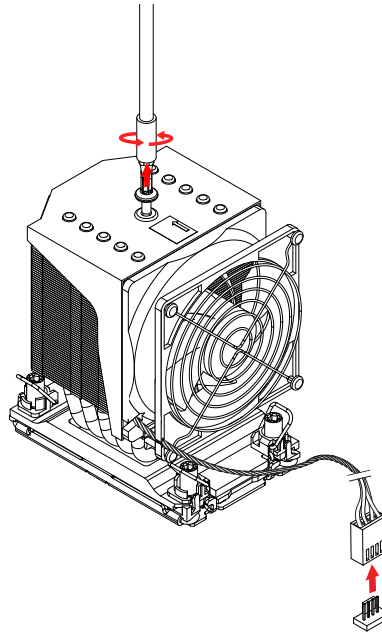


4. Connect the fan power connector to a 4-pin fan header on the motherboard.

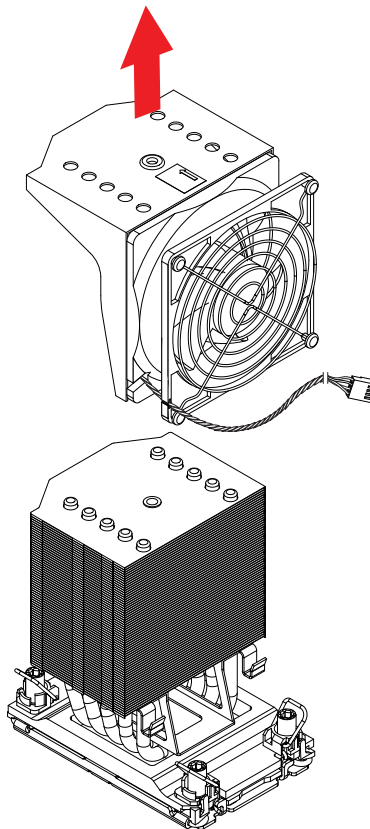


Uninstalling the Fan Before Removing the PHM (4U Heatsinks Only)

1. Loosen the torx screw from the heatsink. Unplug the fan power connector from the fan header.



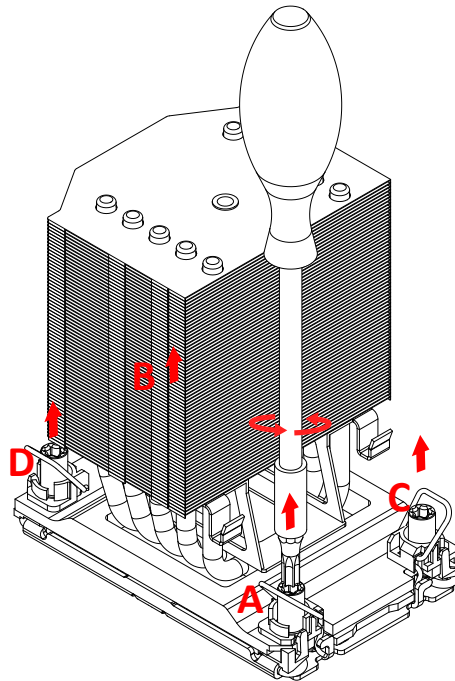
2. Gently pull the heatsink fan upward to detach it from the heatsink.



Removing the PHM from the CPU Socket

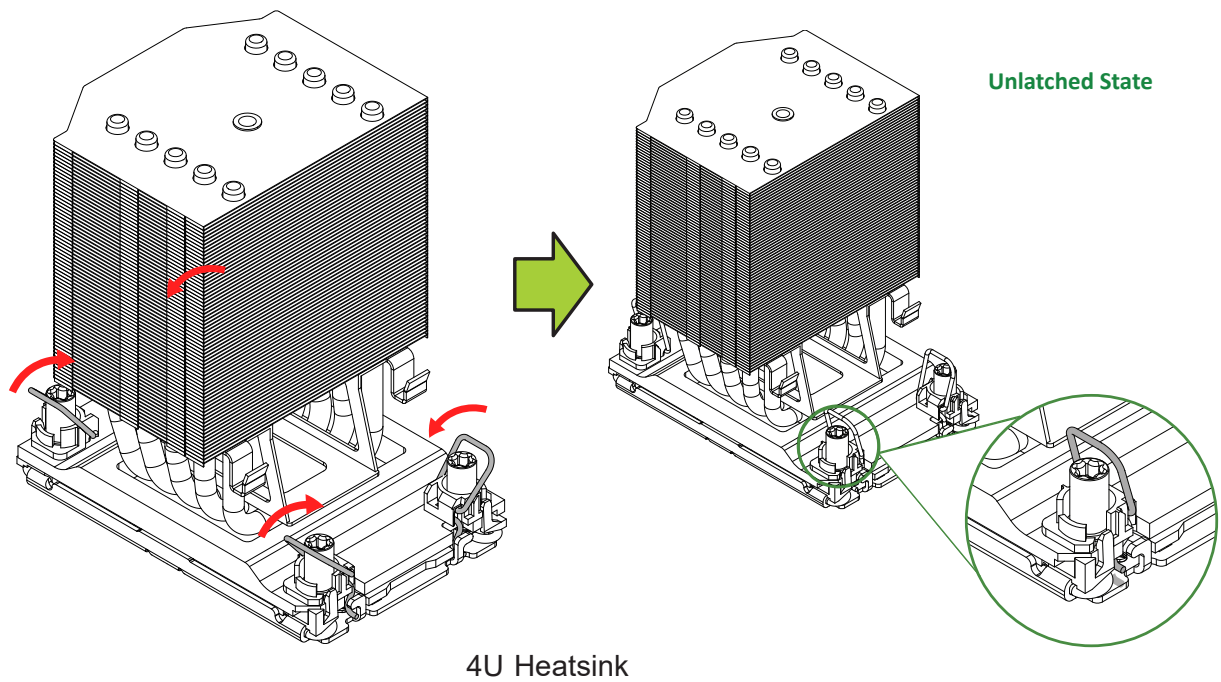
Before removing the PHM from the motherboard, be sure to shut down the system and unplug the power cables from the power supply. Then follow the steps below.

1. Use a T30 screwdriver to loosen the four peek nuts on the heatsink in the sequence of A, B, C, and D.



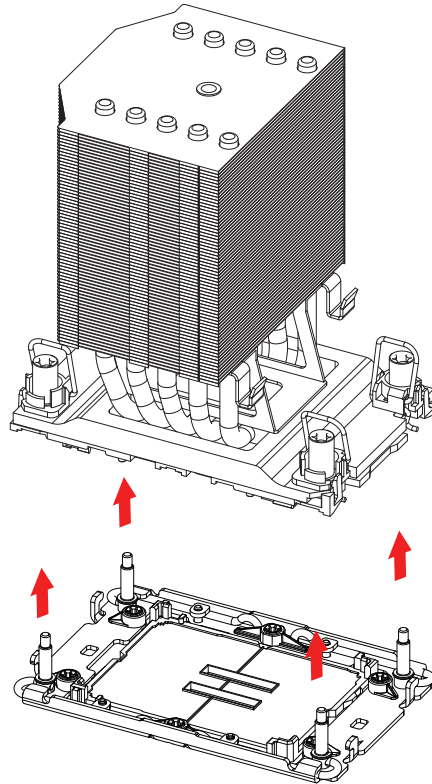
4U Heatsink

2. Once the peek nuts are loosened from the CPU socket, press the rotating wires inwards to unlatch the PHM from the socket as shown below.



3. Gently pull the PHM upwards to remove it from the CPU socket.

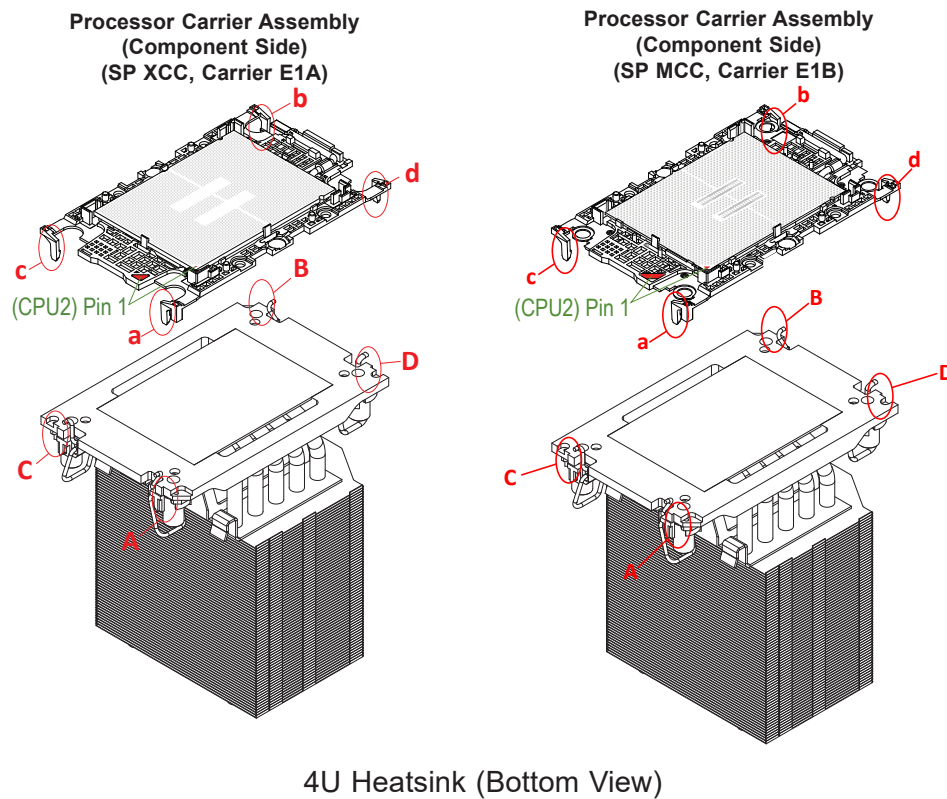
4U Heatsink



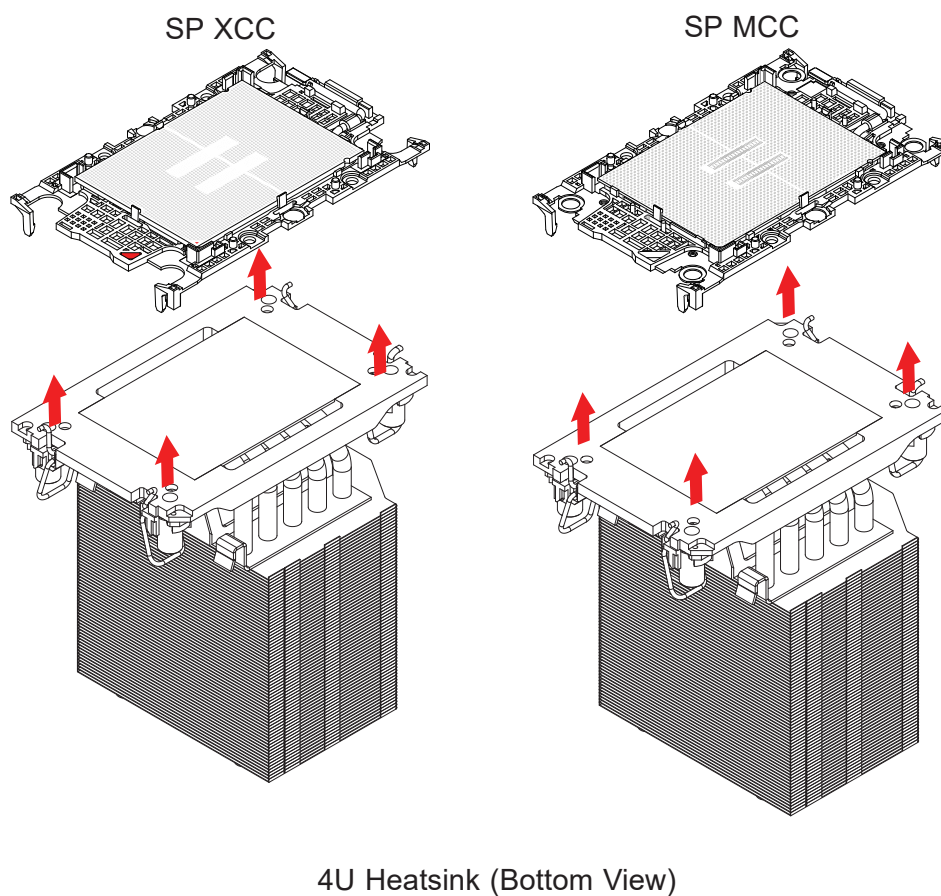
Removing the Processor Carrier Assembly from the PHM

To remove the processor carrier assembly from the PHM, please follow the steps below.

1. Detach the four plastic clips (marked a, b, c, d) on the processor carrier assembly from the four corners of the heatsink (marked A, B, C, D) as shown below.



2. When all plastic clips are detached from the heatsink, remove the processor carrier assembly from the heatsink.

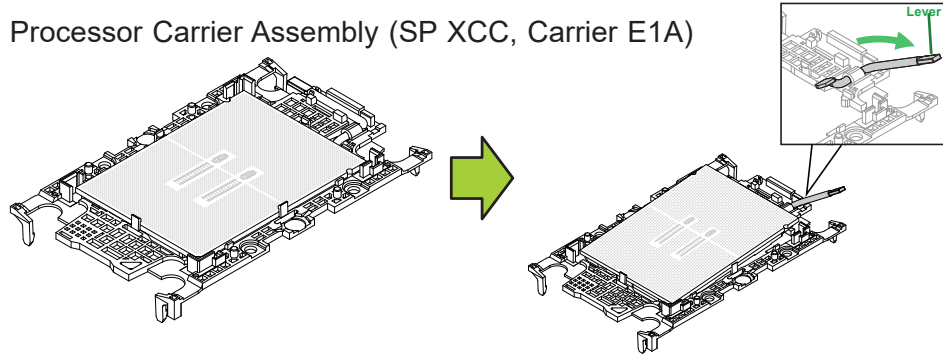


Removing the Processor from the Processor Carrier Assembly

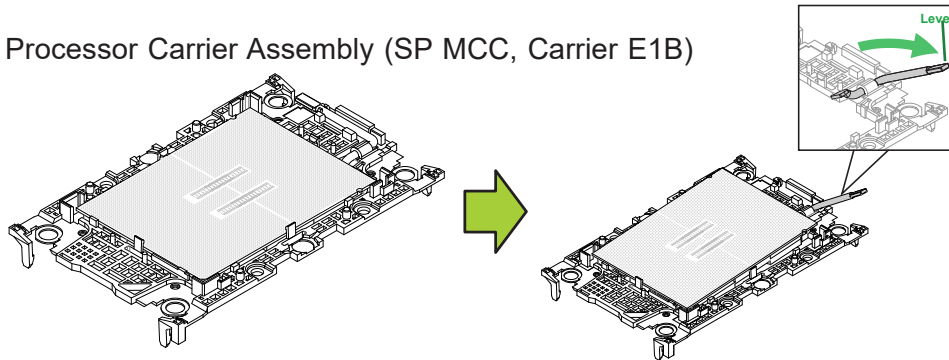
Once you have removed the processor carrier assembly from the PHM, you are ready to remove the processor from the processor carrier by following the steps below.

1. Unlock the lever from its locked position and push the lever upwards to disengage the processor from the processor carrier as shown in the drawings on the right below.

Processor Carrier Assembly (SP XCC, Carrier E1A)

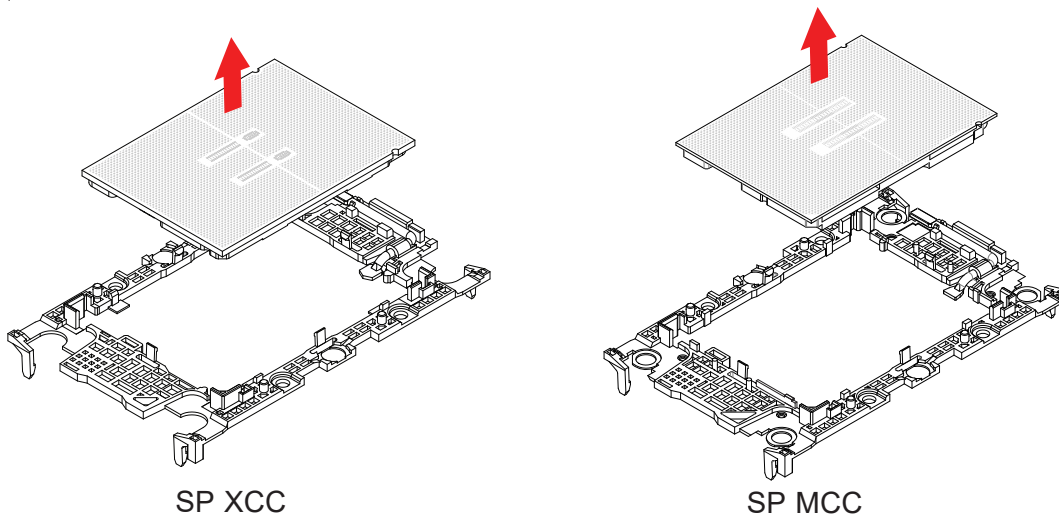


Processor Carrier Assembly (SP MCC, Carrier E1B)



2. Once the processor is loosened from the carrier, carefully remove the processor from the processor carrier.

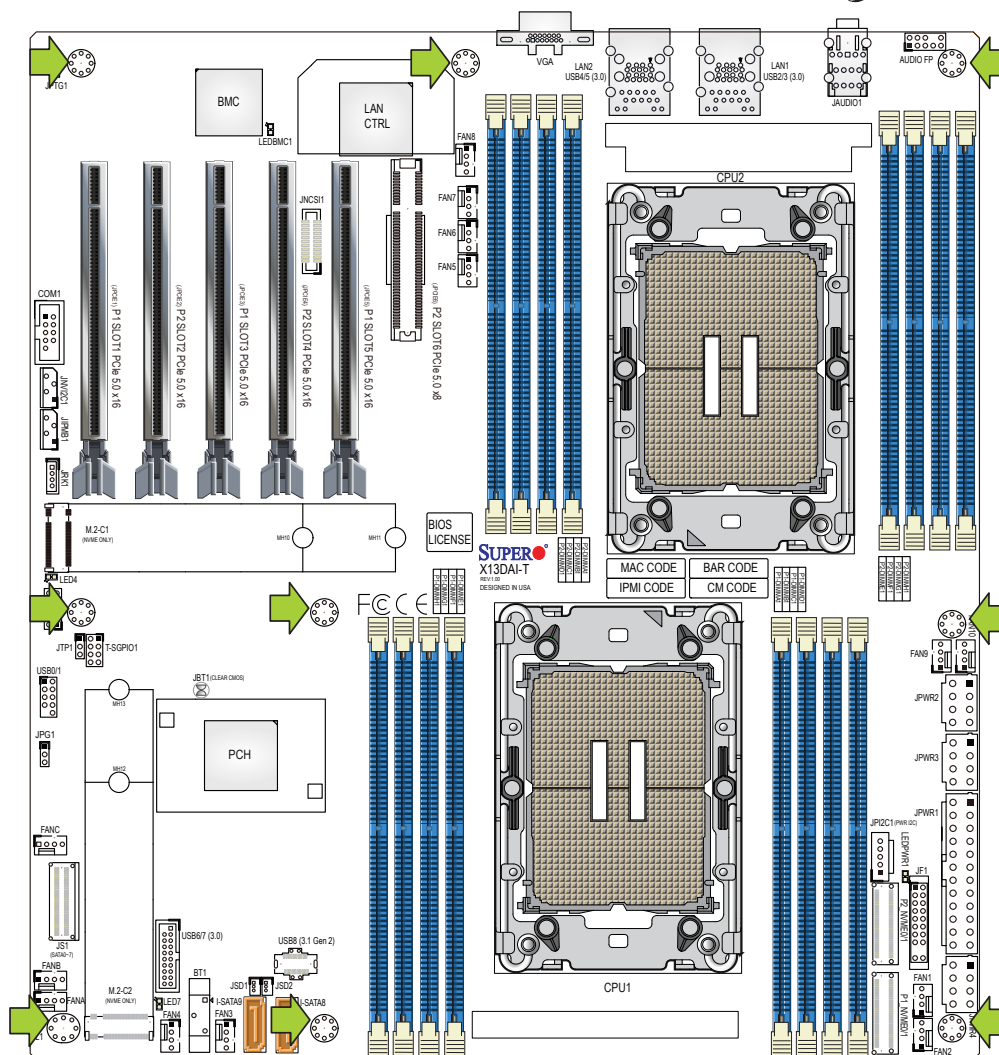
 **Note:** Please handle the processor with care to avoid damaging the processor and its pins.



2.3 Motherboard Installation

All motherboards have standard mounting holes to fit different types of chassis. Make sure that the locations of all the mounting holes for both the motherboard and the chassis match. Although a chassis may have both plastic and metal mounting fasteners, metal ones are highly recommended because they ground the motherboard to the chassis. Make sure that the metal standoffs click in or are screwed in tightly.

Tools Needed



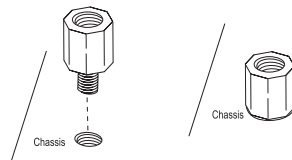
Locations of Mounting Holes

Note 1: To avoid damaging the motherboard and its components, please do not use a force greater than 8 lbf-in on each mounting screw during motherboard installation.

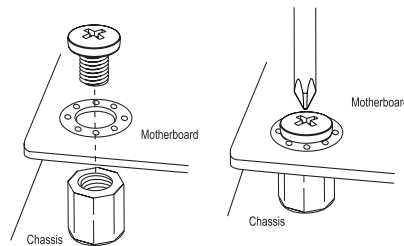
Note 2: Some components are very close to the mounting holes. Please take precautionary measures to avoid damaging these components when installing the motherboard to the chassis.

Installing the Motherboard

1. Install the I/O shield into the back of the chassis, if applicable.
2. Locate the mounting holes on the motherboard. See the previous page for the location.



3. Locate the matching mounting holes on the chassis. Align the mounting holes on the motherboard against the mounting holes on the chassis.



4. Install standoffs in the chassis as needed.
5. Install the motherboard into the chassis carefully to avoid damaging other motherboard components.
6. Using the Phillips screwdriver, insert a pan head #6 screw into a mounting hole on the motherboard and its matching mounting hole on the chassis.
7. Repeat Step 6 to insert #6 screws into all mounting holes.
8. Make sure that the motherboard is securely placed in the chassis.

 **Note:** Images displayed are for illustration only. Your chassis or components might look different from those shown in this manual.

2.4 Memory Support and Installation



Note: Check the Supermicro website for recommended memory modules.



Important: Exercise extreme care when installing or removing memory modules to prevent any possible damage.

Memory Support

This motherboard supports up to 4 TB of 3DS RDIMM/RDIMM DDR5 (288-pin) ECC memory with speeds of up to 5600 MT/s in 16 DIMM slots.



Note: Memory speed and capacity support depends on the processor.

DDR5 Memory Support for the 4th Gen. Intel Xeon Scalable Processors

DDR5 Memory Support for the 4th Gen. Intel Xeon Scalable Processors						
Type	Ranks Per DIMM and Data Width (Stack)	DIMM Capacity (GB)			Speed (MT/s); Voltage (V); DIMM Per Channel (DPC)	
					1DPC ^{Note 1}	2DPC
		16 Gb (DRAM Density)	24 Gb ^{Note 2} (DRAM Density)	32 Gb (DRAM Density)	1.1 V	
RDIMM	SRx8 (RC D)	16 GB	24 GB	N/A	4800	4400
	SRx4 (RC C)	32 GB	48 GB	N/A		
	SRx4 (RC F) 9x4	32 GB	N/A	N/A		
	DRx8 (RC E)	32 GB	48 GB	N/A		
	DRx4 (RC A)	64 GB	96 GB	128 GB		
	DRx4 (RC B) 9x4	64 GB	N/A	N/A		
RDIMM-3DS	(4R/8R) x4 (RC A)	2H-128 GB 4H-256 GB	N/A	N/A	Not Supported	Not Supported
Supported DIMM generations		DDR5-4800, DDR5-5600	DDR5-4800, DDR5-5600	DDR5-5600		
LRDIMM/LRDIMM-3DS	N/A	N/A	N/A	N/A	Not Supported	Not Supported



Note 1: 1DPC applies to 1 Socket Per Channel (SPC) or 2SPC implementation.

Note 2: The 24 Gb configuration of SP XCC and SP MCC allows only 8 or 16 DIMMs installed. Its 1DPC configuration supports all DIMM types and 2DPC configuration supports capacity of 96 GB only.

DDR5 Memory Support for the 5th Gen. Intel Xeon Scalable Processors

DDR5 Memory Support for the 5th Gen. Intel Xeon Scalable Processors						
Type	Ranks Per DIMM and Data Width (Stack)	DIMM Capacity (GB)			Speed (MT/s); Voltage (V); DIMM Per Channel (DPC)	
		16 Gb (DRAM Density)	24 Gb ^{Note 2} (DRAM Density)	32 Gb (DRAM Density)	1DPC ^{Note 1}	2DPC
					1.1 V	
RDIMM	SRx8 (RC D)	16 GB	24 GB ^{Note 3}	N/A	5600 ^{Note 4}	4400 ^{Note 4}
	SRx4 (RC C)	32 GB	48 GB ^{Note 3}	N/A		
	SRx4 (RC F) 9x4	N/A	N/A	N/A		
	DRx8 (RC E)	32 GB	48 GB ^{Note 3}	N/A		
	DRx4 (RC A)	64 GB	96 GB	128 GB		
	DRx4 (RC B) 9x4	N/A	N/A	N/A		
RDIMM-3DS	(4R/8R) x4 (RC A)	2H-128 GB 4H-256 GB	N/A	N/A		
Supported DIMM generations		DDR5-4800, DDR5-5600	DDR5-4800, DDR5-5600	DDR5-5600		
LRDIMM/LRDIMM-3DS	N/A	N/A	N/A	N/A	Not Supported	Not Supported



Note 1: 1DPC applies to 1 Socket Per Channel (SPC) or 2SPC implementation.

Note 2: The 24 Gb configuration for 2 DIMMs per processor and 4 DIMMs per processor is NOT supported.

Note 3: The 24 Gb 2DPC configuration with 24 GB and 48 GB DIMMs is NOT recommended.

Note 4: DDR5-4800 DIMMs memory speed supports up to 4800 MT/s (1DPC) and 4400 MT/s (2DPC).

Memory Population for the X13DAI-T Motherboard (with 16 DIMM Slots)

DDR5 Memory Population Table for the X13DAI-T Motherboard (with 16 DIMM Slots)	
1 CPU:	Memory Population Sequence
1 CPU & 1 DIMM	P1-DIMMA1 or P1-DIMME1 or P1-DIMMB1 or P1-DIMMF1
1 CPU & 2 DIMMs	P1-DIMMA1 / P1-DIMMG1 or P1-DIMMC1 / P1-DIMME1
1 CPU & 4 DIMMs	P1-DIMMA1 / P1-DIMMC1 / P1-DIMME1 / P1-DIMMG1
1 CPU & 6 DIMM	P1-DIMMA1 / P1-DIMMC1 / P1-DIMMD1 / P1-DIMME1 / P1-DIMMF1 / P1-DIMMG1 or P1-DIMMA1 / P1-DIMMB1 / P1-DIMMC1 / P1-DIMME1 / P1-DIMMG1 / P1-DIMMH1 or P1-DIMMB1 / P1-DIMMC1 / P1-DIMMD1 / P1-DIMME1 / P1-DIMMF1 / P1-DIMMH1 or P1-DIMMA1 / P1-DIMMB1 / P1-DIMMD1 / P1-DIMMF1 / P1-DIMMG1 / P1-DIMMH1
1 CPU & 8 DIMMs	P1-DIMMA1 / P1-DIMMB1 / P1-DIMMC1 / P1-DIMMD1 / P1-DIMME1 / P1-DIMMF1 / P1-DIMMG1 / P1-DIMMH1
2 CPUs: (Recommended)	Memory Population Sequence
2 CPUs & 2 DIMMs	CPU1: P1-DIMMA1, CPU2: P2-DIMMA1 or CPU1: P1-DIMME1, CPU2: P2-DIMME1 or CPU1: P1-DIMMB1, CPU2: P2-DIMMB1 or CPU1: P1-DIMMF1, CPU2: P2-DIMMF1
2 CPUs & 4 DIMMs	CPU1: P1-DIMMA1 / P1-DIMMG1, CPU2: P2-DIMMA1 / P2-DIMMG1 or CPU1: P1-DIMMC1 / P1-DIMME1, CPU2: P2-DIMMC1 / P2-DIMME1
2 CPUs & 8 DIMMs	CPU1: P1-DIMMA1 / P1-DIMMC1 / P1-DIMME1 / P1-DIMMG1 CPU2: P2-DIMMA1 / P2-DIMMC1 / P2-DIMME1 / P2-DIMMG1
2 CPUs & 12 DIMMs	CPU1: P1-DIMMA1/P1-DIMMC1/P1-DIMMD1/P1-DIMME1/P1-DIMMF1/P1-DIMMG1 CPU2: P2-DIMMA1/P2-DIMMC1/P2-DIMMD1/P2-DIMME1/P2-DIMMF1/P2-DIMMG1 or CPU1: P1-DIMMA1/P1-DIMMB1/P1-DIMMC1/P1-DIMME1/P1-DIMMG1/P1-DIMMH1 CPU2: P2-DIMMA1/P2-DIMMB1/P2-DIMMC1/P2-DIMME1/P2-DIMMG1/P2-DIMMH1 or CPU1: P1-DIMMB1/P1-DIMMC1/P1-DIMMD1/P1-DIMME1/P1-DIMMF1/P1-DIMMH1 CPU2: P2-DIMMB1/P2-DIMMC1/P2-DIMMD1/P2-DIMME1/P2-DIMMF1/P2-DIMMH1 or CPU1: P1-DIMMA1/P1-DIMMB1/P1-DIMMD1/P1-DIMMF1/P1-DIMMG1/P1-DIMMH1 CPU2: P2-DIMMA1/P2-DIMMB1/P2-DIMMD1/P2-DIMMF1/P2-DIMMG1/P2-DIMMH1
2 CPUs & 16 DIMMs	CPU1: P1-DIMMA1/P1-DIMMB1/P1-DIMMC1/P1-DIMMD1/P1-DIMME1/P1-DIMMF1/P1-DIMMG1/P1-DIMMH1 CPU2: P2-DIMMA1/P2-DIMMB1/P2-DIMMC1/P2-DIMMD1/P2-DIMME1/P2-DIMMF1/P2-DIMMG1/P2-DIMMH1



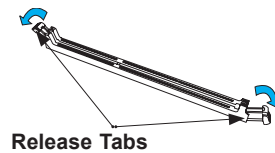
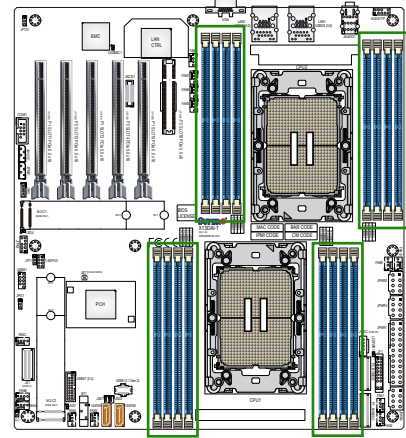
Note 1: The memory configuration is recommended by Supermicro for optimal memory performance. Please use this configuration to maximize your memory performance.

Note 2: To support SGX and TDX features, DIMM population must be symmetric across integrated Memory Controllers (iMCs) and eight DIMMs per socket at least. For each memory controller, populating first slots (Px-DIMMX1) in all channels is required.

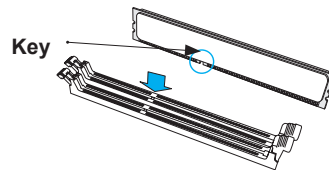
DIMM Installation

 **Note:** The DDR5 DIMM module is NOT hot-swappable and be sure to disconnect power for a minimum of twenty seconds before inserting or removing it.

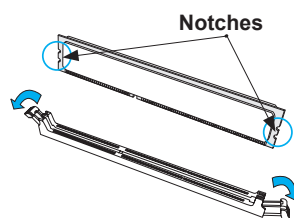
1. Insert the desired number of DIMMs into the memory slots based on the recommended DIMM population tables in the previous section. Locate DIMM memory slots on the motherboard as shown on the right.
2. Push the release tabs outwards on both ends of the DIMM slot to unlock it.



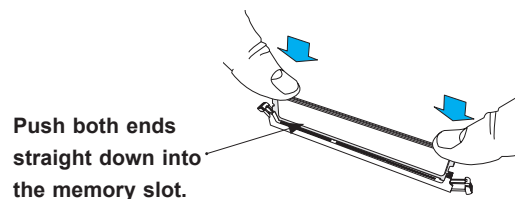
3. Align the key of the memory module with the receptive point on the memory slot.



4. Align the notches on both ends of the module against the receptive points on the ends of the slot.

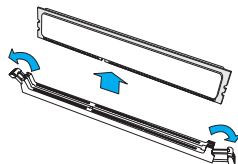


5. Push both ends of the module straight down into the slot until the module snaps into place.
6. Press the release tabs to the lock positions to secure the memory module into the slot.



DIMM Removal

Press both release tabs on the ends of the memory module to unlock it. Once the memory module has been loosened, remove it from the memory slot.



 **Note:** Removing a DDR5 DIMM module at a slant angle will cause module damages. It is strongly recommended that you lift the module straight up out of the slot.

Warning! Please do not use excessive force when pressing the release tabs on the ends of the DIMM socket to avoid causing any damage to the memory module or the DIMM socket. Please handle memory modules with care. Carefully follow all the instructions given on the first page of this chapter to avoid ESD-related damages done to your memory modules or components.

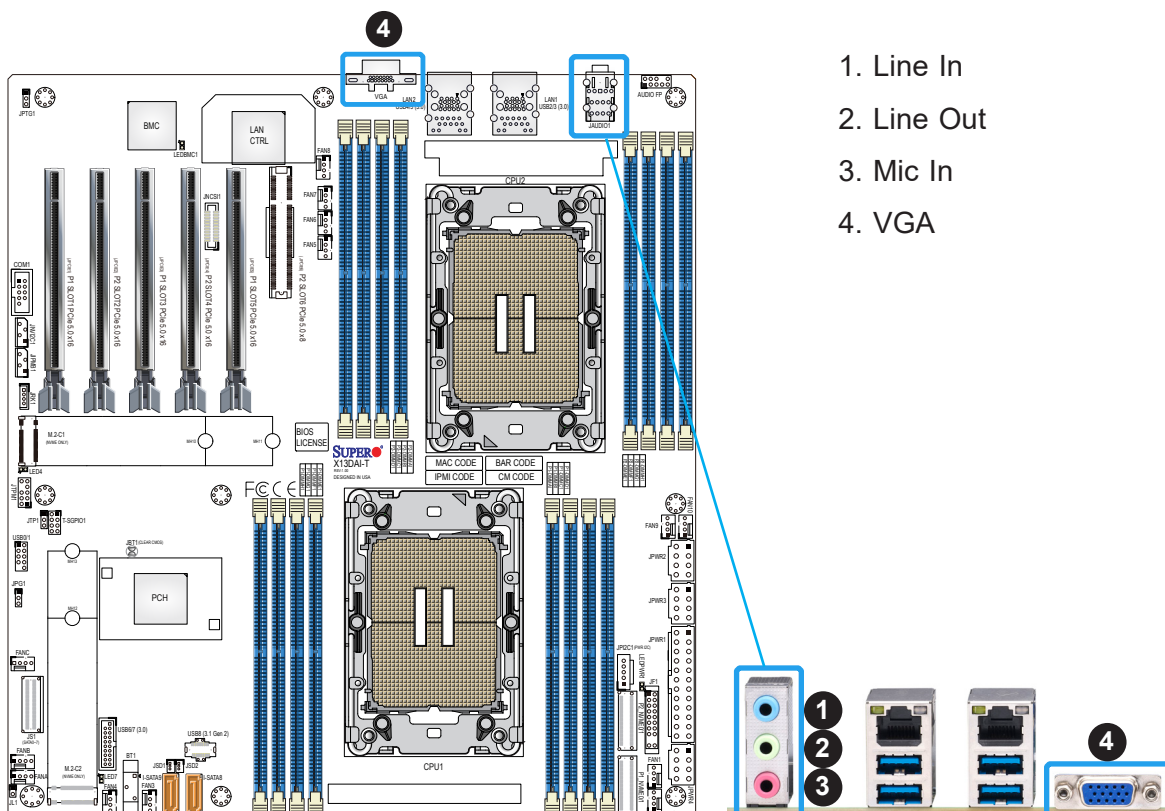
2.5 Rear I/O Connectors/Ports

7.1 High-Definition (HD) Audio

This motherboard features a 7.1 Channel High-Definition (HD) Audio codec that provides eight Digital to Analog Converter (DAC) channels. The HD audio supports multiple-streaming 7.1 sound playback through the front_panel stereo output via the subwoofer speakers. Download the appropriate software from our website to enable this function.

VGA Port

There is one VGA port located on the rear I/O panel. The VGA connection provides analog interface support between the computer and the video displays. Refer to the layout below for the location of VGA connection.

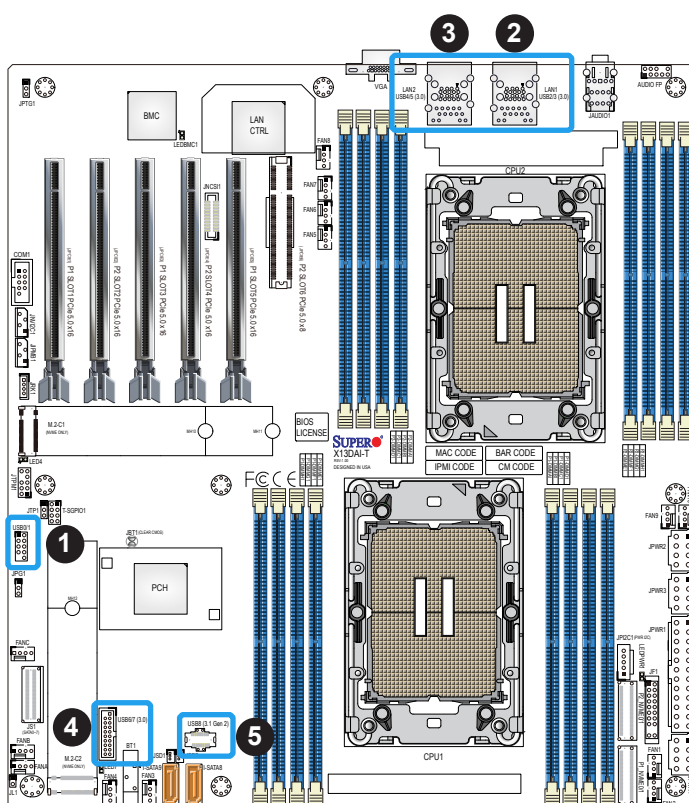


Universal Serial Bus (USB) Ports and Headers

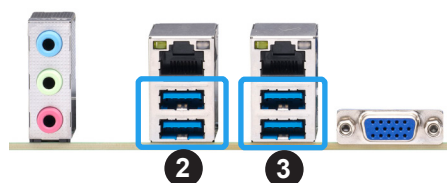
There are four USB 3.0 ports (USB2, USB3, USB4, USB5) on the rear I/O panel. The USB 2.0 header, located at USB0/1, and one USB 3.0 header, located at USB6/7, support two USB connections of each for front access. USB8 is the internal USB 3.1 Gen 2 connector. These USB ports and headers/connector can be used for USB support via USB cables (not included).

USB 3.0 Header (USB6/7) Pin Definitions			
Pin#	Definition	Pin#	Definition
1	USB3_RN1	11	USB_P2
2	USB3_RP1	12	USB_N2
3	GND	13	GND
4	USB3_TN1	14	USB3_TP2
5	USB3_TP1	15	USB3_TN2
6	GND	16	GND
7	USB_N1	17	USB3_RP2
8	USB_P1	18	USB3_RN2
9	GND	19	VBUS
10	NC	X	

USB 3.1 Gen 2 Connector (USB8) Pin Definitions			
Pin#	Definition	Pin#	Definition
1	VBUS	20	VBUS
2	USB3_TP1	19	USB3_TP2
3	USB3_TN1	18	USB3_TN2
4	GND	17	GND
5	USB3_RP1	16	USB3_RP2
6	USB3_RN1	15	USB3_RN2
7	VBUS	14	GND
8	USBC_CC1	13	USB_N
9	USBC_SBU1	12	USB_P
10	USBC_SBU2	11	USBC_CC2

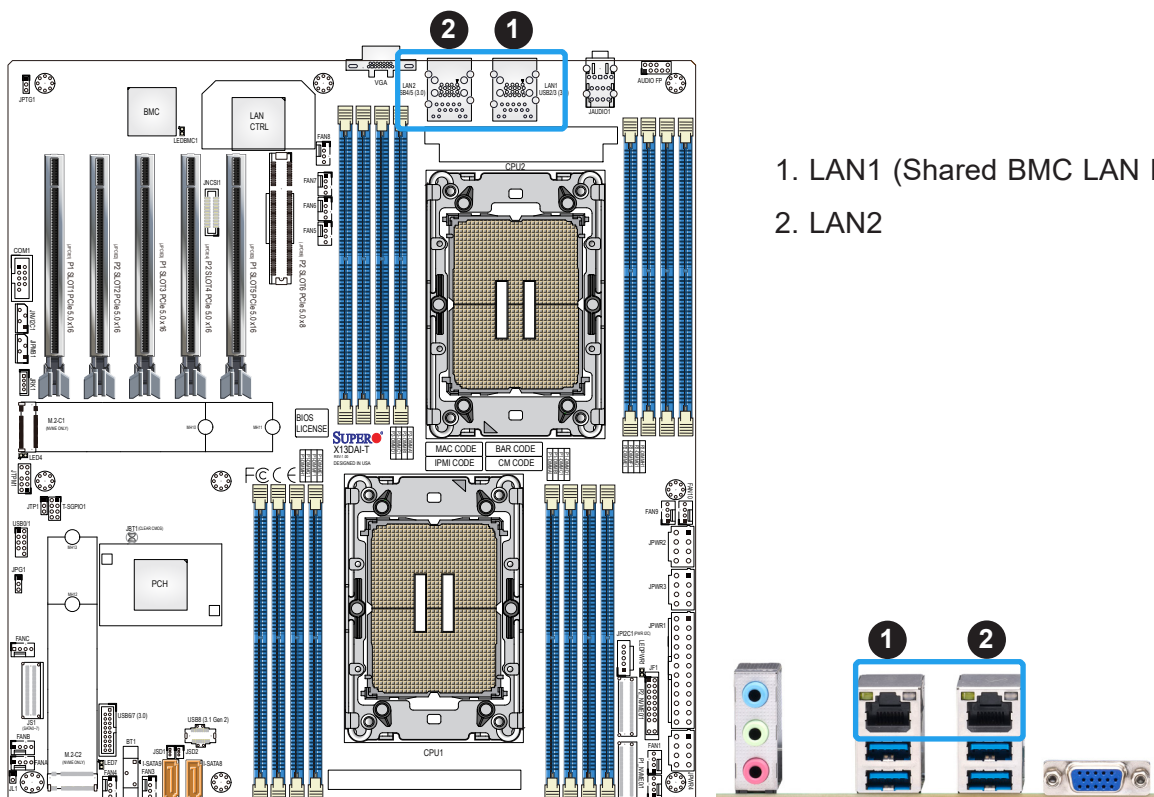


1. USB0/1: USB 2.0 Header
2. USB2/USB3: USB 3.0 Ports
3. USB4/USB5: USB 3.0 Ports
4. USB6/7: USB 3.0 Header
5. USB8: Internal USB 3.1 Gen 2 Connector



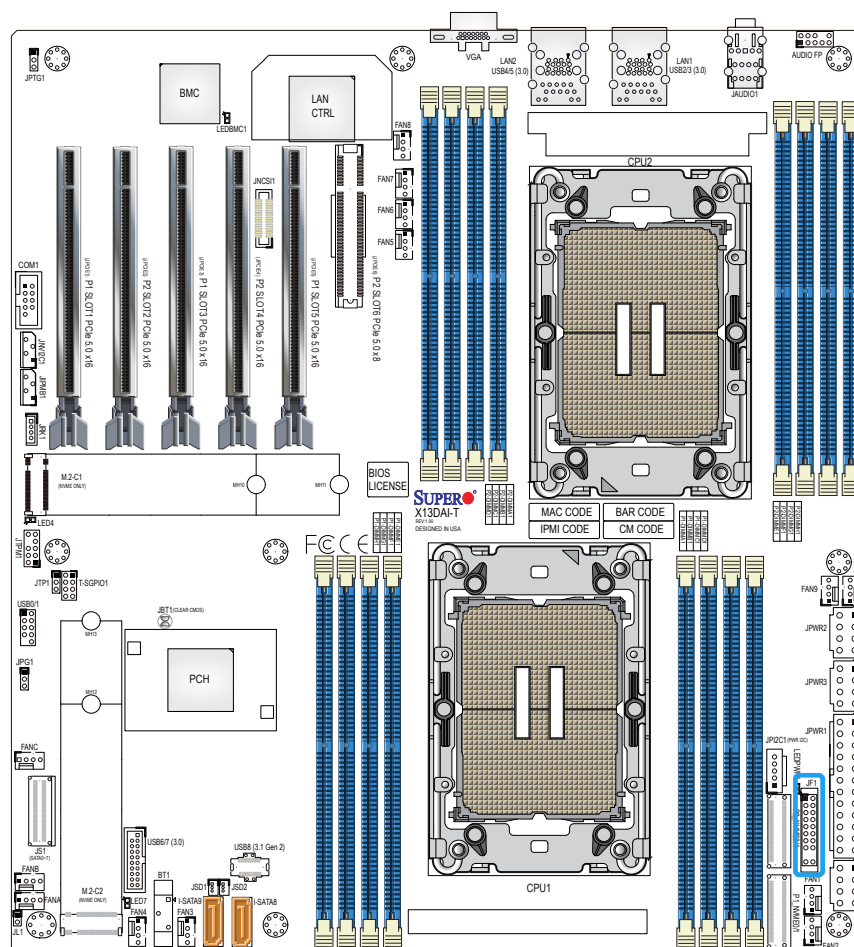
LAN Ports (LAN1/LAN2)

Two Ethernet LAN ports (LAN1, LAN2) are located on the rear I/O panel. LAN1/LAN2 ports support 10 GbE LAN connections (via the Broadcom BCM57416 controller) and share with the support for the Baseboard Management Controller (BMC). LAN1 is the shared BMC LAN port. Both of the LAN ports accept RJ45 cables. Please refer to [Section 2.9](#) for LAN LED information.



2.6 Front Control Panel

The front control panel header (JF1) contains header pins for various buttons and indicators that are normally located on a control panel at the front of the chassis. These connectors are designed specifically for use with Supermicro chassis. Refer to the figure below for the descriptions of the front control panel buttons and LED indicators.



JF1		1	2
Power Button		○	○
Reset Button		○	○
3.3V		○	○
Red+ (Blue LED_Cathode_UID)		○	○
NIC2 (Activity) LED		○	○
NIC1 (Activity) LED		○	○
ID_UID/3.3V Stby		○	○
3.3V PWR LED+(Cable)		○	○
Key		○	○
NMI PWR LED-(Cable)		○	○
		Ground	
		Ground	
		Power Fail (for LED6)	
		Blue+ (Red OH/Fan Fail/PWR Fail for LED5/Blue UID LED)	
		NIC2 (Link) LED	
		NIC1 (Link) LED	
		HDD LED	
		FP PWR LED	
		Key	
		Ground	
		19	20

Front Control Panel (JF1) LEDs

Front Control Panel (JF1) LED Indicators					
Event	Power (LED1)	HDD (LED2)	LAN (LED3/4)	Information (LED5)	Power Fail (LEDPWR)
Power On	Solid On				
HDD Activity		Blinking			
NIC Activity			Blinking		
Overheat				Solid On	
Fan Fail				Blinking at 1 Hz	
Power Fail				Blinking at 1/4 Hz	Solid On
Checking	BMC/BIOS Blinking at 4 HZ				
Recovering/Updating	BMC Blinking at 4 HZ BMC 2 Blinks at 4 Hz, 1 Pause at 2 Hz (on-on-off-off)				
Flash Not Detected or Golden Image Check Failed	BMC/BIOS Blinking at 1 HZ				
CPLD Recovery Mode				Blinking at 10 Hz (FP Red LED)	

Power On & BMC/BIOS Status LED Button

The Power On and BMC/BIOS Status LED button is located on Pin 1 and Pin 2 of JF1. Momentarily contacting both pins will power on/off the system or display BMC/BIOS status. Refer to the tables below for more information.

Power Button & BIOS/BMC Status LED Indicator Pin Definitions (JF1)	
Pin#	Definition
1	Signal
2	Ground

Power Button LED Indicator Status	
Status	Event
Green: solid on	System power on
BMC/BIOS blinking green at 4 Hz	BMC/BIOS checking
BIOS blinking green at 4 Hz	BIOS recovery/update in progress
BMC blinking red x2 (2 blinks red) at 4 Hz, 1 pause at 2 Hz (on-on-off-off)	BMC recovery/update in progress
BMC/BIOS blinking green at 1 Hz	Flash not detected or golden image checking failure

Reset Button

The Reset Button connection is located on Pin 3 and Pin 4 of JF1. Momentarily contacting both pins will reset the system. Refer to the table below for pin definitions.

Reset Button Pin Definitions (JF1)	
Pin#	Definition
3	Reset
4	Ground

JF1			
	1	2	
1 Power Button	○	○	Ground
2 Reset Button	○	○	Ground
3.3V	○	○	Power Fail (for LED6)
Red+ (Blue LED_Cathode_UID)	○	○	Blue+ (Red OH/Fan Fail/PWR Fail for LED5/Blue UID LED)
NIC2 (Activity) LED	○	○	NIC2 (Link) LED
NIC1 (Activity) LED	○	○	NIC1 (Link) LED
ID_UID/3.3V Stby	○	○	HDD LED
3.3V PWR LED+(Cable)	○	○	FP PWR LED
Key	○	○	Key
NMI PWR LED-(Cable)	○	○	Ground
	19	20	

1. PWR Button
2. Reset Button

Power Fail LED

The Power Fail LED connection is located on Pin 5 and Pin 6 of JF1. When this LED turns solid red, it indicates a power failure. Refer to the table below for pin definitions.

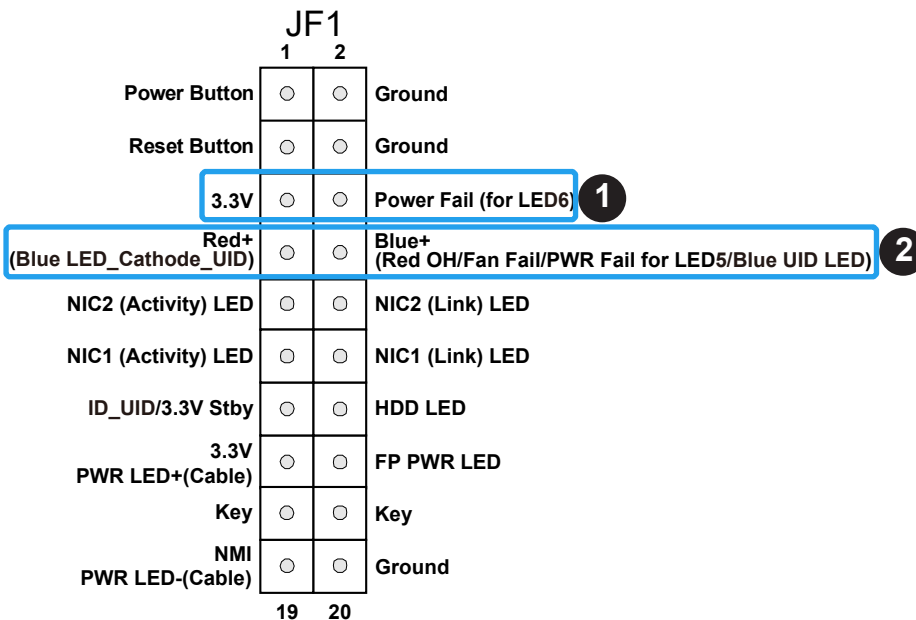
Power Fail LED Pin Definitions (JF1)	
Pin#	Definition
5	3.3V
6	PWR Fail for LEDPWR (Solid red on: PWR failure)

Information LED (OH/Fan Fail/PWR Fail/UID LED)

The Information LED (OH/Fan Fail/PWR Fail/UID LED) connection is located on Pin 7 and Pin 8 of JF1. The LED on Pin 8 provides warnings of overheat, power failure, or fan failure. Refer to the table below for more information.

Information LED-Blue+ (OH/Fan Fail/PWR Fail LED/Blue UID LED) (Pin 7 & Pin 8 of JF1) LED Indicator Status	
Status	Description
Solid red (on)	Overheating, recovering/updating, flash not detected or golden image checking fail have occurred.
Blinking red (1 Hz)	Fan failure: check for an inoperative fan.
Blinking red (0.25 Hz)	Power failure: check for a non-operational power supply.
Blinking red (10 Hz) (FP red LED)	CPLD recovery mode error(s).

Information LED-Blue+ (Blue UID LED) (Pin 7 & Pin 8 of JF1) LED Indicator Status	
Status	Description
BIOS/BMC blinking blue (10 Hz) (blinking for a few minutes, and stop when recovery complete)	Recovering/Updating; CPLD recovery mode.
BIOS/BMC blinking blue (10 Hz) (never stop)	OTP has not been programmed.



1. Power Fail LED

2. Information LED

NIC1/NIC2 (LAN1/LAN2)

The NIC (Network Interface Controller) LED connection for LAN port 1 is located on Pin 11 and Pin 12 of JF1, and LAN port 2 is on Pin 9 and Pin 10. Refer to the tables below for pin definitions.

LAN1/LAN2 LED Pin Definitions (JF1)			
Pin#	Definition	Pin#	Definitin
9	NIC 2 Activity LED	10	NIC 2 Link LED
11	NIC 1 Activity LED	12	NIC 1 Link LED

LAN1/LAN2 LED LED Indicator Status	
Color	State
NIC 2: Blinking green	LAN 2: Active
NIC 1: Blinking green	LAN 1: Active

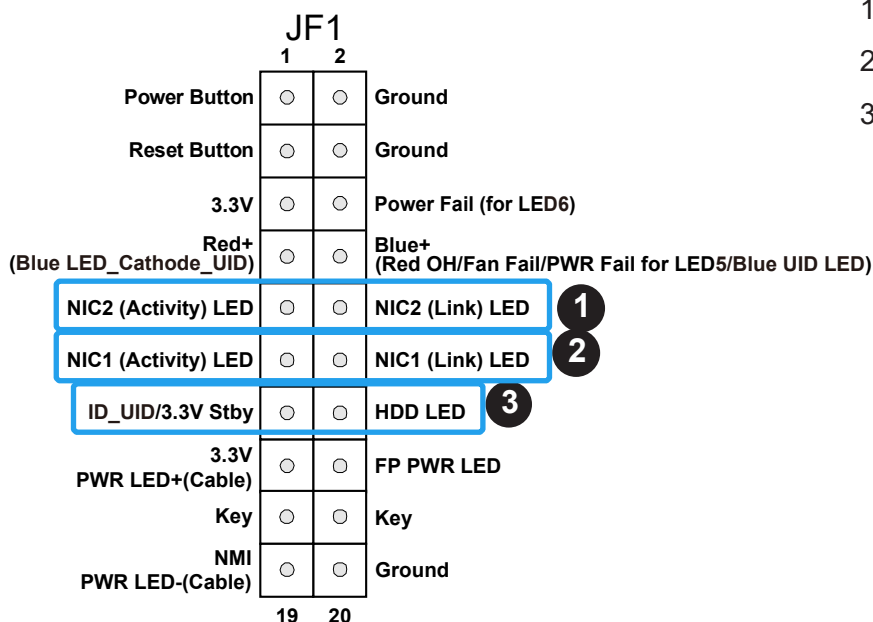
ID_UID Button/HDD LED

The UID Button/HDD LED connection is located on Pin 13 and Pin 14 of JF1. The UID Button is used for a chassis that supports a front UID Button. The front UID Button functions in the same way as the rear UID Button; both are for input only and cannot be used for output.

When this LED is blinking green, it indicates HDD is active. Attach a cable to Pin 13 and Pin 14 to show ID_UID status and hard drive activity. Refer to the tables below for pin definitions.

ID_UID/HDD LED Pin Definitions (JF1)	
Pin#	Definition
13	ID_UID/3.3V Stdbby
14	HDD Activity

ID_UID/HDD LED Pin Definitions (JF1)	
Color	State
Blinking Green	HDD Active



1. NIC2 (LAN2) LED
2. NIC1 (LAN1) LED
3. ID_UID/HDD LED

Front Panel Power LED

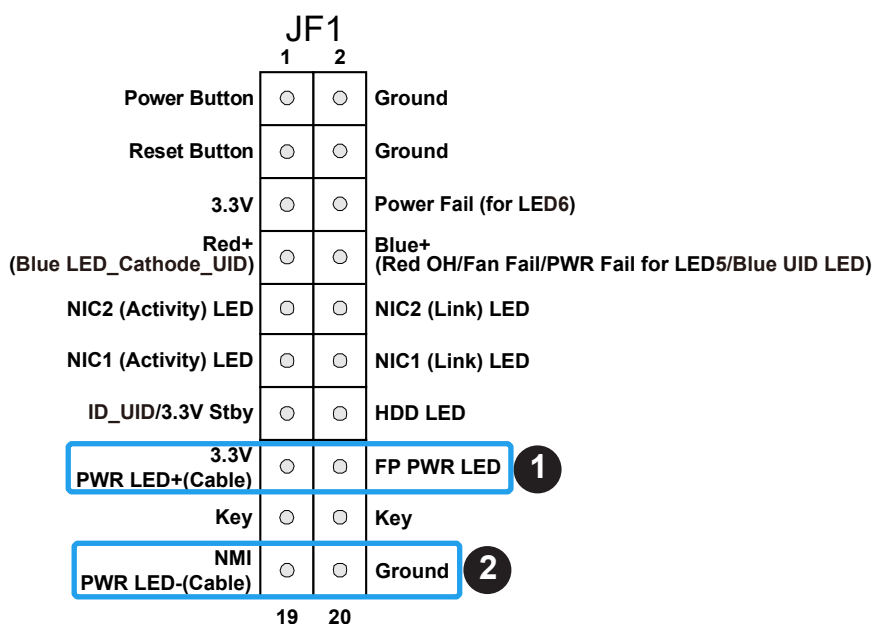
The Front Panel Power LED connection is located on Pin 15 and Pin 16 of JF1. Refer to the table below for pin definitions. Please note that Pin 15 and Pin 16 are also for the connection of PWR LED+(Cable).

FP Power LED Pin Definitions (JF1)	
Pin#	Definition
15	3.3V
16	FP PWR LED

NMI Button

The non-maskable interrupt (NMI) button header is located on Pin 19 and Pin 20 of JF1. Refer to the table below for pin definitions. Please note that Pin 19 and Pin 20 are also for the connection of PWR LED-(Cable).

NMI Button Pin Definitions (JF1)	
Pin#	Definition
19	NMI
20	Ground



1. FP PWR LED

2. NMI

2.7 Connectors and Headers

Power Connections

ATX Power Supply Connector (JPWR1)

The 24-pin power supply connector (JPWR1) meets the ATX power specification. You must also connect the 8-pin 12 V DC power connectors (JPWR2/JPWR3/JPWR4) to the power supply to provide adequate power to your system.



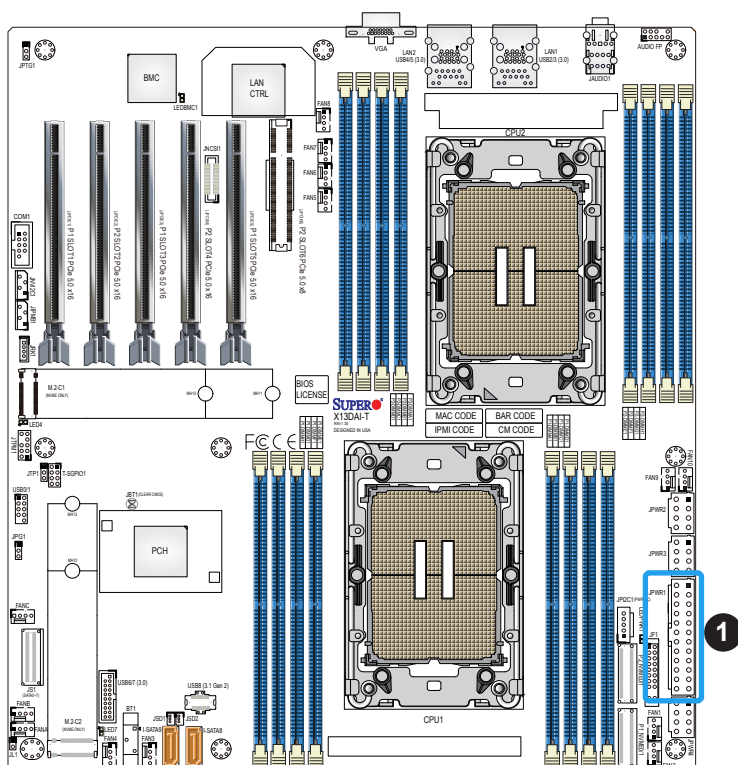
Important: To provide adequate power supply to the motherboard, be sure to connect the 24-pin ATX power connector and the 8-pin power connectors to the power supply. Failure to do so may void the manufacturer warranty on your power supply and motherboard.

12V 8-pin Power Pin Definitions	
Pin#	Definition
1 - 4	Ground
5 - 8	+12V

Required Connection

ATX Power 24-pin Connector Pin Definitions			
Pin#	Definition	Pin#	Definition
13	+3.3V	1	+3.3V
14	NC	2	+3.3V
15	Ground	3	Ground
16	PS_ON	4	+5V
17	Ground	5	Ground
18	Ground	6	+5V
19	Ground	7	Ground
20	Res (NC)	8	PWR_OK
21	+5V	9	5VSB
22	+5V	10	+12V
23	+5V	11	+12V
24	Ground	12	+3.3V

Required Connection



1. JPWR1: 24-pin ATX Power Connector

ATX Power Supply Connector (JPWR2/JPWR3/JPWR4)

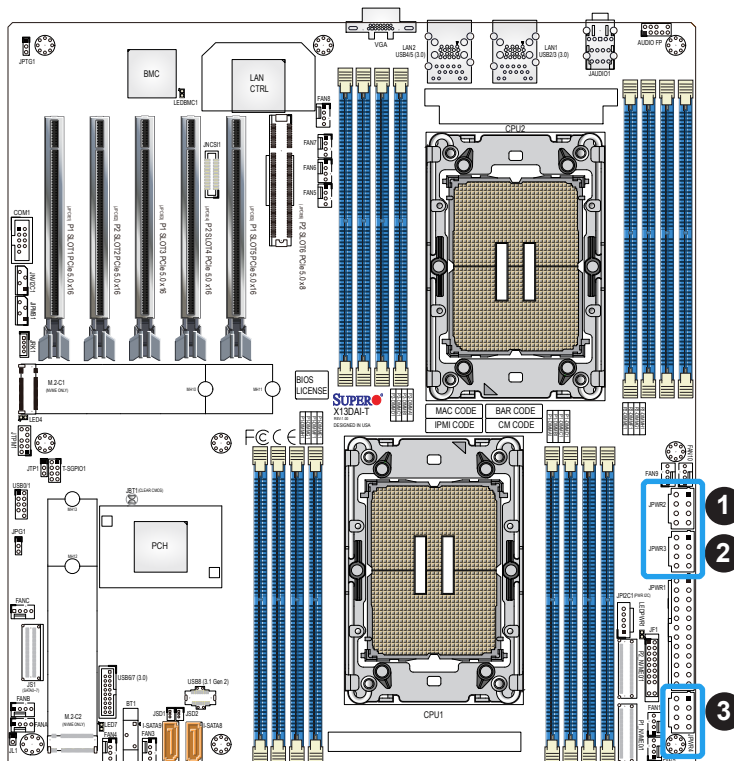
It is required to connect the 8-pin 12 V DC power connectors (JPWR2/JPWR3/JPWR4) to the power supply to provide adequate power to your system.

12V 8-pin Power Pin Definitions	
Pin#	Definition
1 - 4	Ground
5 - 8	+12V

Required Connection



Important: To provide adequate power supply to the motherboard, be sure to connect the 24-pin ATX power connector and the 8-pin power connectors to the power supply. Failure to do so may void the manufacturer warranty on your power supply and motherboard.



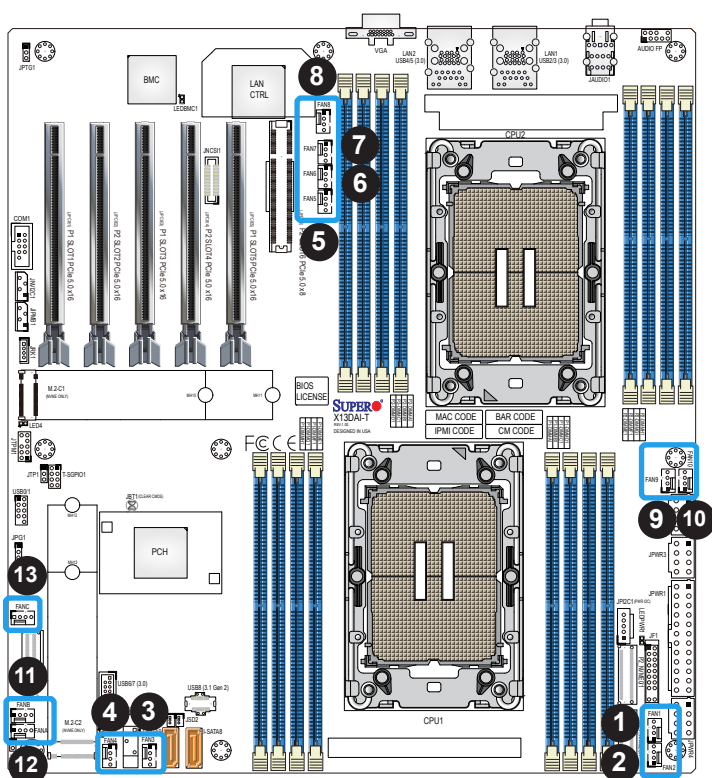
1. JPWR2: 8-pin Power Connector
2. JPWR3: 8-pin Power Connector
3. JPWR4: 8-pin Power Connector

Headers

Fan Headers

There are thirteen 4-pin fan headers (FAN1–FAN10: CPU fan headers; FANA, FANB, FANC: system fan headers) on the motherboard. All these 4-pin fan headers are backwards compatible with the traditional 3-pin fans. However, fan speed control is available for 4-pin fans only by Thermal Management via the BMC interface. Refer to the table below for pin definitions.

Fan Header Pin Definitions	
Pin#	Definition
1	Ground
2	2.5A/+12V
3	Tachometer
4	PWM_Control

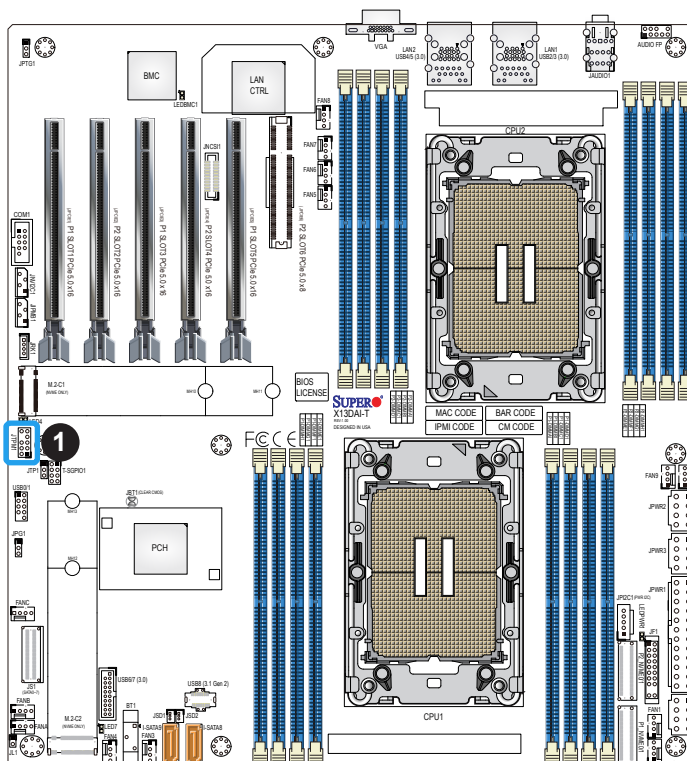


1. FAN1
2. FAN2
3. FAN3
4. FAN4
5. FAN5
6. FAN6
7. FAN7
8. FAN8
9. FAN9
10. FAN10
11. FANA
12. FANB
13. FANC

TPM/Port 80 Header

The JTPM1 header is used to connect a Trusted Platform Module (TPM)/Port 80, which is available from Supermicro (optional). A TPM/Port 80 connector is a security device that supports encryption and authentication in hard drives. It allows the motherboard to deny access if the TPM, which is associated with the hard drive, is not installed in the system. Refer to the layout below for the location of the TPM header. Please go to the following link for more information on the TPM: https://www.supermicro.com/manuals/other/AOM-TPM-9670V_9670H.pdf.

Trusted Platform Module Header Pin Definitions			
Pin#	Definition	Pin#	Definition
1	+3.3V	2	SPI_CS#
3	RESET#	4	SPI_MISO
5	SPI_CLK	6	GND
7	SPI_MOSI	8	NC
9	+3.3V Stdby	10	SPI_IRQ#



1. TPM Header (JTPM1)

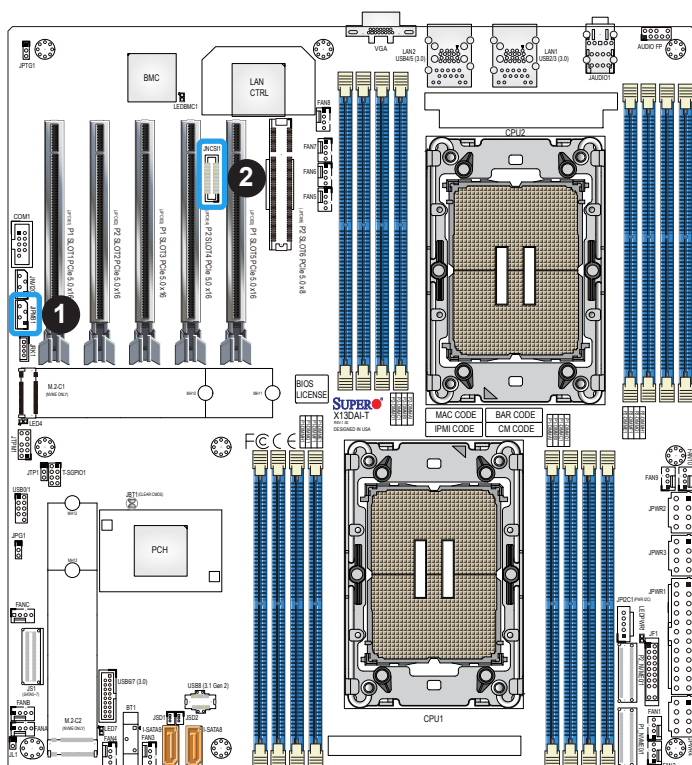
4-pin BMC External I²C Header

An SMBus (I²C) header for the BMC is located at JIPMB1. Connect the appropriate cable here to use the IPMB I²C connection on your system. Refer to the layout for the location of JIPMB1.

NC-SI Connector

The Network Controller Sideband Interface (NC-SI) connector is located at JNCSI1. This connector is used to connect a Network Interface Card (NIC) to the motherboard to allow the onboard BMC to communicate with a network.

Note: For detailed instructions on how to configure Network Interface Card (NIC) settings, please refer to the Network Interface Card Configuration User's Guide posted on the web page under the link: <https://www.supermicro.com/support/manuals/>.



1. BMC External Header (JIPMB1)
2. NC-SI Connector (JNCSI1)

T-SGPIO Header

The Serial General Purpose Input/Output header (T-SGPIO1) is used to communicate with the enclosure management chip on the backplane. Refer to the table below for pin definitions.

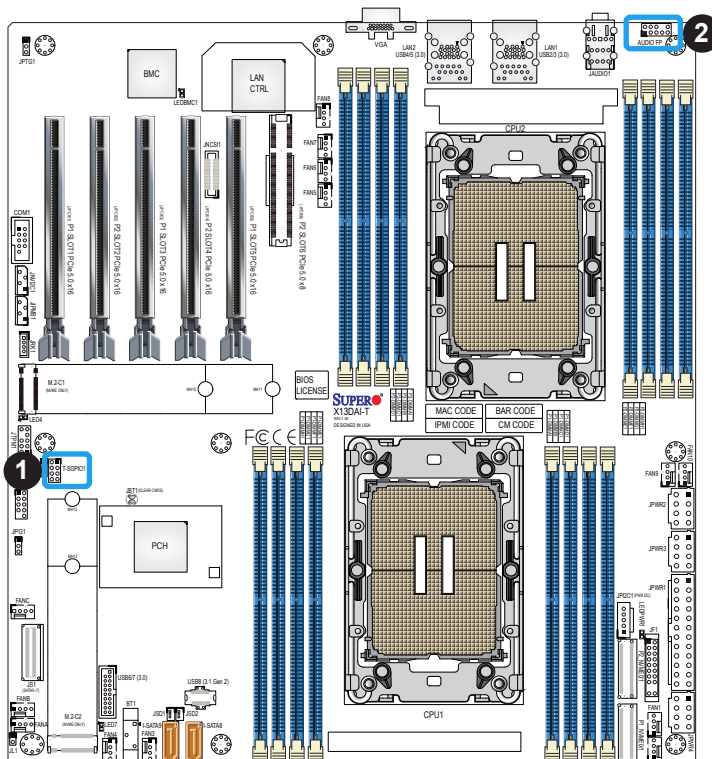
T-SGPIO Header Pin Definitions			
Pin#	Definition	Pin#	Definition
1	NC	2	NC
3	Ground	4	Data
5	Load	6	Ground
7	Clock	8	NC

NC = No Connection

Audio Front Panel Header

A 10-pin audio header (AUDIO FP) located on the motherboard allows you to use the onboard sound chip (ALC888S) for audio function. Connect an audio cable to this header to use this feature. Refer to the table below for pin definitions.

Audio Header Pin Definitions			
Pin#	Definition	Pin#	Definition
1	Microphone_Left	2	Audio_Ground
3	Microphone_Right	4	Audio_Detect
5	Line_2_Right	6	Ground
7	Jack_Detect	8	Key
9	Line_2_Left	10	Ground



1. T-SGPIO Header (T-SGPIO1)
2. Audio Front Panel Header (AUDIO FP)

Disk-On-Module Power Connector

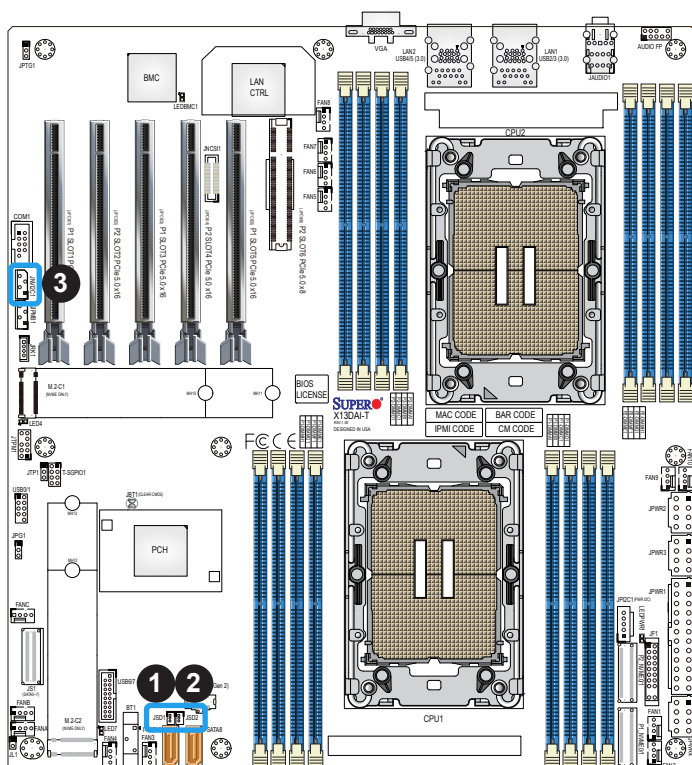
The Disk-On-Module (DOM) power connectors at JSD1 and JSD2 provide 5 V power to a solid-state DOM storage devices connected to one of the SATA ports. Refer to the table below for pin definitions.

DOM Power Pin Definitions	
Pin#	Definition
1	5V
2	Ground
3	Ground

NVMe SMBus Header

The NVMe SMBus (I2C) header (JNVI2C1), used for PCIe SMBus clock and data connections, provides hot-plug support via a dedicated SMBus interface. This feature is only available for a Supermicro complete system with an Supermicro-proprietary NVMe add-on card and a proper cable installed. Refer to the table below for pin definitions.

NVMe SMBus Header Pin Definitions	
Pin#	Definition
1	Data
2	Ground
3	Clock
4	VCCIO



1. Disk-On-Module (DOM) Power Connector (JSD1)
2. Disk-On-Module (DOM) Power Connector (JSD2)
3. NVMe SMBus (I²C) Header (JNVI2C1)

Power SMBus (I²C) Header

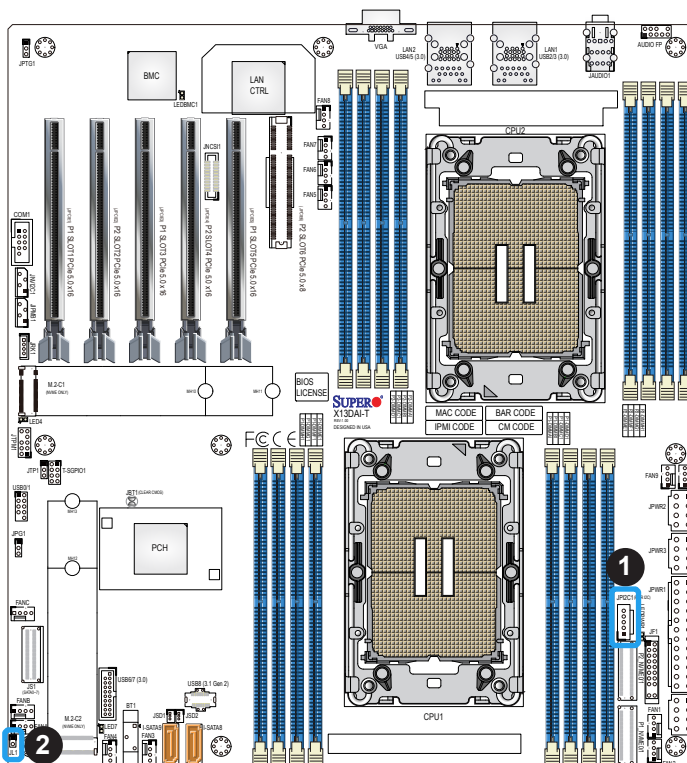
The Power SMBus (I²C) header (JPI2C1) monitors the power supply, fans, and system temperatures. Refer to the table below for pin definitions.

Power SMBus Header Pin Definitions	
Pin#	Definition
1	Clock
2	Data
3	PMBUS_Alert
4	Ground
5	+3.3V

Chassis Intrusion

A Chassis Intrusion header is located at JL1 on the motherboard. Attach the appropriate cable from the chassis to inform you when the chassis is opened. Refer to the table below for pin definitions.

Chassis Intrusion Pin Definitions	
Pin#	Definition
1	Intrusion Input
2	Ground



1. Power SMBus (I²C) Header (JPI2C1)
2. Chassis Intrusion Header (JL1)

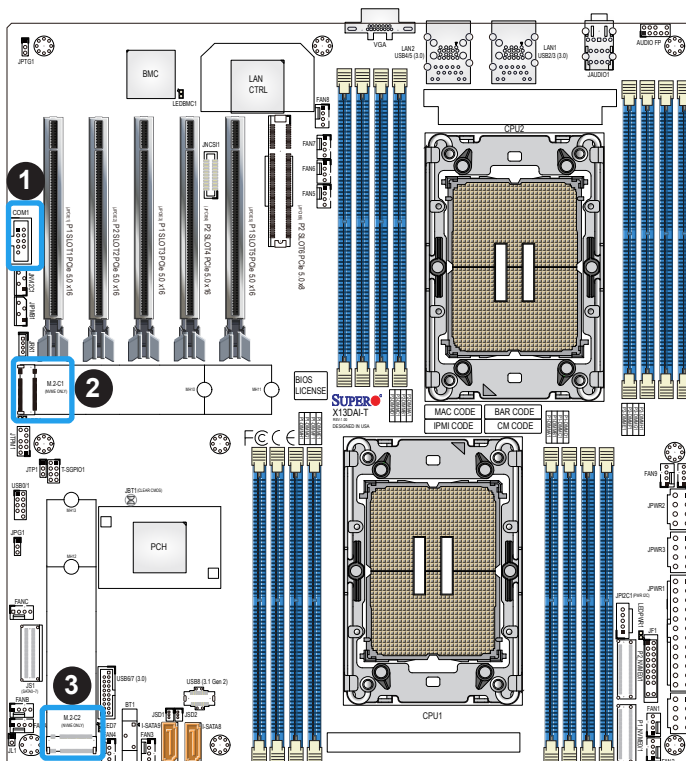
COM Header

A single COM connection (COM1) is located on the motherboard. COM1 is located next to P1 SLOT1. Refer to the layout below for the location of COM1.

COM Header Pin Definitions			
Pin#	Definition	Pin#	Definition
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI
5	Ground	10	N/A

M.2-C1/M.2-C2 Slots (for NVMe Only)

Two M.2 slots are located at M.2-C1 and M.2-C2 on the motherboard. These M.2 slots support PCIe 5.0 x4 M.2 NVMe devices in the 2280 and 22110 form factors. M.2 allows for a variety of card sizes, increased functionality, and spatial efficiency. Refer to the layout below for the locations of M.2-C1 and M.2-C2.

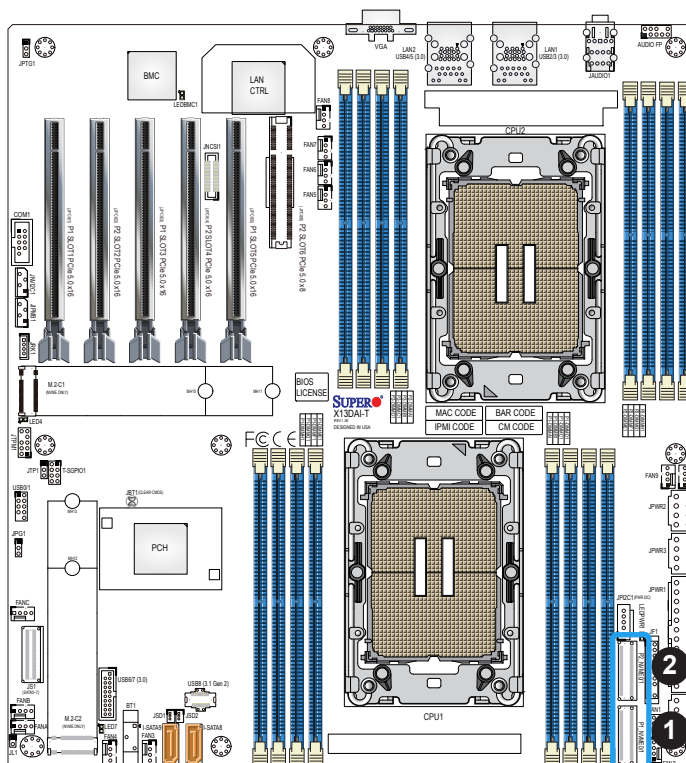


1. COM1
2. M.2 Slot (M.2-C1)
3. M.2 Slot (M.2-C2)

MCIO NVMe Connectors

Two PCIe 5.0 x8 MCIO NVMe connectors, located at P1_NVME0/1 and P2_NVME0/1, provide four NVMe connections on the motherboard. P1_NVME0/1 connector is supported by CPU1. P2_NVME0/1 connector is supported by CPU2. Use these MCIO connectors to support high-speed PCIe NVMe storage devices.

Note: When installing an NVMe device on a motherboard, please be sure to connect the first MCIO NVMe connector (P1_NVME0/1) first for your system to work properly.



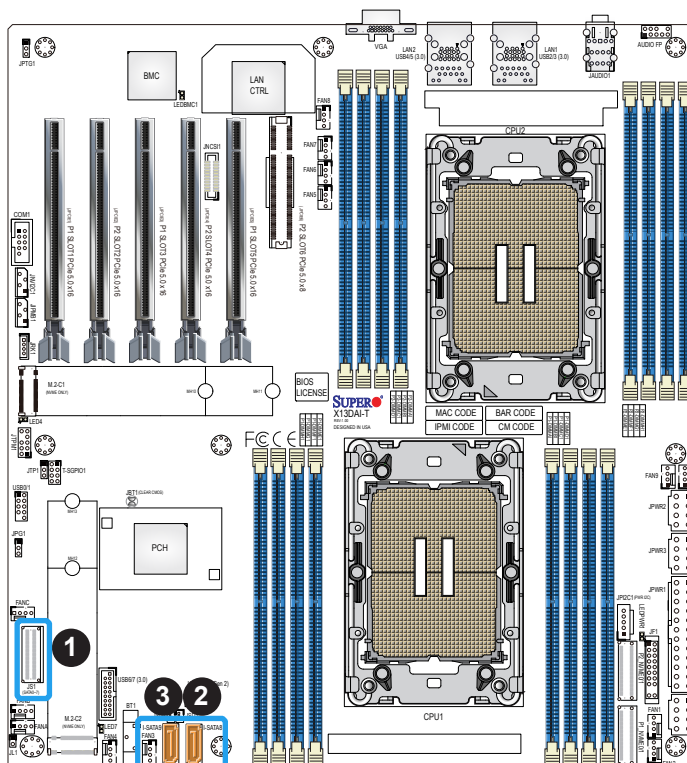
1. P1_NVME0/1
2. P2_NVME0/1

SATA 3.0 via SlimSAS

One SlimSAS connector, located at JS1, supports eight SATA 3.0 connections (SATA0~7) on the motherboard. These SATA connections are supported by the Intel C741 chipset. Connect a proper SlimSAS cable to JS1 to use SATA connections.

SATA 3.0 Connections

Two SATA 3.0 connectors, located at I-SATA8/I-SATA9, support two SATA connections on the motherboard. Supported by the Intel C741 chipset, these SATA connections are compatible with SATA HDDs and SATA DOMs that need external power cables. In addition, I-SATA8 and I-SATA9, which are orange SATA connectors with power pins built in, can be used with Supermicro SuperDOMs and do not require external power cables.



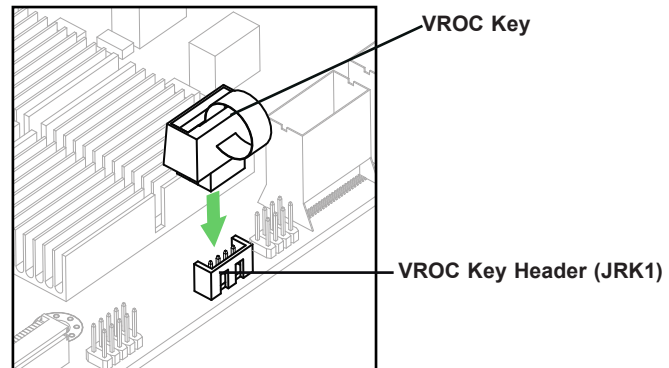
1. JS1 (SATA0~7)
2. I-SATA8 (SuperDOM)
3. I-SATA9 (SuperDOM)

VROC RAID Key Header

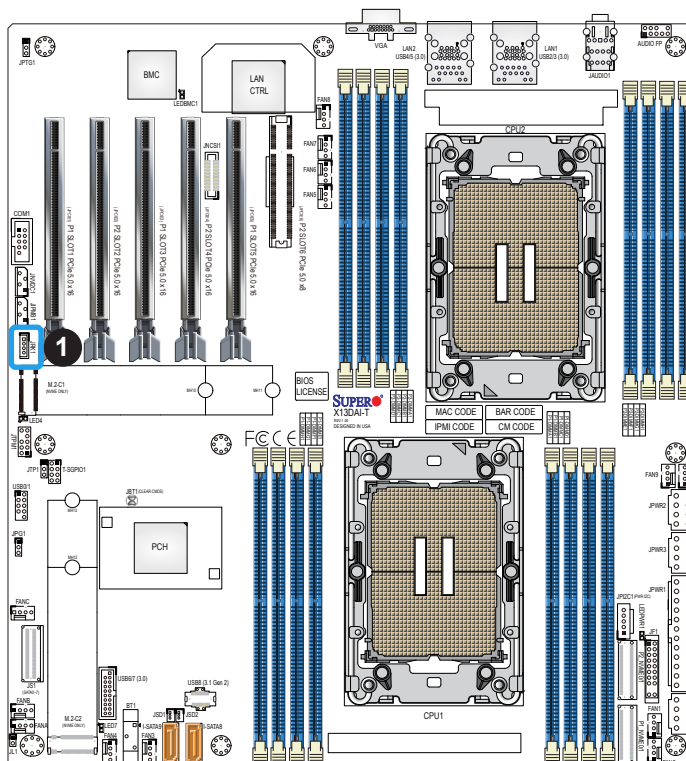
An Intel VROC RAID Key header is located at JRK1 on the motherboard. Install a VROC RAID Key on JRK1 for NVMe RAID support as shown in the illustration below. Please refer to the layout below for the location of JRK1.

Note: For detailed instructions on how to configure VROC RAID settings, please refer to the VROC RAID Configuration User's Guide posted on the web page under the link: <https://www.supernmicro.com/support/manuals/>.

Intel VROC Key Pin Definitions	
Pin#	Definition
1	Ground
2	3.3V Standby
3	Ground
4	PCH RAID Key



Note: The graphics contained in this user's manual are for illustration only. The components installed in your system may or may not look exactly the same as the graphics shown in the manual.



1. VROC RAID Key Header (JRK1)

2.8 Jumper Settings

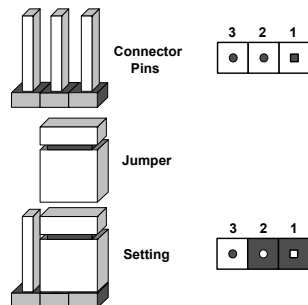
How Jumpers Work

To modify the operation of the motherboard, jumpers can be used to choose between optional settings. Jumpers create shorts between two pins to change the function of the connector. Pin 1 is identified with a square solder pad on the printed circuit board. See the diagram below for an example of closing Pin 1 and Pin 2 of the jumper. Refer to the motherboard layout page for jumper locations.



Note 1: Unplug the power cord from the power supply before adjust jumper setting.

Note 2: On two-pin jumpers, "Closed" means the jumper is on and "Open" means the jumper is off the pins.



CMOS Clear

JBT1 is used to clear CMOS, which will also clear any passwords. Instead of pins, this jumper consists of contact pads to prevent accidentally clearing the contents of CMOS.



JBT1 contact pads

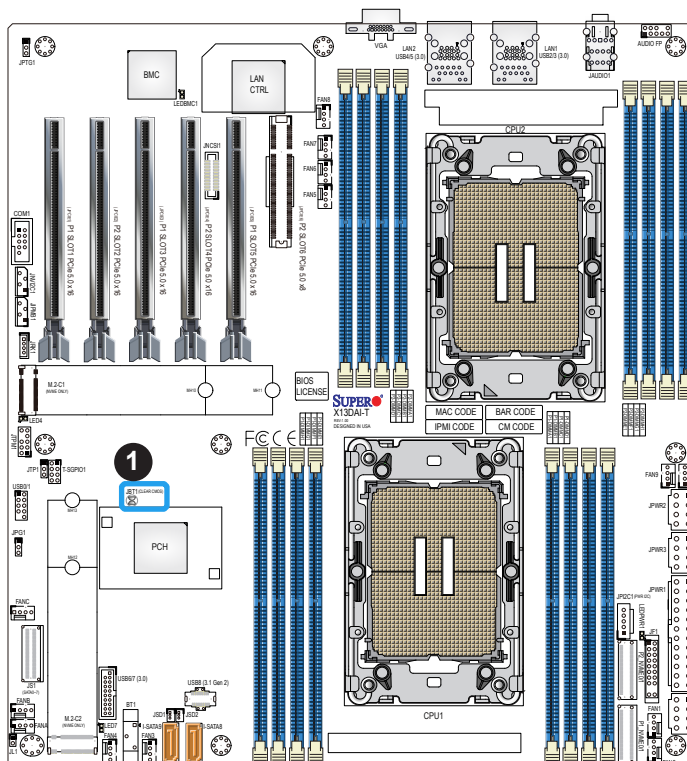
To Clear CMOS

1. Power down the system.
2. Unplug the power cord(s).
3. Remove the cover of the chassis to access the motherboard.
4. Remove the onboard battery from the motherboard.
5. Short the CMOS pads, JBT1, with a metal object such as a small screwdriver for at least four seconds.



Note: Clearing CMOS will also clear all passwords.

6. Remove the screwdriver or shorting device.
7. Reinsert the battery.
8. Replace the cover.
9. Reconnect the power cord(s).
10. Power on the system.

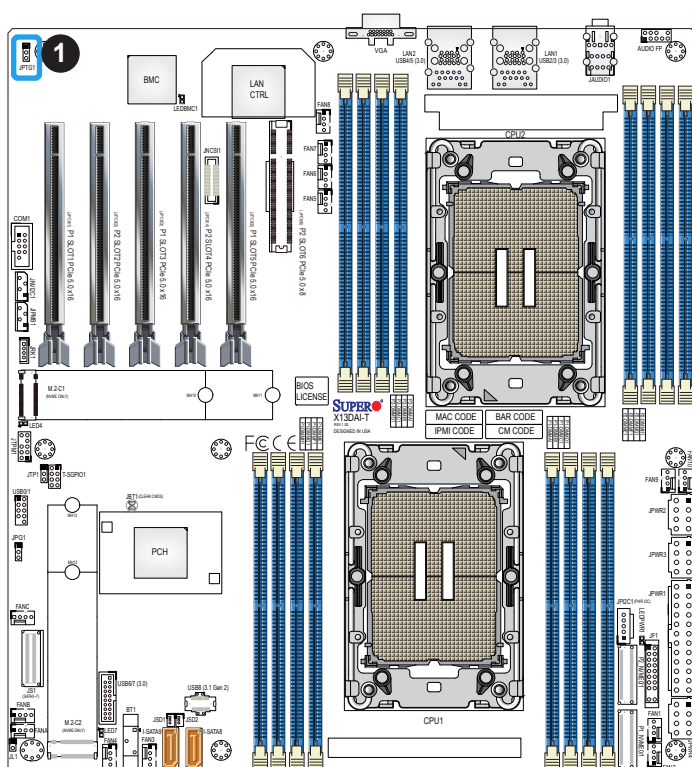


1. JBT1

LAN Port Enable/Disable

JPTG1 allows you to enable the onboard LAN ports (LAN1 and LAN2). The default setting is pins 1-2 to enable the connections. Refer to the table below for jumper settings.

LAN Enable/Disable Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Enabled (Default)
Pins 2-3	Disabled



1. LAN Port Enable/Disable (JPTG1)

VGA Enable/Disable

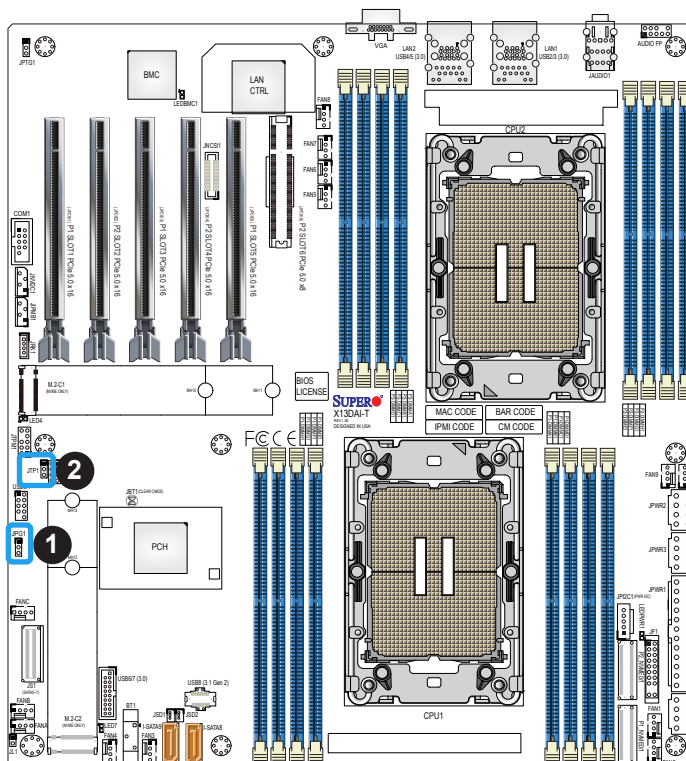
JPG1 allows you to enable the onboard VGA connector. The default setting is pins 1-2 to enable the connection. Refer to the table below for jumper settings.

VGA Enable/Disable Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Enabled (Default)
Pins 2-3	Disabled

TPM Module Mode

JTP1 allows you to set the TPM module mode. The default setting is pins 1-2 to have the onboard TPM module mode (internal). Close pins 2-3 to disable the onboard TPM and enable the external TPM module.

TPM Module Mode Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Onboard TPM Module
Pins 2-3	JTPM1 Header (External Module)



1. VGA Enable/Disable (JPG1)
2. TPM Module Mode (JTP1)

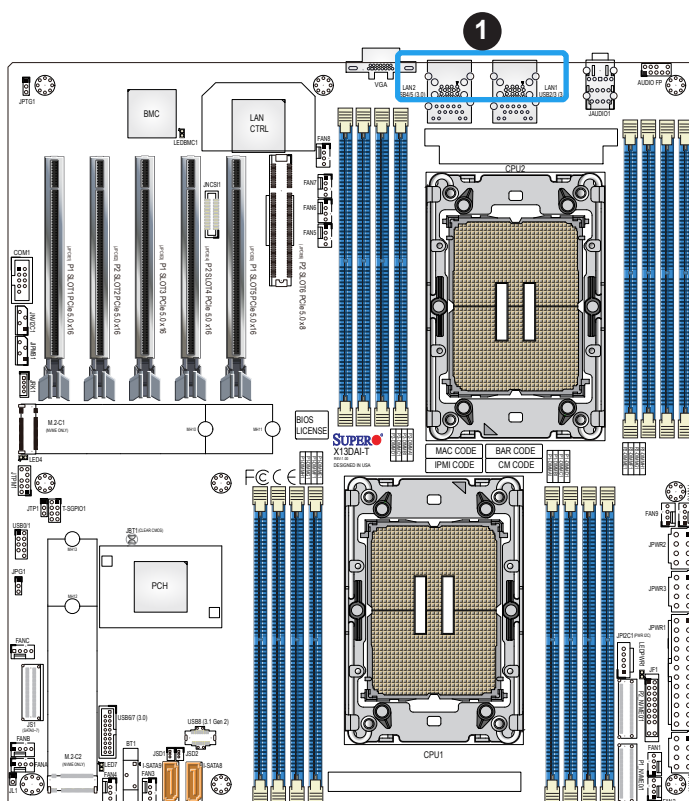
2.9 LED Indicators

LAN LEDs

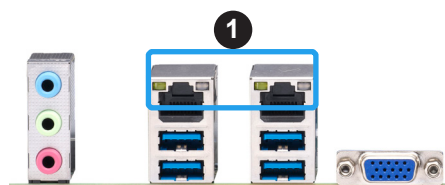
Two LAN ports (LAN1 and LAN2) are located on the rear I/O panel of the motherboard. Each Ethernet LAN port has two LEDs. The amber LED indicates activity, while the other Link LED may be green, amber, or off to indicate the speed of the connection. Refer to the tables below for more information.

LAN1/2 Activity LED (Right) LED State		
Color	Status	Definition
Amber	Blinking	Active

LAN1/2 Link LED (Left) LED State	
LED Color	Definition
Solid Green	10Gbps
Solid Amber	1Gbps



1. LAN1/LAN2 LEDs



Onboard Power LED

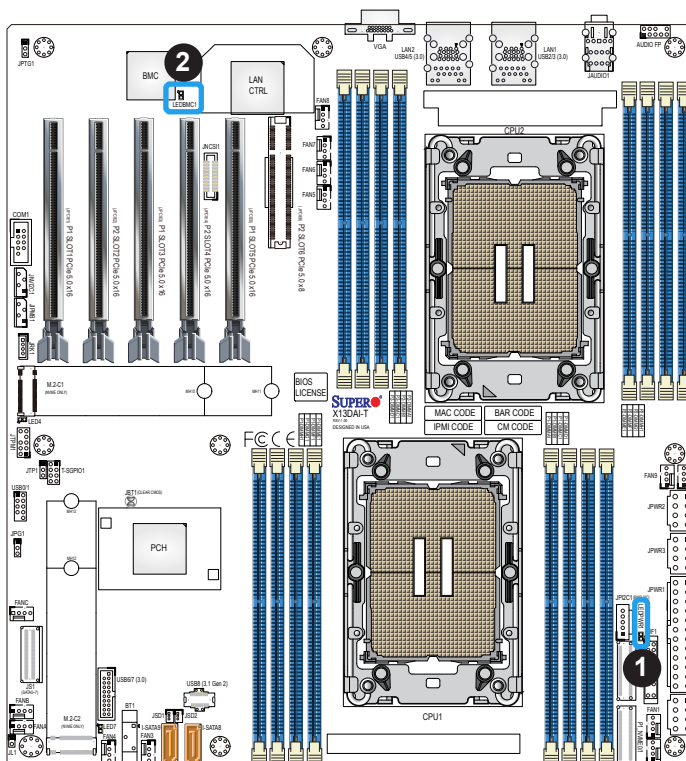
The Onboard Power LED is located at LEDPWR1 on the motherboard. When this LED is on, the system power is on. Be sure to turn off the system power and unplug the power cords before removing or installing components. Refer to the table below for more information.

Onboard Power LED Indicator	
LED Color	Definition
Off	System Power Off (power cable not connected)
Green	System Power On

BMC Heartbeat LED

A BMC Heartbeat LED is located at LEDBMC1 on the motherboard. When it is blinking green, the BMC is functioning normally. Refer to the layout below for the location of LEDBMC1.

BMC Heartbeat LED Indicator	
LED Color	Definition
Blinking Green	BMC Normal

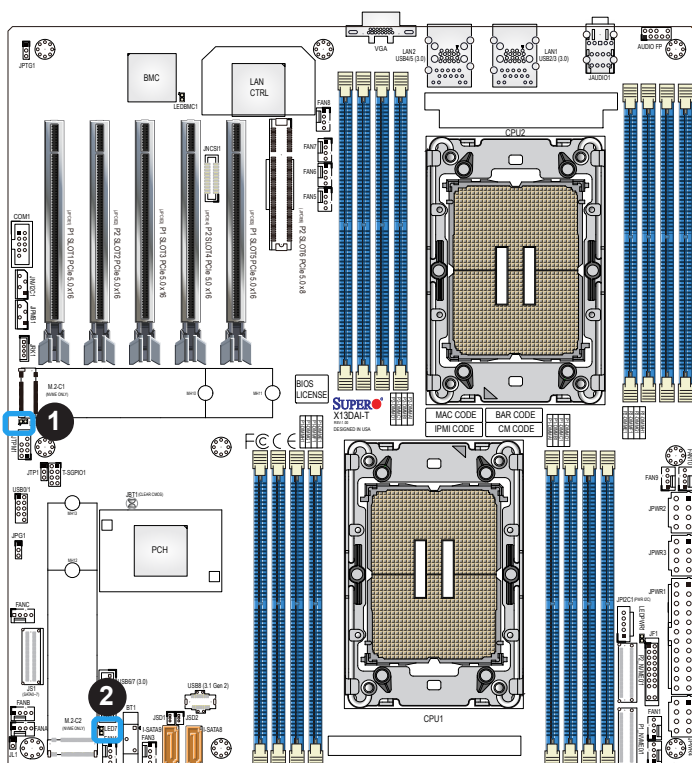


1. Power LED (LEDPWR1)
2. BMC Heartbeat LED (LEDBMC1)

M.2 LED Indicators

Two M.2 LED indicators are located at LED4 and LED7 on the motherboard. When LED4 is blinking, M.2-C1 functions normally, while LED7 is blinking, M.2-C2 functions properly. Refer to the layout below for locations of LED4 and LED7.

M.2 LED Indicators (LED4/LED7)		
LED#	LED Color	State
LED4	Blinking Green	M.2-C1: M.2 device working properly
LED7	Blinking Green	M.2-C2: M.2 device working properly



1. LED4 (M.2-C1 LED)
2. LED7 (M.2-C2 LED)

Chapter 3

Troubleshooting

3.1 Troubleshooting Procedures

Use the following procedures to troubleshoot your system. If you have followed all of the procedures below and still need assistance, refer to the 'Technical Support Procedures' and/or 'Returning Merchandise for Service' section(s) in this chapter. Always disconnect the AC power cord before adding, changing or installing any non hot-swap hardware components. If the below steps do not fix the setup configuration problem, contact your vendor for repairs.

Before Power On

1. Make sure that there are no short circuits between the motherboard and chassis.
2. Disconnect all ribbon/wire cables from the motherboard, including those for the keyboard and mouse.
3. Remove all add-on cards.
4. Install the CPU (making sure it is fully seated) and connect the front panel connectors to the motherboard.

No Power

1. Make sure that there are no short circuits between the motherboard and the chassis.
2. Make sure that the ATX power connectors are properly connected.
3. Check that the 115V/230V switch, if available, on the power supply is properly set.
4. Turn the power switch on and off to test the system, if applicable.
5. The battery on your motherboard may be old. Check to verify that it still supplies approximately 3VDC. If it does not, replace it with a new one.

No Video

1. If the power is on, but you do not have video, remove all add-on cards and cables.
2. Remove all memory modules and turn on the system (if the alarm is on, check the specs of memory modules, reset the memory, or try a different one).

System Boot Failure

If the system does not display POST (Power-On-Self-Test) or does not respond after the power is turned on, check the following:

1. Remove all components from the motherboard, especially the DIMM modules. Power on the system and check if the power-on LED (LEDPWR1) and the BMC Heartbeat LED (LEDBMC1) are on, and system fans are spinning.
2. Turn on the system with only one DIMM module installed. If the system boots, check for bad DIMM modules or slots by following the Memory Errors Troubleshooting procedure in this chapter.

Memory Errors

1. Make sure that the memory modules are compatible with the system and are properly installed. See Chapter 2 for installation instructions. (For memory compatibility, refer to the "Tested Memory List" link on the motherboard's product page to see a list of supported memory.)
2. Check if different speeds of DIMMs have been installed. It is strongly recommended that you use the same RAM type and speed for all DIMM modules in the system.
3. Make sure that you are using the correct type of ECC DDR5 modules recommended by the manufacturer.
4. Check for bad DIMM modules or slots by swapping a single module among all memory slots and check the results.

Losing the System's Setup Configuration

1. Make sure that you are using a high-quality power supply. A poor-quality power supply may cause the system to lose the CMOS setup information. Refer to Chapter 1 for details on recommended power supplies.
2. The battery on your motherboard may be old. Check to verify that it still supplies approximately 3VDC. If it does not, replace it with a new one.

When the System Becomes Unstable

A. If the system becomes unstable during or after OS installation, check the following:

1. CPU/BIOS support: Make sure that your CPU is supported and that you have the latest BIOS installed in your system.
2. Memory support: Make sure that the memory modules are supported by testing the modules using memtest86 or a similar utility.



Note: Click on the "Tested Memory List" link on the motherboard's product page to see a list of supported memory.

3. HDD support: Make sure that all hard disk drives (HDDs) work properly. Replace the bad HDDs with good ones.
4. System cooling: Check the system cooling to make sure that all heatsink fans and CPU/system fans, etc., work properly. Check the hardware monitoring settings in the BMC to make sure that the CPU and system temperatures are within the normal range. Also check the front panel Overheat LED and make sure that it is not on.
5. Adequate power supply: Make sure that the power supply provides adequate power to the system. Make sure that all power connectors are connected. Please refer to our website for more information on the minimum power requirements.
6. Proper software support: Make sure that the correct drivers are used.

B. If the system becomes unstable before or during OS installation, check the following:

1. Source of installation: Make sure that the devices used for installation are working properly, including boot devices such as USB flash or media drives.
2. Cable connection: Check to make sure that all cables are connected and working properly.
3. Using the minimum configuration for troubleshooting: Remove all unnecessary components (starting with add-on cards first), and use the minimum configuration (but with the CPU and a memory module installed) to identify the trouble areas. Refer to the steps listed in Section A above for proper troubleshooting procedures.
4. Identifying bad components by isolating them: If necessary, remove a component in question from the chassis, and test it in isolation to make sure that it works properly. Replace a bad component with a good one.

5. Check and change one component at a time instead of changing several items at the same time. This will help isolate and identify the problem.
6. To find out if a component is good, swap this component with a new one to see if the system will work properly. If so, then the old component is bad. You can also install the component in question in another system. If the new system works, the component is good and the old system has problems.

3.2 Technical Support Procedures

Before contacting Technical Support, please take the following steps. Also, please note that as a motherboard manufacturer, Supermicro also sells motherboards through its channels, so it is best to first check with your distributor or reseller for troubleshooting services. They should know of any possible problems with the specific system configuration that was sold to you.

1. Please go through the Troubleshooting Procedures and Frequently Asked Questions (FAQ) sections in this chapter or see the FAQs on our website (<https://www.supermicro.com/FAQ/index.php>) before contacting Technical Support.
2. BIOS upgrades can be downloaded from our website (https://www.supermicro.com/ResourceApps/BIOS_BMC_Intel.html).
3. If you still cannot resolve the problem, include the following information when contacting Supermicro for technical support:
 - Motherboard model and PCB revision number
 - BIOS release date/version (This can be seen on the initial display when your system first boots up.)
 - System configuration
4. For immediate assistance, please have your account number ready when placing a call to our Technical Support department. We can be reached by email at support@supermicro.com.
5. For worldwide services and support, please visit our website at [Worldwide Services & Support | Supermicro](#).

3.3 Frequently Asked Questions

Question: What type of memory does my motherboard support?

Answer: This motherboard supports up to 4 TB 3DS RDIMM/RDIMM DDR5 (288-pin) DDR5 memory with speeds of up to 5600 MT/s in 16 DIMM slots. To enhance memory performance, do not mix memory modules of different speeds and sizes. Please follow all memory installation instructions given in Section 2.4.

Question: How do I update my BIOS?

Answer: It is recommended that you do not upgrade your BIOS if you are not experiencing any problems with your system. Updated BIOS files are located on our website at https://www.supermicro.com/ResourceApps/BIOS_BMC_Intel.html. Please check our BIOS warning message and the information on how to update your BIOS on our website. Select your motherboard model and download the BIOS file to your computer. Also, check the current BIOS revision to make sure that it is newer than your BIOS before downloading.



Note 1: The SPI BIOS chip used on this motherboard cannot be removed. Send your motherboard back to our RMA Department at Supermicro for repair.

Note 2: For BIOS Update and Recovery instructions, please refer to the Firmware Update and Recovery Instructions for Supermicro's X13 motherboard user's manuals posted at <https://www.supermicro.com/support/manuals/>.

3.4 Battery Removal and Installation

Battery Removal

To remove the onboard battery, follow the steps below:

1. Power off your system and unplug your power cable.
2. Locate the onboard battery as shown below.
3. Using a tool such as a pen or a small screwdriver, push the battery lock outwards to unlock it. Once unlocked, the battery will pop out from the holder.
4. Remove the battery.

Proper Battery Disposal

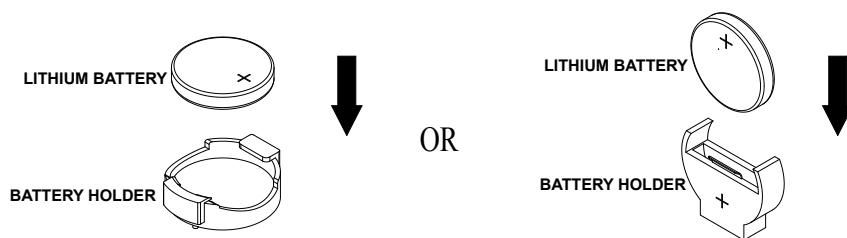
Warning: Please handle used batteries carefully. Do not damage the battery in any way; a damaged battery may release hazardous materials into the environment. Do not discard a used battery in the garbage or a public landfill. Please comply with the regulations set up by your local hazardous waste management agency to dispose of your used battery properly.

Battery Installation

To install an onboard battery, follow the steps below:

1. Power off your system and unplug your power cable.
2. Locate the onboard battery as shown below
3. Identify the battery's polarity. The positive (+) side should be facing up.
4. Insert the battery into the battery holder and push it down until you hear a click to ensure that the battery is securely locked.

Warning: When replacing a battery, be sure to only replace it with the same type.



3.5 Returning Merchandise for Service

A receipt or copy of your invoice marked with the date of purchase is required before any warranty service will be rendered. You can obtain service by calling your vendor for a Returned Merchandise Authorization (RMA) number. When returning the motherboard to the manufacturer, the RMA number should be prominently displayed on the outside of the shipping carton, and the shipping package is mailed prepaid or hand-carried. Shipping and handling charges will be applied for all orders that must be mailed when service is complete. For faster service, you can also request a RMA authorization online (<https://www.supermicro.com/RmaForm/>).

This warranty only covers normal consumer use and does not cover damages incurred in shipping or from failure due to the alternation, misuse, abuse or improper maintenance of products.

During the warranty period, contact your distributor first for any product problems.

Chapter 4

UEFI BIOS

4.1 Introduction

This chapter describes the AMIBIOS™ Setup utility for the motherboard. The BIOS is stored on a chip and can be easily upgraded using the UEFI script (flash.nsh), the BMC WebUI, or the SuperServer Automation Assistant (SAA) utility.



Note: Due to periodic changes to the BIOS, some settings may have been added or deleted and might not yet be recorded in this manual. Please refer to the Manual Download area of our website for any changes to the BIOS that may not be reflected in this manual.

Starting the Setup Utility

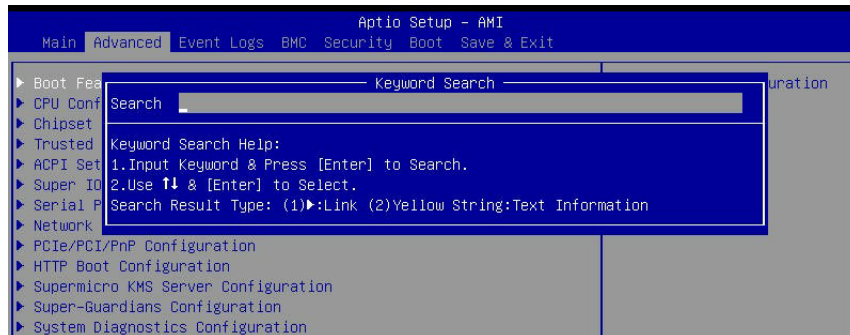
To enter the BIOS Setup utility, press the <Delete> key while the system is booting up. In most cases, the <Delete> key is used to invoke the BIOS Setup screen; however, in other cases, other hot keys, such as <F1>, <F2>, may be used for this purpose. Each main BIOS menu option is described in this manual.

The Main BIOS screen has two main frames. The left frame displays all the options that can be configured. "Grayed-out" options cannot be configured. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white, and often a text message will accompany it. Please note that BIOS has default text messages built in, and we retain the option to include, omit, or change any of these text messages. Settings printed in **Bold** are the default values. A "►" indicates a submenu. Highlighting such an item and pressing the <Enter> key will open the list of settings within that submenu.

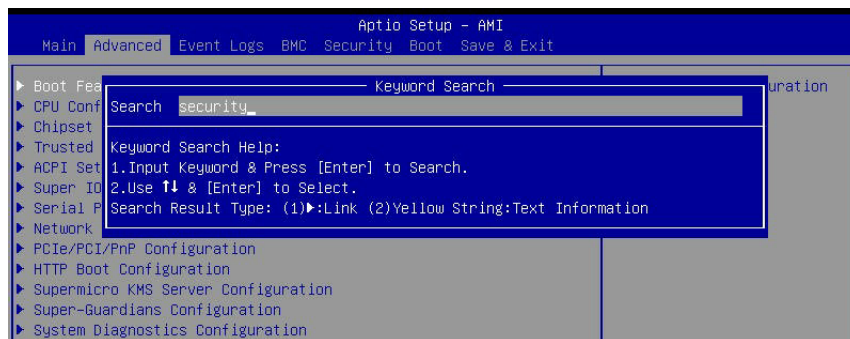
The BIOS Setup utility uses a key-based navigation system called hot keys. Most of these hot keys (<F1>, <F2>, <F3>, <F4>, <F5>, <Enter>, <ESC>, the arrow keys, etc.) can be used at any time during the setup navigation process.

Tips on using the <F5> key:

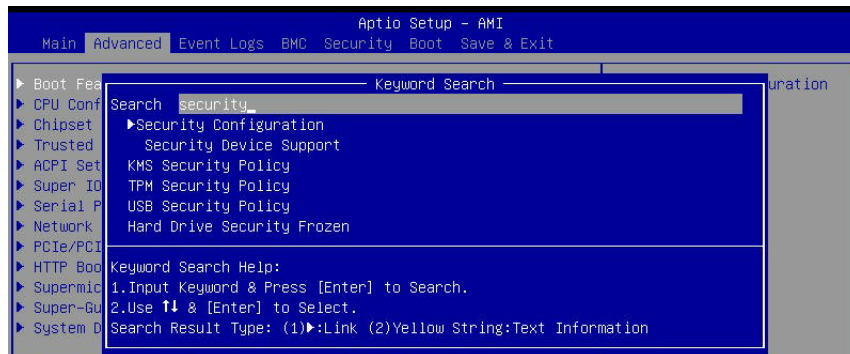
To search for a BIOS menu, submenu, or item using the <F5> key, press <F5> and the Keyword Search screen will appear as shown below.



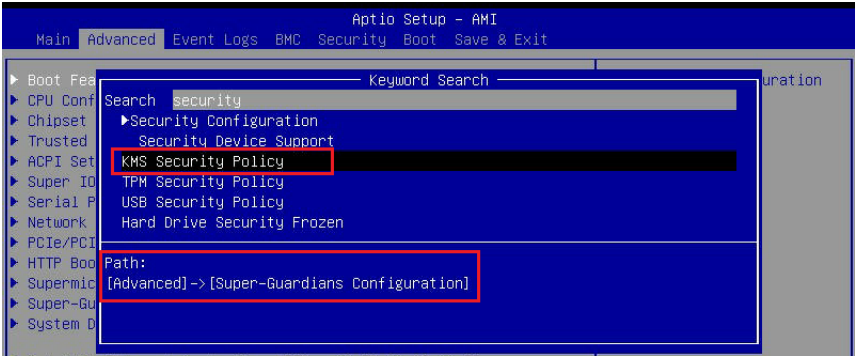
In the Search field, enter a keyword (e.g., security).



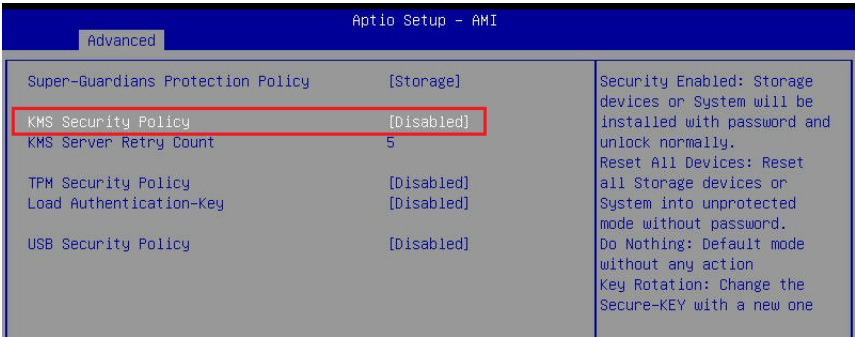
Pressing <Enter> will list the search results.



Use the arrow keys to select, for example, KMS Security Policy. The Keyword Search screen will display the path information for KMS Security Policy.

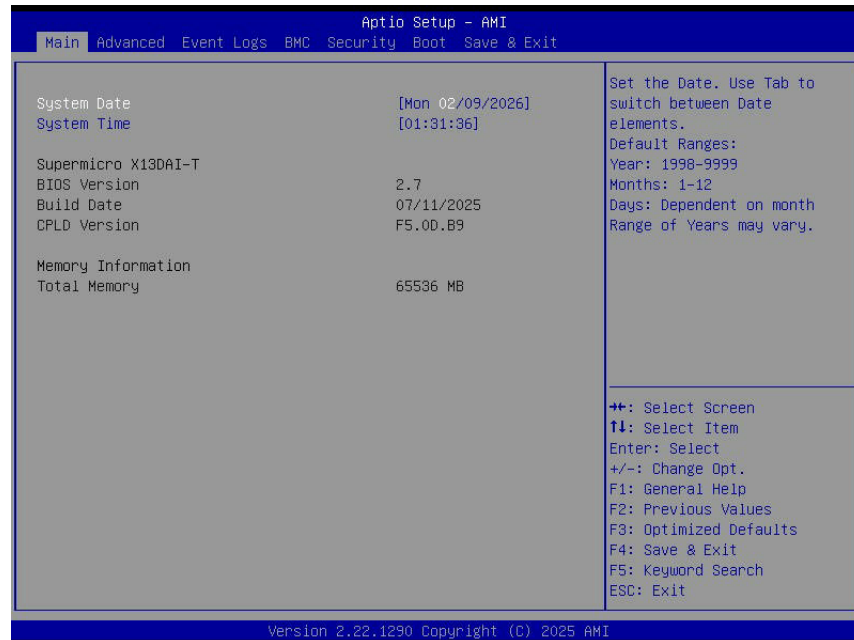


In this case, pressing <Enter> will go to the page that contains the selected BIOS item, which is KMS Security Policy.



4.2 Main Setup

When you first enter the AMI BIOS Setup utility, you will see the Main setup screen. You can always return to the Main setup screen by selecting the Main tab on the top of the screen. The Main BIOS Setup screen is shown below.



System Date / System Time

Use the two features to change the system date and time. To change system date and time settings, highlight System Date or System Time using the arrow keys and enter new values using the keyboard. Press the <Tab> key or the arrow keys to move between fields. The date must be entered in MM/DD/YYYY format. The time is entered in HH:MM:SS format.

 **Note:** The time is in the 24-hour format. For example, 5:30 P.M. appears as 17:30:00. The date's default value is the BIOS build date after the RTC (Real Time Clock) reset.

Supermicro X13DAIT

BIOS Version

This feature displays the version of the BIOS ROM used in the system.

Build Date

This feature displays the date when the version of the BIOS ROM used in the system was built.

CPLD Version

This feature displays the version of the Complex-Programmable Logical Device (CPLD) used in the system.

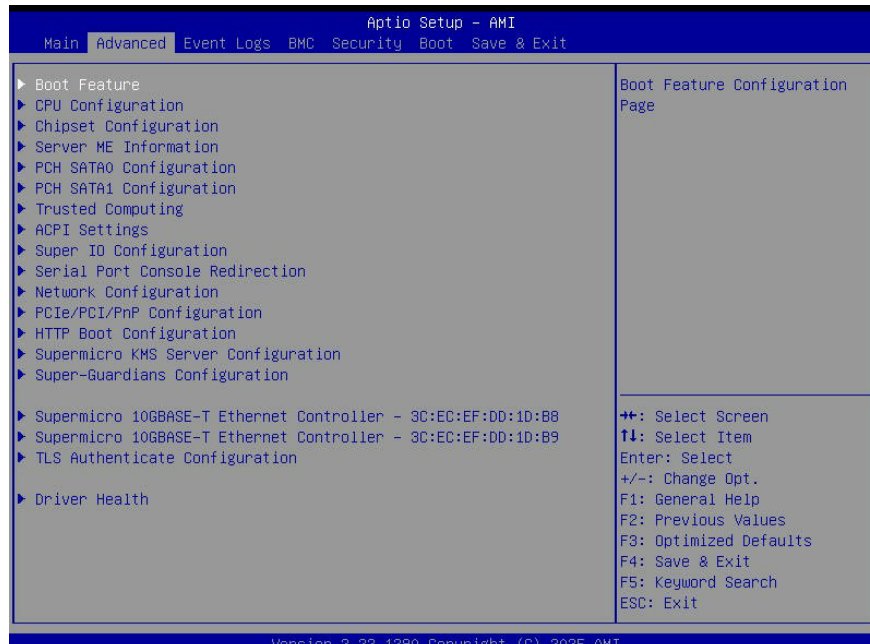
Memory Information

Total Memory

This feature displays the total size of memory available in the system.

4.3 Advanced Setup Configurations

Use the arrow keys to select the Advanced submenu and press <Enter> to access the submenu items:



Warning: Take caution when changing the Advanced settings. An incorrect value, an improper DRAM frequency, or a wrong BIOS timing setting may cause the system to malfunction. When this occurs, restore the settings to the default manufacturing settings.

► Boot Feature

Quiet Boot

Use this feature to select the screen between displaying Power On Self Test (POST) messages or the OEM logo at bootup. Select Disabled to display the POST messages. Select Enabled to display the OEM logo instead of the normal POST messages. The options are Disabled and **Enabled**.

 **Note:** BIOS POST messages are always displayed regardless of the setting for this feature.

Option ROM Messages

Use this feature to set the display mode for the Option ROM. The options are **Force BIOS** and Keep Current.

Bootup NumLock State

Use this feature to set the power on state for the <Num Lock> key. The options are **On** and Off.

Wait For "F1" If Error

Select Enabled to force the system to wait until the <F1> key is pressed if an error occurs. The options are **Disabled** and Enabled.

INT19 Trap Response

Interrupt 19 is the software interrupt that handles the boot disk function. When this feature is set to Immediate, the ROM BIOS of the host adaptors will "capture" Interrupt 19 at bootup immediately and allow the drives that are attached to these host adaptors to function as bootable disks. If this feature is set to Postponed, the ROM BIOS of the host adaptors will not capture Interrupt 19 immediately and allow the drives attached to these adaptors to function as bootable devices at bootup. The options are **Immediate** and Postponed.

Re-try Boot

When Extensible Firmware Interface (EFI) Boot is selected, the system BIOS will automatically reboot the system from an EFI boot device after an initial boot failure. Select Legacy Boot to allow the BIOS to automatically reboot the system from a Legacy boot device after an initial boot failure. The options are **Disabled**, Legacy Boot, and EFI Boot.

Power Configuration**Watch Dog Function**

Select Enabled to allow the Watchdog timer to reboot the system when it is inactive for more than five minutes. The options are **Disabled** and Enabled.

Watch Dog Action (Available when "Watch Dog Function" is set to Enabled)

Use this feature to configure the Watchdog timeout setting. The options are **Reset** and NMI.

Front USB Port(s) (Available when "Lockdown Mode" is set to Enabled with the DCMS key)

Select Enabled to allow the specific type of USB devices to be used in the front USB ports. Select Enabled (Dynamic) to allow or disallow this particular type of USB devices to be used in the front USB ports without rebooting the system. The options are **Enabled**, Disabled, and Enabled (Dynamic).

 **Note 1:** Supermicro DataCenter Management Suite per Node License Key (SFT-DC-MS-SINGLE) is Supermicro's Data Center Management Suite license that enables server node to take full advantage of Supermicro Management Software and Utilities features. Contact us for more information.

Note 2: Refer to the submenu of Security > Supermicro Security Erase Configuration to set "Lockdown Mode" ([page 171](#)).

Rear USB Port(s) (Available when "Lockdown Mode" is set to Enabled with the DCMS key)

Select Enabled to allow the specific type of USB devices to be used in the rear USB ports. Select Enabled (Dynamic) to allow or disallow this particular type of USB devices to be used in the rear USB ports without rebooting the system. The options are **Enabled**, Disabled, and Enabled (Dynamic).

Restore on AC Power Loss

Use this feature to set the power state after a power outage. Select Stay Off for the system power to remain off after a power loss. Select Power On for the system power to be turned on after a power loss. Select Last State to allow the system to resume its last power state before a power loss. The options are Stay Off, Power On, and **Last State**.

Power Button Function

This feature controls how the system shuts down when the power button is pressed. Select 4 Seconds Override to power off the system after pressing and holding the power button for four seconds or longer. Select Instant Off to instantly power off the system as soon as you press the power button. The options are **Instant Off** and 4 Seconds Override.

►CPU Configuration

Warning: Setting the wrong values for the features included in the following sections may cause the system to malfunction.

Processor Configuration

The following CPU information is displayed:

- Processor BSP Revision
- Processor Socket
- Processor ID
- Processor Frequency
- Processor Max Ratio
- Processor Min Ratio
- Microcode Revision
- L1 Cache RAM (Per Core)
- L2 Cache RAM (Per Core)

- L3 Cache RAM (Per Package)
- Processor 0 Version
- Processor 1 Version

►Advanced Power Management Configuration

Workload Profile

Use this feature to select a preconfigured workload profile, which is used to tune the resources in your system. The options are **Disabled**, HPC, I/O, and Virtualization. Changes take effect after you save settings and reboot the system.

 **Note:** Select HPC to optimize power performance of High Performance Computing (HPC) workloads for your system running in the HPC environment. Select I/O for I/O intensive workloads to optimize power performance of high volume of data transfers to and from system memory and storage devices or any program. Select Virtualization to optimize power performance of the workload for your system running in the virtualization environment.

Power Technology

Select Energy Efficient to support power-saving mode. Select Custom to customize system power settings. Select Disabled to disable power-saving settings. The options are Disable, Energy Efficient, and **Custom**.

 **Note:** This feature is available when "Workload Profile" is set to Disabled.

Power Performance Tuning

Set this feature to allow either operating system (OS) or the BIOS to control the EPB. The options are **OS Controls EPB** and BIOS Controls EPB. (EPB is the abbreviation for Intel Performance and Energy Bias Hint.)

 **Note 1:** This feature is available when "Power Technology" is set to Custom.

Note 2: This feature is available when "Workload Profile" is set to Disabled.

ENERGY_PERF_BIAS_CFG Mode (ENERGY PERFORMANCE BIAS CONFIGURATION Mode)

Use this feature to configure the proper operation setting for your machine by achieving the desired system performance level and energy saving (efficiency) level at the same time. Select Maximum Performance to maximize system performance to its highest potential; however, this may consume maximal amount of power as energy is needed to fuel processor operation. Select Performance to enhance system performance; however, this may consume more power as energy is needed to fuel the processors for operation. The options are Extreme Performance, Maximum Performance, Performance, **Balanced Performance**, Balanced Power, Power, and Max Power Efficient. Note that the options of Extreme Performance and Max Power Efficient are motherboard-specific.

 **Note 1:** This feature is available when "Power Performance Tuning" is set to BIOS Controls EPB.

Note 2: This feature is available when "Workload Profile" is set to Disabled.

Optimized Power Mode (Available when "Power Technology" is set to Custom)

Set this feature to Enable to reduce overall power consumption. The options are **Disable** and Enable. When this feature is set to Enable, the features below will be automatically set by the BIOS:

- "Power Performance Tuning" - BIOS controls EPB
- "ENERGY_PERF_BIAS_CFG Mode" - Balanced Performance
- "Enhanced Halt State (C1E)" - Enable

► CPU P State Control

Use this submenu to configure the following CPU power settings.

 **Note:** This submenu is available when "Power Technology" is set to Custom.

AVX P1

Use this feature to set the appropriate TDP level for the system. The Intel Advanced Vector Extensions (Intel AVX) P1 feature allows you to set the base P1 ratio for Streaming SIMD Extensions (SSE) and AVX workloads. Each P1 ratio has the corresponding AVX Impressed Current Cathodic Protection (ICCP) pre-grant license level, which refers to the selection between different AVX ICCP transition levels. The options are **Nominal**, Level 1, and Level 2.

 **Note:** This feature is available when "SpeedStep (P-States)" is set to Enable.

Intel SST-PP

Use this feature to choose from two additional Base-Frequency conditions maximum for CPU P State Control. The options are **Auto**, Level 0, Level 3, and Level 4. The options regarding SST-PP levels are CPU-dependent. (SST-PP is the abbreviation for Speed Select Technology-Performance Profile.)

 **Note 1:** This feature is available when "SpeedStep (P-States)" is set to Enable and "Dynamic SST-PP" is set to Disable.

Note 2: This feature is available when your CPU supports the Intel Speed Select function and the number of SST-PP levels supported by your CPU is no less than two.

Dynamic SST-PP

If this feature is set to Enable, it allows you to configure Intel SST-PP features, including Base, Configuration 3, and Configuration 4 settings under various processor working conditions. The options are **Disable** and Enable.

 **Note 1:** This feature is available when "SpeedStep (P-States)" is set to Enable and "AVX P1" is set to Nominal.

Note 2: This feature is available when your CPU supports the Intel Speed Select function and the number of SST-PP levels supported by your CPU is no less than two.

Note 3: This feature is available when "Hardware P-states" is set to Native Mode or Native Mode with No Legacy Support.

When "SpeedStep (P-States)" is set to Enable, the information about SST-PP levels supported by your CPU is displayed.

- SST-PP Level
- Capable
- Core Count
- P1 Ratio
- Package TDP (W)
- DTS_Max

Activate SST-BF

Select Enable for Intel Speed Select Technology-Base Frequency support. The options are **Disable** and Enable. (SST-BF is the abbreviation for Speed Select Technology-Base Frequency.)

 **Note 1:** This feature is available when your CPU supports the Intel Speed Select function.

Note 2: This feature is available when "Hardware P-states" is set to Native Mode or Native Mode with No Legacy Support.

Note 3: This feature is available when "AVX P1" is set to Nominal.

Configure SST-BF

When this feature is set to Enable, the system BIOS will configure SST-BF High Priority Core settings so that system software does not have to configure these settings. The options are Disable and **Enable**.

 **Note 1:** This feature is available when your CPU supports the Intel Speed Select function and the number of SST-PP levels supported by your CPU is no less than two.

Note 2: This feature is available when "Hardware P-states" is set to Native Mode or Native Mode with No Legacy Support.

Note 3: This feature is available when "Activate SST-BF" is set to Enable and "AVX P1" is set to Nominal.

SpeedStep (P-States)

Enhanced Intel SpeedStep Technology (EIST) allows the system to automatically adjust processor voltage and core frequency in an effort to reduce power consumption and heat dissipation. Refer to Intel's website for detailed information. The options are Disable and **Enable**.

 **Note:** This feature is available when "Workload Profile" is set to Disabled.

EIST PSD Function

This feature reduces the latency that occurs when one P-state changes to another, thus allowing the transitions to occur more frequently. This will allow for more demand-based P-state switching to occur based on the real-time energy needs of applications so that the power-to-performance balance can be optimized for energy efficiency. The options are **HW_ALL** and SW_ALL.

 **Note:** This feature is available when "SpeedStep (P-States)" is set to Enable.

Turbo Mode

Select Enable to allow the CPU to operate at the manufacturer-defined turbo speed by increasing CPU clock frequency. This feature is available when it is supported by the processors used in the system. The options are Disable and **Enable**.

 **Note:** This feature is available when "SpeedStep (P-States)" is set to Enable and "Workload Profile" is set to Disabled.

► Hardware PM State Control

 **Note:** This submenu is available when "Power Technology" is set to Custom.

Hardware P-States

If this feature is set to Disable, system hardware will choose a P-state setting for the system based on an OS request. If this feature is set to Native Mode, hardware will choose a P-state setting based on the OS guidance. If this feature is set to Native Mode with No Legacy Support, system hardware will choose a P-state setting independently without OS guidance. The options are **Disable**, Native Mode, Out of Band Mode, and Native Mode with No Legacy Support.

► Frequency Prioritization

 **Note 1:** This submenu is available when "Power Technology" is set to Custom.

Note 2: This submenu is available when your CPU supports the Intel SST-CP.

Note 3: This submenu is available when "Hardware P-states" is set to Native Mode or Native Mode with No Legacy Support.

SST-CP

With Intel Speed Select Technology (Intel SST-CP), surplus frequency is allocated based on the cores' weights. The weight for each core is assigned by the OS or the Virtual Machine Manager (VMM). The options are Enable and **Disable**.

► CPU C State Control

 **Note:** This submenu is available when "Power Technology" is set to Custom.

Enable Monitor MWAIT

Select Enable to support MONITOR and MWAIT, which are two instructions in Streaming SIMD Extension 3 (SSE3) to improve synchronization between multiple threads for CPU performance enhancement. The options are Disable, Enable, and **Auto**.

 **Note:** This feature is available when "Workload Profile" is set to Disabled.

CPU C1 Auto Demotion

Enable this feature to allow CPU to automatically demote to the C1 state. Reboot the system for the change to take effect. The options are Disable, Enable, and **Auto**.

 **Note:** This feature is available when "Workload Profile" is set to Disabled.

CPU C6 Report

Select Enable to allow the BIOS to report the CPU C6 State (ACPI C3) to the operating system. During the CPU C6 State, the power to all cache is turned off. The options are Disable, Enable, and **Auto**. (ACPI is the abbreviation for Advanced Configuration and Power Interface.)

 **Note:** This feature is available when "Workload Profile" is set to Disabled.

Enhanced Halt State (C1E)

Select Enable to enable Enhanced Halt State support, which will significantly reduce the CPU's power consumption by minimizing CPU's clock cycles and reduce voltage during a Halt State. The options are Disable and **Enable**.

 **Note:** This feature is available when "Workload Profile" is set to Disabled.

► Package C State Control

 **Note 1:** This submenu is available when "Power Technology" is set to Custom.

Note 2: This submenu is NOT available when "Workload Profile" is set to I/O.

Package C State

Use this feature to optimize and reduce CPU package power consumption in the idle mode. Please note that the changes you've made in this setting will affect all CPU cores or the circuits of the entire system. The options are C0/C1 state, C2 state, C6 (non Retention) state, C6 (Retention) state, No Limit, and **Auto**.

►CPU1/CPU2 Core Disable Bitmap



Note: The submenu of CPU2 Core Disable Bitmap is available when your motherboard supports dual processors.

Available Bitmap:

This feature displays the available bitmap.

CPU Core Count:

This feature displays the number of CPU cores that can be enabled.

CPU1/CPU2 Cores Enable

Use this feature to set the number of CPU cores to be enabled. Enter 0 to enable all CPU cores. Note that it is required to enable at least one core per CPU. The default setting is **0**.

Hyper-Threading [ALL]

Select Enable to use Intel Hyper-Threading Technology to enhance CPU performance. The options are Disable and **Enable**.

Hardware Prefetcher

If this feature is set to Enable, the hardware prefetcher will prefetch data from the main system memory to Level 2 cache to help expedite data transaction to enhance memory performance. The options are **Enable** and Disable.



Note: This feature is available when "Workload Profile" is set to Disabled.

Adjacent Cache Prefetch

Select Enable for the CPU to prefetch both cache lines for 128 bytes as comprised. Select Disable for the CPU to prefetch both cache lines for 64 bytes. The options are **Enable** and Disable.



Note: This feature is available when "Workload Profile" is set to Disabled.

DCU Streamer Prefetcher

If this feature is set to Enable, the Data Cache Unit (DCU) streamer prefetcher will prefetch data streams from the cache memory to the DCU to speed up data accessing and processing to enhance CPU performance. The options are **Enable** and Disable.



Note: This feature is available when "Workload Profile" is set to Disabled.

DCU IP Prefetcher

This feature allows the system to use the sequential load history, which is based on the instruction pointer of previous loads, to determine whether the system will prefetch additional lines. The options are **Enable** and Disable.



Note: This feature is available when "Workload Profile" is set to Disabled.

LLC Prefetch

If this feature is set to Enable, LLC (hardware cache) prefetching on all threads will be supported. The options are **Disable** and Enable.



Note: This feature is available when "Workload Profile" is set to Disabled.

Extended APIC

Based on the Intel Hyper-Threading technology, each logical processor (thread) is assigned 256 APIC IDs (APIDs) in 8-bit bandwidth. When this feature is set to Enable, the APIC ID will be expanded from 8 bits to 16 bits to provide 512 APIDs to each thread to enhance CPU performance. The options are Disable and **Enable**. (APIC is the abbreviation for Extended Advanced Programmable Interrupt Controller.)



Note: This feature is NOT available when "Workload Profile" is set to Virtualization.

Intel Virtualization Technology

Select Enable to enable the Intel Vanderpool Technology for Virtualization platform support, which allows multiple operating systems to run simultaneously on the same computer to maximize system resources for performance enhancement. The options are Disable and **Enable**.



Note 1: This feature is NOT available when "Workload Profile" is set to Virtualization.

Note 2: Reboot the system for changes to take effect.

Enable SMX

Select Enable to support Safer Mode Extensions (SMX), which provides a programming interface for system software to establish a controlled environment to support the trusted platform configured by the end user and to verify a virtual machine monitor before it is allowed to run. The options are **Disable** and Enable.

PPIN Control

Select Unlock/Enable to use the Protected Processor Inventory Number (PPIN) in the system. The PPIN is a unique number set for tracking a given Intel Xeon server processor. The options are Lock/Disable and **Unlock/Enable**.

AES-NI

Select Enable to use the Intel Advanced Encryption Standard (AES) New Instructions (NI) to ensure data security. The options are Disable and **Enable**.

Limit CPU PA to 46 Bits

Select Enable to limit CPU physical address to 46 bits to support the older Hyper-V CPU platform. The options are Disable and **Enable**.

 **Note:** For GPU systems, it is recommended to set this feature to Disable to avoid MMIOH oversize.

Minimize Cores

Use this feature to enable the Minimize Cores setting. The options are **Disable** and Enable.

 **Note:** This feature is for 8-way motherboards only.

TME, TME-MT, TDX

Memory Encryption (TME) (Available when your CPU supports the Intel TME)

Select Enabled for Intel Total Memory Encryption (TME) support to enhance memory data security. The options are **Disabled** and Enabled.

Total Memory Encryption (TME) Bypass

Use this feature to disable/enable the TME function for physical memory protection. The options are **Auto**, Disabled, and Enabled. This feature is CPU-dependent.

 **Note:** This feature is available when "Memory Encryption (TME)" is set to Enabled.

Total Memory Encryption Multi-Tenant (TME-MT)

Use this feature to support tenant-provided (SW-provided) keys. The options are **Disabled** and Enabled. This feature is CPU-dependent.

 **Note:** This feature is available when "Memory Encryption (TME)" is set to Enabled and "Limit CPU PA to 46 Bits" is set to Disable.

Memory Integrity

Use this feature to enable TME-MT memory integrity protection for memory transactions. The options are **Disabled** and Enabled. This feature is CPU-dependent.

 **Note:** This feature is available when "Memory Encryption (TME)" is set to Enabled and "Limit CPU PA to 46 Bits" is set to Disable.

When "Memory Encryption (TME)" is set to Enabled, the following information is displayed.

- KEY Stock Amount
- TME-MT Key ID Bits

Trust Domain Extension (TDX) (Available when your CPU supports the Intel TDX)

Use this feature to enable Intel Trust Domain Extension (TDX) technology support to enhance control of data security. The options are **Disabled** and Enabled.

Note 1: This feature is available when the 5th Gen Intel Xeon Scalable series processor is used.

Note 2: This feature is available when "Total Memory Encryption Multi-Tenant (TME-MT)" is set to Enabled, "Mirror Mode" is set to Disabled, and "Extended APIC" is set to Enable.

Note 3: To support TDX features, DIMM population must be symmetric across Integrated Memory Controllers (IMCs) and eight DIMMs per socket at least. For each memory controller, populating first slots (Px-DIMMX1 or DIMMX1 depending on the motherboard design) in all channels is required. Refer to memory population below for your motherboard.

IMC#	IMC4				IMC3				CPU	IMC1				IMC2			
Channel	P1/P2-DIMMH		P1/P2-DIMMG		P1/P2-DIMMF		P1/P2-DIMME			P1/P2-DIMMA		P1/P2-DIMMB		P1/P2-DIMMC		P1/P2-DIMMD	
	Slot1	Slot2	Slot1	Slot2	Slot1	Slot2	Slot1	Slot2		Slot2	Slot1	Slot2	Slot1	Slot2	Slot1	Slot2	Slot1
8	DDR5		DDR5		DDR5		DDR5				DDR5		DDR5		DDR5		DDR5
16	DDR5	DDR5	DDR5	DDR5	DDR5	DDR5	DDR5	DDR5			DDR5	DDR5	DDR5	DDR5	DDR5	DDR5	DDR5

TDX Secure Arbitration Mode Loader (SEAM Loader)

The SEAM Loader (SEAMLDR) is used to load and update Intel TDX modules into the SEAM memory range by verifying the digital signature. The options are **Disabled** and Enabled.

 **Note 1:** This feature is available when the 5th Gen Intel Xeon Scalable series processor is used.

Note 2: This feature is available when "Total Memory Encryption Multi-Tenant (TME-MT)" is set to Enabled, "Mirror Mode" is set to Disabled, and "Extended APIC" is set to Enable.

Disable Excluding Mem Below 1MB In CMR

Use this feature to enable/disable TDX Excluding CMR below 1MB. The options are Disabled, Enabled, and **Auto**.

 **Note:** This feature is available when both "Memory Encryption (TME)" and "Trust Domain Extension (TDX)" are set to Enabled.

TME-MT/TDX Key Split

Use this feature to set the number of bits for TDX. The other bits will be used by TME-MT. The default setting is **1**.

 **Note:** This feature is available when both "Memory Encryption (TME)" and "Trust Domain Extension (TDX)" are set to Enabled.

TME-MT Keys:

This feature displays the number of keys designated for TME-MT.

 **Note:** This feature is available when both "Memory Encryption (TME)" and "Trust Domain Extension (TDX)" are set to Enabled.

TDX Keys:

This feature displays the number of keys designated for TDX.

 **Note:** This feature is available when both "Memory Encryption (TME)" and "Trust Domain Extension (TDX)" are set to Enabled.

Software Guard Extension (SGX)

*The following SGX features are available when "Memory Encryption (TME)" is set to Enabled and when your processor supports the Intel SGX.

 **Note:** To support SGX features, DIMM population must be symmetric across integrated Memory Controllers (IMCs) and eight DIMMs per socket at least. For each memory controller, populating first slots (Px-DIMMX1 or DIMMX1 depending on the motherboard design) in all channels is required. Refer to memory population below for your motherboard.

IMC#	IMC4				IMC3				CPU	IMC1				IMC2			
Channel	P1/P2-DIMMH		P1/P2-DIMMG		P1/P2-DIMMF		P1/P2-DIMME			P1/P2-DIMMA		P1/P2-DIMMB		P1/P2-DIMMC		P1/P2-DIMMD	
	Slot1	Slot2	Slot1	Slot2	Slot1	Slot2	Slot1	Slot2		Slot2	Slot1	Slot2	Slot1	Slot2	Slot1	Slot2	Slot1
8	DDR5		DDR5		DDR5		DDR5				DDR5		DDR5		DDR5		DDR5
16	DDR5	DDR5	DDR5	DDR5	DDR5	DDR5	DDR5	DDR5			DDR5	DDR5	DDR5	DDR5	DDR5	DDR5	DDR5

SGX Factory Reset

Use this feature to perform an SGX factory reset to delete all registration data and force an Initial Platform Establishment flow. Reboot the system for the changes to take effect. The options are **Disabled** and Enabled.

 **Note:** This feature is available when "Memory Encryption (TME)" is set to Enabled and when your processor supports the Intel SGX.

SW Guard Extensions (SGX)

Use this feature to enable Intel Software Guard Extensions (SGX) support. Intel SGX is a set of extensions that increases the security of application code and data by using enclaves in memory to protect sensitive information. The options are **Disabled** and Enabled.

 **Note:** This feature is available when "Memory Encryption (TME)" is set to Enabled and when your processor supports the Intel SGX.

SGX Package Info In-Band Access

Setting this feature to Enabled is required before the BIOS provides software with the key blobs, which are generated for each CPU package. The options are **Disabled** and Enabled.

 **Note:** This feature is available when "Memory Encryption (TME)" is set to Enabled and when your processor supports the Intel SGX.

PRM Size for SGX (Available when "SW Guard Extensions (SGX)" is set to Enabled)

Use this feature to set the Processor Reserved Memory Range Register (PRMRR) size. The options are **Auto**, 128M, 256M, 512M, 1G, 2G, 4G, 8G, 16G, 32G, 64G, 128G, 256G, and 512G. Note that the available options are based on your motherboard features, memory size, and memory map.

SGX QoS

Use this feature to enable the Intel SGX Quality of Service (QoS) support. QoS can enhance network performance by prioritizing network traffic. The options are Disabled and **Enabled**. This feature is CPU-dependent.

 **Note:** This feature is available when both "Memory Encryption (TME)" and "SW Guard Extensions (SGX)" are set to Enabled.

Select Owner EPOCH Input Type

Owner EPOCH is used as a parameter to allow you to add personal entropy into the key derivation process. A correct Owner EPOCH is required to have access to personal data previously sealed by other platform users. There are two Owner EPOCH modes. One is New Random Owner EPOCH, and the other is manually entered by the user. Each EPOCH is 64-bit. The options are Change to New Random Owner EPOCHs and **Manual User Defined Owner EPOCHs**. This feature is CPU-dependent.

 **Note 1:** This feature is available when both "Memory Encryption (TME)" and "SW Guard Extensions (SGX)" are set to Enabled.

Note 2: Changing the Owner EPOCH value will lose the data in enclaves.

Software Guard Extensions Epoch 0

Use this feature to enter the EPOCH value. The default is **0**.

 **Note 1:** This feature is available when both "Memory Encryption (TME)" and "SW Guard Extensions (SGX)" are set to Enabled.

Note 2: This feature is available when "Select Owner EPOCH input type" is set to Manual User Defined Owner EPOCHs.

Software Guard Extensions Epoch 1

Use this feature to enter the EPOCH value. The default is **0**.

 **Note 1:** This feature is available when both "Memory Encryption (TME)" and "SW Guard Extensions (SGX)" are set to Enabled.

Note 2: This feature is available when "Select Owner EPOCH input type" is set to Manual User Defined Owner EPOCHs.

SGXLEPUBKEYHASHx Write Enable

Use this feature to enable writes to SGXLEPUBKEYHASH[3..0] from OS/SW. The options are Disabled and **Enabled**. Only those CPUs that support the Intel SGX Flexible Launch Control (FLC) feature have SGXLEPUBKEYHASH, which contains the hash of the public key for the SGX Launch Enclave (LE) to be signed with.

 **Note:** This feature is available when both "Memory Encryption (TME)" and "SW Guard Extensions (SGX)" are set to Enabled.

SGXLEPUBKEYHASH0 (Available when both "SW Guard Extensions (SGX)" and "SGXLEPUBKEYHASHx Write Enable" are set to Enabled)

Use this feature to enter the bytes 0–7 of SGX Launch Enclave Public Key Hash.

SGXLEPUBKEYHASH1 (Available when both "SW Guard Extensions (SGX)" and "SGXLEPUBKEYHASHx Write Enable" are set to Enabled)

Use this feature to enter the bytes 8–15 of SGX Launch Enclave Public Key Hash.

SGXLEPUBKEYHASH2 (Available when both "SW Guard Extensions (SGX)" and "SGXLEPUBKEYHASHx Write Enable" are set to Enabled)

Use this feature to enter the bytes 16–23 of SGX Launch Enclave Public Key Hash.

SGXLEPUBKEYHASH3 (Available when both "SW Guard Extensions (SGX)" and "SGXLEPUBKEYHASHx Write Enable" are set to Enabled)

Use this feature to enter the bytes 24–31 of SGX Launch Enclave Public Key Hash.

SGX Auto MP Registration

Use this feature to enable/disable SGX Auto Multi-Package Registration Agent (MPA) running automatically at boot time. The options are **Disabled** and Enabled. This feature is CPU-dependent.

 **Note:** This feature is available when both "Memory Encryption (TME)" and "SW Guard Extensions (SGX)" are set to Enabled.

► **In Field Scan (IFS)**

Scan at Field (SAF, S@F)

Enable SAF

Select Enabled to enable the Intel SAF feature, which tests the CPU core logic for faults by using scan test images. The options are **Disabled** and Enabled.

 **Note:** This feature is available when "Memory Encryption (TME)" is set to Enabled.

► **Chipset Configuration**

Warning: Setting the wrong values in the following features may cause the system to malfunction.

► **North Bridge**

Use this submenu to configure the following North Bridge settings.

► Uncore Configuration

The following information is displayed.

- Number of CPU
- Current UPI Link Speed
- Current UPI Link Frequency
- Global MMIO Low Base / Limit
- Global MMIO High Base / Limit
- PCIe Configuration Base / Size

Degrade Precedence

Use this feature to select the degrading precedence option for Ultra Path Interconnect (UPI) connections. Select Topology Precedence to degrade UPI features if system options are in conflict. Select Feature Precedence to degrade UPI topology if system options are in conflict. The options are **Topology Precedence** and Feature Precedence.

Link L0p Enable

Select Enable for the system BIOS to enable Link L0p support, which allows the CPU to reduce the UPI links from full width to half width in the event when the CPU's workload is low in an attempt to save power. This feature is available for the system that uses Intel processors with UPI technology support. The options are Disable, Enable, **Auto**, and Full L0p Enable.

 **Note 1:** You can change the performance settings for non-standard applications by using this parameter. It is recommended that the default settings be used for standard applications.

Note 2: The option of Full L0p Enable is available when the 5th Gen Intel Xeon Scalable series processor is used.

Link L1 Enable

Select Enable for the BIOS to activate Link L1 support which will power down the UPI links to save power when the system is idle. This feature is available for the system that uses Intel processors with UPI technology support. The options are Disable, Enable, and **Auto**.

 **Note:** Link L1 is an excellent feature for an idle system. L1 is used during Package C-States when its latency is hidden by other components during a wakeup.

Directory Mode Enable

Use this feature to enable/disable the directory mode for the processor. The options are Disable, Enable, and **Auto**. The option of Auto is based on SI Compatibility.

KTI Prefetch

Keizer Technology Interconnect (KTI) is also known as the Intel Ultra Path Interconnect (UPI) technology. Select Enable for the KTI prefetcher to preload the L1 cache with data deemed relevant, which allows the memory read to start earlier on a DDR bus in an effort to reduce latency. Select Auto for the KTI prefetcher to automatically preload the L1 cache with relevant data whenever is needed. The options are Disable, Enable, and **Auto**.

IO Directory Cache (IODC)

This feature allows the IODC to generate snoops instead of generating memory lockup for remote IIO (InvltoM) and/or WCiLF (Cores). Select Auto for the IODC to generate snoops (instead of memory lockups) for WCiLF (Cores). The options are Disable, **Auto**, Enable for Remote InvltoM Hybrid Push, InvltoM AllocFlow, Enable for Remote InvltoM Hybrid AllocNonAlloc, and Enable for Remote InvltoM and Remote WCiLF.

SNC

Sub NUMA Clustering (SNC) is a feature that breaks up the Last Level Cache (LLC) into clusters based on address range. Each cluster is connected to a subset of the memory controller. Enable this feature to improve average latency and reduce memory access congestion for higher performance. The options are **Auto**, Disable, Enable SNC2 (2-clusters), and Enable SNC4 (4-clusters).

 **Note 1:** The option of Enable SNC4 (4-clusters) depends on your system configuration and the processor.

Note 2: This feature is NOT available when "Workload Profile" is set to I/O or Virtualization.

Stale AtoS

The in-memory directory has three states: I, A, and S states. The I (-invalid) state indicates that the data is clean and does not exist in the cache of any other sockets. The A (-snoop All) state indicates that the data may exist in another socket in an exclusive or modified state. The S state (-Shared) indicates that the data is clean and may be shared in the caches across one or more sockets. When the system is performing "read" on the memory and if the directory line is in A state, we must snoop all other sockets because another socket may have the line in a modified state. If this is the case, a "snoop" will return the modified data. However, it may be the case that a line "reads" in an A state, and all the snoops come back with a "miss." This can happen if another socket reads the line earlier and then has silently dropped it from its cache without modifying it. If "Stale AtoS" is enabled, a line will transition to the S state when the line in the A state returns only snoop misses. That way, subsequent reads to the line will encounter it in the S state and will not have to snoop, saving the latency and snoop bandwidth. Stale "AtoS" may be beneficial in a workload where there are many cross-socket reads. The options are Disable, Enable, and **Auto**.

LLC Dead Line Alloc

Select Enable to opportunistically fill the dead lines in the LLC. The options are Disable, **Enable**, and Auto.

UPI3 (Available when your motherboard supports dual processors)

Use this feature to enable/disable the 4th Intel Ultra Path Interconnect (UPI) link. The default setting is Enable if your motherboard supports UPI3. The options are Disable and **Enable**. This feature depends on your system configuration.

► Memory Configuration

Use this submenu to configure the Integrated Memory Controller (IMC) settings.

Enforce DDR Memory Frequency POR

Select POR to enforce Plan of Record (POR) restrictions for DDR memory frequency and voltage programming. The options are **POR** and Disable.

Memory Frequency

Use this feature to set the maximum memory frequency for onboard memory modules. The options are **Auto**, 3200, 3600, 4000, 4400, 4800, 5200, 5600, 6000, and 6400. Note that the available options are CPU-dependent.

Data Scrambling for DDR5

Select Enable to enable data scrambling for DDR5 modules to enhance memory data security. The options are Disable and **Enable**.

Enable ADR

Select Enable for Asynchronous DRAM Refresh (ADR) support to enhance memory performance. The options are Disable and **Enable**.

Legacy ADR Mode (Available when "Enable ADR" is set to Enable)

Use this feature to support the Legacy ADR mode to enhance memory performance. In the Legacy ADR mode, the ADR safe domain (flush domain) includes the WPQ in memory controllers. The options are Disable, Enable, and **Auto**.

DDR 2x Refresh Enable

Select Enable for memory 2X refresh support to enhance memory performance. The options are **Auto**, Disable, and Enable.

 **Note:** This feature is NOT available when "Workload Profile" is set to HPC or I/O.

CXL Type 3 Legacy

Select Enable to use the CXL Type 3 memory device, which can be supported by the CXL Type 2 flows, for memory bandwidth and capacity expansion. The options are **Disable** and Enable.

 **Note:** This feature depends on the CXL Type 2 flow and the memory device used.

Volatile Memory Mode

Use this feature to select the volatile memory mode. The option is **1LM**. The available options are CPU-dependent.

 **Note:** This feature is available when your motherboard has the high bandwidth memory (HBM) CPU installed and when "NUMA" (Advanced > ACPI Settings > NUMA) is set to Enabled.

►Memory Topology

This submenu displays the information of onboard memory modules as detected by the BIOS, for example:

P1-DIMMA1: 4800MT/s Hynix DRx8 32GB RDIMM

►Page Policy

Page Policy

Use this feature to set your memory page policy. The options are **Closed** and **Adaptive**. The Closed Page Policy is good for random memory access patterns. The Adaptive Page Policy can reduce the average memory latency.

►Memory RAS Configuration

Use this submenu to configure the memory mirroring, Reliability Availability Serviceability (RAS) settings.

Mirror Mode (Available when "ADDDC Sparing" is set to Disabled and "UEFI ARM Mirror" is set to Disabled)

Use this feature to configure the Extended APIC settings for all 1LM/2LM memory modules in the system to create a duplicate copy of data stored in the memory to increase memory security. It will reduce the memory capacity into half. The options are **Disabled**, **Full Mirror Mode**, and **Partial Mirror Mode**.

UEFI ARM Mirror (Available when "ADDDC Sparing" is set to Disabled and "Mirror Mode" is set to Disabled)

If this feature is set to **Enabled**, mirror mode configuration settings for UEFI-based Address Range memory will be enabled upon system boot. This will create a duplicate copy of data stored in the memory to increase memory security, but it will reduce the memory capacity into half. The options are **Disabled** and **Enabled**.

ARM Mirror Percentage (Available when "UEFI ARM Mirror" is set to Enabled)

Use this feature to set the percentage of memory space to be used for UEFI ARM mirroring for memory security enhancement. The default setting is **0**.

Correctable Error Threshold (Available when "Memory PFA Support" is set to Disabled)

Use this feature to specify the threshold value for correctable memory-error logging, which sets a limit on the maximum number of events that can be logged in the memory error log at a given time. The default setting is **512**.

Leaky Bucket Low Bit

Use this feature to set the Low Bit value for the Leaky Bucket algorithm, which is used to check the data transmissions between CPU sockets and the memory controller. The default setting is **11**.

Leaky Bucket High Bit

Use this feature to set the High Bit value for the Leaky Bucket algorithm, which is used to check the data transmissions between CPU sockets and the memory controller. The default setting is **14**.

ADDDC Sparing (Available when populating 1Rx4, 2Rx4, and 4Rx4 DIMMs and when "Memory PFA Support" is set to Disabled)

Select Enabled for Adaptive Double Device Data Correction (ADDDC) support, which will not only provide memory error checking and correction but will also prevent the system from issuing a performance penalty before a device fails. Note that virtual lock-step mode will only start to work for ADDDC after a faulty DRAM module is spared. The options are Disabled and **Enabled**.

Patrol Scrub

Patrol Scrubbing is a process that allows the CPU to correct correctable memory errors detected in a memory module and send the corrections to the requestor (the original source). When this feature is set to Enable, the IO hub will read and write back one cache line every 16K cycles if there is no delay caused by internal processing. By using this method, roughly 64 GB of memory behind the IO hub will be scrubbed every day. The options are Disabled and **Enable at End of POST**.

DDR PPR Type (Available when "Memory PFA Support" is set to Disabled)

Post Package Repair (PPR) is a new feature available for the DDR4/DDR5 technology. PPR provides additional spare capacity within a DDR4/DDR5 DRAM module that is used to replace faulty cell areas detected during system boot. PPR offers two types of memory repairs. Soft Post Package Repair (sPPR) provides a quick, temporary fix on a raw element in a bank group of a DDR4/DDR5 DRAM device, while hard Post Package Repair (hPPR) will take a longer time to provide a permanent repair on a raw element. The options are PPR Disabled, **Hard PPR**, and Soft PPR.

Enhanced PPR

Use this feature to set advanced memory test. Select Enabled to always execute for every boot. The options are **Disable**, Enable, and Persistent.

Memory PFA Support (Available when the DCMS key is activated)

Select Enabled to enable memory Predictive Failure Analysis (PFA) support. PFA can be used to avoid uncorrectable faults in the same memory page. The options are **Disabled** and Enabled.

► I/O Configuration

► CPU1 Configuration / CPU2 Configuration

IOU0 (I/O PCIe Port 1)

This feature is CPU-dependent. Use this feature to configure the PCIe Bifurcation setting for a PCIe port specified by the user. The options are **Auto**, x4x4x4x4, x4x4x8, x8x4x4, x8x8, and x16.

IOU1 (I/O PCIe Port 2)

This feature is CPU-dependent. Use this feature to configure the PCIe Bifurcation setting for a PCIe port specified by the user. The options are **Auto**, x4x4x4x4, x4x4x8, x8x4x4, x8x8, and x16.

IOU2 (I/O PCIe Port 3)

This feature is CPU-dependent. Use this feature to configure the PCIe Bifurcation setting for a PCIe port specified by the user. The options are **Auto**, x4x4x4x4, x4x4x8, x8x4x4, x8x8, and x16.

IOU3 (I/O PCIe Port 4)

This feature is CPU-dependent. Use this feature to configure the PCIe Bifurcation setting for a PCIe port specified by the user. The options are **Auto**, x4x4x4x4, x4x4x8, x8x4x4, x8x8, and x16.

IOU4 (I/O PCIe Port 5)

This feature is CPU-dependent. Use this feature to configure the PCIe Bifurcation setting for a PCIe port specified by the user. The options are **Auto**, x4x4x4x4, x4x4x8, x8x4x4, x8x8, and x16.

► P1 SLOT5 PCIe 5.0 X16 / P1 SLOT3 PCIe 5.0 X16 / P1 SLOT1 PCIe 5.0 X16 / M.2-C1 / P1_NVME0 / P1_NVME1 / M.2-C2 / P2 SLOT4 PCIe 5.0 X16 / P2 SLOT2 PCIe 5.0 X16 / P2_NVME0 / P2_NVME1 / P2 SLOT6 PCIe 5.0 X8

Note: The number of slots and the slot naming vary based on your motherboard features.

PCIe Port

Use this feature to set the PCIe Root Port. The options are **Auto**, No, and Yes. If this feature is set to Auto, the PCIe device will be automatically detected by the BIOS. Select No/Yes to disable/enable the PCIe Root Port manually. Note that this feature depends on your motherboard specifications.

Link Speed

Use this feature to select the link speed for the PCIe port specified by the user. The options are **Auto**, Gen 1 (2.5 GT/s), Gen 2 (5 GT/s), Gen 3 (8 GT/s), Gen 4 (16 GT/s), and Gen 5 (32 GT/s).

The following information is displayed:

- PCIe Port Link Status
- PCIe Port Link Max
- PCIe Port Link Speed

Data Link Feature Exchange

Use this feature to enable or disable the PCIe port to enter PCIe 4.0 DL_Feature negotiation state. The options are Disable and **Enable**.

PCIe Port Max Payload Size

Use this feature to set the maximum payload size supported in PCIe device capabilities register for the device installed in the PCIe port. The options are 128B, 256B, 512B, and **Auto**.

Equalization Bypass To Highest Rate

Set this feature to Enable to reduce the link training time for PCIe 5.0 device by skipping equalization of intermediate data rates. The options are Disable and **Enable**.

►IOAT Configuration

Relaxed Ordering

Select Yes to allow certain transactions to be processed and completed before other transactions that have already been enqueued. The options are **No** and Yes.

►Intel VT for Directed I/O (VT-d)



Note: This submenu is NOT available when "Workload Profile" is set to Virtualization.

Intel VT for Directed I/O (VT-d)

Select Enable to use Intel Virtualization Technology for Direct I/O VT-d support by reporting the I/O device assignments to the Virtual Machine Monitor (VMM) through the DMAR ACPI tables. This feature offers fully-protected I/O resource sharing across Intel platforms, providing greater reliability, security and availability in networking and data-sharing. The options are **Enable** and Disable. (DMA is the abbreviation for Direct Memory Access. DMAR is the abbreviation for DMA Remapping Reporting.)

Opt-Out Illegal MSI Mitigation (Available when "Intel VT for Directed I/O (VT-d)" is set to Enable)

If this feature is set to Enable, "Illegal OxzFEE Platform Mitigation" will be opted out. The options are Enable and **Disable**.

Pre-boot DMA Protection (Available when "Intel VT for Directed I/O (VT-d)" is set to Enable)

Select Enable to establish DMA protection during pre-boot processing by setting DMA_CTRL_PLATFORM_OPT_IN_FLAG in the DMAR ACPI table. The options are Enable and **Disable**.

Interrupt Remapping (Available when "Intel VT for Directed I/O (VT-d)" is set to Enable)

Select Enable to support I/O DMA transfer remapping and device-generated interrupts. The options are **Auto**, Enable, and Disable.

PCIe ACSCTL (Available when "Intel VT for Directed I/O (VT-d)" is set to Enable)

Select Enable to program ACS control to Chipset PCIe Root Port bridges. Select Disable to program ACS control to all PCIe Root Port bridges. The options are Enable and **Disable**.

►Intel VMD Technology

This section describes the configuration settings for the Intel VMD technology.



Note 1: After you've enabled VMD in the BIOS on a PCIe slot, this PCIe slot will be dedicated for VMD use only, and it will no longer support any PCIe device. To re-activate this slot for PCIe use, please disable VMD in the BIOS.

Note 2: The number of PCIe slots and the slot naming can differ depending on the PCIe devices connected to your motherboard.

NVMe Mode Switch

When this feature is set to Auto, VMD support will be automatically enabled when a VROC key is detected by the BIOS. The options are Manual, VMD, and **Auto**.

►Intel VMD for Volume Management Device on CPU1 (Available when "NVMe Mode Switch" is set to Manual)

VMD Config for PCH ports

Enable/Disable VMD

Select Enable to enable the Intel Volume Management Device (VMD) technology support for the root port specified. The options are **Disable** and Enable.

M.2-P1 VMD / M.2-P2 VMD (Available when the device is detected by the system and "Enable/Disable VMD" above is set to Enable)

Select Enable to enable the Intel VMD technology support for the root port specified. The options are **Disable** and Enable.

VMD Config for IOU 0 / VMD Config for IOU 1 / VMD Config for IOU 2 / VMD Config for IOU 3

Enable/Disable VMD

Select Enable to enable the Intel VMD technology support for the root port specified. The options are **Disable** and Enable.

CPU1 SLOT9 PCIe 5.0 X16 VMD / CPU1 SLOT4 PCIe 5.0 X16 VMD / Onboard NVMe1 VMD / CPU1 SLOT2 PCIe 5.0 X16 VMD (Available when the device is detected by the system and "Enable/Disable VMD" above is set to Enable)

Select Enable to enable the Intel VMD technology support for the root port specified. The options are **Disable** and Enable.

Hot Plug Capable (Available when the device is detected by the system and "Enable/Disable VMD" above is set to Enable)

Select Enable to enable Hot Plug support for the root ports specified, which allows you to change the devices on those root ports without shutting down the system. The options are **Disable** and Enable.

VMD Config for IOU 4

Enable/Disable VMD

Select Enable to enable the Intel VMD technology support for the root port specified. The options are **Disable** and Enable.

CPU1 NVMe1 VMD / CPU1 NVMe2 VMD / CPU1 NVMe3 VMD / CPU1 NVMe4 VMD (Available when the device is detected by the system and "Enable/Disable VMD" above is set to Enable)

Select Enable to enable the Intel VMD technology support for the root port specified. The options are **Disable** and Enable.

Hot Plug Capable (Available when the device is detected by the system and "Enable/Disable VMD" above is set to Enable)

Select Enable to enable Hot Plug support for the root ports specified, which allows you to change the devices on those root ports without shutting down the system. The options are **Disable** and Enable.

►Intel VMD for Volume Management Device on CPU2 (Available when "NVMe Mode Switch" is set to Manual)

VMD Config for IOU 0 / VMD Config for IOU 1 / VMD Config for IOU 2 / VMD Config for IOU 3

Enable/Disable VMD

Select Enable to enable the Intel VMD technology support for the root port specified. The options are **Disable** and Enable.

CPU2 SLOT11 PCIe 5.0 X8 VMD / M.2-HC1 VMD / M.2-HC2 VMD / CPU2 SLOT8 PCIe 5.0 X16 VMD / Onboard NVMe1 VMD / CPU2 SLOT6 PCIe 5.0 X16 VMD (Available when the device is detected by the system and "Enable/Disable VMD" above is set to Enable)

Select Enable to enable the Intel VMD technology support for the root port specified. The options are **Disable** and Enable.

Hot Plug Capable (Available when the device is detected by the system and "Enable/Disable VMD" above is set to Enable)

Select Enable to enable Hot Plug support for the root ports specified, which allows you to change the devices on those root ports without shutting down the system. The options are **Disable** and Enable.

VMD Config for IOU 4

Enable/Disable VMD

Select Enable to enable the Intel VMD technology support for the root port specified. The options are **Disable** and Enable.

CPU2 SLOT10 PCIe 5.0 X16 VMD / CPU2 NVMe5 VMD / CPU2 NVMe6 VMD / CPU2 NVMe7 VMD / CPU2 NVMe8 VMD (Available when the device is detected by the system and "Enable/Disable VMD" above is set to Enable)

Select Enable to enable the Intel VMD technology support for the root port specified. The options are **Disable** and Enable.

Hot Plug Capable (Available when the device is detected by the system and "Enable/Disable VMD" above is set to Enable)

Select Enable to enable Hot Plug support for the root ports specified, which allows you to change the devices on those root ports without shutting down the system. The options are **Disable** and Enable.

► PCIe Leaky Bucket Configuration

Gen2 Link Degradation

Use this feature to enable PCIe Gen2 link degradation. The options are Disable and **Enable**.

 **Note:** The default setting is Enable when your motherboard supports PCIe Gen2 link. Otherwise, the default setting is Disable.

Gen3 Link Degradation

Use this feature to enable PCIe Gen3 link degradation. The options are Disable and **Enable**.

 **Note:** The default setting is Enable when your motherboard supports PCIe Gen3 link. Otherwise, the default setting is Disable.

Gen4 Link Degradation

Use this feature to enable PCIe Gen4 link degradation. The options are Disable and **Enable**.

 **Note:** The default setting is Enable when your motherboard supports PCIe Gen4 link. Otherwise, the default setting is Disable.

Gen5 Link Degradation

Use this feature to enable PCIe Gen5 link degradation. The options are **Disable** and **Enable**.

 **Note:** The default setting is **Enable** when your motherboard supports PCIe Gen5 link. Otherwise, the default setting is **Disable**.

IIO-PCIe Express Global Options

PCIe Completion Timeout

Use this feature to select the PCIe completion timeout settings. The options are 50µs to 50ms, 50µs to 100µs, 1ms to 10ms, 16ms to 55ms, 65ms to 210ms, **260ms to 900ms**, 1s to 3.5s, and **Disable**.

PCIe ASPM Support (Global)

Use this feature to disable the Active State Power Management (ASPM) support for all PCIe root ports. The options are **Disable** and **Auto**.

PCIe Max Read Request Size

Use this feature to set the maximum read request size in PCI hierarchy. The options are **Auto**, 128B, 256B, 512B, 1024B, 2048B, and 4096B.

Equalization Bypass To Highest Rate

Set this feature to **Enable** to reduce the link training time for PCIe 5.0 device by skipping equalization of intermediate data rates. The options are **Disable** and **Enable**.

IIO eDPC Support (Available when your system supports this feature)

Use this feature to configure the setting for IIO Enhanced Downstream Port Containment (eDPC) support for your system in an effort to improve the error containment capacity within the PCIe subsystem when an uncorrected error is detected either at the root port or at the switch downstream port. Select **Disable** to disable IIO eDPC support. Select **On Fatal Error** to enable IIO eDPC support in your system when a fatal error occurs. Select **On Fatal and Non-Fatal Error** to enable IIO eDPC support when an error, fatal or non-fatal, has occurred. The options are **Disable**, **On Fatal Error**, and **On Fatal and Non-Fatal Errors**.

IIO eDPC Interrupt (Available when your system supports this feature and when "IIO eDPC Support" is set to **On Fatal Error** or **On Fatal and Non-Fatal Errors**)

Select **Enable** to enable IIO eDPC Interrupt support. The options are **Enable** and **Disable**.

IIO eDPC ERR_COR Message (Available when your system supports this feature and when "IIO eDPC Support" is set to On Fatal Error or On Fatal and Non-Fatal Errors)

If this feature is set to Enable, an IIO eDPC error correction message will be displayed. The options are **Enable** and Disable.

CXL Security Level

By defining security protocols, CXL standards provide protection against the data security threats. Use this feature to set the CXL security level for data transiting the CXL link. The options are Fully Trusted, Partially Trusted, Untrusted, and **Auto**.

- Fully Trusted: This option allows the CXL device to access CXL.\$ for both host-attached and device-attached memory ranges in the write-back (WB) address space.
- Partially Trusted: This option allows the CXL device to access CXL.\$ for device-attached memory ranges only.
- Untrusted: If this option is selected, the host (your system) will abort all requests on CXL.\$.
- Auto: This option is based on Si Compatibility.

CXL Header Bypass

Set this feature to enable or disable the CXL header bypass. The options are **Disable** and Enable.

► South Bridge

The following information is displayed:

- USB Devices:

Legacy USB Support

Select Enabled to support onboard legacy USB devices. Select Auto to disable legacy support if there are no legacy USB devices present. Select Disabled to have all USB devices available for EFI applications only. The options are **Enabled**, Disabled, and Auto.

XHCI Hand-off

This is a work-around solution for operating systems that do not support Extensible Host Controller Interface (XHCI) hand-off. The XHCI ownership change should be claimed by the XHCI driver. The options are **Enabled** and Disabled.

Port 60/64 Emulation

Select Enabled for I/O port 60h/64h emulation support, which in turn, provides complete legacy USB keyboard support for the operating systems that do not support legacy USB devices. The options are **Disabled** and Enabled.

PCIe PLL SSC

Select Enabled for PCH PCIe Spread Spectrum Clocking (SSC) support, which allows the BIOS to monitor and attempt to reduce the level of electromagnetic interference caused by the components whenever needed. The options are **Disabled** and Enabled. The available options are CPU-dependent.

►Server ME Information

The following information is displayed:

- General ME Configuration
- Oper. Firmware Version
 - Current State
 - Error Code

►PCH SATA0 Configuration / ►PCH SATA1 Configuration

When this submenu is selected, the AMI BIOS automatically detects the presence of the SATA devices that are supported by the Intel PCH chip and displays the following features.

SATA Controller(s)

Use this feature to enable or disable the onboard SATA controller(s) supported by the Intel PCH chip. The options are Disabled and **Enabled**.

SATA Mode Selection (Available when "SATA Controller(s)" is set to Enabled)

Use this feature to select the mode of installed SATA drives. The options are **AHCI** and RAID.

Support Aggressive Link Power Management (Available when "SATA Controller(s)" is set to Enabled)

When this feature is set to Enabled, the SATA AHCI controller manages the power use of the SATA link. The controller will put the link in a low power mode during an extended period of I/O inactivity, and will return the link to an active state when I/O activity resumes. The options are **Disabled** and Enabled.

SATA SGPIO Mode (Available when "SATA Controller(s)" is set to Enabled)

Use this feature to change the serial GPIO mode for SATA controller. The options are LED and **SGPIO**. The default option is motherboard-dependent.

SATA Port 0 – SATA Port 7 (M.2-H1) (Available when "SATA Controller(s)" is set to Enabled)

Note: The SATA port naming may vary based on the related configuration.

Hot Plug

Select Enabled to support hot-plugging for the device installed on a selected SATA port to replace the device installed in the slot without shutting down the system. The options are Disabled and **Enabled**.

Spin Up Device

Select Enabled for staggered spin-up support to allow the SATA devices specified to spin up one at a time at boot up in an effort to prevent all hard drive disks from spinning up at the same time, causing a power surge. The options are **Disabled** and Enabled.

SATA Device Type

Use this feature to select the device type for the SATA port. The options are **Hard Disk Drive** and Solid State Drive.

► Trusted Computing

Note: This submenu is available when the TPM 2.0 (either onboard or external) is detected by the BIOS.

When the TPM 2.0 (either onboard or external) is detected by your system, the following information is displayed:

- TPM 2.0 Device Found
- Firmware Version:
- Vendor:

Security Device Support

Select Enable to enable BIOS support for onboard security devices, which are not displayed in the OS. If this feature is set to Enable, TCG EFI protocol and INT1A interface will not be available. The options are Disable and **Enable**.

*When "Security Device Support" is set to Enable, the following information is displayed:

- Active PCR banks
- Available PCR banks

SHA-1 PCR Bank (Available when "Security Device Support" is set to Enable)

Select Enabled to enable SHA-1 PCR Bank support to enhance system integrity and data security. The options are Disabled and **Enabled**.

SHA256 PCR Bank (Available when "Security Device Support" is set to Enable)

Select Enabled to enable SHA256 PCR Bank support to enhance system integrity and data security. The options are Disabled and **Enabled**.

Pending Operation (Available when "Security Device Support" is set to Enable)

Use this feature to schedule a TPM-related operation to be performed by the security TPM (either onboard or external) at the next system boot to enhance system data integrity. The options are **None** and TPM Clear.



Note: Your system will reboot to carry out a pending TPM operation.

Platform Hierarchy (Available when "Security Device Support" is set to Enable)

Select Enabled for TPM Platform Hierarchy support, which allows the manufacturer to utilize the cryptographic algorithm to define a constant key or a fixed set of keys to be used for initial system boot. These early boot codes are shipped with the platform and are included in the list of "public keys." During system boot, the platform firmware uses the trusted public keys to verify a digital signature in an attempt to manage and control the security of the platform firmware used in a host system via the TPM (either onboard or external). The options are Disabled and **Enabled**.

Storage Hierarchy (Available when "Security Device Support" is set to Enable)

Select Enabled for TPM Storage Hierarchy support that is intended to be used for non-privacy-sensitive operations by a platform owner such as an IT professional or the end user. Storage Hierarchy has an owner policy and an authorization value, both of which can be set and are held constant (-rarely changed) through reboots. This hierarchy can be cleared or changed independently of the other hierarchies. The options are Disabled and **Enabled**.

Endorsement Hierarchy (Available when "Security Device Support" is set to Enable)

Select Enabled for Endorsement Hierarchy support, which contains separate controls to address the user's privacy concerns because the primary keys in the hierarchy are certified by the TPM key or by a manufacturer with restrictions on how an authentic TPM (either onboard or external) that is attached to an authentic platform can be accessed and used. A primary key can be encrypted and certified with a certificate created by using TPM2_ ActivateCredential, which allows the user to independently enable "flag, policy, and authorization values" without involving other hierarchies. A user with privacy concerns can disable the endorsement hierarchy while still using the storage hierarchy for TPM applications, permitting the platform software to use the TPM. The options are Disabled and **Enabled**.

PH Randomization

Select Enabled for Platform Hierarchy (PH) Randomization support, which is used only during the platform developmental stage. This feature cannot be enabled in the production platforms. The options are **Disabled** and Enabled.

Supermicro BIOS-Based TPM Provision Support

Set this feature to Enabled to unlock the TPM. Save settings and exit the BIOS Setup utility. The Non-volatile (NV) indexes can be deleted after the system reboot. The options are Disabled and **Enabled**.

TXT Support

Select Enabled to enable Intel Trusted Execution Technology (TXT) support to enhance system integrity and data security. The options are **Disabled** and Enabled. This feature is CPU-dependent.

 **Note 1:** If this feature is set to Enabled, be sure to disable Device Function On-Hide (EV DFX) support when it is present in the BIOS for the system to work properly.

Note 2: For more information on TPM, refer to the TPM manual at https://www.supermicro.com/manuals/other/AOM-TPM-9670V_9670H.pdf.

►ACPI Settings

NUMA

Use this feature to enable Non-Uniform Memory Access (NUMA) support to minimize memory access latencies. The options are Disabled and **Enabled**.

Virtual NUMA

Enable this feature to optimize the memory-access performance for VMware virtual machines. The options are **Disabled** and Enabled.

UMA-Based Clustering

When this feature is set to Hemisphere, Uniform Memory Access (UMA)-based clustering will support 2-cluster configuration for system performance enhancement. The options are Disabled (All2All), Hemisphere (2-clusters), and **Quadrant (4-clusters)**. The option of Disabled (All2All) is CPU-dependent.

WHEA Support

Select Enabled to support the Windows Hardware Error Architecture (WHEA) platform and provide a common infrastructure for the system to handle hardware errors within the Windows OS environment to reduce system crashes and to enhance system recovery and health monitoring. The options are Disabled and **Enabled**.

High Precision Event Timer

Select Enabled to activate the High Precision Event Timer (HPET) that produces periodic interrupts at a much higher frequency than a Real-time Clock (RTC) does in synchronizing multimedia streams, providing smooth playback and reducing the dependency on other timestamp calculation devices, such as an x86 RDTSC Instruction embedded in the CPU. The HPET is used to replace the 8254 Programmable Interval Timer. The options are Disabled and **Enabled**.

► Super IO Configuration (Available when your system supports this feature)

The following information is displayed.

- Super IO Chip

► Serial Port 1 Configuration

Serial Port 1

Select Enabled to enable serial port 1. The options are Disabled and **Enabled**.

Device Settings (Available when "Serial Port 1" above is set to Enabled)

This feature displays the base I/O port address and the Interrupt Request address of serial port 1.

Change Settings (Available when "Serial Port 1" above is set to Enabled)

This feature specifies the base I/O port address and the Interrupt Request address of serial port 1. Select Auto for the BIOS to automatically assign the base I/O and IRQ address to serial port 1. The options are **Auto**, (IO=3F8h; IRQ=4;), (IO=2F8h; IRQ=4;), (IO=3E8h; IRQ=4;), and (IO=2E8h; IRQ=4;). The available options are motherboard-dependent.

► Serial Port 2 Configuration



Note: It can be "Serial Port 2 Configuration" or "SOL Configuration" based on your system support.

Serial Port 2/SOL ("Serial Port 2" or "SOL" based on your system support)

Select Enabled to enable serial port 2 (or SOL). The options are Disabled and **Enabled**.

Device Settings (Available when "Serial Port 2/SOL" above is set to Enabled)

This feature displays the base I/O port address and the Interrupt Request address of serial port 2 (or SOL).

Change Settings (Available when "Serial Port 2/SOL" above is set to Enabled)

This feature specifies the base I/O port address and the Interrupt Request address of serial port 2 (or SOL). Select Auto for the BIOS to automatically assign the base I/O and IRQ address to serial port 2. The options are **Auto**, (IO=3F8h; IRQ=3;), (IO=2F8h; IRQ=3;), (IO=3E8h; IRQ=3;), and (IO=2E8h; IRQ=3;). The available options are motherboard-dependent.

Serial Port 2 Attribute (Available for Serial Port 2 only)

Select SOL to use serial port 2 as a Serial Over LAN (SOL) port for console redirection. The options are **SOL** and **COM**.

► Serial Port Console Redirection

COM1 (Available when your system supports the serial port of COM1)**Console Redirection**

Select Enabled to enable COM port 1 for Console Redirection, which allows a client machine to be connected to a host machine at a remote site for networking. The options are **Disabled** and **Enabled**.



Note: This feature will be set to Enabled if there is no BMC support.

► Console Redirection Settings (Available when "Console Redirection" above is set to Enabled)

Terminal Type

Use this feature to select the target terminal emulation type for Console Redirection. Select VT100 to use the ASCII character set. Select VT100+ to add color and function key support. Select ANSI to use the extended ASCII character set. Select VT-UTF8 to use UTF8 encoding to map Unicode characters into one or more bytes. The options are VT100, **VT100+**, VT-UTF8, and ANSI.

Bits Per Second

Use this feature to set the transmission speed for a serial port used in Console Redirection. Make sure that the same speed is used in the host computer and the client computer. A lower transmission speed may be required for long and busy lines. The options are 9600, 19200, 38400, 57600, and **115200** (bits per second).

Data Bits

Use this feature to set the data transmission size for Console Redirection. The options are 7 and **8** (bits).

Parity

A parity bit can be sent along with regular data bits to detect data transmission errors. Select Even if the parity bit is set to 0 and the number of 1s in data bits is even. Select Odd if the parity bit is set to 0 and the number of 1s in data bits is odd. Select None if you do not want to send a parity bit with your data bits in transmission. Select Mark to add a mark as a parity bit to be sent along with the data bits. Select Space to add a space as a parity bit to be sent with your data bits. The options are **None**, Even, Odd, Mark, and Space.

Stop Bits

A stop bit indicates the end of a serial data packet. Select 1 (stop bit) for standard serial data communication. Select 2 (stop bits) if slower devices are used. The options are **1** and **2**.

Flow Control

Use this feature to set the flow control for Console Redirection to prevent data loss caused by buffer overflow. Send a "Stop" signal to stop sending data when the receiving buffer is full. Send a "Start" signal to start sending data when the receiving buffer is empty. The options are **None** and Hardware RTS/CTS.

VT-UTF8 Combo Key Support

Select Enabled to enable VT-UTF8 Combination Key support for ANSI/VT100 terminals. The options are Disabled and **Enabled**.

Recorder Mode

Select Enabled to capture the data displayed on a terminal and send it as text messages to a remote server. The options are **Disabled** and Enabled.

Resolution 100x31

Select Enabled for extended-terminal resolution support. The options are Disabled and **Enabled**.

Putty KeyPad

Use this feature to select the function key and keypad settings on Putty, which is a terminal emulator designed for the Windows OS. The options are **VT100**, LINUX, XTERMR6, SCO, ESCN, and VT400.

SOL/COM2



Note: This feature is available when your system supports serial port of SOL and/or COM2. The "SOL/COM2" here indicates a shared serial port, and SOL is used as the default.

Console Redirection

Select Enabled to use the SOL/COM2 port for Console Redirection. The options are Disabled and **Enabled**.

► Console Redirection Settings (Available when "Console Redirection" above is set to Enabled)

Terminal Type

Use this feature to select the target terminal emulation type for Console Redirection. Select VT100 to use the ASCII character set. Select VT100+ to add color and function key support. Select ANSI to use the extended ASCII character set. Select VT-UTF8 to use UTF8 encoding to map Unicode characters into one or more bytes. The options are VT100, **VT100+**, VT-UTF8, and ANSI.

Bits Per Second

Use this feature to set the transmission speed for a serial port used in Console Redirection. Make sure that the same speed is used in the host computer and the client computer. A lower transmission speed may be required for long and busy lines. The options are 9600, 19200, 38400, 57600, and **115200** (bits per second).

Data Bits

Use this feature to set the data transmission size for Console Redirection. The options are 7 and **8** (bits).

Parity

A parity bit can be sent along with regular data bits to detect data transmission errors. Select Even if the parity bit is set to 0 and the number of 1s in data bits is even. Select Odd if the parity bit is set to 0 and the number of 1s in data bits is odd. Select None if you do not want to send a parity bit with your data bits in transmission. Select Mark to add a mark as a parity bit to be sent along with the data bits. Select Space to add a space as a parity bit to be sent with your data bits. The options are **None**, Even, Odd, Mark, and Space.

Stop Bits

A stop bit indicates the end of a serial data packet. Select 1 (stop bit) for standard serial data communication. Select 2 (stop bits) if slower devices are used. The options are **1** and 2.

Flow Control

Use this feature to set the flow control for Console Redirection to prevent data loss caused by buffer overflow. Send a "Stop" signal to stop sending data when the receiving buffer is full. Send a "Start" signal to start sending data when the receiving buffer is empty. The options are **None** and Hardware RTS/CTS.

VT-UTF8 Combo Key Support

Select Enabled to enable VT-UTF8 Combination Key support for ANSI/VT100 terminals. The options are Disabled and **Enabled**.

Recorder Mode

Select Enabled to capture the data displayed on a terminal and send it as text messages to a remote server. The options are **Disabled** and Enabled.

Resolution 100x31

Select Enabled for extended-terminal resolution support. The options are Disabled and **Enabled**.

Putty KeyPad

Use this feature to select the function key and keypad settings on Putty, which is a terminal emulator designed for the Windows OS. The options are **VT100**, LINUX, XTERMR6, SCO, ESCN, and VT400.

Legacy Console Redirection**► Legacy Console Redirection Settings****Legacy Serial Redirection Port**

Use this feature to select a COM port to display redirection of Legacy OS and Legacy OPRM messages. The options are **COM1** and SOL/COM2. Note that the available options are based on your motherboard features.

Resolution

Use this feature to select the numbers of rows and columns used in Console Redirection for Legacy OS support. The options are 80x24 and **80x25**.

Redirection After BIOS POST

Use this feature to enable or disable legacy console redirection after BIOS POST. When the option - BootLoader is selected, legacy console redirection is disabled before booting the OS. When the option - Always Enable is selected, legacy console redirection remains enabled upon OS bootup. The options are **Always Enable** and BootLoader.

Serial Port for Out-of-Band Management/Windows Emergency Management Services (EMS)

Use the features below to configure Console Redirection settings to support Out-of-Band Serial Port management.

Console Redirection EMS

Select Enabled to use the SOL port for Console Redirection. The options are **Disabled** and Enabled.

► Console Redirection Settings (Available when "Console Redirection EMS" above is set to Enabled)

Out-of-Band Mgmt Port

Use this feature to select a serial port in a client server to be used by the Microsoft Windows Emergency Management Services (EMS) to communicate with a remote host server. The options are **COM1** and SOL/COM2. Note that the option of SOL/COM2 indicates a shared serial port. SOL is available with BMC support.

Terminal Type EMS

Use this feature to select the target terminal emulation type for Console Redirection. Select VT100 to use the ASCII character set. Select VT100+ to add color and function key support. Select ANSI to use the extended ASCII character set. Select VT-UTF8 to use UTF8 encoding to map Unicode characters into one or more bytes. The options are VT100, VT100+, **VT-UTF8**, and ANSI.

Bits Per Second EMS

This feature sets the transmission speed for a serial port used in Console Redirection. Make sure that the same speed is used in the host computer and the client computer. A lower transmission speed may be required for long and busy lines. The options are 9600, 19200, 57600, **115200**, 230400, 460800, and 921600 (bits per second).

Flow Control EMS

Use this feature to set the flow control for Console Redirection to prevent data loss caused by buffer overflow. Send a "Stop" signal to stop sending data when the receiving buffer is full. Send a "Start" signal to start sending data when the receiving buffer is empty. The options are **None**, Hardware RTS/CTS, and Software Xon/Xoff.

The following information is displayed:

Data Bits EMS / Parity EMS / Stop Bits EMS

► Network Configuration

Network Stack

Select Enabled to enable Preboot Execution Environment (PXE) or Unified Extensible Firmware Interface (UEFI) for network stack support. The options are Disabled and **Enabled**.

IPv4 PXE Support (Available when "Network Stack" is set to Enabled)

Select Enabled to enable IPv4 PXE boot support. If this feature is disabled, it will not create the IPv4 PXE boot option. The options are Disabled and **Enabled**.

IPv4 HTTP Support (Available when "Network Stack" is set to Enabled)

Select Enabled to enable IPv4 HTTP boot support. If this feature is disabled, it will not create the IPv4 HTTP boot option. The options are **Disabled** and Enabled.

IPv6 PXE Support (Available when "Network Stack" is set to Enabled)

Select Enabled to enable IPv6 PXE boot support. If this feature is disabled, it will not create the IPv6 PXE boot option. The options are **Disabled** and Enabled.

IPv6 HTTP Support (Available when "Network Stack" is set to Enabled)

Select Enabled to enable IPv6 HTTP boot support. If this feature is disabled, it will not create the IPv6 HTTP boot option. The options are **Disabled** and Enabled.

PXE Boot Wait Time (Available when "Network Stack" is set to Enabled)

Use this feature to set the wait time (in seconds) upon which the system BIOS will wait for you to press the <ESC> key to abort PXE boot instead of proceeding with PXE boot by connecting to a network server immediately. Press the <+> or <-> key on your keyboard to change the value. The default setting is **0**.

Media Detect Count

Use this feature to select the wait time (in seconds) for the BIOS ROM to detect the presence of a LAN media either via the Internet connection or via a LAN port. Press the <+> or <-> key on your keyboard to change the value. The default setting is **1**.

►MAC:(MAC address)-IPv4 Network Configuration**Configured**

Select Enabled to show whether the network address has been successfully configured. The options are **Disabled** and Enabled.

Enable DHCP (Available when "Configured" is set to Enabled)

Select Enabled to support Dynamic Host Configuration Protocol (DHCP), which allows the BIOS to search for a DHCP server attached to the network and request the next available IP address for this computer. The options are **Disabled** and Enabled.

Local IP Address (Available when "Configured" is set to Enabled and when "Enable DHCP" is set to Disabled)

Use this feature to enter an IP address for the local machine.

Local NetMask (Available when "Configured" is set to Enabled and when "Enable DHCP" is set to Disabled)

Use this feature to set the netmask for the local machine.

Local Gateway (Available when "Configured" is set to Enabled and when "Enable DHCP" is set to Disabled)

Use this feature to set the gateway address for the local machine.

Local DNS Servers (Available when "Configured" is set to Enabled and when "Enable DHCP" is set to Disabled)

Use this feature to set the Domain Name System (DNS) server address for the local machine.

Save Changes and Exit

Press <Enter> to save changes and exit. The options are **Yes** and No.

►MAC:(MAC address)-IPv6 Network Configuration**►Enter Configuration Menu**

The following information is displayed:

Interface Name / Interface Type / MAC address / Host addresses / Route Table / Gateway addresses / DNS addresses

Interface ID

Use this feature to change/enter the 64-bit alternative interface ID for the device. The string format is colon separated. The default setting is the MAC address above.

DAD Transmit Count

This feature displays the number of consecutive neighbor solicitation messages that have been sent while performing duplicate address detection on a tentative address. The default setting is **1**.

Policy

Use this feature to select how the policy is to be configured. The options are **automatic** and manual.

►Advanced Configuration (Available when "Policy" is set to manual)**New IPv6 address**

Use this feature to enter the IPv6 address for the local machine.

New Gateway addresses

Use this feature to set the gateway address for the local machine.

New DNS addresses

Use this feature to set the DNS server address for the local machine.

Commit Changes and Exit

Press <Enter> to save changes and exit. The options are **Yes** and No.

Discard Changes and Exit

Press <Enter> to discard changes and exit. The options are **Yes** and No.

Save Changes and Exit

Press <Enter> to save changes and exit. The options are **Yes** and No.

► PCIe/PCI/PnP Configuration

The following information is displayed:

- PCI Bus Driver Version

PCI Devices Common Settings:**Above 4G Decoding (Available when the system supports 64-bit PCI decoding)**

Set this feature to Enabled to allow a 64-bit PCIe device to use more than 4 GB of memory address space. The options are Disabled and **Enabled**.

MMCFG Base

This feature determines how the lowest Memory Mapped Configuration (MMCFG) base is assigned to onboard PCI devices. The options are 1G, 1.5G, 1.75G, 2G, 2.25G, 3G, and **Auto**.

MMCFG Size

Use this feature to set the MMCFG size. The options are 128M, 256M, 512M, 1G, 2G, and **Auto**. Note that the MMCFG size is based on the memory populated.



Note: The options shown here depend on your memory size.

MMIO High Base

Use this feature to select the base memory size according to memory-address mapping for the I/O hub. The options are 56T, 40T, **32T**, 24T, 16T, 4T, 2T, 1T, 512G, and 3584T. Note that the options are based on the system configuration.

MMIO High Granularity Size

Use this feature to select the high memory size according to memory-address mapping for the I/O hub. The options are 1G, 4G, 16G, 64G, 256G, and **1024G**. Note that the options are based on the system configuration.

Re-Size BAR Support

Use this feature to enable the Resizable BAR support. Resizable BAR is a PCIe interface technology that allows the CPU to access the entire frame buffer. With this technology, your system will be able to handle multiple CPU to GPU transfers simultaneously rather than queuing, which can improve the frame rate performance. The options are **Disabled** and **Enabled**.

SR-IOV Support

Select Enabled for Single-Root I/O Virtualization support. The options are **Disabled** and **Enabled**.



Note: This feature is NOT available when "Workload Profile" is set to Virtualization.

ARI Support

Select Enabled for Alternative Routing-ID Interpretation (ARI) support. The options are **Disabled** and **Enabled**.

Bus Master Enable

If this feature is set to Enabled, the PCI Bus Driver will enable the Bus Master Attribute for DMA transactions. If this feature is set to Disabled, the PCI Bus Driver will disable the Bus Master Attribute for Pre-Boot DMA protection. The options are **Disabled** and **Enabled**.

Consistent Device Name Support

Select Enabled for ACPI_DSM (DSM: Device Specific Method) device name support for onboard devices and slots. The options are **Disabled** and **Enabled**. This feature is motherboard-dependent.

NVMe Firmware Source

Use this feature to select the NVMe firmware to support system boot. The options are Vendor Defined Firmware and **AMI Native Support**. The option of Vendor Defined Firmware is pre-installed on the drive and may resolve errata or enable innovative functions for the drive. The option of AMI Native Support is offered by the BIOS with a generic method. This default option is motherboard-dependent.

VGA Priority

Use this feature to select the graphics device to be used as the primary video display for system boot. The options are **Onboard** and **Offboard**.

For the following features, note that:



Note 1: The number of slots and slot naming vary based on your motherboard features.

Note 2: The option of Legacy is available when "Boot Mode Select" is set to Dual or Legacy.

Note 3: Refer to the Boot menu ([Section 4.7](#)) to set "Boot Mode Select."

Onboard Video Option ROM

Select EFI to boot the computer using the Extensible Firmware Interface (EFI) device installed on the onboard video port. The options are Disabled and **EFI**.

P1 SLOT1 PCIe 5.0 X16 OPROM / P2 SLOT2 PCIe 5.0 X16 OPROM / P1 SLOT3 PCIe 5.0 X16 OPROM / P2 SLOT4 PCIe 5.0 X16 OPROM / P1 SLOT5 PCIe 5.0 X16 OPROM / P2 SLOT6 PCIe 5.0 X8 OPROM / M.2-C1 OPROM / M.2-C2 OPROM

Select EFI to boot the computer using the EFI device installed on the PCIe slot specified. The options are Disabled and **EFI**.

Onboard LAN Device

Select Enabled to use the onboard LAN device. The options are Disabled and **Enabled**.

Onboard LAN1 Option ROM (Available when "Onboard LAN Device" is set to Enabled)

Use this feature to select the type of device installed on LAN port 1 for system boot. The options are Disabled, PXE, iSCSI, Legacy, FCoE, and **EFI**. Note that available options are based on your LAN OPROM ROM. The options of PXE and iSCSI are available when the LAN OPROM ROM is stored in the BIOS. The options of Legacy and EFI are available when the LAN OPROM ROM is stored in the Non Volatile Memory (NVM).



Note 1: This feature is available when your motherboard supports onboard LAN ports.

Note 2: The default option is PXE when the LAN OPROM ROM is stored in the BIOS.

Note 3: The default option is Legacy when the LAN OPROM ROM is stored in the NVM.

Onboard LAN2 Option ROM

Use this feature to select the type of device installed on LAN port 2 for system boot. The options are **Disabled**, EFI, Legacy, and PXE. Note that available options are based on your LAN OPROM ROM. The options of Legacy and EFI are available when the LAN OPROM ROM is stored in the NVM. The option of PXE is available when the LAN OPROM ROM is stored in the BIOS.



Note 1: This feature is available when "Onboard LAN Device" is set to Enabled and "Onboard LAN1 Option ROM" is set to Disabled or PXE.

Note 2: The default option is PXE when the LAN OPROM ROM is stored in the BIOS.

Note 3: The default option is Legacy when the LAN OPROM ROM is stored in the NVM.

Onboard NVMe1 Option ROM / Onboard NVMe2 Option ROM / Onboard NVMe3 Option ROM / Onboard NVMe4 Option ROM

Use this feature to select which firmware function to be loaded for the NVMe device in this slot. The options are Disabled and **EFI**.

► HTTP Boot Configuration

HTTP Boot Configuration

HTTP Boot Policy

Use this feature to set the HTTP boot policy. The options are Apply to all LANs, **Apply to each LAN**, and Boot Priority #1 instantly.

HTTPS Boot Checks Hostname

Enable this feature for HTTPS boot to check the hostname of the TLS certificates to see if it matches the host name provided by the remote server. The options are **Enabled** and Disabled (WARNING: Security Risk!!).

Priority of HTTP Boot

Instance of Priority 1: (Available when your motherboard supports this feature)

This feature sets the rank target port. The default setting is **1**.

Select IPv4 or IPv6

This feature specifies which connection the target LAN port should boot from. The options are **IPv4** and IPv6.

Boot Description

Use this feature to enter a boot description, which cannot be longer than 75 characters. Be sure to enter a boot description; otherwise, the boot option for the URI cannot be created.

Boot URI

Enter a Boot Uniform Research Identifier (URI) with 128 characters or shorter. This Boot URI determines how IPv4 Boot Option and IPv6 Boot Option will be created. This feature is only supported on Dual or EFI Boot Mode.

Instance of Priority 2: (Available when your motherboard supports this feature)

This feature sets the rank target port. The default setting is **0**.

Select IPv4 or IPv6 (Unavailable when "Instance of Priority x:" above is set to 0)

This feature specifies which connection the target LAN port should boot from. The options are **IPv4** and IPv6.

Boot Description (Unavailable when "Instance of Priority x:" above is set to 0)

Use this feature to enter a boot description, which cannot be longer than 75 characters. Please be sure to enter a boot description; otherwise, the boot option for the URI cannot be created.

Boot URI (Unavailable when "Instance of Priority x:" above is set to 0)

Enter a Boot URI with 128 characters or shorter. This Boot URI determines how IPv4 Boot Option and IPv6 Boot Option will be created. This feature is only supported on Dual or EFI Boot Mode.

► Supermicro KMS Server Configuration

Note: Be sure to configure all the features in the section of Supermicro KMS Server Configuration and the feature of "KMS Security Policy" ([page 150](#)) so that your system can communicate with the KMS server.

Supermicro KMS Server IP address

Use this feature to set the Supermicro Key Management Service (KMS) server IPv4 address in dotted-decimal notation.

Second Supermicro KMS Server IP address

Use this feature to set the second Supermicro KMS server IPv4 address in dotted-decimal notation.

Supermicro KMS TCP Port number

Use this feature to set the TCP port number used in the Supermicro KMS server. The valid range is 100–9999. The default setting is **5696**. Do not change the default setting unless a different TCP port number has been specified and used in the Supermicro KMS server.

KMS Time Out

Use this feature to set the KMS server connecting timeout (in seconds). The default setting is **5** (seconds).

TimeZone

Use this feature to set the correct time zone. The default setting is **0** (not specified).

Client UserName

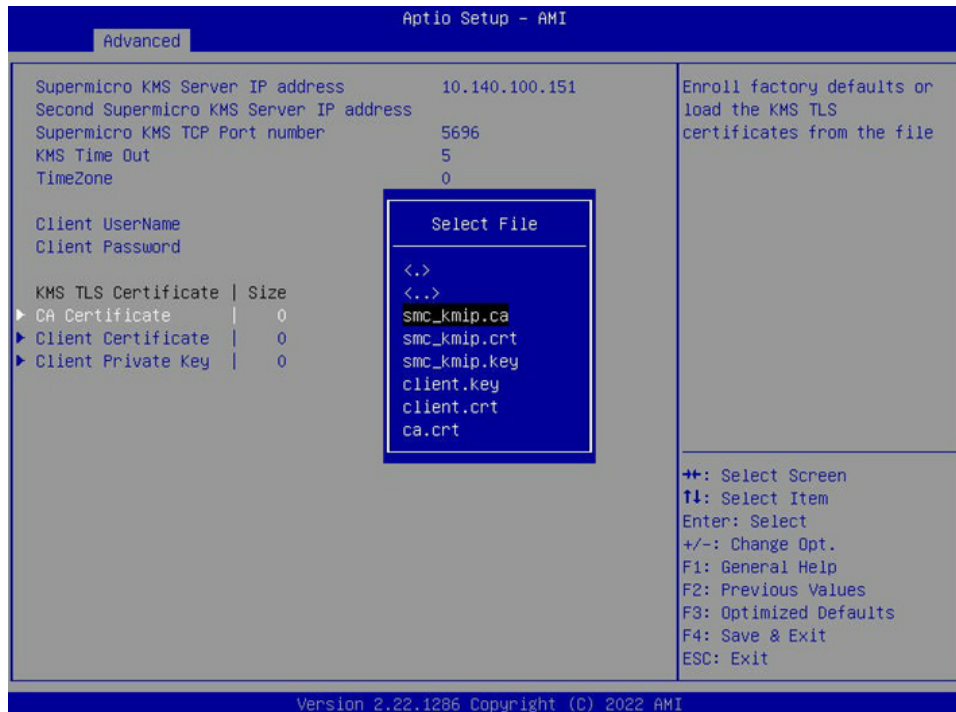
Press <Enter> to set the client identity (UserName). The maximum length is 63 characters.

Client Password

Press <Enter> to set the client identity (Password). The maximum length is 31 characters.

► CA Certificate/ ►Client Certificate/ ►Client Private Key

Use the three features to enroll factory defaults or load the KMS Transport Layer Security (TLS) certificates, which are generated by the KMS server, from the file stored in the USB flash drive as shown below.

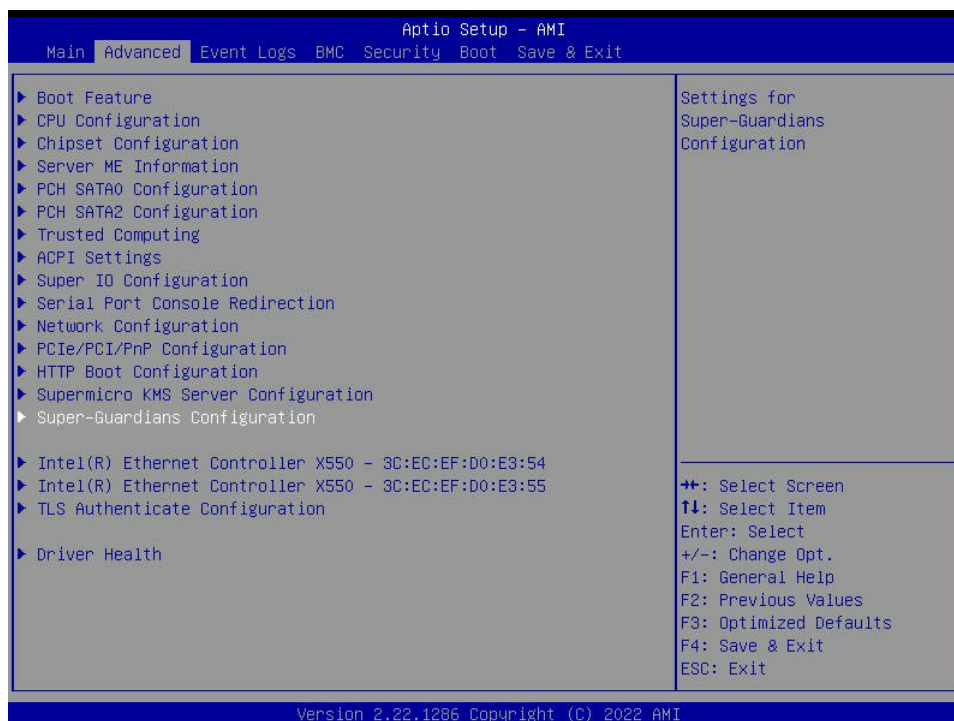


Private Key Password (Available when "Client Private Key" above has been set)

Use this feature to change the private key password.

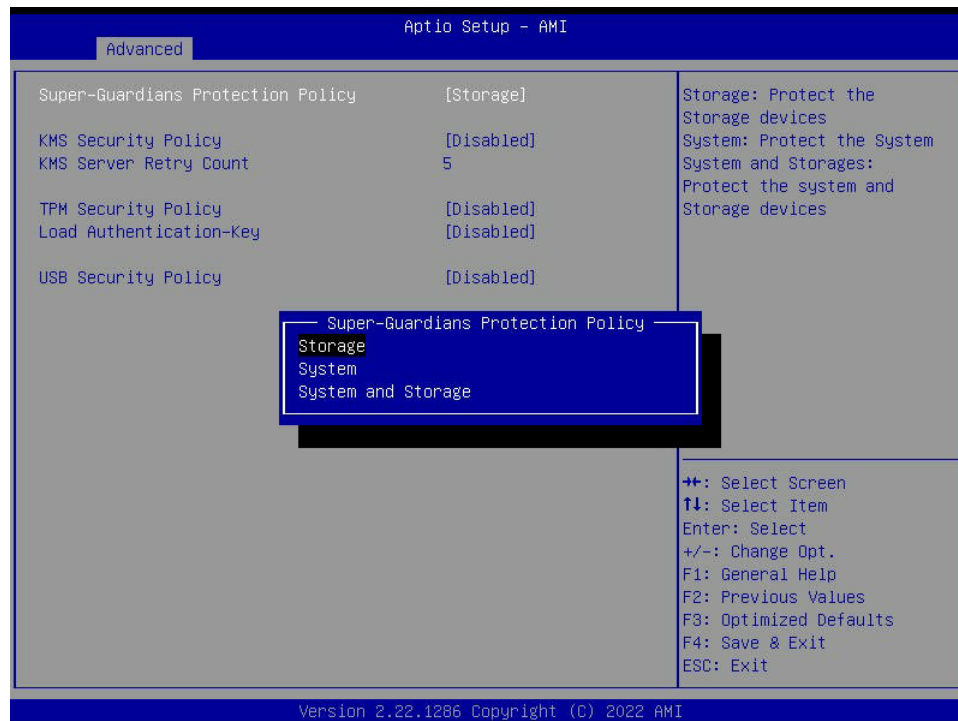
► Super-Guardians Configuration

Press <Del> during system boot to enter the BIOS Setup utility. Navigate to the Advanced tab. Use the arrow keys to select Super-Guardians Configuration and press <Enter>.



Super-Guardians Protection Policy

Use this feature to enable the Super-Guardians Protection Policy. The options are **Storage**, **System**, and **System and Storage**. The default setting is **Storage**. Set this feature to **Storage** to protect and have secure access to the Trusted Computing Group (TCG) NVMe devices with the Authentication-Key (AK). Set this feature to **System** to protect and have secure access to your system/motherboard with the AK. Set this feature to **System and Storage** to protect and have secure access to your system/motherboard/storage devices with the AK. (TCG is the abbreviation for Trusted Computing Group.)



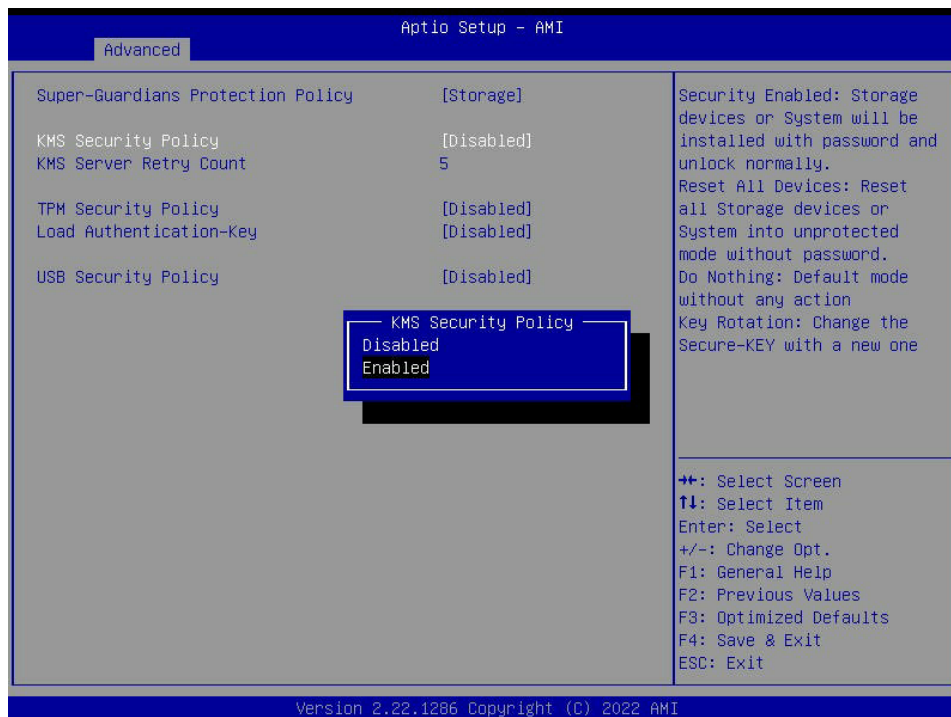
KMS Security Policy (Available when "TPM Security Policy" and "USB Security Policy" are set to Disabled)

Set this feature to Enabled to enable the KMS Security Policy. The options are **Disabled** and **Enabled**. The default setting is Disabled. Save settings (you can press <F4>) and reboot the system for changes to take effect.



Note 1: Be sure that the KMS server is ready before configuring this feature.

Note 2: Use the professional KMS server solutions (e.g., Thales Server) or the Supermicro PyKMIP Software Package to establish the KMS server.



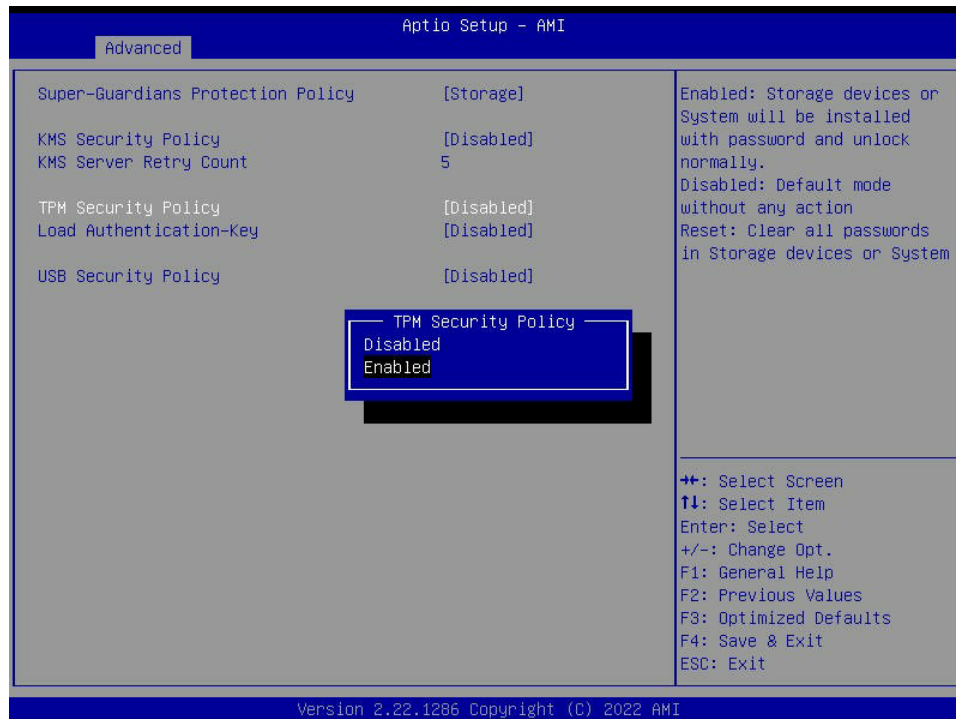
KMS Server Retry Count (Available when "TPM Security Policy" and "USB Security Policy" are set to Disabled)

Use this feature to specify how many times the system will attempt reconnecting to the KMS server. The valid range is 0–10. Press the <+> or <-> key on your keyboard to change the value. The default setting is **5** (times). If the value is 0, the system will retry infinitely.

TPM Security Policy (Available when "KMS Security Policy" and "USB Security Policy" are set to Disabled)

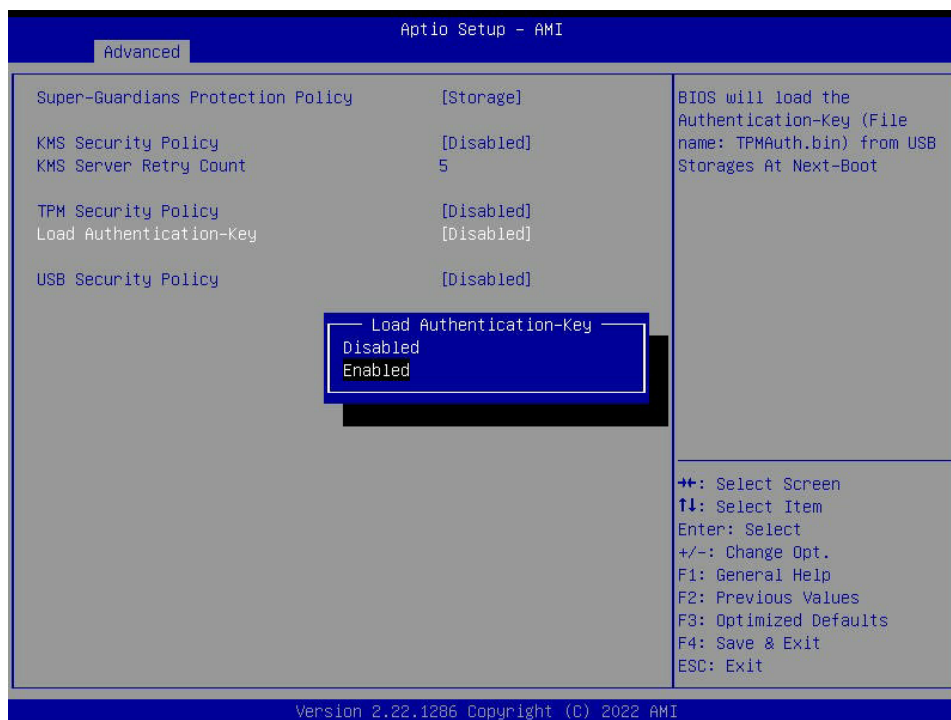
The options are **Disabled** and **Enabled**. The default setting is Disabled. Set this feature to Enabled to enable the TPM Security Policy. Save settings (you can press <F4>) and reboot the system for changes to take effect.

 **Note:** The TPM 2.0 (either onboard or external) is required to configure this feature.



Load Authentication-Key (Available when "KMS Security Policy," "TPM Security Policy," and "USB Security Policy" are set to Disabled)

Use this feature to load the Authentication-Key. The options are **Disabled** and **Enabled**. The default setting is Disabled. Set this feature to Enabled; save settings (you can press <F4>) and reboot the system for changes to take effect. While booting, the BIOS will automatically load the Authentication-Key (filename: TPMAuth.bin) from the USB flash drive. Afterwards, the default setting will be set to Disabled by the BIOS.



 **Note 1:** Be sure to connect a USB flash drive with the Authentication-Key (filename: TPMAuth.bin) to your system before the system reboot.

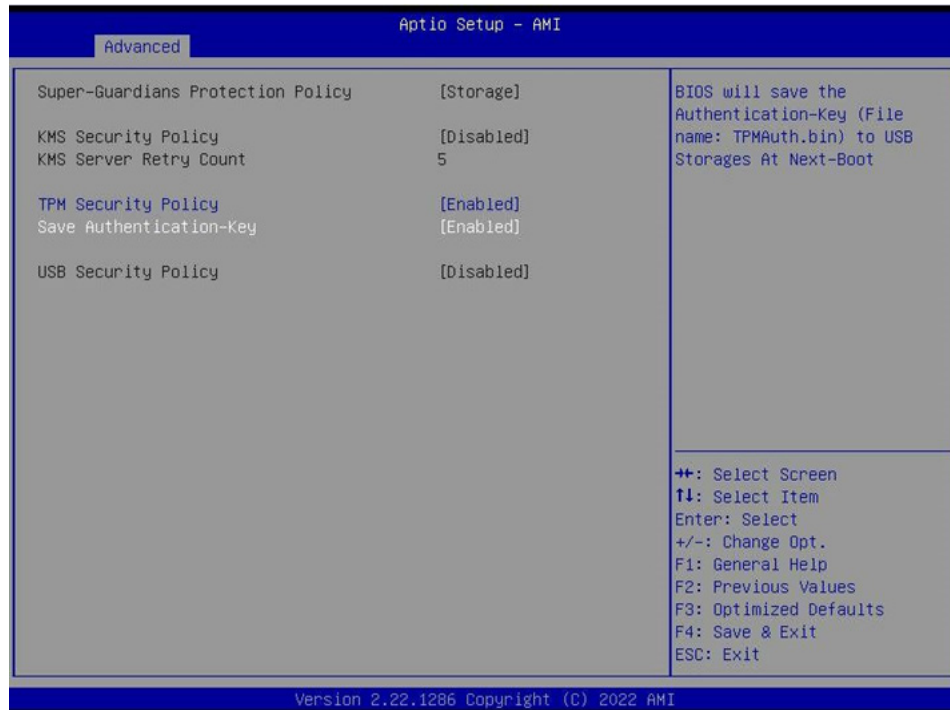
Note 2: Be sure to save the Authentication-Key (filename: TPMAuth.bin) to the USB flash drive and keep a backup. Load the Authentication-Key (filename: TPMAuth.bin) after the TPM (either onboard or external) is detected by your system. Otherwise, the TPM function can not work properly.

Save Authentication-Key (Available when "TPM Security Policy" is set to Enabled)

Use this feature to save the Authentication-Key. The options are **Disabled** and Enabled. The default setting is Disabled. Set this feature to Enabled; save settings (you can press <F4>) and reboot the system for changes to take effect. While booting, the BIOS will automatically save the Authentication-Key (filename: TPMAuth.bin) to the USB flash drive. Afterwards, the default setting will be set to Disabled by the BIOS.

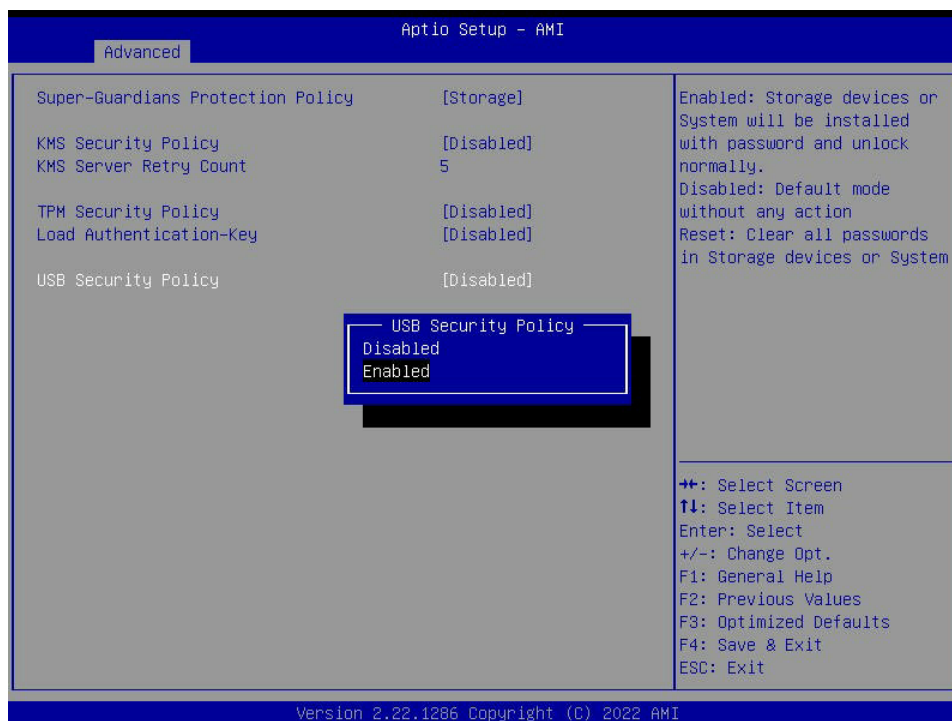


Note: Be sure to connect a USB flash drive to your system before the system reboot.



USB Security Policy (Available when "KMS Security Policy" and "TPM Security Policy" are set to Disabled)

Use this feature to enable the USB Security Policy. The options are **Disabled** and **Enabled**. The default setting is Disabled. Set this feature to Enabled; save settings (you can press <F4>) and reboot the system for changes to take effect. Connect a USB flash drive to your system before the system reboot. While booting, the BIOS will automatically create the USB Authentication-Key (filename: USBAuth.bin) and save it to the USB flash drive.



Note 1: Be sure to connect a USB flash drive to your system before configuring this feature.

Note 2: Be sure to save the USB Authentication-Key (filename: USBAuth.bin) to the USB flash drive and keep a backup.

►Intel(R) VROC SATA Controller



Note 1: This section is based on your system features and related device(s) installed.

Note 2: This section is available when "SATA Mode Selection" is set to RAID.

Note 3: Refer to the PCH SATA0 Configuration, PCH SATA1 Configuration, and PCH SATA2 Configuration submenus to set "SATA Mode Selection" ([page 130](#)).

The following information is displayed.

- Intel VROC SATA driver version

►Create RAID Volume

Name:

Use this feature to enter the unique name of RAID volume.

RAID Level:

Use this feature to select the RAID level. The options are **RAID0(Stripe)**, RAID1(Mirror), RAID5(Parity), and RAID10(RAID0+1).

Select Disks:

Select the desired RAID disks one by one by setting them to **X**. The options are (not selected) and **X** (selected).

Strip Size:

Use this feature to select the RAID strip size. The options are 4KB, 8KB, 16KB, 32KB, 64KB, and **128KB**. The available options are based on the setting of "RAID Level:" above.

Capacity (GB):

Use this feature to enter the desired RAID capacity (in GB).

►Create RAID Volume

Use this feature to create a RAID volume with the settings above. The options are **Yes** and No.

Non-RAID Physical Disks:

This feature displays the information of non-RAID physical disk(s).

RAID Volumes:

This feature displays the information of RAID volumes that have been created earlier.

►Intel(R) VROC sSATA Controller



Note 1: This section is based on your system features and related device(s) installed.

Note 2: This section is available when "SATA Mode Selection" is set to RAID.

Note 3: Refer to the PCH SATA0 Configuration, PCH SATA1 Configuration, and PCH SATA2 Configuration submenus to set "SATA Mode Selection" ([page 130](#)).

The following information is displayed.

- Intel VROC sSATA driver version

►Create RAID Volume

Name:

Use this feature to enter the unique name of RAID volume.

RAID Level:

Use this feature to select the RAID level. The options are **RAID0(Stripe)**, RAID1(Mirror), RAID5(Parity), and RAID10(RAID0+1).

Select Disks:

Select the desired RAID disks one by one by setting them to **X**. The options are (not selected) and **X** (selected).

Strip Size:

Use this feature to select the RAID strip size. The options are 4KB, 8KB, 16KB, 32KB, 64KB, and **128KB**. The available options are based on the setting of "RAID Level:" above.

Capacity (GB):

Use this feature to enter the desired RAID capacity (in GB).

►Create RAID Volume

Use this feature to create a RAID volume with the settings above. The options are **Yes** and No.

Non-RAID Physical Disks:

This feature displays the information of non-RAID physical disk(s).

RAID Volumes:

This feature displays the information of RAID volumes that have been created earlier.

► Supermicro 10GBASE-T Ethernet Controller - (MAC address)

 **Note 1:** The Ethernet controller and MAC addresses shown above are based on your system features.

Note 2: This submenu is available when the LAN Option ROM type is EFI.

► Firmware Image Menu

The following information is displayed:

- Family Firmware Version
- Boot Code
- MBA
- EFI
- NCSI
- RDMA FW

► Device Configuration Menu

Multi-Function Mode

Use this feature to configure NIC hardware mode. In Single Function (SF) mode, a single physical function is assigned to each network port. In Network Partitioning Mode (NPAR) mode, a single physical network port will appear as multiple virtual network interfaces in system. The options are **SF** and NPAR 1.0.

Number of VFs Per PF (Available when "SR-IOV" is set to Enabled)

Use this feature to configure the number of Virtual Function (VF) per Physical Function (PF). The valid range is from 0 to 128 in multiples of 8. Maximum value is 128 divided by number of ports. The default is **8**.

SR-IOV

Use this feature to enable or disable the Single Root I/O Virtualization (SR-IOV) feature on the network adapter. The options are **Disabled** and Enabled.

Number of MSI-X Vectors per VF

Use this feature to configure the number of Message Signaled Interrupts (MSI)-X vectors per VF. The valid range is from 0 to 64. The default is **16**.

Maximum Number of PF MSI-X Vectors

Use this feature to configure the maximum number of MSI-X Vectors of a PF. The valid range is from 0 to 512. The default is **255**.

Energy Efficient Ethernet

Use this feature to configure the Energy Efficient Ethernet (EEE) mode. The options are **Disabled** and **Enabled**.

Operational Link Speed

This feature controls the default link speed for the LAN port. The default setting is **AutoNeg** (Auto Negotiation).

Support RDMA

Use this feature to configure the Remote Direct Memory Access (RDMA) mode. The options are **Disabled** and **Enabled**.

DCB Protocol

Use this feature to configure the Data Center Bridging (DCB) settings. The options are **Disabled**, **Enabled (IEEE only)**, **CEE (only)**, and **Both (IEEE preferred with fallback to CEE)**.

LLDP nearest bridge

Use this feature to configure the Link Layer Discovery Protocol (LLDP) nearest bridge state. The options are **Disabled** and **Enabled**.

Default EVB Mode

Use this feature to configure the Edge Virtual Bridging (EVB) mode. The options are **VEB**, **VEPA**, and **None**.

Enable PME Capability

Use this feature to configure the Power Management Event (PME) capability support. The options are **Disabled** and **Enabled**.

Flow Offload

Use this feature to configure the Flow Offload mode. This feature is supported on Linux DPDK only. It is not supported on Windows or ESX OS. The options are **Disabled** and **Enabled**.

Live Firmware Upgrade

Use this feature to enable the upgrade of device firmware with minimal downtime and minimal traffic interruption. It avoids host reboot, device power cycle, and driver reload. This feature is only supported on Linux OS only. The options are **Disabled** and **Enabled**.

Adapter Error Recovery

Use this feature to enable the recovery of firmware from fatal errors without manual intervention, host reboot, or power cycle. The options are **Disabled** and Enabled.

►MBA Configuration Menu

Option ROM

Use this feature to control the enablement of legacy boot protocols in Option ROM. The options are Disabled and **Enabled**.

Legacy Boot Protocol

Use this feature to specify the non-UEFI boot protocol. The options are **PXE** and NONE.

Boot Strap Type

Use this feature to specify the boot strap method used to boot to the operating system. Options are **Auto Detect**, BBS, Int 18h, and Int 19h.

Hide Setup Prompt

Use this feature to specify whether to display or hide the legacy Option ROM setup prompt during system Power-on Self Test (POST). The options are **Disabled** and Enabled.

Setup Key Stroke

Use this feature to configure key strokes to invoke configuration menu. The options are **Ctrl-S** and Ctrl-B.

Banner Message Timeout

Use this feature to specify the number of seconds that the Option ROM banner is displayed during POST. The default is **7**.

Pre-boot Wake On LAN

This feature allows you to remotely wake up the system from standby mode. The options are Disabled and **Enabled**.

VLAN Mode

Use this feature to enable or disable VLAN mode. The options are **Disabled** and Enabled.

VLAN ID (1–4094)

If VLAN Mode is enabled, use this feature to specify the VLAN ID. The valid VLAN ID range is from 1 to 4049. The default is **1**.

Boot Retry Count

Use this feature to specify the number of times legacy boot to be attempted in case of a boot failure. The options are **No Retry**, 1 Retry, 2 Retries, 3 Retries, 4 Retries, 5 Retries, 6 Retries, and Indefinite Retries.

Blink LEDs

Use this feature to identify the physical network port by blinking the associated LED. The default setting is **0** (up to 15 seconds).

The following information is displayed:

- Link Status
- Physical Link Speed
- Chip Type
- PCI Device ID
- Bus: Device: Function
- Permanent MAC Address
- Virtual MAC Address

Restore Defaults

Use this feature to reset the network adapter settings to factory defaults.

► TLS Authenticate Configuration

Use this submenu to configure Transport Layer Security (TLS) settings.

► Server CA Configuration

Use this feature to configure the client certificate that is to be used by the server.

► Enroll Certification

Use this feature to enroll the certificate in the system.

► Enroll Certification Using File

Use this feature to enroll the security certificate in the system by using a file.

►Commit Changes and Exit

Use this feature to save all changes and exit TLS settings.

►Discard Changes and Exit

Use this feature to discard all changes and exit TLS settings.

►Delete Certification

Use this feature to delete the certificate if a certificate has been enrolled in the system. The options are **Disabled** and Enabled.

►Client Certification Configuration

Use this feature to configure the client certificate to be used by the server.

►Enroll Certification

Use this feature to enroll the certificate in the system.

►Enroll Certification Using File

Use this feature to enroll the security certificate in the system by using a file.

►Commit Changes and Exit

Use this feature to save all changes and exit TLS settings.

►Discard Changes and Exit

Use this feature to discard all changes and exit TLS settings.

►Delete Certification

Use this feature to delete the certificate if a certificate has been enrolled in the system. The options are **Disabled** and Enabled.

► Intel(R) Virtual RAID on CPU

 **Note:** It is available when your system supports this feature and when "Enable/Disable VMD" is set to Enable.

The following information is displayed:

- Intel(R) VROC with VMD Technology x.x.x.xxxx
- Upgrade key:
- Intel VROC Managed Controllers:
 - Memory controller ID

► Driver Health

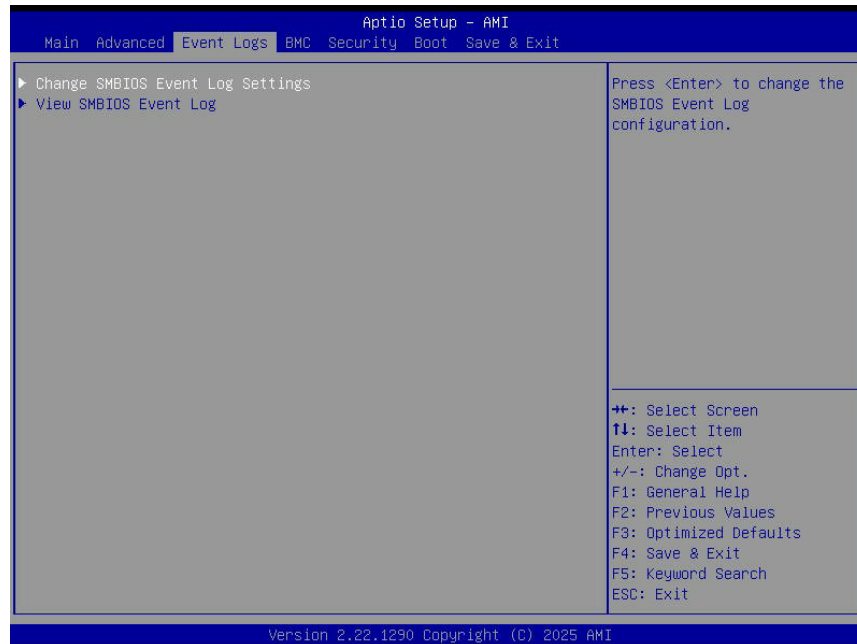
This feature displays the health information of the drivers installed in your system, including LAN controllers, as detected by the BIOS. Select one and press <Enter> to see the details.

 **Note:** This section is provided for reference only, for the driver health status will differ depending on the drivers installed in your system. It's also based on your system configuration and the environment that your system is operating in.

4.4 Event Logs

Use this feature to configure Event Logs settings.

 **Note:** After you've made any changes in this section, please be sure to reboot the system for the changes to take effect.



► Change SMBIOS Event Log Settings

Enabling/Disabling Options

SMBIOS Event Log

Select Enabled to enable System Management BIOS (SMBIOS) Event Logging during system boot. The options are Disabled and **Enabled**.

Erasing Settings

Erase Event Log (Available when "SMBIOS Event Log" is set to Enabled)

Select No to keep the event log without erasing it upon next system bootup. Select (Yes, Next reset) to erase the event log upon next system reboot. The options are **No**, (Yes, Next reset), and (Yes, Every reset).

When Log is Full (Available when "SMBIOS Event Log" is set to Enabled)

Select Erase Immediately to immediately erase all errors in the SMBIOS event log when the event log is full. Select Do Nothing for the system to do nothing when the SMBIOS event log is full. The options are **Do Nothing** and Erase Immediately.

SMBIOS Event Log Standard Settings

Log System Boot Event (Available when "SMBIOS Event Log" is set to Enabled)

Select Enabled to log system boot events. The options are Enabled and **Disabled**.

MECI (Available when "SMBIOS Event Log" is set to Enabled)

Enter the increment value for the multiple event counter. Enter a number between 1 to 255. The default setting is **1**. (MECI is the abbreviation for Multiple Event Count Increment.)

METW (Available when "SMBIOS Event Log" is set to Enabled)

This feature is used to determine how long (in minutes) should the multiple event counter wait before generating a new event log. Enter a number between 0 to 99. The default setting is **60**. (METW is the abbreviation for Multiple Event Count Time Window.)



Note: Please reboot the system for the changes above to take effect.

►View SMBIOS Event Log

Use this feature to view the event in the system event log. Select this feature and press <Enter> to view the status of an event in the log. The following information is displayed:

DATE / TIME / ERROR CODE / SEVERITY.

4.5 BMC

Use this feature to configure BMC settings.



BMC Firmware Revision

This feature indicates the BMC firmware revision used in your system.

BMC STATUS

This feature indicates the status of the BMC firmware installed in your system.

► System Event Log

Enabling/Disabling Options

SEL Components

Select Enabled to enable all system event logging upon system boot. The options are Disabled and **Enabled**.

Erasing Settings

Erase SEL (Available when "SEL Components" is set to Enabled)

Select (Yes, On next reset) to erase all system event logs upon next system boot. Select (Yes, On every reset) to erase all system event logs upon each system reboot. Select No to keep all system event logs after each system reboot. The options are **No**, (Yes, On next reset), and (Yes, On every reset).

When SEL is Full (Available when "SEL Components" is set to Enabled)

This feature defines what the BIOS should do when the system event log is full. Select Erase Immediately to erase all events in the log when the system event log is full. The options are **Do Nothing** and Erase Immediately.



Note: After making changes on a setting, be sure to reboot the system for the changes to take effect.

► BMC Network Configuration

Update BMC LAN Configuration

Select Yes for the BIOS to implement all IP/MAC address changes upon next system boot. The options are **No** and Yes.

Configure IPv4 Support

BMC LAN Selection

This feature displays the type of the BMC LAN.

BMC Network Link Status:

This feature displays the status of the BMC network link for this system.

Configuration Address Source (Available when "Update BMC LAN Configuration" is set to Yes)

Use this feature to select the source of the IPv4 connection. If Static is selected, note the IP address of IPv4 connection and enter it to the system manually in the field. If DHCP is selected, the BIOS will search for a Dynamic Host Configuration Protocol (DHCP) server in the network that is attached to and request the next available IP address for this computer. The options are Static and **DHCP**.

Station IP Address (Available when "Configuration Address Source" is set to Static)

This feature displays the Station IP address in decimal and in dotted quad form (i.e., 172.29.176.131).

Subnet Mask (Available when "Configuration Address Source" is set to Static)

This feature displays the sub-network that this computer belongs to. The value of each three-digit number separated by dots should not exceed 255.

Station MAC Address

This feature displays the Station MAC address for this computer. MAC addresses are six two-digit hexadecimal numbers. It is available for configuration when "Configuration Address Source" is set to Static.

Gateway IP Address (Available when "Configuration Address Source" is set to Static)

This feature displays the IPv4 gateway IP address for this computer. This should be in decimal and in dotted quad form (i.e., 172.29.0.1).

VLAN (Available when "Update BMC LAN Configuration" is set to Yes)

Use this feature to enable the virtual LAN (VLAN) support. The options are **Disable** and **Enable**.

VLAN ID (Available when "VLAN" is set to Enable)

Use this feature to create a new VLAN ID. The valid range is 1–4094. The default setting is 1.

Configure IPv6 Support

IPv6 Address Status

This feature displays the status of the IPv6 address.

IPv6 Support (Available when "Update BMC LAN Configuration" is set to Yes)

Use this feature to enable IPv6 support. The options are **Enabled** and **Disabled**.

Configuration Address Source (Available when "Update BMC LAN Configuration" is set to Yes)

Use this feature to select the source of the IPv6 connection. If Static Configuration is selected, note the IP address of IPv6 connection and enter it to the system manually in the field. If the other two options are selected, the BIOS will search for a DHCP server in the network that is attached to and request the next available IP address for this computer. The options are Static Configuration, **DHCPv6 Stateless**, and DHCPv6 Stateful.

IPv6 Address ("Static," "DHCPv6 Stateless," or "DHCPv6 Stateful," depending on the option you selected for "Configuration Address Source" above)

This feature displays the station IPv6 address. It is available for configuration when "Update BMC LAN Configuration" is set to Yes. It is available for configuration when "Configuration Address Source" above is set to Static Configuration.

Prefix Length (Available when "Configuration Address Source" is set to Static Configuration and "Update BMC LAN Configuration" is set to Yes)

This feature displays the prefix length.

Gateway IP (Available when "Configuration Address Source" is set to Static Configuration and "Update BMC LAN Configuration" is set to Yes)

This feature displays the IPv6 gateway IP address.

Advanced Settings (Available when "Configuration Address Source" is set to DHCPv6 Stateless and "Update BMC LAN Configuration" is set to Yes)

Use this feature to set the DNS server IP. The default setting allows the system to obtain the DNS server IP automatically. The options are Auto obtain DNS server IP and **Manually obtain DNS server IP**.

Preferred DNS server IP (Available when "Advanced Settings" above is set to Manually obtain DNS server IP)

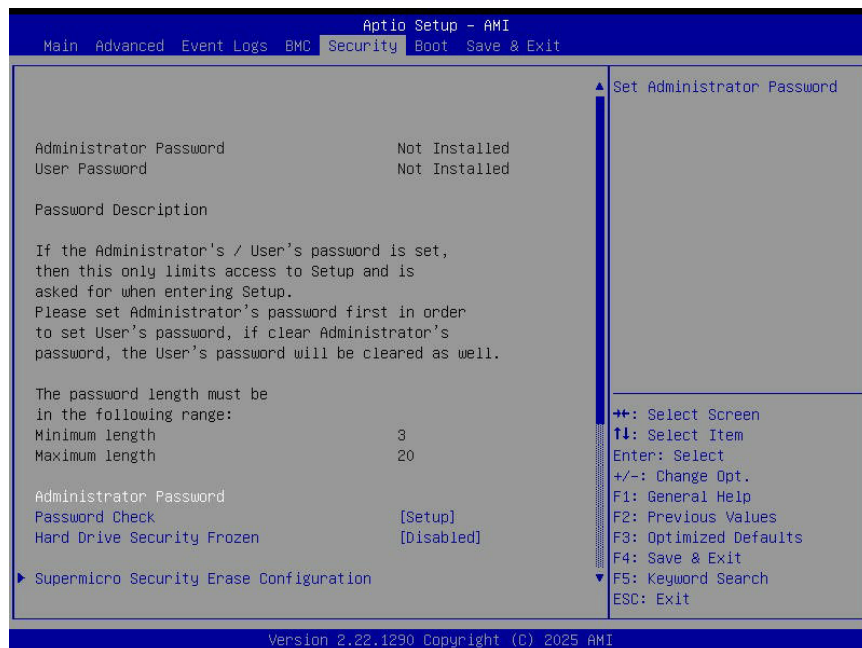
This feature displays the preferred DNS server IP. It can be configured via Redfish.

Alternative DNS server IP (Available when "Advanced Settings" above is set to Manually obtain DNS server IP)

This feature displays the alternative DNS server IP. It can be configured via Redfish.

4.6 Security

Use this menu to configure the following security settings for the system.



Disable Block Sid (Available when your storage devices support TCG)

Select Enabled to allow SID authentication to be performed in TCG storage devices. The options are **Disabled** and Enabled.

The following information is displayed:

- Administrator Password
- User Password
- Password Description

Administrator Password

This feature indicates if an administrator password has been installed. Use this feature to set the administrator password, which is required to enter the BIOS Setup utility. The length of the password can be between three and 20 characters long.

 **Note:** For detailed instructions on how to configure Security Boot settings, please refer to the Security Boot Configuration User's Guide posted on the web page under the link: <https://www.supermicro.com/support/manuals/>.

User Password (Available when "Administrator Password" has been set)

This feature indicates if a user password has been installed. Use this feature to set the user password, which is required to enter the BIOS Setup utility. The length of the password can be between three and 20 characters long.

Password Check

Select Setup for the system to check for a password upon entering the BIOS Setup utility. Select Always for the system to check for the passwords needed at bootup and upon entering the BIOS Setup utility. The options are **Setup** and Always.

Hard Drive Security Frozen

Select Enabled to freeze the Lock Security feature for HDD to protect key data in hard drives from being altered. The options are **Disabled** and Enabled.

► Supermicro Security Erase Configuration (Available when any storage device is detected by the BIOS)

Note: For more information, please refer to https://www.supermicro.com/manuals/other/X11_X12_X13_B11_B12_B13_H11_H12_BH12_H13_Secure_Erase_Guide.pdf.

Use this submenu to configure the Supermicro-proprietary Security Erase settings. When this submenu is selected, the following information is displayed. Note that the order of the following information may differ based on the storage devices being detected.

- **HDD Name:** This feature displays the name of the storage device that is detected by the BIOS.
- **HDD Serial Number:** This feature displays the serial number of the storage device that is detected by the BIOS.
- **Security Mode:** This feature displays the security mode of the storage device that is detected by the BIOS.
- **Estimated Time:** This feature displays the estimate time needed to perform the selected Security Erase features.
- **HDD User Pwd Status:** This feature indicates if a password has been set as a storage device user password, which enables configuring Supermicro Security Erase settings on this storage device.
- **TCG Device Type:** This feature displays the TCG device type detected by the system.
- **Admin Pwd Status:** This feature indicates if a password has been set as a storage device administrator password, which enables configuring Supermicro Security Erase settings on this storage device.

Security Function

Select Set Password to set a storage device password that enables configuring the security settings on the storage device. Select Security Erase - Password to enter a storage device user password to enable erasing the password and the contents previously stored in the storage device. Select Security Erase - Without Password to use the manufacturer default password "111111111" as the storage device user password and enable erasing the contents of the storage device by using this default password. The options are **Disable**, Set Password, Change Password, Clear Password, Security Erase - Password, Security Erase - PSID, and Security Erase - Without Password.



Note 1: The option of Security Erase - PSID is based on the storage device support. PSID is the abbreviation for Physical Security Identification.

Note 2: The options of Change Password and Clear Password are available when "Password" below has been set.

Note 3: The option of Set Password is NOT available when "Password" below has been set.

Password

Use this feature to set the storage device user password, which enables configuring the Supermicro Security Erase settings by using this user password.

New Password (Available when "Password" above has been set)

Use this feature to set the new user password for the storage device, which enables configuring the Supermicro Security Erase settings by using this new user password.

Lockdown Mode (Available when the DCMS key is activated)

Select Enabled to support Lockdown Mode that prevents the existing data or keys stored in the system from being altered or changed in an effort to preserve system integrity and security. The options are **Disabled** and Enabled.

HDD Security Configuration:

►P4: (Storage device model name)

This section is available when the storage device is detected by the BIOS. Select this device. Press <Enter> and the following information is displayed:

- HDD Password Description:
- HDD PASSWORD CONFIGURATION:
 - Security Supported:

- Security Enabled:
- Security Locked:
- Security Frozen:
- HDD User Pwd Status:
- HDD Master Pwd Status:

Set User Password (Available when "Security Frozen:" above is No)

Press <Enter> to set the HDD user password.

► Secure Boot



Note: For detailed instructions on configuring Security Boot settings, refer to the Security Boot Configuration User's Guide at <https://www.supermicro.com/support/manuals/>.

The following information is displayed:

- System Mode
- Secure Boot

Secure Boot

Select Enabled to configure Secure Boot settings. The options are **Disabled** and Enabled.

Secure Boot Mode

Use this feature to select the desired secure boot mode for the system. The options are Standard and **Custom**.

CSM Support

If this feature is set to Enabled, legacy BIOS boot mode will be supported by the system. Please make sure you use the device with compatibility support for legacy boot. The options are Disabled and **Enabled**.

► Enter Audit Mode (Available when "Secure Boot Mode" is set to Custom)

Select Ok to enter the Audit Mode workflow. It will result in erasing of Platform Key (PK) variables and reset system to the Setup/Audit Mode.

► Enter Deployed Mode / Exit Deployed Mode (Available when "Secure Boot Mode" is set to Custom)

Select Ok to reset system to the User Mode or to the Deployed Mode.

► Key Management (Available when "Secure Boot Mode" is set to Custom)

The following information is displayed.

- Vendor Keys

Provision Factory Defaults

Select Enabled to install the default secure boot keys when the system is in the Setup Mode. Changes take effect after you save settings and reboot the system. The options are **Disabled** and **Enabled**.

► Restore Factory Keys (Available when any secure keys have been installed)

Select Yes to restore manufacturer default keys to ensure system security. The options are **Yes** and **No**. Selecting Yes will reset the system to the Deployed mode.

► Reset To Setup Mode (Available when any secure keys have been installed)

This feature resets the system to the Setup Mode. The options are **Yes** and **No**.

► Enroll Efi Image

This feature allows the Efi image to run in the secure boot mode and enroll the SHA256 Hash certificate of a PE image into the Authorized Signature Database (DB).

► Export Secure Boot variables (Available when any secure keys have been installed)

This feature exports the NVRAM contents of secure boot variables to a storage device. The options are **Yes** and **No**.

Secure Boot variable / Size / Keys / Key Source

► Platform Key (PK)

Use this feature to enter and configure a set of values to be used as platform firmware keys for the system. These values also indicate the sizes, keys numbers, and the sources of the authorized signatures. Select Update to update the platform key.

►Key Exchange Keys (KEK)

Use this feature to enter and configure a set of values to be used as Key Exchange Keys for the system. These values also indicate the sizes, key numbers, and the sources of the authorized signatures. Select Update to update the Key Exchange Keys. Select Append to append the Key Exchange Keys.

►Authorized Signatures (db)

Use this feature to enter and configure a set of values to be used as Authorized Signatures for the system. These values also indicate the sizes, keys numbers, and the sources of the authorized signatures. Select Update to update the Authorized Signatures. Select Append to append the Authorized Signatures.

►Forbidden Signatures (dbx)

Use this feature to enter and configure a set of values to be used as Forbidden Signatures for the system. These values also indicate sizes, key numbers, and key sources of the forbidden signatures. Select Update to update the Forbidden Signatures. Select Append to append the Forbidden Signatures.

►Authorized TimeStamps (dbt)

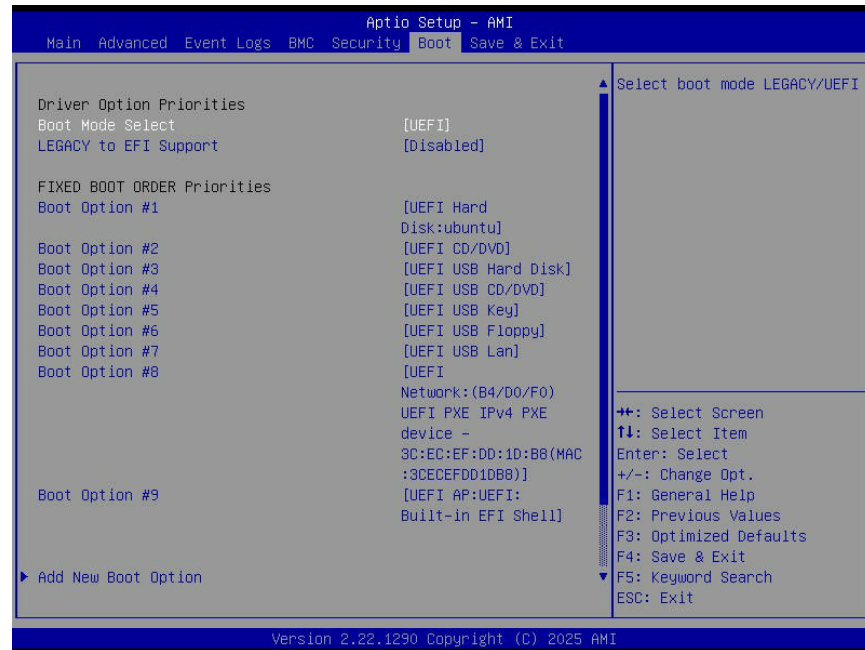
Use this feature to set and save the timestamps for the authorized signatures, which indicates the time when these signatures are entered into the system. These values also indicate sizes, keys, and key sources of the authorized timestamps. Select Update to update the Authorized TimeStamps. Select Append to append the Authorized TimeStamps.

►OsRecovery Signatures (dbr)

Use this feature to set and save the Authorized Signatures used for OS recovery. Select Update to update the OS Recovery Signatures. These values also indicate sizes, keys, and key sources of the OsRecovery signatures. Select Append to append the OS Recovery Signatures.

4.7 Boot

Use this menu to configure Boot settings:



Driver Option Priorities

Boot Mode Select

Use this feature to select the type of devices from which the system will boot. The options are Legacy, **UEFI**, and Dual. Note that the available options are motherboard-dependent.

 **Note:** When "Boot Mode Select" is set to Dual, all OPRM-related features will be set to Legacy.

LEGACY to EFI Support

Select Enabled to boot EFI OS support after Legacy boot order has failed. The options are **Disabled** and Enabled.

FIXED BOOT ORDER Priorities

This feature prioritizes the order of a bootable device from which the system will boot. Press <Enter> on each item sequentially to select devices.

When "Boot Mode Select" is set to Dual, the following features will be displayed for configuration:

- Boot Option #1 – Boot Option #17

When "Boot Mode Select" is set to Legacy, the following features will be displayed for configuration:

- Boot Option #1 – Boot Option #8

When "Boot Mode Select" is set to UEFI, the following features will be displayed for configuration:

- Boot Option #1 – Boot Option #9

►Add New Boot Option (Available when any storage device is detected by the BIOS)

Use this submenu to add a new boot option to the boot priority features for system boot.

Add boot option

Use this feature to specify the name for the new boot option.

Path for boot option

Use this feature to enter the path for the new boot option in the format fsx:\path\filename.efi.

Boot option File Path

Use this feature to specify the file path for the new boot option.

Create

After setting the name and the file path for the boot option, press <Enter> to create the new boot option in the boot priority list.

►Delete Boot Option

Use this feature to select a boot device to delete from the boot priority list.

Delete Boot Option

Use this feature to remove an EFI boot option from the boot priority list.

►UEFI Hard Disk Drive BBS Priorities

Use this feature to set the system boot order of detected devices.

►UEFI NETWORK Drive BBS Priorities

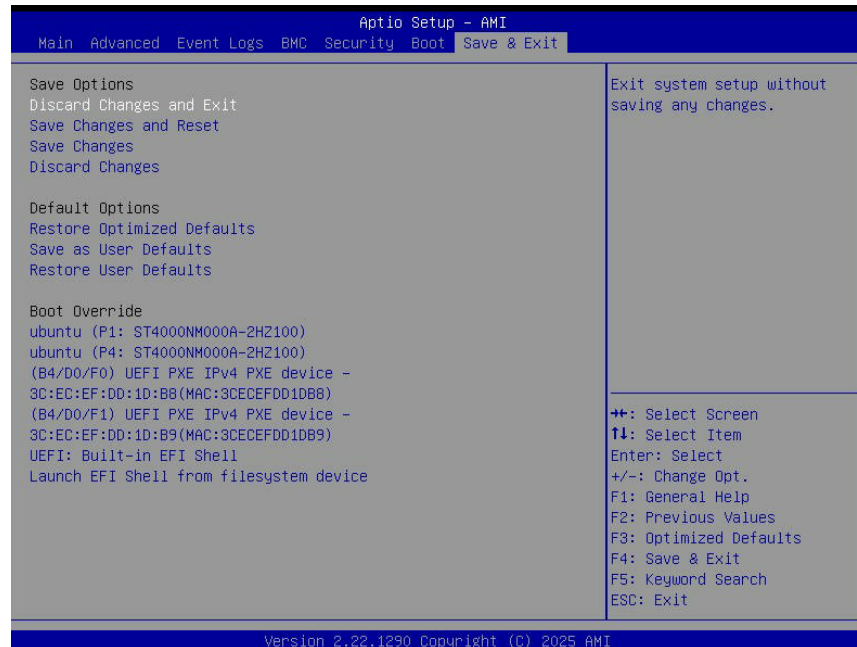
Use this feature to set the system boot order of detected devices.

►UEFI Application Boot Priorities

Use this feature to set the system boot order of detected devices.

4.8 Save & Exit

Select Save & Exit from the BIOS Setup screen to configure the settings below.



Save Options

Discard Changes and Exit

Use this feature to exit from the BIOS Setup utility without making any permanent changes to the system configuration and reboot the computer.

Save Changes and Reset

On completing the system configuration changes, use this feature to exit the BIOS Setup utility and reboot the computer for the new system configuration parameters to take effect.

Save Changes

On completing the system configuration changes, use this feature to save all changes made. This will not reset (reboot) the system.

Discard Changes

Select this feature and press <Enter> to discard all changes made and return to the BIOS Setup utility.

Default Options

Restore Optimized Defaults

Select this feature and press <Enter> to load manufacturer optimized default settings, which are intended for maximum system performance but not for maximum stability.



Note: Reboot the system for the changes to take effect to ensure that the system has the optimized default settings.

Save as User Defaults

Select this feature and press <Enter> to save all changes as the default values specified to the BIOS Setup utility for future use.

Restore User Defaults

Select this feature and press <Enter> to retrieve user-defined default settings that have been saved previously.

Boot Override



Note: Use this section to override the Boot priorities sequence in the Boot menu, and immediately boot the system with a device specified here instead of the one specified in the boot list. This is a one-time boot override.

Launch EFI Shell from filesystem device

Use this feature to launch EFI shell application (Shell.efi) from one of the available filesystem devices. A filesystem is a virtual, logical, or physical system for organizing, managing, and accessing the files and directories on devices such as SSDs, HDDs, or other storage device.

Appendix A

BIOS POST Codes

A.1 BIOS POST Codes

The AMI BIOS supplies additional checkpoint codes, which are documented online at <https://www.supermicro.com/support/manuals/> ("AMI BIOS POST Codes User's Guide").

When BIOS performs the Power On Self Test, it writes checkpoint codes to I/O port 0080h. If the computer cannot complete the boot process, a diagnostic card can be attached to the computer to read I/O port 0080h (Supermicro P/N AOM-SPI80-V).

For information on AMI updates, please refer to <https://www.ami.com/products/>.

Appendix B

Software

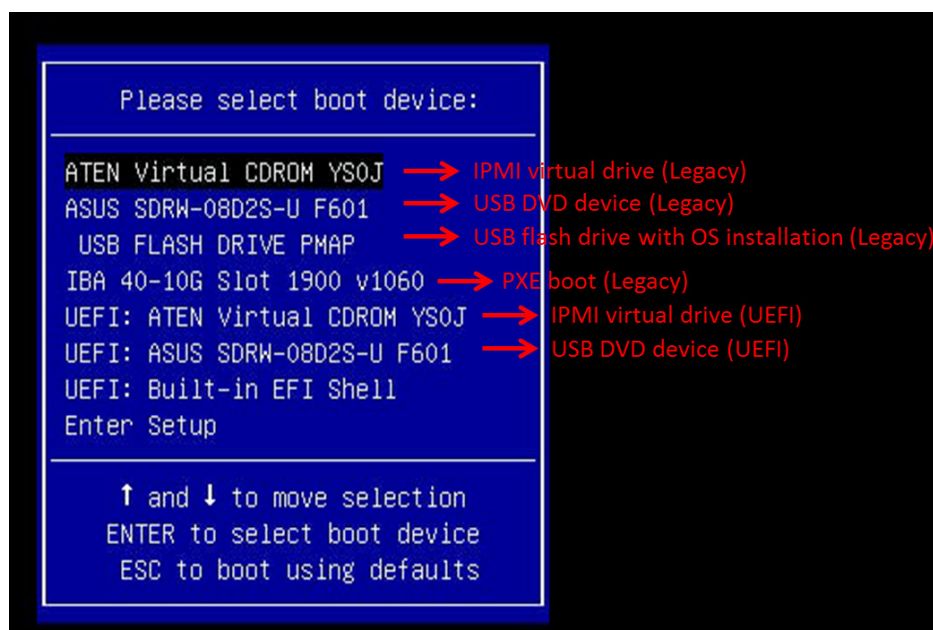
After the hardware has been installed, you can install the Operating System (OS), configure RAID settings, and install the drivers.

B.1 Microsoft Windows OS Installation

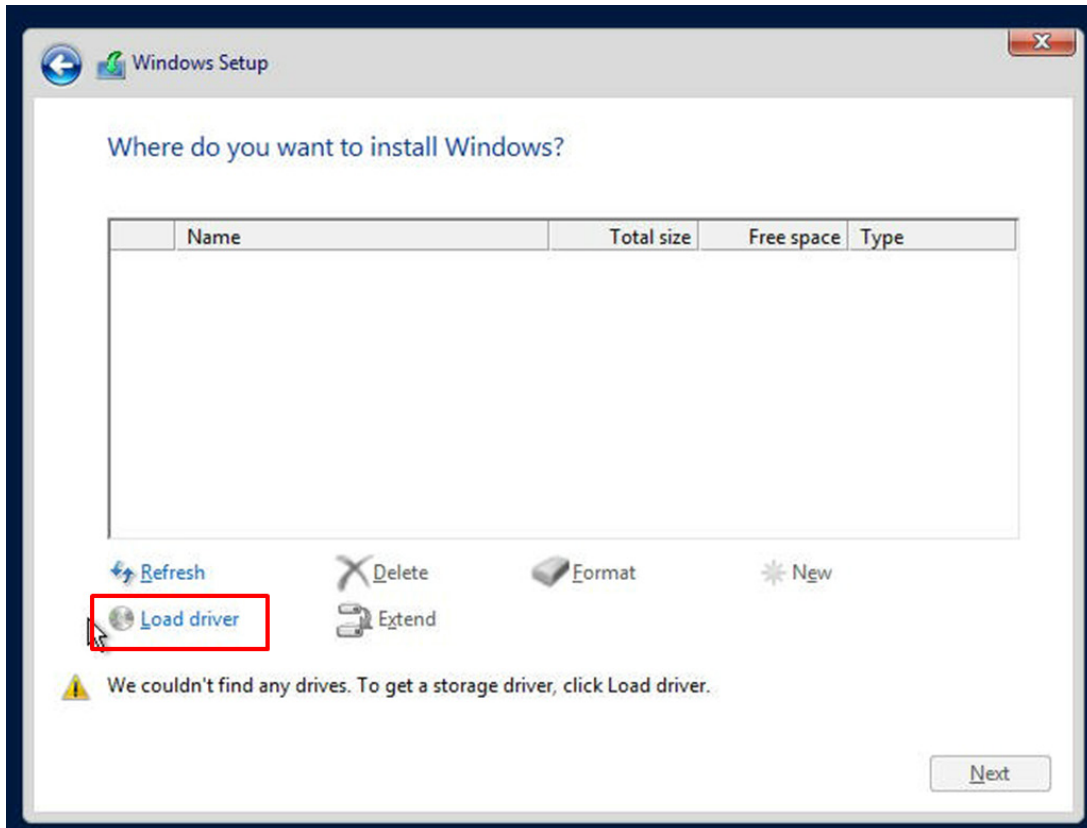
If you will be using RAID, you must configure RAID settings before installing the Windows OS and the RAID driver. Refer to the RAID Configuration User Guides posted on our website at www.supermicro.com/support/manuals.

Installing the OS

1. Create a method to access the Microsoft Windows installation ISO file. That can be a USB flash or media drive.
2. Retrieve the proper RST/RSTe driver. Go to the Supermicro web page for your motherboard and click on "Download the Latest Drivers and Utilities", select the proper driver, and copy it to a USB flash drive.
3. Boot from a bootable device with Windows OS installation. You can see a bootable device list by pressing **F11** during the system startup.



4. During Windows Setup, continue to the dialog where you select the drives on which to install Windows. If the disk you want to use is not listed, click on “Load driver” link at the bottom left corner.



To load the driver, browse the USB flash drive for the proper driver files.

- For RAID, choose the SATA/sSATA RAID driver indicated then choose the storage drive on which you want to install it.
 - For non-RAID, choose the SATA/sSATA AHCI driver indicated then choose the storage drive on which you want to install it.
5. Once all devices are specified, continue with the installation.
 6. After the Windows OS installation has completed, the system will automatically reboot multiple times.

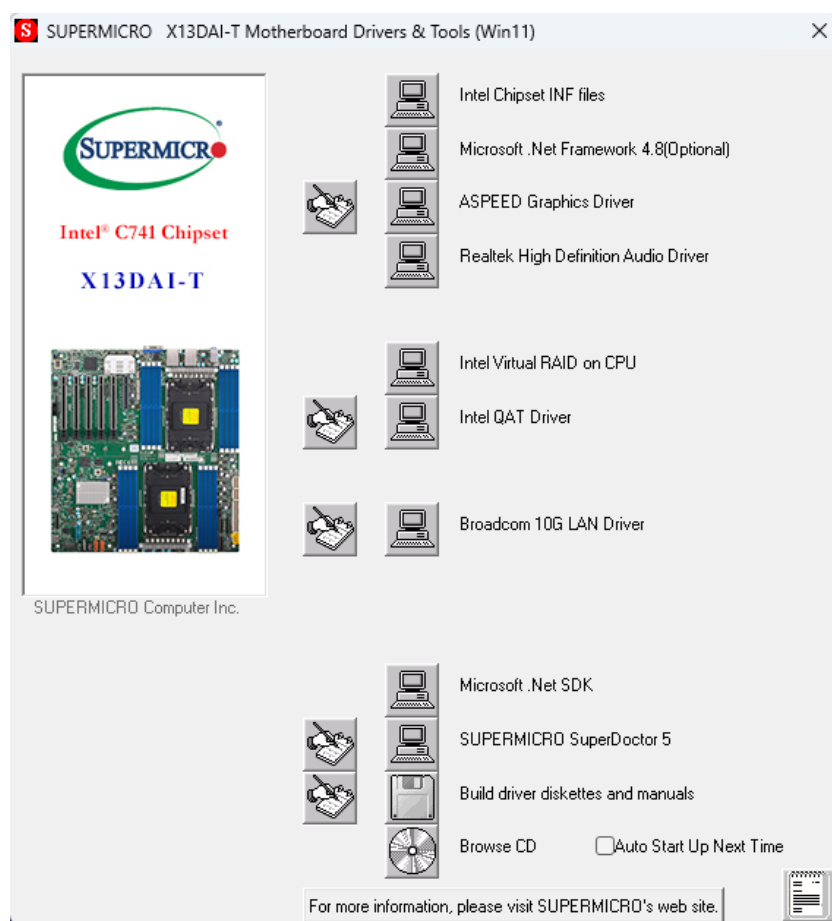
B.2 Driver Installation

The Supermicro website contains drivers and utilities for your system is at <https://www.supermicro.com/wdl/driver>. Some of these must be installed, such as the chipset driver.

After accessing the website, go into the CDR_Images (in the parent directory of the above link) and locate the ISO file for your motherboard. Download this file to a USB flash or media drive. (You may also use a utility to extract the ISO file if preferred.)

Another option is to go to the Supermicro website at <https://www.supermicro.com/products/>. Find the product page for your motherboard and download the latest drivers and utilities.

Insert the flash drive or disk and the screenshot shown below should appear.



Note: Click the icons showing a hand writing on paper to view the readme files for each item. Click the computer icons to the right of these items to install each item (from top to the bottom) one at a time. **After installing each item, you must re-boot the system before moving on to the next item on the list.** The bottom icon with a CD on it allows you to view the entire contents.

B.3 BMC

This motherboard supports the Baseboard Management Controller (BMC). BMC is used to provide remote access, monitoring and management. There are several BIOS settings that are related to BMC.

For general documentation and information on BMC, please visit our website at: <https://www.supermicro.com/products/nfo/BMC.cfm>.

B.4 Logging into the BMC (Baseboard Management Controller)

Supermicro ships standard products with a unique password for the BMC ADMIN user. This password can be found on a label on the motherboard.

When logging in to the BMC for the first time, please use the unique password provided by Supermicro to log in. You can change the unique password to a user name and password of your choice for subsequent logins.

For more information regarding BMC passwords, please visit our website at <https://www.supermicro.com/bmcpassword>.

Appendix C

Standardized Warning Statements

The following statements are industry standard warnings, provided to warn the user of situations which have the potential for bodily injury. Should you have questions or experience difficulty, contact Supermicro's Technical Support department for assistance. Only certified technicians should attempt to install or configure components.

Read this section in its entirety before installing or configuring components in the Supermicro chassis.

These warnings may also be found on our website at the following page:

https://www.supermicro.com/about/policies/safety_information.cfm.

Battery Handling



Warning! There is risk of explosion if the battery is replaced by an incorrect type. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

تحذير! يوجد خطر حدوث انفجار إذا تم استبدال البطارية بنوع غير صحيح. استبدل البطارية بنفس النوع أو نوع مكافئ موصى به من قبل الشركة المصنعة فقط. يجب التخلص من البطاريات المستخدمة وفقاً لإرشادات الجهة المصنعة.

警告！如果更换的电池类型不正确，有爆炸危险。更换电池时，请使用制造商推荐的相同或同等型号的电池。请按制造商的说明处理废旧电池。

警告！如果更換的電池類型不正確。請使用製造商建議之相同或功能相當的電池更換原有電池。請按照製造商的說明指示處理廢棄舊電池。

Advarsel! Der er risiko for eksplosion, hvis batteriet skiftes med et batteri af den forkerte type. Batteriet må kun skiftes med et batteri af samme eller tilsvarende type, der anbefales af producenten. Opbrugte batterier skal bortskaffes i henhold til vejledningerne fra producenten.

Waarschuwing! Er bestaat een explosiegevaar als de batterij wordt vervangen door een onjuist type. Vervang de batterij alleen door hetzelfde type of een soortgelijk type aanbevolen door de fabrikant. Verwijder gebruikte batterijen overeenkomstig de instructies van de fabrikant.

Varoitus! Väärän tyyppisen akun käyttö voi aiheuttaa räjähdysvaaran. Vaihda akku vain valmistajan suosittelemaan samaan tai vastaavaan tyyppiseen akkuun. Hävitä käytetyt paristot valmistajan ohjeiden mukaisesti.

Attention! Il y a un risque d'explosion si la batterie est remplacée par une d'un type incorrect. Remplacez la batterie uniquement par une d'un type identique ou équivalent recommandé par le fabricant. Éliminez les batteries usagées conformément aux instructions du fabricant.

Warnung! Es besteht Explosionsgefahr, wenn die Batterie durch einen falschen Typ ersetzt wird. Ersetzen Sie die Batterie ausschließlich durch denselben oder einen vom Hersteller empfohlenen gleichwertigen Typ. Entsorgen Sie gebrauchte Batterien gemäß den Anweisungen des Herstellers.

אזהרה! קיימת סכנת פיצוץ אם הסוללה תוחלף בסוללה מסוג שגוי. החלף את הסוללה רק בסוללה מאותו סוג או בסוללה מקבילה המומלצת על ידי היצרן. השלך סוללות משומשות בהתאם להוראות היצרן.

चेतावनी! यदि बैटरी को गलत प्रकार से बदला जाता है तो विस्फोट का जोखिम है। बैटरी को केवल निर्माता द्वारा अनुशंसित समान या समकक्ष प्रकार से ही बदलें। इस्तेमाल की गई बैटरियों का निपटान निर्माता के निर्देशों के अनुसार करें।

警告！電池を間違ったタイプに交換すると爆発する危険があります。交換する電池はメーカーが推奨するタイプ、または同等のものを使用してください。使用済み電池は、メーカーの指示に従って廃棄してください。

경고! 배터리를 잘못된 종류로 교체하면 폭발의 위험이 있습니다. 기존 배터리와 동일하거나 제조사에서 권장하는 동등한 종류의 배터리로만 교체해야 합니다. 제조사의 안내에 따라 사용된 배터리를 처리하여 주십시오.

Advarsel! Det er fare for eksplosjon hvis batteriet byttes ut med et av feil type. Batterier skal kun byttes ut med et av lik eller tilsvarende type, som anbefalt av produsenten. Kast brukte batterier i henhold til produsentens instruksjoner.

¡Advertencia! Existe riesgo de explosión si se sustituye la batería por una de tipo incorrecto. Reemplace la batería únicamente con el mismo tipo o uno equivalente recomendado por el fabricante. Deseche las baterías usadas de acuerdo con las instrucciones del fabricante.

Varning! Det finns risk för explosion om batteriet byts ut mot en felaktig typ. Byt endast ut batteriet mot ett batteri av samma eller likvärdig typ som rekommenderas av tillverkaren. Kassera förbrukade batterier i enlighet med tillverkarens anvisningar.

Connection to Earth



Warning! Equipment shall be connected to an Earth mains socket-outlet.

تحذير! يجب توصيل الأجهزة بمقبس كهربائي أرضي.

警告！设备应连接到接地电源插座。

警告！應將設備連接至接地電源插座。

Advarsel! Dette udstyr skal sluttet til en jordforbundet stikkontakt.

Waarschuwing! De apparatuur moet worden aangesloten op een geaard netstopcontact.

Varoitus! Laitteet on kytkettävä maadoitettuun pistorasiaan.

Attention! L'équipement doit être connecté à une prise de courant avec mise à la terre.

Warnung! Das Gerät muss an eine geerdete Netzsteckdose angeschlossen werden.

אזהרה! יש לחבר את הציוד לשקע חשמל עם הארקה.

चेतावनी! उपकरण को एक अर्थ मेन्स सॉकेट-आउटलेट से जोड़ा जाना चाहिए।

警告！機器は、接地主電源コンセントに接続するものとします。

경고! 장비는 접지된 전원 콘센트에 연결해야 합니다.

Advarsel! Utstyret skal kobles til en jordet stikkontakt.

¡Advertencia! El equipo deberá conectarse a una toma de corriente con conexión a tierra.

Varning! Utrustningen ska vara ansluten till ett jordat eluttag.

Product Disposal



Warning! Ultimate disposal of this product should be handled according to all national laws and regulations.

تحذير! يجب التخلص النهائي من هذا المنتج وفقا لجميع القوانين واللوائح الوطنية.

警告！本产品的废弃处理应根据所有国家的法律和规章进行。

警告！本產品的廢棄處理應根據所有國家的法律和規章進行。

Advarsel! Dette produkt skal bortskaffes i henhold til alle nationale love og regler.

Waarschuwing! De uiteindelijke verwijdering van dit product dient te geschieden in overeenstemming met alle nationale wetten en voorschriften.

Varoitus! Tämän tuotteen lopullinen hävittäminen on suoritettava kaikkien kansallisten lakien ja määräysten mukaisesti.

Attention! La mise au rebut ou le recyclage de ce produit sont généralement soumis à des lois et/ou directives de respect de l'environnement. Renseignez-vous auprès de l'organisme compétent.

Warnung! Die endgültige Entsorgung dieses Produkts muss gemäß allen nationalen Gesetzen und Vorschriften erfolgen.

אזהרה! סילוק סופי של מוצר זה חייב להתבצע בהתאם לכל החוקים והתקנות הלאומיים.

चेतावनी! इस उत्पाद का अंतिम निपटान सभी राष्ट्रीय कानूनों और नियमों के अनुसार किया जाना चाहिए।

警告! この製品を廃棄処分する場合、国の関係する全ての法律・条例に従い処理する必要があります。

경고! 이 제품은 해당 국가의 관련 법규 및 규정에 따라 폐기되어야 합니다.

Advarsel! Når produktet til slutt skal kasseres, må det håndteres i henhold til alle nasjonale lover og forskrifter.

¡Advertencia! Al deshacerse por completo de este producto debe seguir todas las leyes y reglamentos nacionales.

Varning! Slutgiltigt bortskaffande av denna produkt ska ske i enlighet med alla nationella lagar och förordningar.