



X12SPT-PT

USER'S MANUAL

Revision 1.0

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Note: For the most up-to-date version of this manual, see our website at www.supermicro.com.

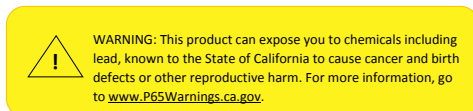
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Manual Revision 1.0

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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 motherboard.

About This Motherboard

Supermicro X12SPT-PT built with Intel® C621A PCH supports a 3rd Generation Intel Xeon® Scalable Processor (LGA 4189 in Socket P+) with up to 40 cores, 270W Thermal Design Power (TDP)^{Note 1, Note 2} and system memory capacity with up to 2TB, speeds of up to 3200 MT/s^{Note 3, Note 4, Note 5}. This motherboard features superior IO expandability, which includes two PCIe 4.0 x16 slots for riser cards, one PCIe 4.0 x8 slot, eight SATA 3.0 ports (two for SuperDOMs, six for the proprietary ADP RSC card), and two rear USB ports (3.2 Gen 1). This motherboard also offers the most advanced data protection capability that encompasses Trusted Platform Module (TPM) and Root of Trust (RoT) support. X12SPT-PT is optimized for high-density, high-end computing platforms for big data, virtualization, and enterprise applications. Note that this motherboard is intended to be installed and serviced by professional technicians only. For processor/memory updates, refer to our website at <http://www.supermicro.com/products/>.



Note 1: Supermicro X12 TwinPro system is designed to cap at 600W per node. When system node power is over 600W, power capping function will be enabled and cause CPU throttling. When system power is below 600W, CPU will resume to normal operation automatically.



Note 2: Intel Optane™ Persistent Memory (PMem) 200 Series are supported by the 3rd Gen. Intel Xeon Scalable (83xx/63xx/53xx/4314) series processors.



Note 3: X12SPT-PT supports 3DS LRDIMM/LRDIMM/3DS RDIMM/RDIMM DDR4 ECC memory with speeds of 3200/2933/2666 MHz and Intel Optane PMem 200 Series with speeds of up to 3200 MHz. The 2TB of memory capacity support is based on eight 256GB DDR4 DIMMs or four 512GB Intel Optane PMem 200 Series DIMMs populated on the motherboard.



Note 4: Supported memory data transfer rate is subject to the specification of processor.

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:



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



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



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



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.

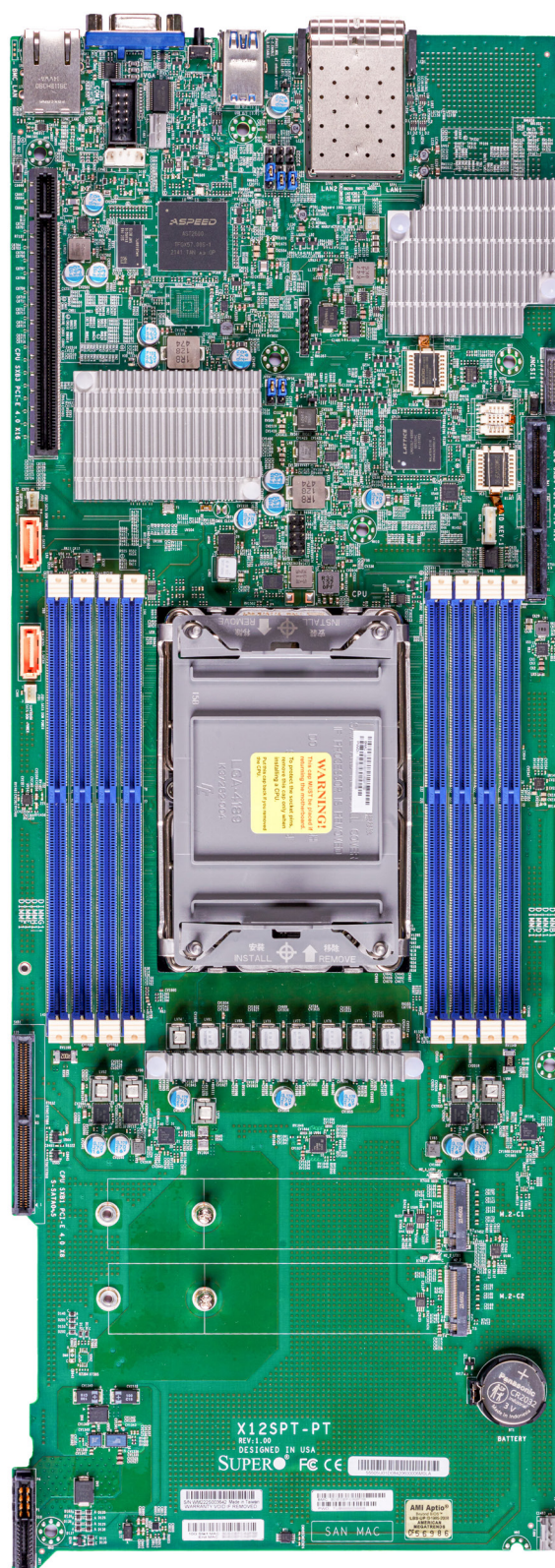
1.1 Important Links

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

- Supermicro product manuals: <http://www.supermicro.com/support/manuals/>
- Product drivers and utilities: <https://www.supermicro.com/wdl/driver>
- Product safety info: http://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: <http://www.supermicro.com/support/manuals/>
- If you have any questions, contact our support team at: support@supermicro.com

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

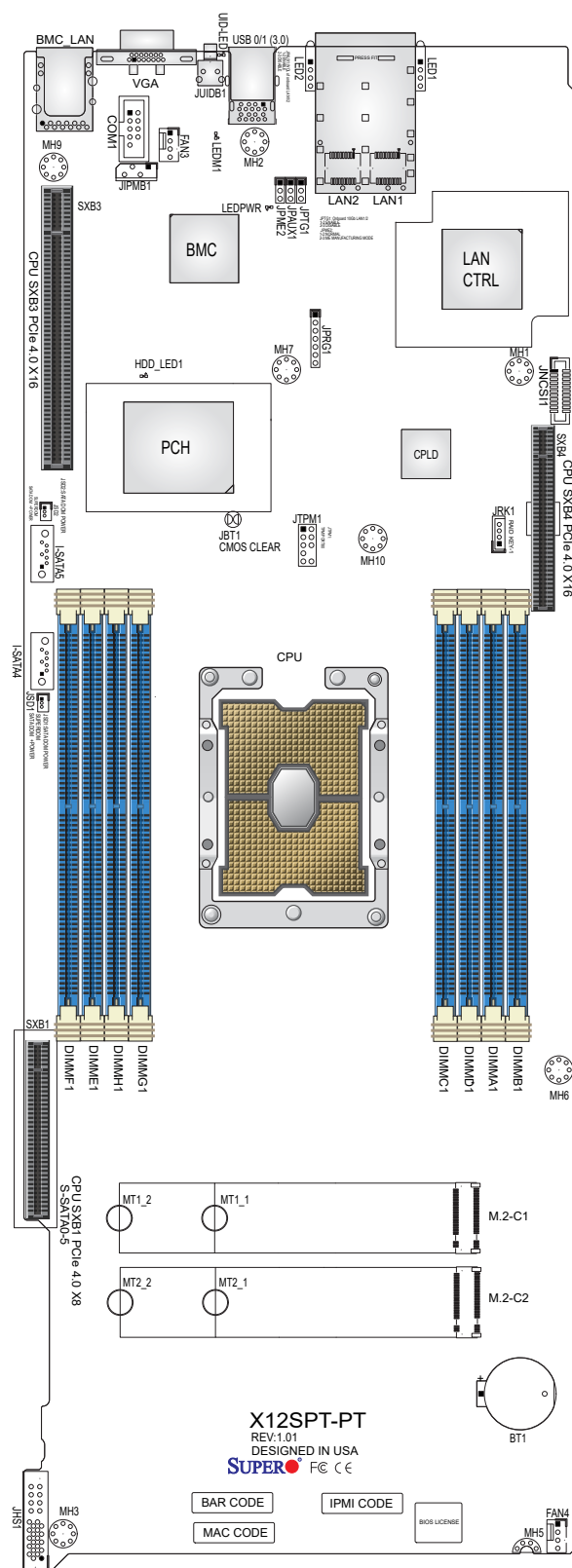
X12SPT-PT Motherboard Image



 **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.

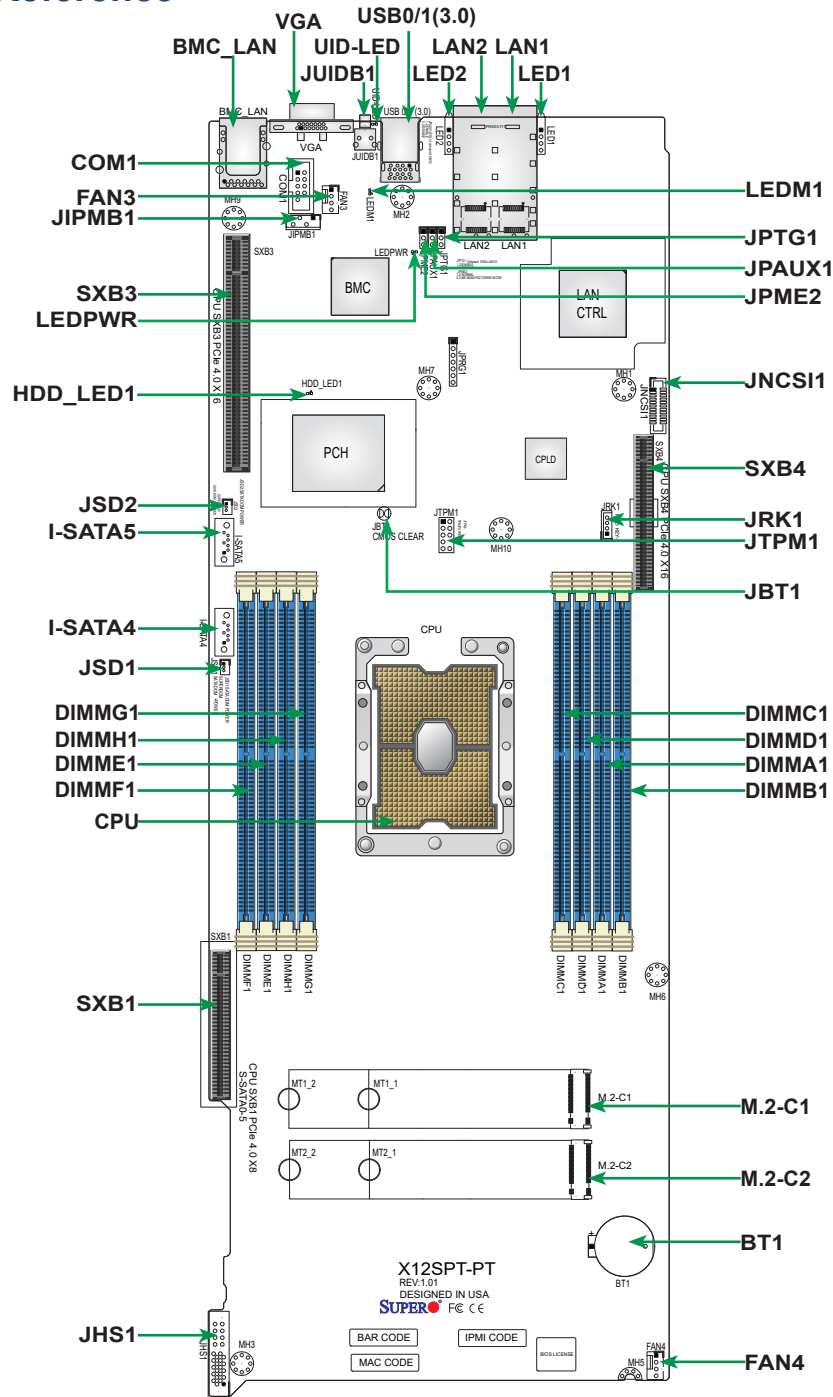
Motherboard Layout

(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 JHS1 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 possible explosion.

Quick Reference Table

Jumper	Description	Default Setting
JBT1	CMOS Clear	Open (Normal)
JPAUX1	10Gb LAN1/LAN2 AUX Power Enable/Disable *Consult Supermicro before enabling this jumper. There must be sufficient airflow to enable JPAUX1 in standby mode (S5 state).	Pins 2-3 (Disabled)
JPME2	ME Manufacturing Mode	Pins 1-2 (Normal)
JPTG1	10Gb LAN1/LAN2 Enable/Disable	Pins 1-2 (Enabled)
LED	Description	Status
HDD_LED1	HDD Activity LED	Blinking Green: HDD Active
LED1, LED2	SFP+ Port LEDs	Blinking Green (Bottom): Activity Solid Green (Top): 10 Gbps Link Speed Solid Yellow (Top): 1 Gbps Link Speed
LEDM1	BMC Heartbeat LED	Blinking Green: BMC Normal (Active) Solid Green: during BMC Reset or during a Cold Reboot
LEDPWR	Power LED	LED On: Onboard Power On
UID-LED	Unit Identifier (UID) LED	Solid Blue: Unit Identified
Connector	Description	
BMC_LAN	Dedicated BMC LAN Port	
BT1	Onboard CMOS Battery	
COM1	Front Accessible COM Port Header	
FAN3, FAN4	4-pin CPU Fan Headers	
I-SATA4, I-SATA5	Intel PCH Powered I-SATA 3.0 Ports with support for SuperDOM (Disk on Module) devices	
JHS1	Supermicro Proprietary Front Control Panel Header	
JIPMB1	4-pin BMC External I ² C Header	
JNCSI1	NC-SI (Network Controller Sideband Interface) Connector	
JSD1, JSD2	SATA DOM (Disk-On-Module) Power Connector	
JTPM1	Trusted Platform Module/Port 80 Connector	
JUIDB1	Unit Identifier (UID) Switch / BMC Reset Button	
LAN1, LAN2	10Gb SFP+ Ports	
M2-C1, M2-C2	M.2 M-Key 2280/22110 (supports PCIe 4.0 x4) Slot	
S-SATA0 - S-SATA5	Intel PCH S-SATA 3.0 Ports (SW RAID 0, 1, 5, 10)	
SXB1	PCIe 4.0 x8 Slot supported by CPU for Supermicro proprietary riser card and six SATA connections (S-SATA0 - S-SATA5) supported by PCH	
SXB3	PCIe 4.0 x16 Slot supported by CPU for the Supermicro proprietary riser card	
SXB4	PCIe 4.0 x16 Slot supported by CPU for the Supermicro proprietary riser card	
USB0, USB1	Rear I/O USB Ports (USB 3.2 Gen 1)	



Note: Table is continued on the next page.

VGA	Rear VGA Port on the I/O back panel
VROC (JRK1)	Intel VROC Key Header for NVMe RAID support

 **Note 1:** For details on how to configure Network Interface Card (NIC) settings, refer to the Network Interface Card Configuration User's Guide posted on our website under the link: <http://www.supermicro.com/support/manuals/>.

 **Note 2:** For detailed instructions on how to configure VROC RAID settings, refer to the VROC RAID Configuration User's Guide posted on the web page under the link: <http://www.supermicro.com/support/manuals/>.

Motherboard Features

Motherboard Features	
CPU	
Supports a 3rd Gen. Intel Xeon Scalable Processor (LGA 4189 in Socket P+) with up to 40 cores and 270W TDP (Thermal Design Power)	
Memory	
Supports system memory capacity of up to 2TB, 3DS LRDIMM/LRDIMM/3DS RDIMM/RDIMM DDR4 ECC memory with speeds of 3200MHz, and Intel Optane Persistent Memory (PMem) 200 Series with speeds of up to 3200 MHz  Note 1: The 2TB of memory capacity support is based on eight 256GB DDR4 DIMMs or four 512GB Intel Optane PMem 200 Series DIMMs populated on the motherboard.  Note 2: Supported memory data transfer rate is subject to the specification of processor.  Note 3: Intel Optane PMem 200 Series are supported by the 3rd Gen. Intel Xeon Scalable (83xx/63xx/53xx/4314) series processors.	
DIMM Size	
Up to 256GB at 1.2V for the DDR4 memory module, up to 512GB for the Intel Optane PMem 200 series module  Note: For the latest CPU/memory updates, refer to our website at http://www.supermicro.com/products/motherboard.	
Chipset	
Intel PCH C621A	
Expansion Slots	
- One PCIe 4.0 x8 slot supported by CPU for Supermicro proprietary riser card and six SATA connections (S-SATA0 - S-SATA5) supported by PCH - One PCIe 4.0 x16 slot (SXB3) supported by CPU for the riser card - One PCIe 4.0 x16 slot (SXB4) supported by CPU for the riser card - Two M.2 in 2280 and 22110 form factors (two PCIe 4.0 x4)	
Network	
- Two rear 10Gb SFP+ ports via Intel X710 BM2 - One rear dedicated BMC LAN via AST2600	
Baseboard Management Controller (BMC)	
ASPEED AST2600	
Graphics	
ASPEED AST2600 Graphics Controller	
I/O Devices	
Serial (COM) Port	One front accessible serial port header (COM1)
SATA 3.0	- Six S-SATA 3.0 ports at 6GB/s (S-SATA0 - S-SATA5) via SXB1 slot - Two SATA 3.0 ports built-in power-pins for SuperDOM (I-SATA4, I-SATA5)
Video (VGA) Connections	One rear VGA port



Note: Table is continued on the next page.

Peripheral Devices

- Two rear USB ports (USB0/USB1, USB 3.2 Gen 1)

BIOS

- AMI BIOS
- ACPI 3.0 or later, PCI firmware 4.0 support, BIOS rescue hot-key, SPI dual/quad speed support, Real Time Clock (RTC) wake up, riser card auto detection support, and SMBIOS 3.0 or later

Power Management

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

System Health Monitoring

- Onboard voltage monitoring for +3.3V, +5V, +12V, +3.3Vstb, +5Vstb, Vcore, Vmem
- Onboard temperature monitoring for CPU, PCH, system, memory, and peripheral
- CPU thermal trip support
- Platform Environment Control Interface (PECI)/TSI

Fan Control

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

System Management

- SuperDoctor® 5
- Server platform service
- IPMIView, SMCIPMITOOL, IPMICFG
- Redundant power supply unit detection sensor
- Plug-in tools through Redfish

Firmware Integrity/System Security

- TPM (Trusted Platform Module) support
- Root of Trust (RoT) support to protect firmware security by detecting critical data corruption, and restoring platform integrity

LED Indicators

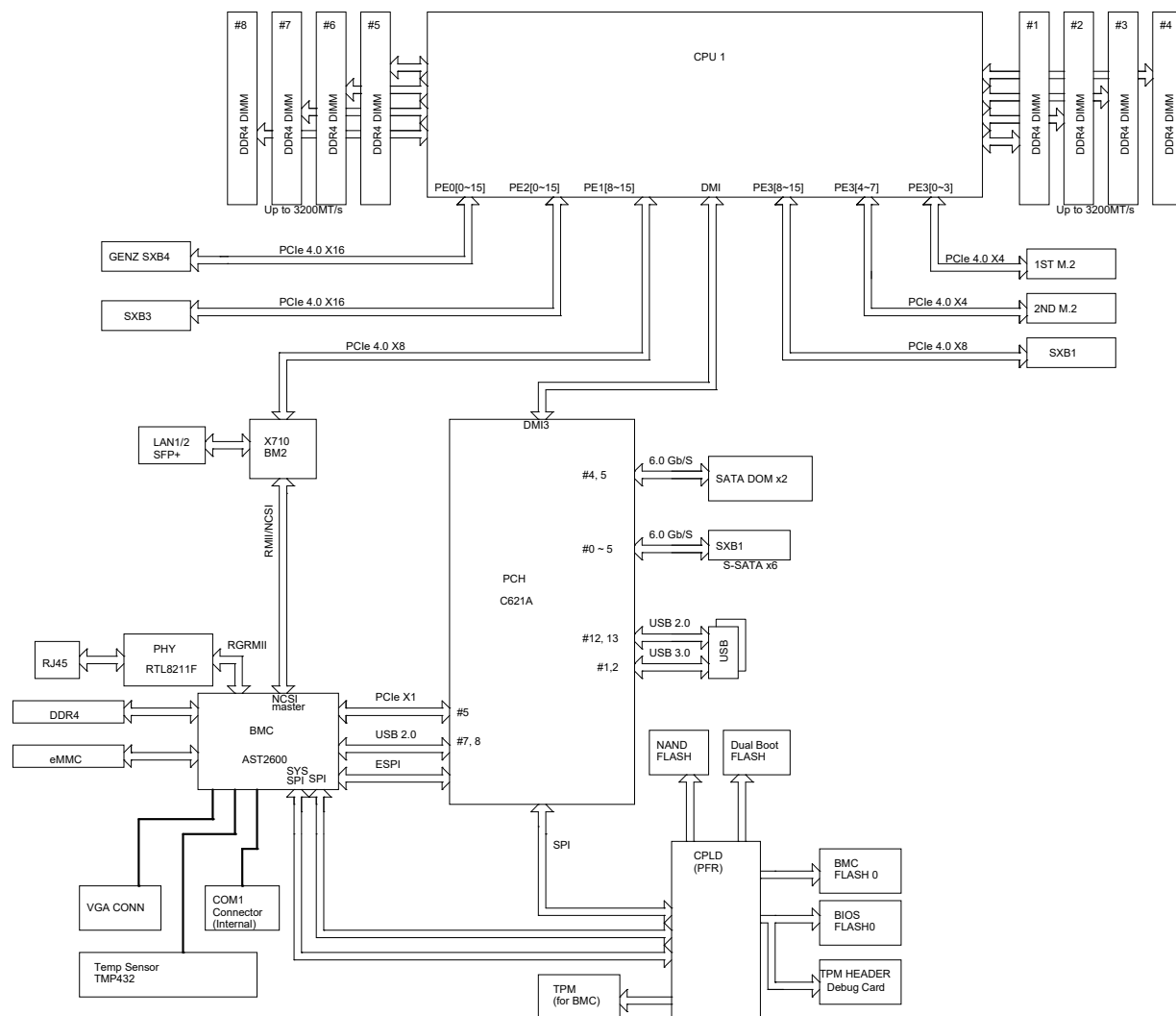
- CPU / System overheat LED
- Power / suspend-state indicator LED
- Fan failed LED
- UID / remote UID
- LAN activity LED

Dimensions

- Proprietary 6.8" (W) x 18.86" (L) (172.72 mm x 479.04 mm)

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

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



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 3rd Gen Intel Xeon Scalable Processor (Socket P+) and the Intel C621A chipset, the motherboard increases energy efficiency, and system performance for a multitude of applications such as high performance computing, Hyper-Converged Infrastructure, big data, and enterprise applications.

Features Supported

- Vector Neural Network Instructions (VNNI) support to accelerate training
- New hardware-enhanced security features help protect platform and data without compromising performance
- High PCIe performance (PCIe 4.0) with double the bandwidth of PCIe 3.0

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 a pre-defined threshold, system and CPU cooling fans will be turned on to prevent the CPU or the system from overheating.



Note: To avoid possible system overheating, be sure to provide adequate airflow to your system.

System Resource Alert

This feature is available when used with SuperDoctor 5® in the Windows OS environment. SuperDoctor is used to notify the user of certain system events. For example, you can configure SuperDoctor to provide you with warnings when the system temperature, CPU temperatures, voltages and fan speeds go beyond a predefined range.

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, 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.

1.7 Serial Port

The motherboard supports one serial communication connection (COM1). COM1 port header can be used for input/output. The UART provides legacy speeds with a baud rate of up to 115.2 Kbps as well as an advanced speed with baud rates of 250 K, 500K, or 1Mb/s, which support high-speed serial communication devices.

1.8 Intel® Optane™ Persistent Memory (PMem) 200 Series Overview

The 3rd Gen Intel Xeon Scalable Processor supports Intel Optane PMem 200 Series memory. Intel Optane PMem offers higher capacities than the traditional DDR4 modules. It also provides increased storage capabilities due to data persistence in a DDR4 form factor for higher performance computing platforms with flexible configuration options.

 **Note:** Intel Optane PMem 200 Series are supported by the 3rd Gen. Intel Xeon Scalable (83xx/63xx/53xx/4314) series processors.

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 possible explosion.

Unpacking

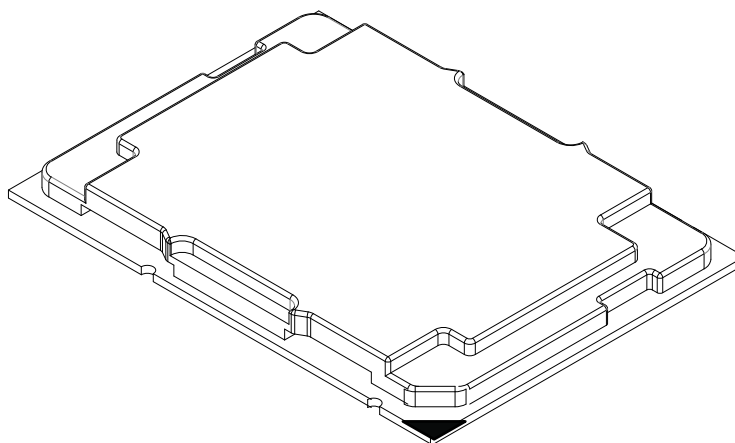
The motherboard is shipped in antistatic packaging to avoid static damage. When unpacking the motherboard, make sure that the person handling it is static protected.

2.2 Processor and Heatsink Installation

The processor (CPU) and processor carrier should be assembled together first to form the processor carrier assembly. This will be 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 below:

- Use ESD protection
- 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.

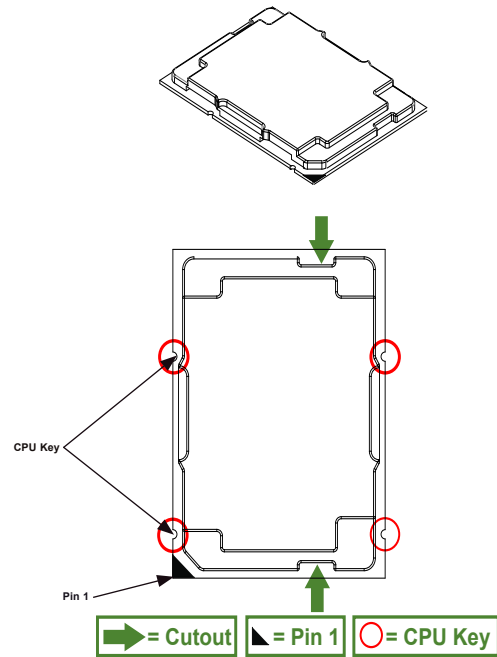
The 3rd Gen Intel Xeon Scalable Processor



Processor Top View

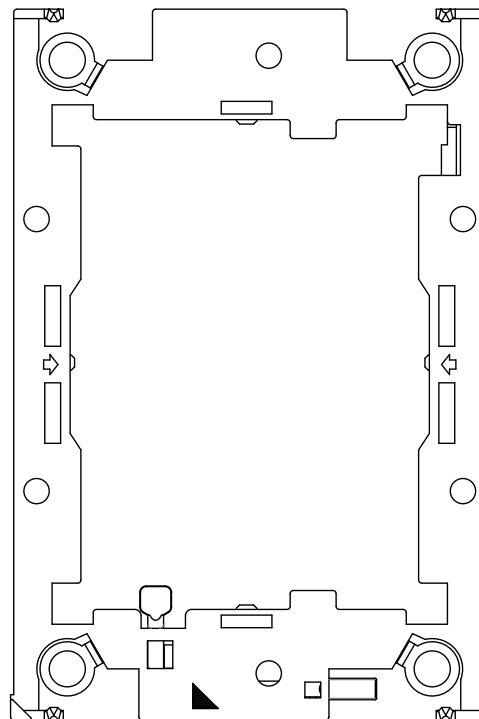
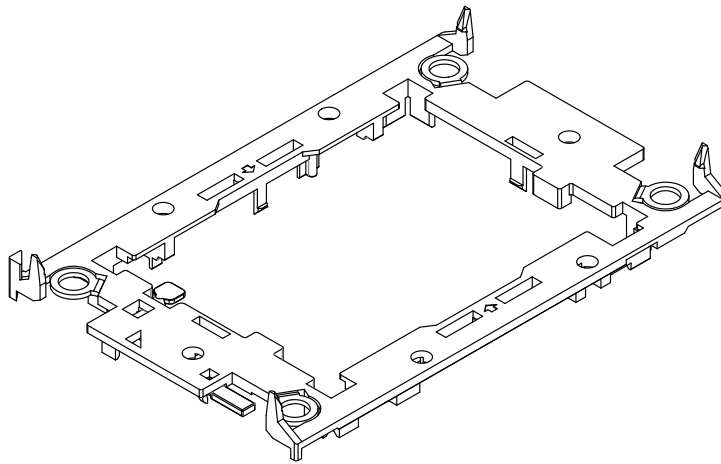
1. The 3rd Gen Intel Xeon Scalable Processor

Processor Top View (3D)



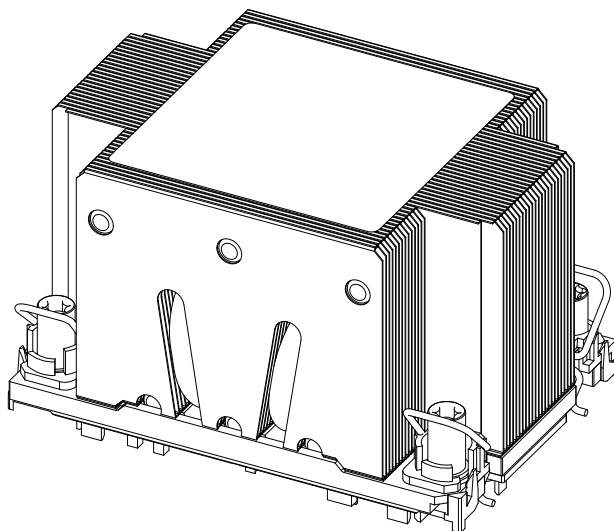
Processor Top View

2. The Processor Carrier



Carrier Bottom View

3. Heatsink

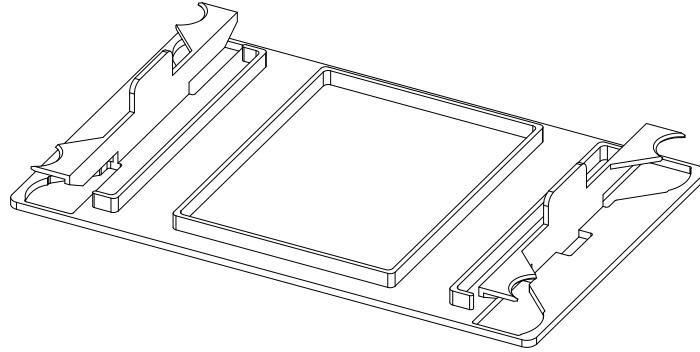


-  **Note 1:** All graphics in this manual are for illustrations only. Your heatsink may look different depending on the Supermicro X12 TwinPro system.
-  **Note 2:** Exercise extreme care when handling the heatsink. Pay attention to the edges of heatsink fins which can be sharp! To avoid damaging the heatsink, do not apply excessive force on the fins when handling the heatsink.

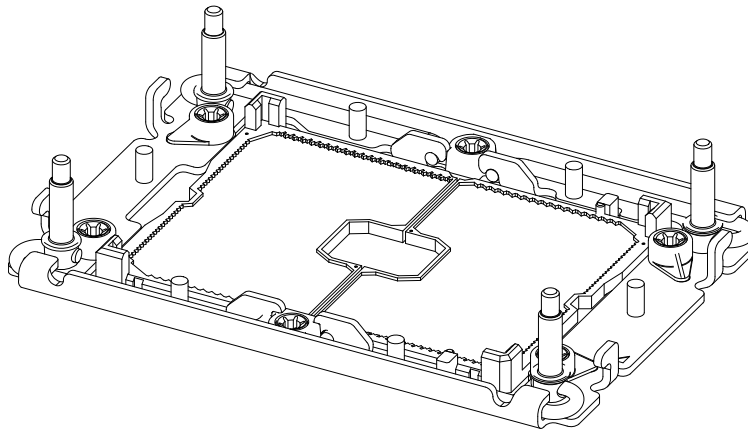
Overview of the CPU Socket

The CPU socket is protected by a plastic protective cover.

Plastic Protective Cover



CPU Socket

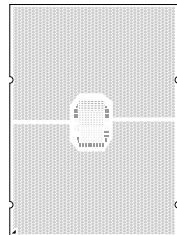


Overview of the Processor Carrier Assembly

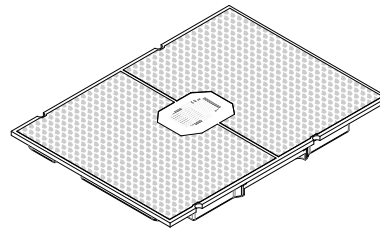
The processor carrier assembly contains a 3rd Gen Intel Xeon Scalable processor and a processor carrier. Carefully follow the instructions given in the installation section to place a processor into the carrier to create a processor carrier.

1. The 3rd Gen Intel Xeon Scalable Processor

Intel Processor (Bottom View)



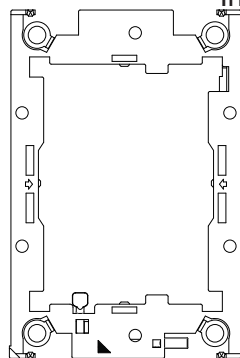
Processor (2D)



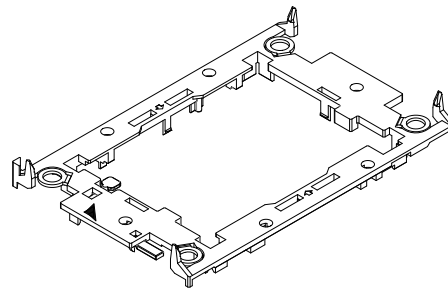
Processor (3D)

2. Processor Carrier

Intel Processor Carrier (Top View)



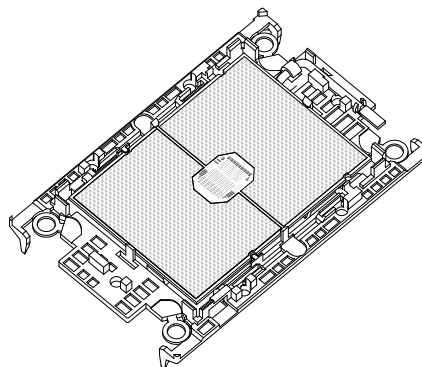
Processor Carrier (2D)



Processor Carrier (3D)



3. Processor Carrier Assembly

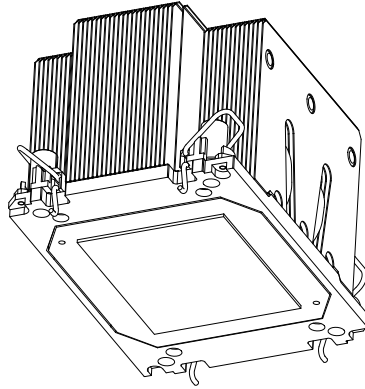


(with Processor Seated inside the Carrier)

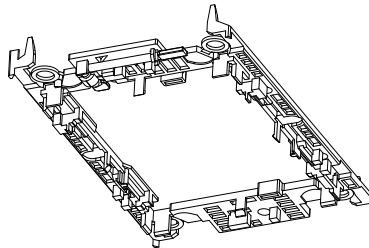
Overview of the Processor Heatsink Module

The Processor Heatsink Module (PHM) contains a heatsink, a processor carrier, and a 3rd Gen Intel Xeon Scalable processor.

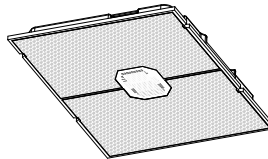
1. Heatsink (with Thermal Grease)



2. Processor Carrier



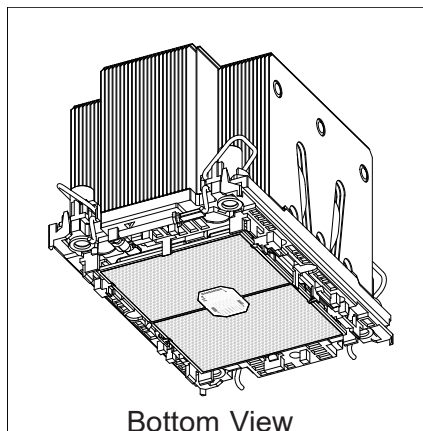
3. The 3rd Gen Intel Xeon Scalable Processor



Bottom View



4. Processor Heatsink Module (PHM)



Bottom View

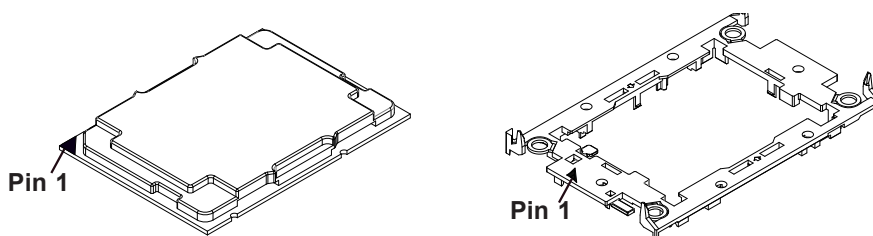
Creating the Processor Carrier Assembly

The processor carrier assembly contains a 3rd Gen Intel Xeon Scalable processor and a processor carrier.

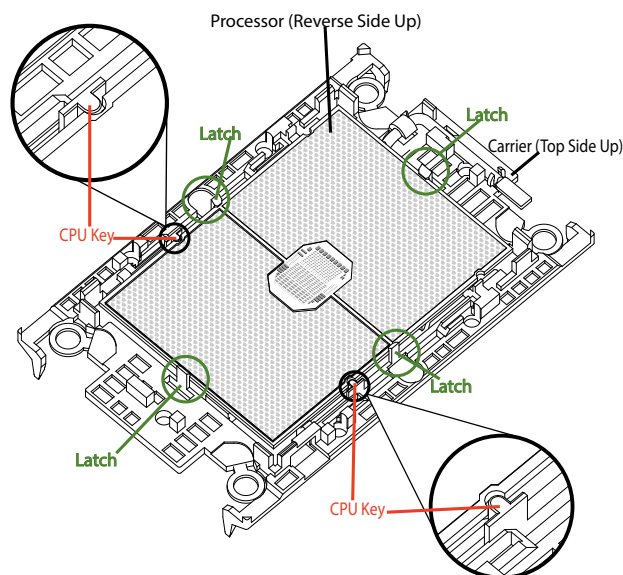
To create the processor carrier assembly, follow the steps below:

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

1. Hold the processor with the LGA lands (with Gold CPU 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 in the graphics below. Note that the triangle indicates Pin 1 location.

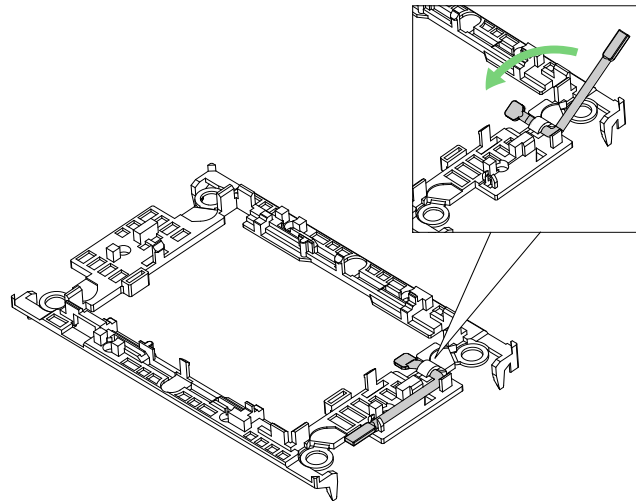


2. First, turn over the processor carrier and locate Pin 1 on the CPU and Pin 1 on the carrier. Then, turn the processor over with the processor reverse side (gold contacts) facing up and locate CPU keys on the processor. Finally, locate the CPU keys and four latches on the carrier as shown below.

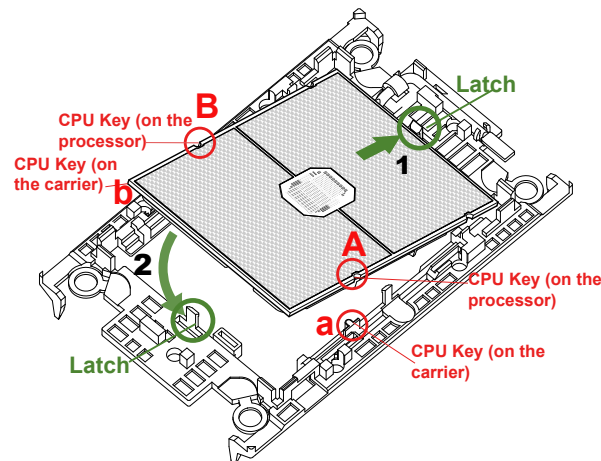


Carrier with the Processor Installed

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

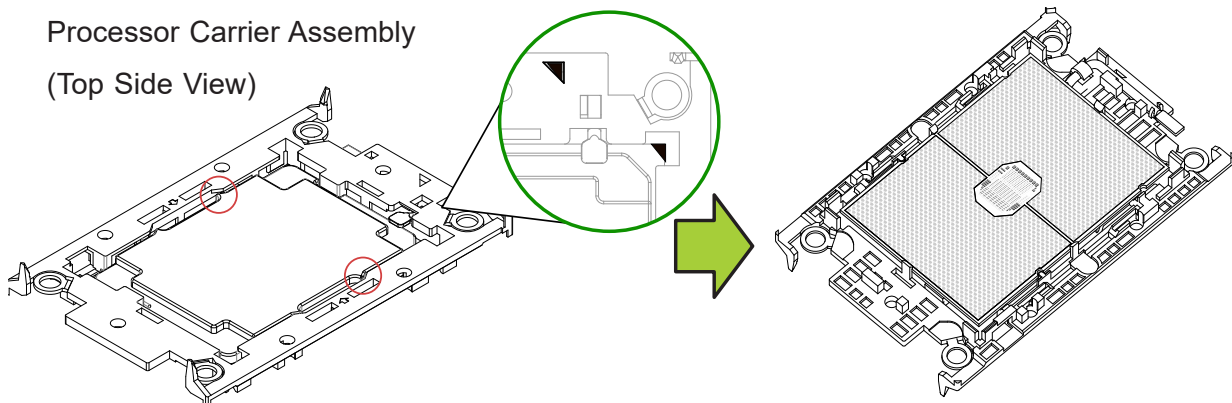


4. Using Pin 1 as a guide, carefully align the CPU keys (A & B) on the processor against the CPU keys on the carrier (a & b) as shown in the drawing below.
5. Once they are properly aligned, carefully place one end of the processor into the latch marked 1 on the carrier, and place the other end of processor into the latch marked 2.



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.

Processor Carrier Assembly
(Top Side View)



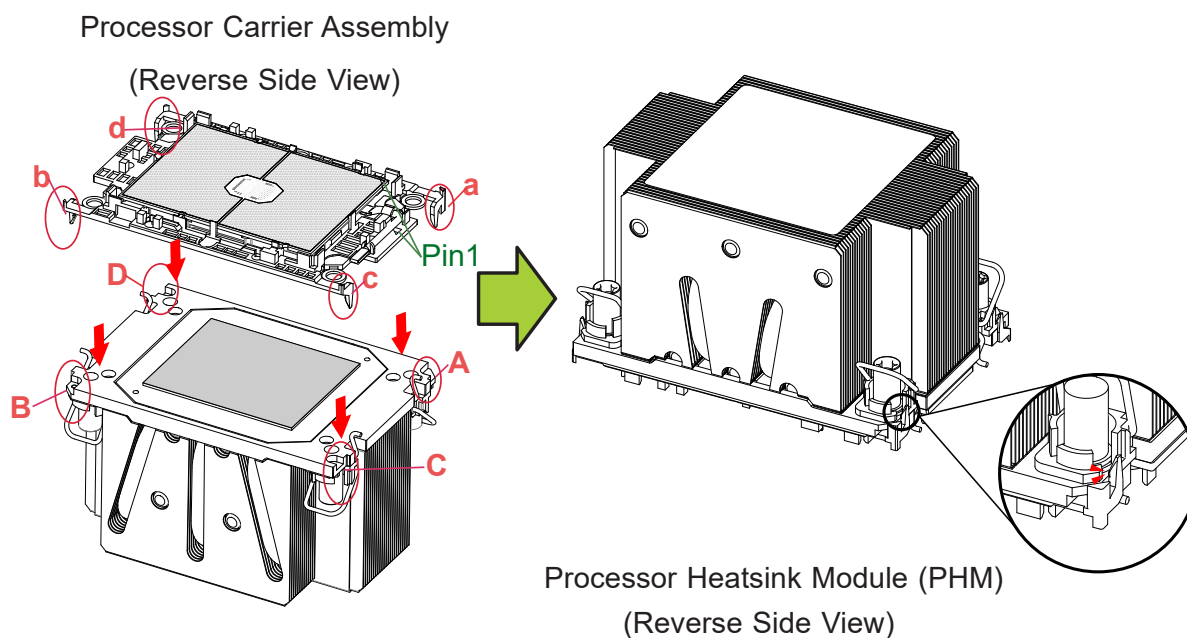
Processor Carrier Assembly

Creating the Processor Heatsink Module (PHM)

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

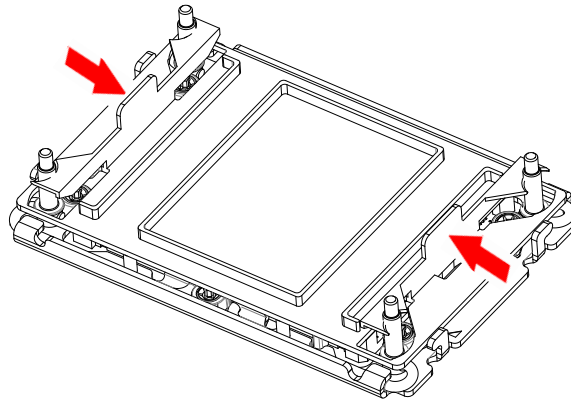
1. Turn the heatsink over with the thermal grease, which is on the reverse side of the heatsink, facing up. Pay attention to the two triangle cutouts (A, B) located at the diagonal corners of the heatsink as shown in the drawing below.
2. Hold the processor carrier assembly top side (with thermal grease) 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 Pin 1 (A) on the processor and Pin 1 (a) on the processor carrier assembly "a."
4. Align the corner marked "a" on the processor carrier assembly against the triangle cutout "A" on the heatsink, then align the corners marked "b," "c," and "d," on processor assembly against the corners marked "B," "C," and "D," on the heatsinks.
5. Once they are properly aligned, place the corner marked "a" on the processor carrier assembly into the corner of the heatsink marked "A." Repeat the same step to place the corners marked "b," "c," and "d" on the processor carrier assembly into the corners of the heatsink marked "B," "C," and "D" making sure that all plastic clips are properly attached to the heatsink.



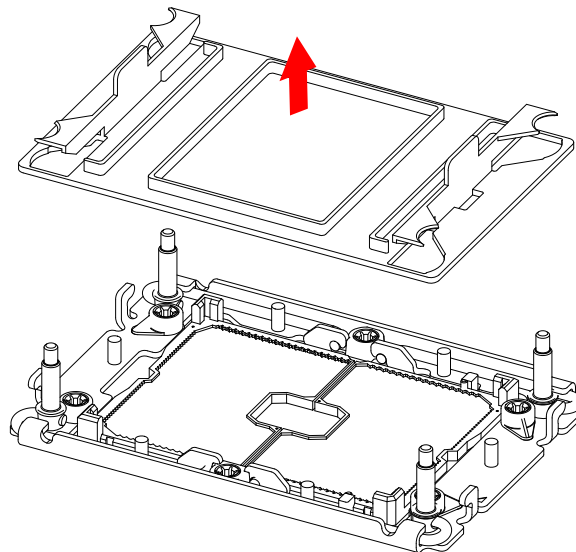
Preparing the CPU Socket for Installation

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

Removing the Plastic Protective Cover from the Socket



1. Press the tabs inward.

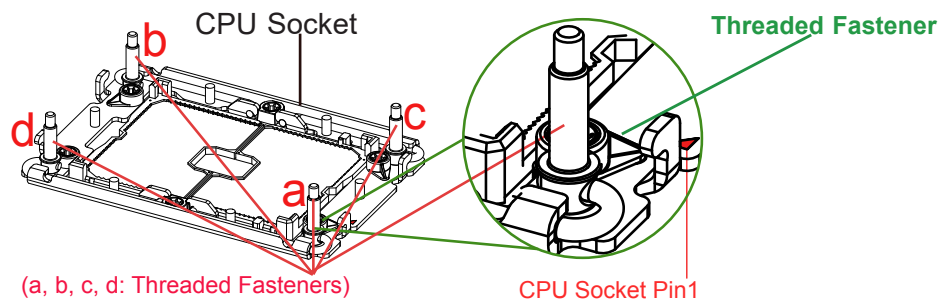


2. Pull up the protective cover from the socket.

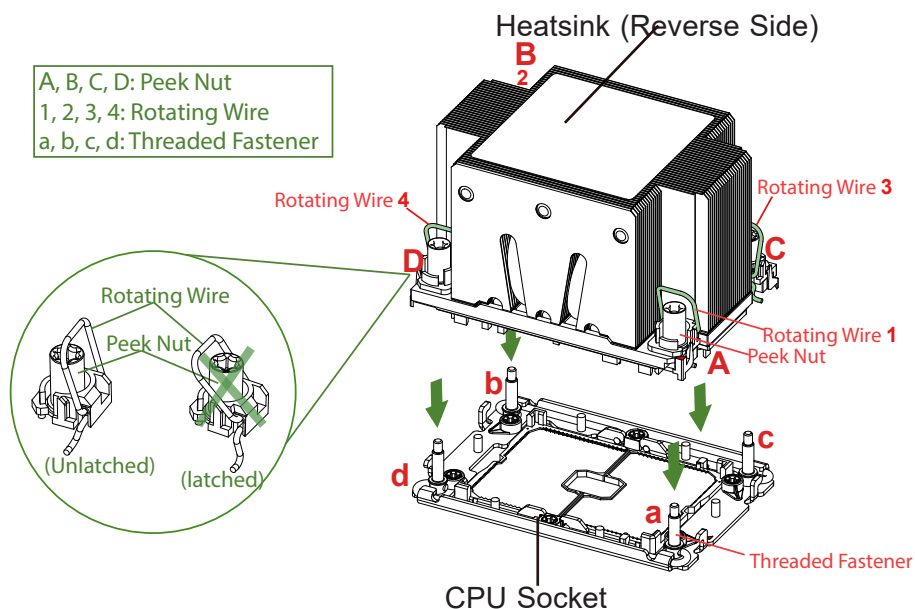
Preparing to Install the Processor Heatsink Module (PHM) into the CPU Socket

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

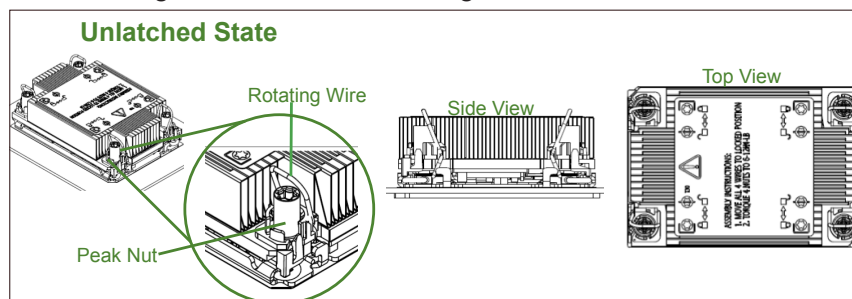
1. Locate four threaded fasteners (a, b, c, d) on the CPU socket.



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

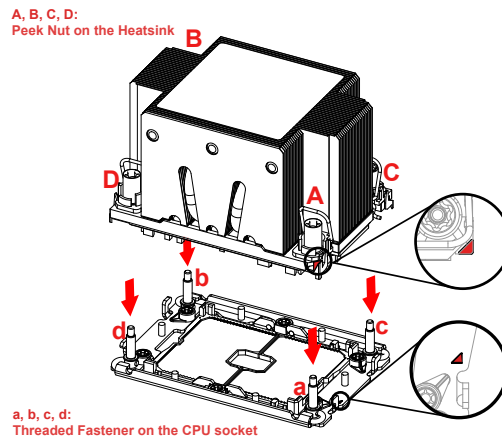


3. Check the rotating wires (1, 2, 3, 4) to make sure that they are at unlatched positions as shown in the drawing below before installing the PHM into the CPU socket.

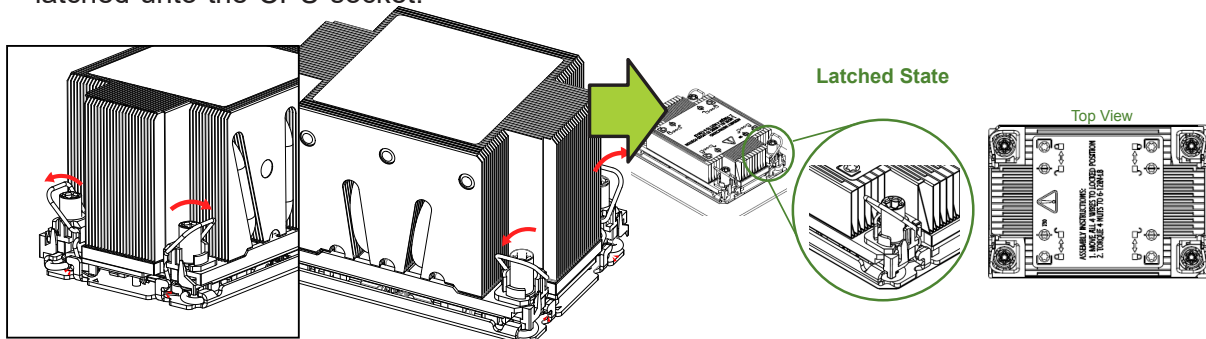


Installing the Processor Heatsink Module (PHM)

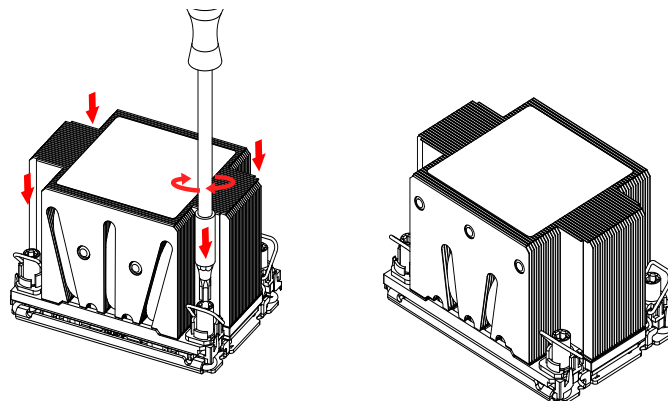
1. Align peek nut "A," which is next to the triangle (Pin 1) on the heatsink, against threaded fastener "a" on the CPU socket. Then align peek nuts "B," "C," and "D" on the heatsink against threaded fasteners "b," "c," and "d" on the CPU socket, making sure that all peek nuts on the heatsink are properly aligned with the correspondent threaded fasteners on the CPU socket.
2. Once they are aligned, gently place the heatsink on top 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.



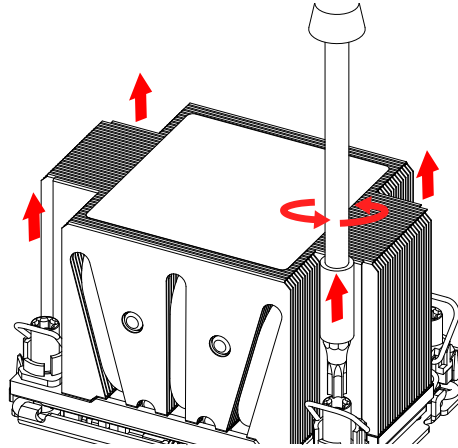
4. With a T30-bit screwdriver, tighten all peek nuts in the sequence of "A," "B," "C," and "D" with even pressure. To avoid damaging the processor or socket, do not use a force greater than 12 lbf-in when tightening the screws.
5. Examine all corners heatsink to ensure that the PHM is firmly attached to the CPU socket.



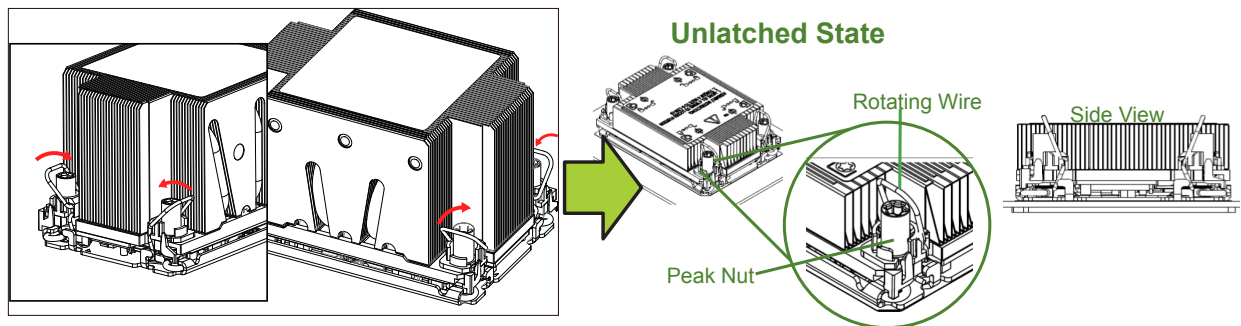
Removing the Processor Heatsink Module from the CPU Socket

Before removing the processor heatsink module (PHM) from the motherboard, unplug the AC power cord from all power supplies after shutting down the system. Then follow the steps below:

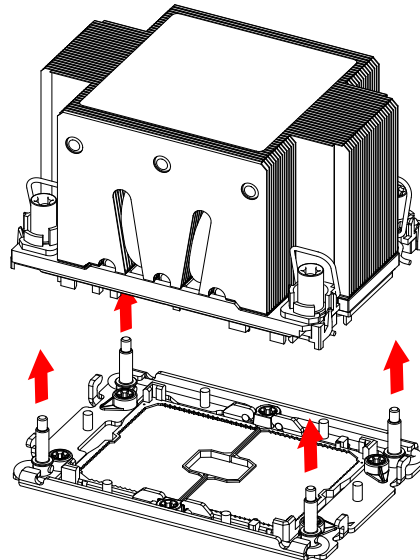
1. Use a T30-bit screwdriver to loosen the four peek nuts on the heatsink in the sequence of A, B, C, and D.



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 in the drawings below.



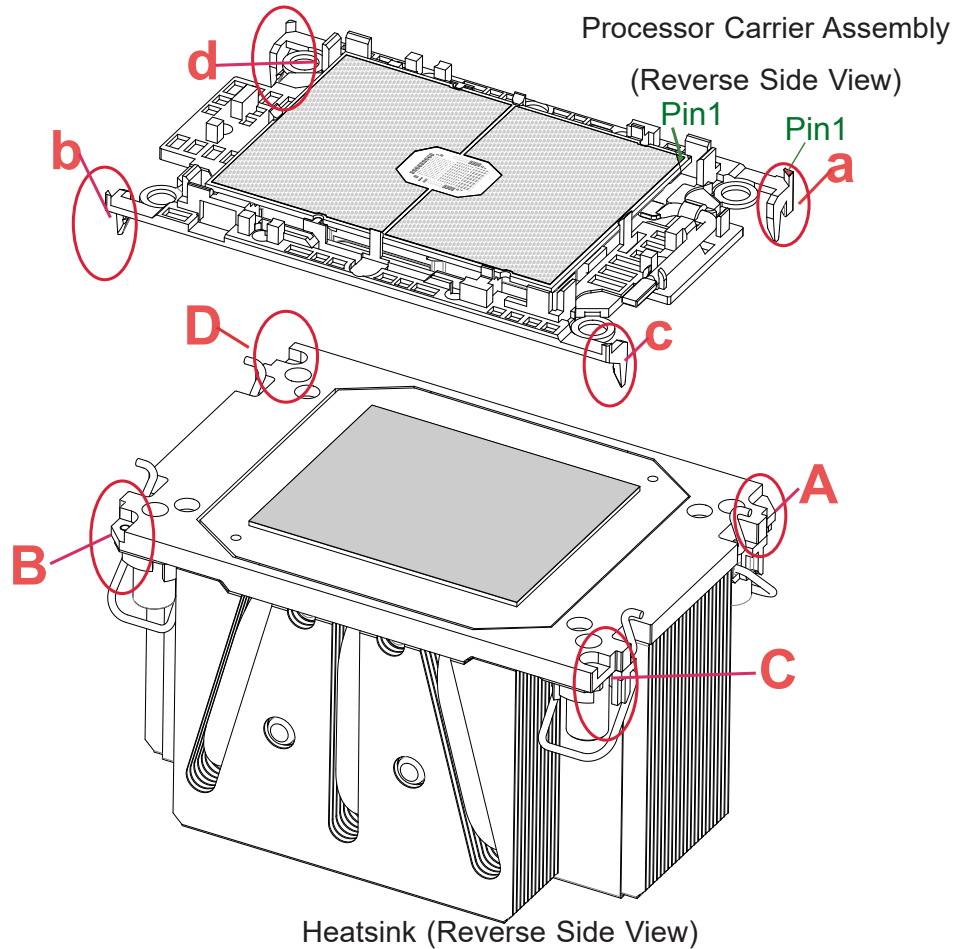
3. Gently lift the PHM upwards to remove it from the CPU socket.



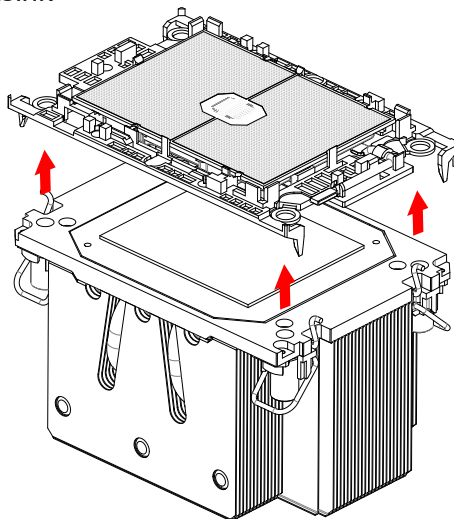
Removing the Processor Carrier Assembly from the Processor Heatsink Module (PHM)

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

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



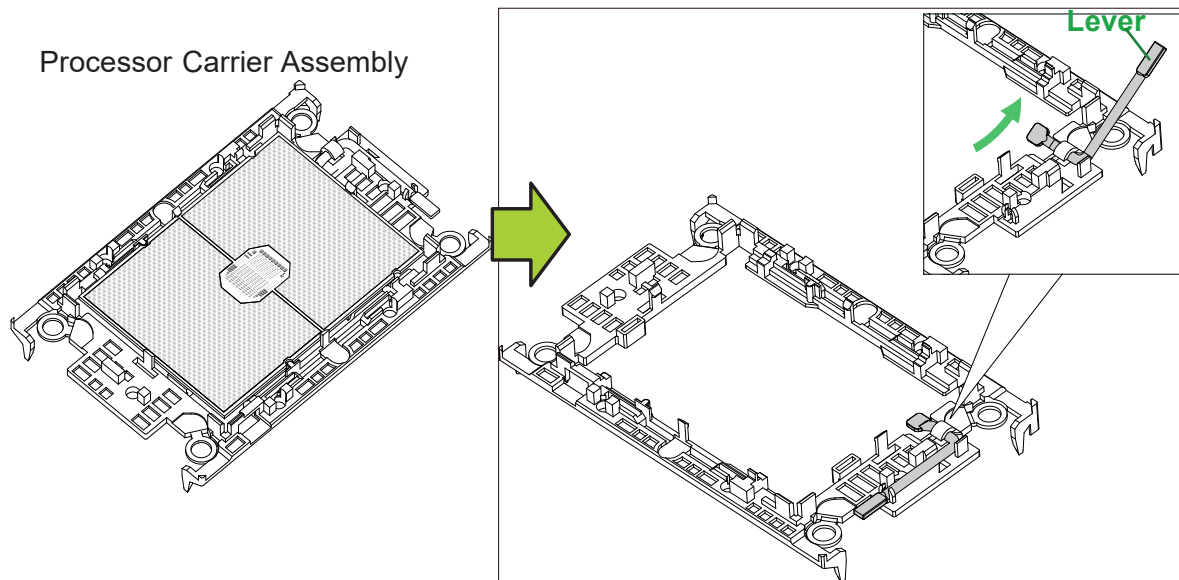
2. When all plastic clips are detached from the heatsink, remove the processor carrier assembly from the heatsink



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.

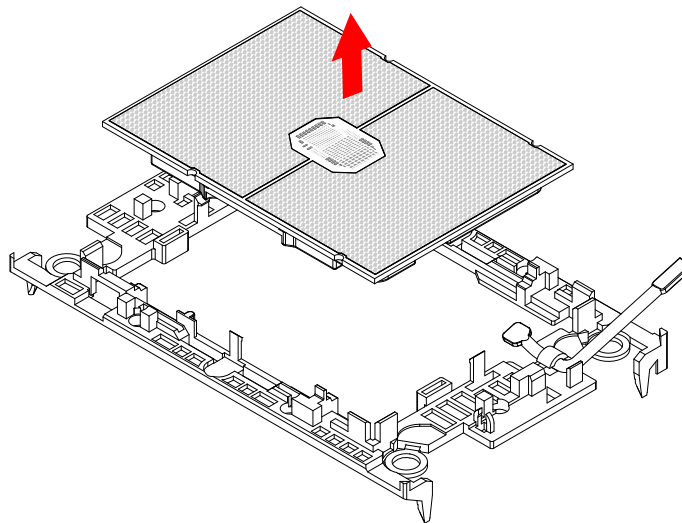
1. Unlock the lever from its locking position and push the lever upwards to disengage the processor from the processor carrier as shown in the right drawing below.



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



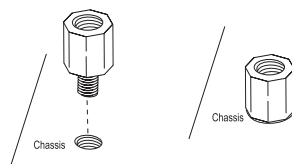
Note: To avoid damaging the processor and its pins, handle the processor with care.



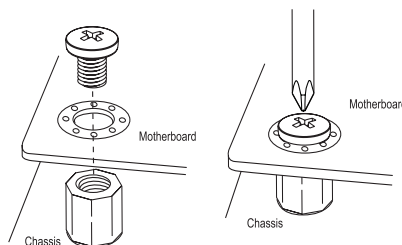
Installing the Motherboard

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 locations.



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 DIMM modules to prevent any possible damage.

Memory Support

The X12SPT-PT supports system memory capacity of up to 2TB, 3DS LRDIMM/LRDIMM/3DS RDIMM/RDIMM DDR4 ECC memory with speeds of 3200 MT/s, and Intel Optane PMem 200 Series with speeds of up to 3200 MHz. The 2TB of memory capacity support is based on four 256GB DDR4 DIMMs and four 512GB Intel Optane PMem 200 Series DIMMs populated on the motherboard.



Note 1: Intel Optane PMem 200 Series are supported by the 3rd Gen. Intel Xeon Scalable (83xx/63xx/53xx/4314) series processors.



Note 2: Supported memory data transfer rate is subject to the specification of processor.

DDR4 Memory Support for the 3rd Gen Intel Xeon Scalable Processor

DDR4 Memory Support for the 3rd Gen. Intel Xeon Scalable Processors				
Type	Ranks Per DIMM & Data Width	DIMM Capacity (GB)		Speed (MT/s); Voltage (V); Slots Per Channel (SPC) and DIMMs Per Channel (DPC)
		8Gb	16Gb	1DPC (1-DIMM Per Channel)
				1.2 V
RDIMM	SRx8	8GB	16GB	3200
	SRx4	16GB	32GB	
	DRx8	16GB	32GB	
	DRx4	32GB	64GB	
RDIMM 3Ds	(4R/8R) X4	2H- 64 GB 4H-128 GB	2H- 128 GB 4H-256 GB	
LRDIMM	QRx4	64GB	128GB	3200
LRDIMM 3Ds	(4R/8R) X4	4H-128 GB	2H- 128 GB 4H-256 GB	3200

Memory Population Table for the 3rd Gen Intel Xeon Scalable Processor

Memory Population Table (with 8 Slots)	
Number of DIMMs	Memory Population Sequence
1	DIMMA1
2	DIMMA1 / DIMME1
4	DIMMA1 / DIMME1 / DIMMC1 / DIMMG1
6	DIMMA1 / DIMME1 / DIMMC1 / DIMMG1 / DIMMB1 / DIMMF1
8	DIMMA1 / DIMME1 / DIMMC1 / DIMMG1 / DIMMB1 / DIMMF1 / DIMMD1 / DIMMH1



Note: This memory configuration is recommended by Supermicro for optimal memory performance. Use this configuration to maximize your memory performance.

Intel Optane PMem 200 Series Memory Population Table (with 8 Slots)

 **Note:** The Intel Optane PMem 200 Series are supported by the 3rd Gen. Intel Xeon Scalable (83xx/63xx/53xx/4314) series processors.

Intel Optane PMem 200 Series Population Table (8-DIMM, within 1 CPU socket)									
DDR4+PMem	Mode	DIMMA1	DIMMB1	DIMMC1	DIMMD1	DIMME1	DIMMF1	DIMMG1	DIMMH1
4+4	AD MM	DDR4	PMem	DDR4	PMem	DDR4	PMem	DDR4	PMem
		PMem	DDR4	PMem	DDR4	PMem	DDR4	PMem	DDR4
6+1	AD	PMem	DDR4	DDR4	DDR4	-	DDR4	DDR4	DDR4
		DDR4	PMem	DDR4	DDR4	DDR4	-	DDR4	DDR4
		DDR4	DDR4	PMem	DDR4	DDR4	DDR4	-	DDR4
		DDR4	DDR4	DDR4	PMem	DDR4	DDR4	DDR4	-
		-	DDR4	DDR4	DDR4	PMem	DDR4	DDR4	DDR4
		DDR4	-	DDR4	DDR4	DDR4	PMem	DDR4	DDR4
		DDR4	DDR4	-	DDR4	DDR4	DDR4	PMem	DDR4
		DDR4	DDR4	DDR4	-	DDR4	DDR4	DDR4	PMem

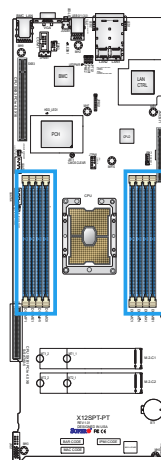
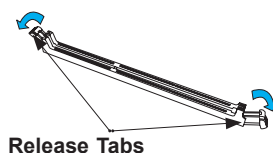
Legend (for the table above)	
DDR4 Type and Capacity	
DDR4	See Validation Matrix (DDR4 DIMMs validated with PMem)
Capacity	
PMem	Any Capacity (Uniformly for all channels for a given configuration)

- Mode definitions: AD = App Direct Mode, MM = Memory Mode.
- No mixing of PMem and NVDIMMs within the platform.
- For MM, NM/FM ratio is between 1:4 and 1:8. (NM = Near Memory (DRAM); FM = Far Memory (PMem)).
- Matrix targets configs for optimized PMem to DRAM cache ratio in MM mode.
- For each individual population, different PMem rearrangements among channels are permitted so long as the configuration doesn't break X12SP Memory population rules.
- Ensure the same DDR4 DIMM type and capacity are used for each DDR4 + PMem population.
- If the system detects an unvalidated configuration, then the system issues a BIOS warning. The CLI functionality is limited in non-POR configurations, and select commands will not be supported.

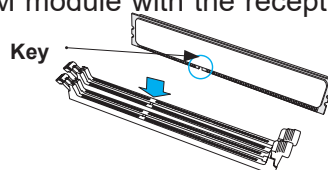
Validation Matrix (DDR4 DIMMS with PMem 200 Series)			
DIMM Type	Ranks Per DIMM & Data Width (Stack)	DIMM Capacity (GB)	
		DRAM Density	
		8Gb	16Gb
RDIMM (up to 3200)	1Rx8	N/A	N/A
	1Rx4	16GB	32GB
	1Rx8	16GB	32GB
	1Rx4	32GB	64GB
RDIMM 3DS (up to 3200)	4Rx4 (2H)	N/A	128GB
	8Rx4 (4H)	NA	256GB
LRDIMM (up to 3200)	4Rx4	64GB	128GB
LRDIMM 3DS (up to 3200)	4Rx4 (2H)	N/A	N/A
	8Rx4 (4H)	128GB	256GB

DIMM Installation

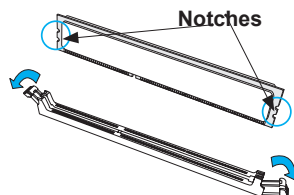
1. Insert the desired number of DIMMs into the memory slots based on the recommended DIMM population tables in the previous section. Locate DIMM memory slots on the motherboard as shown on the right.
2. Push the release tabs outwards on both ends of the DIMM slot to unlock it.



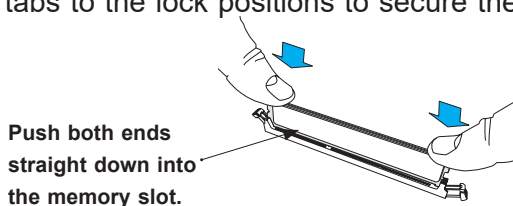
3. Align the key of the DIMM module with the receptive point on the memory slot.



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

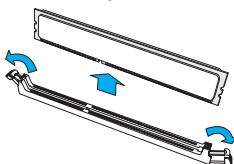


5. Push both ends of the module straight down into the slot until the module snaps into place.
6. Press the release tabs to the lock positions to secure the DIMM module into the slot.



DIMM Removal

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



Warning! Do not use excessive force when pressing the release tabs on the ends of the DIMM socket to avoid causing any damage to the DIMM module or the DIMM socket. Handle DIMM modules with care. Carefully follow all the instructions given on Page 1 of this chapter to avoid ESD-related damages done to your memory modules or components.

2.5 Rear I/O Ports

See Figure 2-1 below for the locations and descriptions of the various I/O ports on the rear of the motherboard.

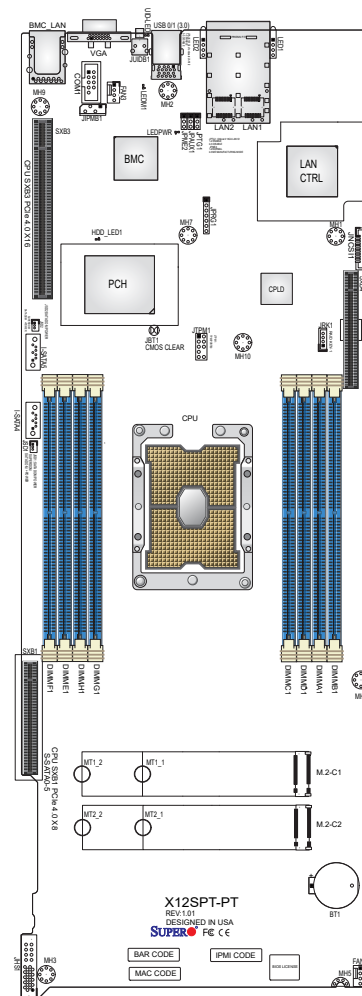
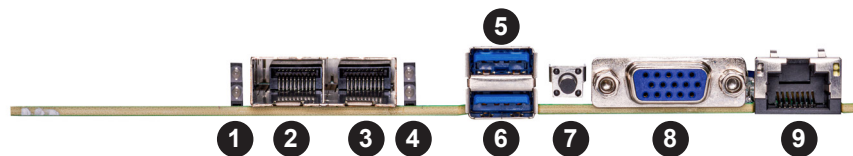


Figure 2-1. I/O Port Locations and Definitions



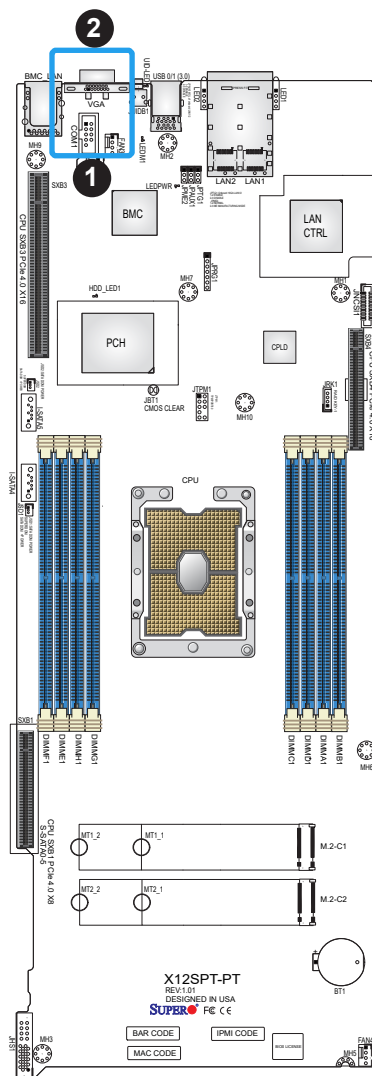
Rear I/O Ports					
#	Description	#	Description	#	Description
1	LED1	5	USB0 (3.2 Gen 1)	9	Dedicated BMC LAN
2	LAN1	6	USB1 (3.2 Gen 1)		
3	LAN2	7	UID Switch / BMC Reset Button		
4	LED2	8	(Rear) VGA Port		

COM Port Header

One COM (communication) port header (COM1) that supports serial link interface is on this motherboard. COM1 is located next to VGA port. Refer to the layout below for the location of COM1.

VGA Connection

There is one VGA connection in your system. The rear VGA port (VGA) is 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 port.



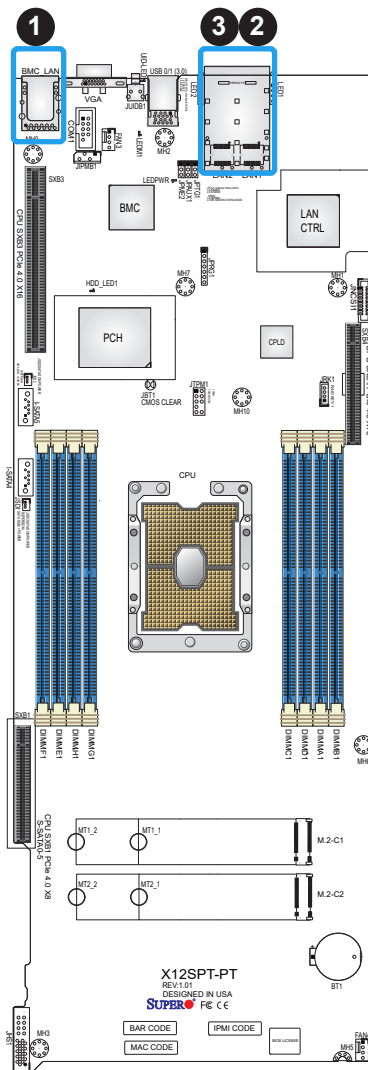
1. COM1
2. (Rear) VGA

LAN Port (Dedicated BMC LAN)

A dedicated BMC LAN port (BMC_LAN) is located on the rear I/O panel. The dedicated BMC LAN port, located on the rear I/O panel, provides LAN support for the Baseboard Management Controller (BMC). Refer to the LED Indicator section (Section 2.8) for LAN LED information.

SFP+ LAN Ports

Two SFP+ LAN ports (LAN1 and LAN2) are located on the rear I/O panel. The SFP+ LAN ports provide Ethernet 10Gb network connections. Refer to the LED Indicator section (Section 2.8) for LAN LED information.



1. BMC LAN Port
2. LAN1 (SFP+)
3. LAN2 (SFP+)

UID (Unit Identifier)/BMC Reset Switch and UID/BMC Reset LED Indicators

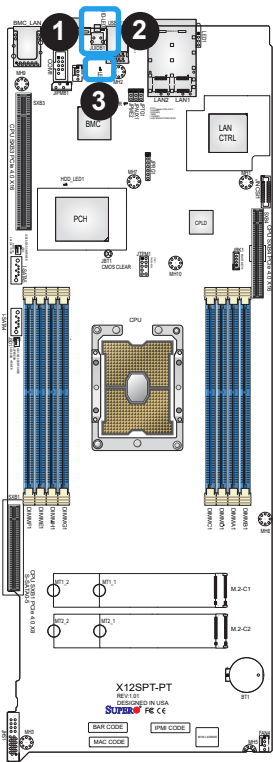
A UID/BMC Reset switch (JUIDB1) is located on the rear side of the motherboard. This switch has dual functions. It can be used to identify a system unit that is in need of service, and it can also be used to reset the BMC settings.

When functioning as a BMC reset switch, JUIDB1 will trigger a cold reboot when you press and hold the switch for six seconds. It will also restore the BMC to the manufacturer's default when you press and hold the switch for 12 seconds.

When functioning as a UID LED switch, JUIDB1 will turn the rear UID LED (UID-LED) on and off when you press the switch on/off.

To achieve these dual purposes, the UID LED/BMC Reset switch works in conjunction with the BMC Heartbeat LED (LEDM1) and rear UID LED (UID-LED). Note that UID can also be triggered via BMC on the motherboard. For more details on the UID LEDs and BMC LEDs, refer to the tables below. Also, refer to the BMC User's Guide posted on our website at www.supermicro.com for more information on BMC.

UID/BMC Reset Switch (JUIDB1) Features & Settings					
When Used as a UID LED Switch			When Used as a BMC Reset Switch		
Work w/Rear UID LED (UID-LED)			Work with BMC Heartbeat LED (LEDM1)		
Rear UID LED	UID-LED	Blue: Unit identified	BMC Heartbeat LED	LEDM1	Green Blinking: BMC Normal
Press the switch (JUIDB1) to turn on and off rear UID LED indicator.			BMC Reset: Press & hold the switch (JUIDB1) 6 seconds	LEDM1: Solid green: during reboot	Triggering a cold reboot; LED: solid green on during cold reboot
			BMC Reset: Press & hold the switch (JUIDB1) 12 seconds	LEDM1: Solid green: during BMC reset	BMC: Reset to the manufacturer's default; LED solid on during BMC Reset



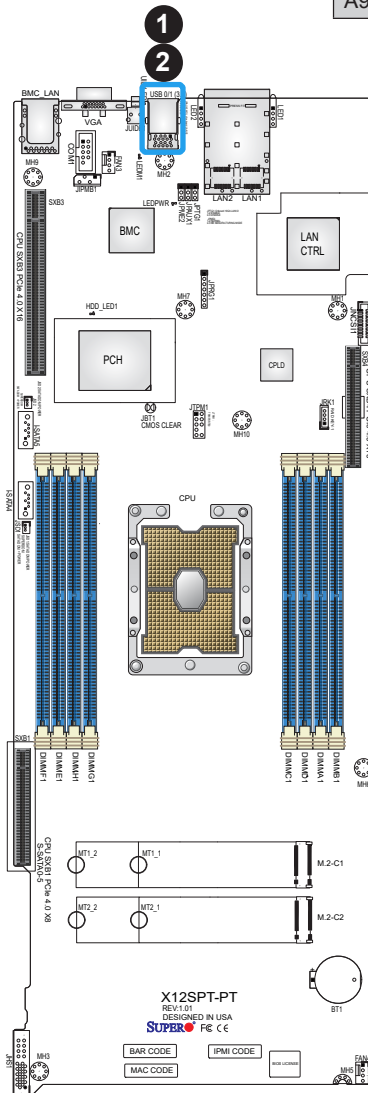
UID/BMC Reset Switch (JUIDB1) Pin Definitions	
Pin#	Definition
1	Ground
2	Ground
3	Button In
4	Button In

- 1. UID Switch / BMC Reset
- 2. Rear UID LED (UID-LED)
- 3. BMC Heartbeat LED (LEDM1)

Universal Serial Bus (USB) Ports

There are two USB ports (USB0/USB1, USB 3.2 Gen 1) located on the rear I/O panel. The USB ports can be used for USB support via USB cables (not included).

Back Panel USB0/1 (USB 3.2 Gen 1) Pin Definitions			
Pin#	Definition	Pin#	Definition
A1	VBUS	B1	VBUS
A2	USB_N	B2	USB_N
A3	USB_P	B3	USB_P
A4	GND	B4	GND
A5	Std_a_SSRX-	B5	Std_a_SSRX-
A6	Std_a_SSRX+	B6	Std_a_SSRX+
A7	GND	B7	GND
A8	Std_a_SSTX-	B8	Std_a_SSTX-
A9	Std_a_SSTX+	B9	Std_a_SSTX+



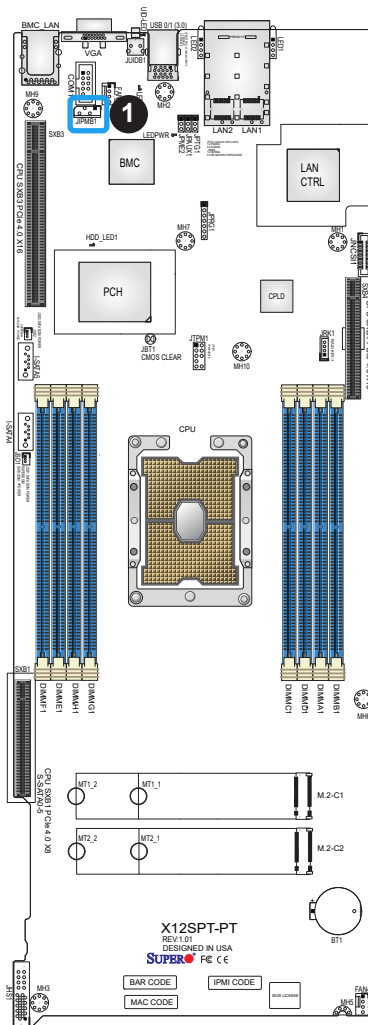
1. Rear I/O Panel USB0 (3.2 Gen 1)
2. Rear I/O Panel USB1 (3.2 Gen 1)

Headers

4-pin BMC External I²C Header

A System Management Bus header for BMC is located at JIPMB1. Connect the appropriate cable here to use the IPMB I²C connection on your system. Refer to the table below for pin definitions.

External I ² C Header Pin Definitions	
Pin#	Definition
1	Data
2	Ground
3	Clock
4	No Connection

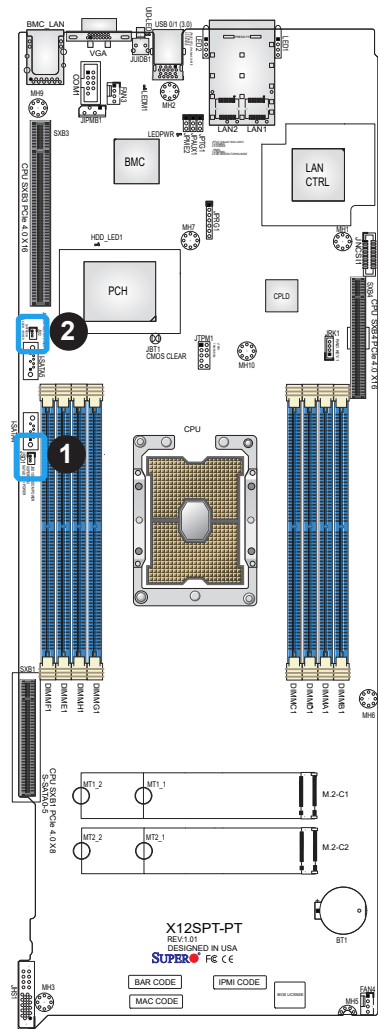


1. BMC External Header

Disk-On-Module Power Connector

The Disk-On-Module (DOM) power connectors at JSD1 and JSD2 provide 5V 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

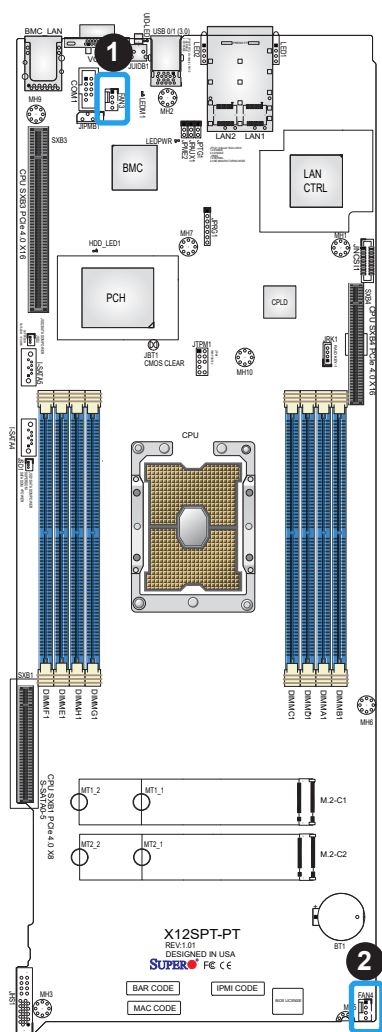


- 1. Disk-On-Module (DOM) Power Connector (JSD1)
- 2. Disk-On-Module (DOM) Power Connector (JSD2)

Fan Headers

There are two 4-pin CPU fan headers (FAN3, FAN4) on the motherboard. All the 4-pin fan headers are backwards compatible with the traditional 3-pin fans. Refer to the table below for pin definitions.

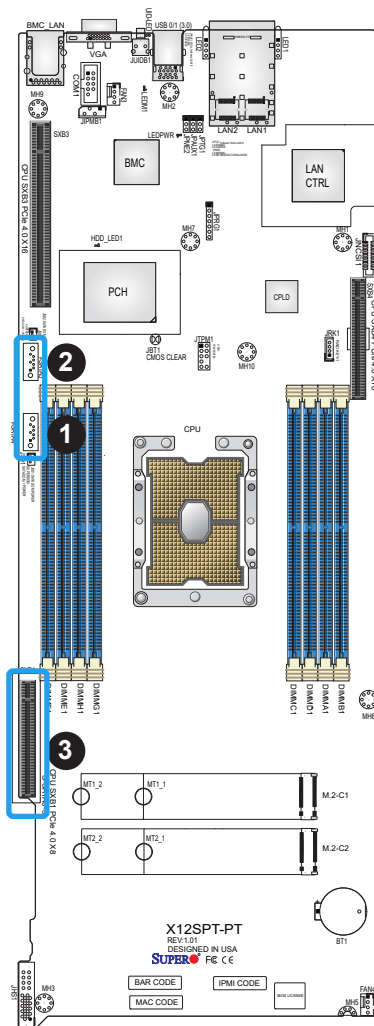
Fan Header Pin Definitions	
Pin#	Definition
1	Ground
2	2.5A/+12V
3	Tachometer
4	PWM_Control



1. FAN3 (CPU Fan Header)
2. FAN4 (CPU Fan Header)

I-SATA 3.0 and S-SATA 3.0 Ports

There are two I-SATA 3.0 ports (I-SATA4, I-SATA5) and six S-SATA ports (S-SATA0-5) on the motherboard. These SATA ports are supported by the C621A chipset. I-SATA4 and I-SATA5 can be used with Supermicro SuperDOMs, which are orange SATA DOM connectors with power pins built in and do not require external power cables. S-SATA0~5 are supported by PCH and are connected to Supermicro storage backplane.



M.2 Slot

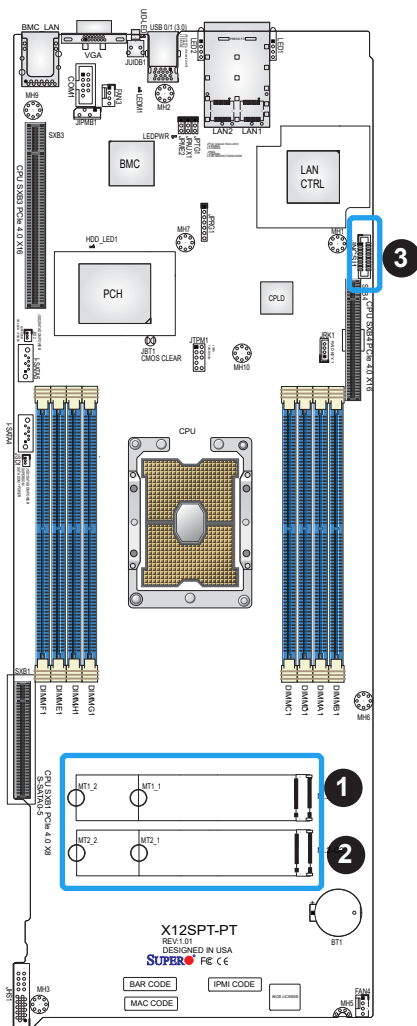
M.2 is formerly known as Next Generation Form Factor (NGFF). The M.2 slot is designed for internal mounting devices and provides M Key 22110/2280 support dedicated for SSD devices with the ultimate performance capability in a PCI Express 4.0 interface for native PCIe SSD support.

NCSI Connector

The NCSI connector (JNSCI1) is used to connect a Network Interface Card (NIC) to the motherboard which will allow the onboard Baseboard Controller (BMC) to communicate with a network.

Note 1: For detailed instructions on how to configure Network Interface Card (NIC) settings, refer to the Network Interface Card Configuration User's Guide posted on the web page under the link: <http://www.supermicro.com/support/manuals/>.

Note 2: LAN1 is the default shared LAN port.

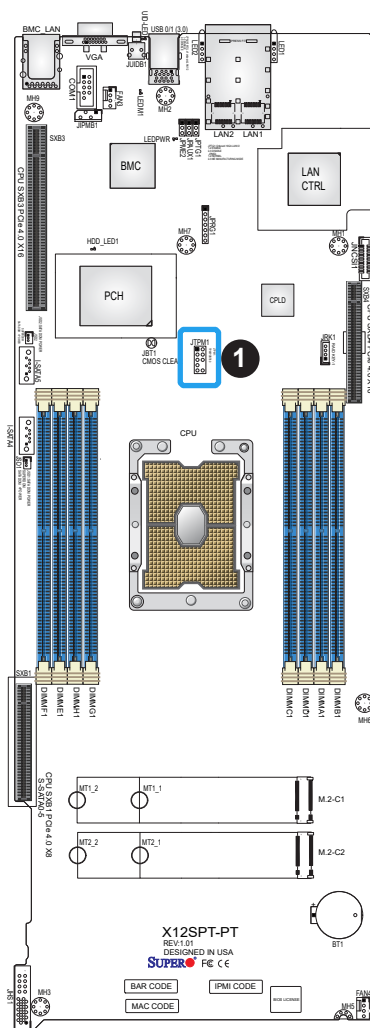


1. M.2-C1
2. M.2-C2
3. NCSI Connector

TPM/Port 80 Connector

The JTPM1 connector 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 associated with the hard drive is not installed in the system. Refer to the layout below for the location of the TPM/Port 80 connector. Go to the following link for more information on the TPM: <http://www.supermicro.com/manuals/other/TPM.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 Stdbby	10	SPI_IRQ#



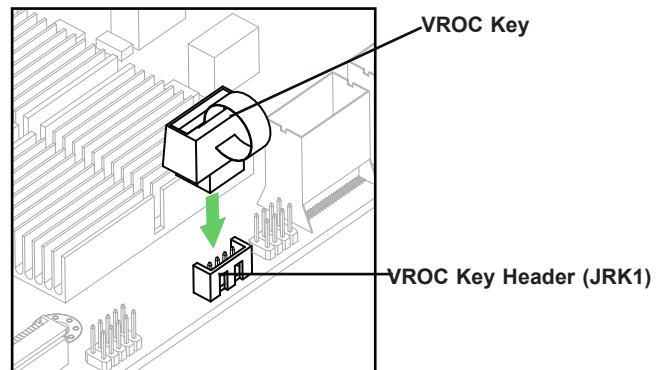
1. TPM/Port 80 Header

VROC RAID Key Header

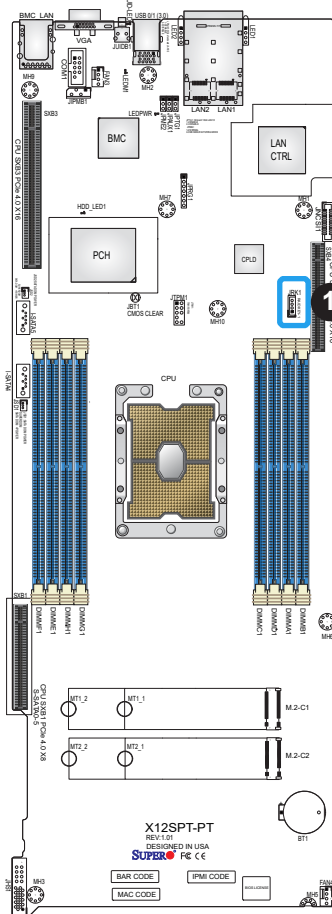
A VROC RAID Key header is located at JRK1 on the motherboard. Install a VROC RAID Key on JRK1 for NVMe RAID support as shown in the illustration below. Refer to the layout below for the location of JRK1.

 **Note:** For detailed instructions on how to configure VROC RAID settings, refer to the VROC RAID Configuration User's Guide posted on the web page under the link: <http://www.supermicro.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 purposes 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 (JRK1)

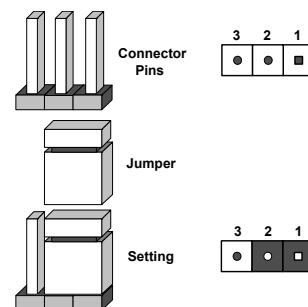
2.7 Jumper Settings

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 jumping pins 1 and 2. Refer to the motherboard layout page for jumper locations.



Note: 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.

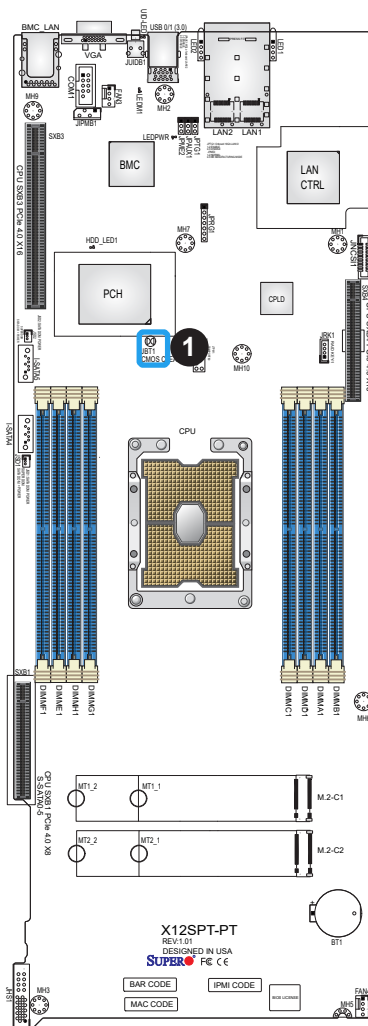
To Clear CMOS



1. First power down the system and unplug the power cord(s).
2. Remove the cover of the chassis to access the motherboard and remove the battery from the motherboard.
3. Short the CMOS pads with a metal object such as a small screwdriver for at least four seconds.
4. Remove the screwdriver (or shorting device).
5. Replace the cover, reconnect the power cord(s), and power on the system.



Note: Clearing CMOS will also clear all passwords.



1. JBT1

LAN Port Enable/Disable

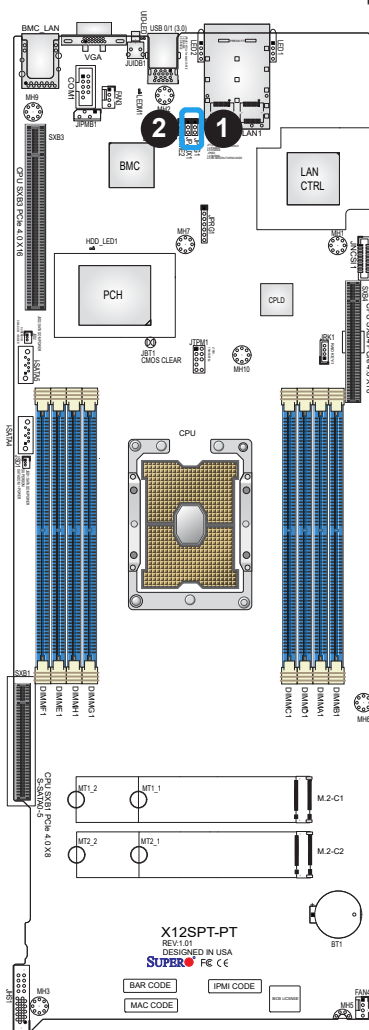
JPTG1 allows you to enable/disable the onboard LAN ports. The default setting is pins 1-2 to enable the connection. Refer to the table below for jumper settings.

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

LAN Port AUX Power Enable/Disable

JPAUX1 allows you to enable/disable the LAN port AUX power to enable/disable onboard LAN ports when the system is in power off status. The default setting is to short pins 2-3 to disable onboard LAN ports when the system is in power off status. Refer to the table below for jumper settings.

LAN Port AUX Power Enable/Disable Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Enabled
Pins 2-3	Disabled



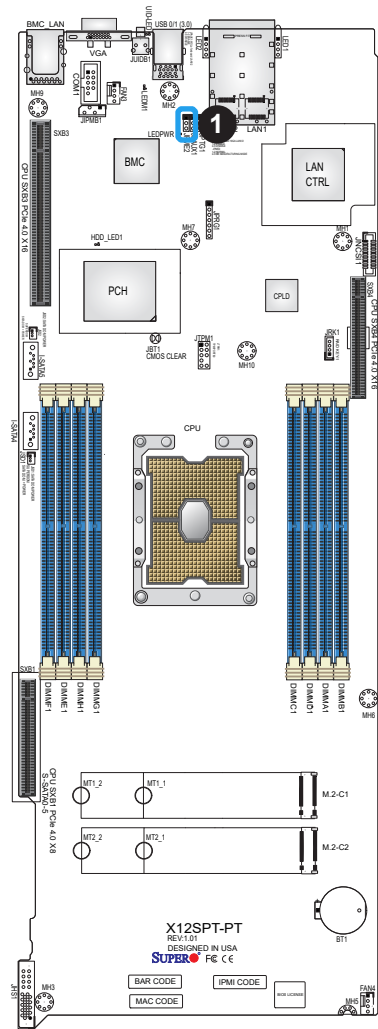
1. LAN Controller Enable/Disable (JPTG1)
2. LAN Port AUX Power Enable/Disable

Note: Consult Supermicro before enabling JPAUX1. There must be sufficient airflow to enable JPAUX1 in standby mode (S5 state).

ME Recovery

JPME2 is used for ME Firmware Recovery mode, which will limit system resource for essential function use only without putting restrictions on power use. In the single operation mode, online upgrade will be available via Recovery mode. Refer to the table below for pin definitions.

ME Recovery Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Normal (Default)
Pins 2-3	ME Recovery



1. JPME2

2.8 LED Indicators

BMC Heartbeat LED

LEDM1 is the BMC heartbeat LED. When the LED is blinking green, BMC is functioning normally. Refer to the table below for the LED status.

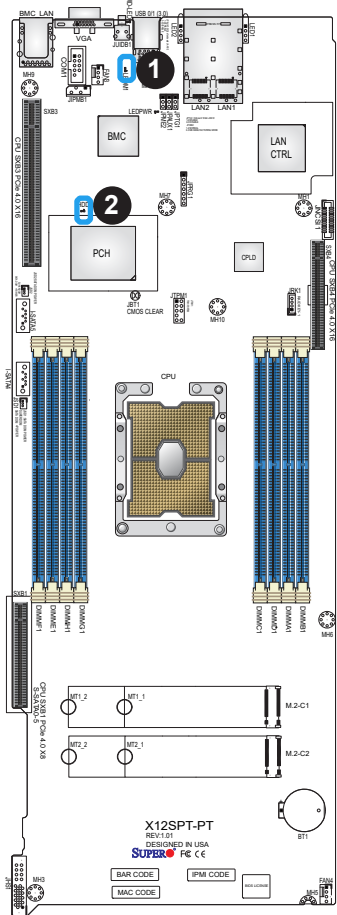
BMC Heartbeat LED Indicator	
LED Color	Definition
Blinking Green	BMC Normal

 **Note:** For information on UID LED Indicators and BMC Heartbeat LED Indicator, refer to the section on UID LED/BMC Reset Switch and LED Indicator on page 48.

LEDHDD

HDD_LED1 is the HDD Activity LED. When the LED is blinking green, HDD is functioning normally. Refer to the table below for the LED status.

HDD LED	
LED Color	Definition
Green: Blinking	HDD Active

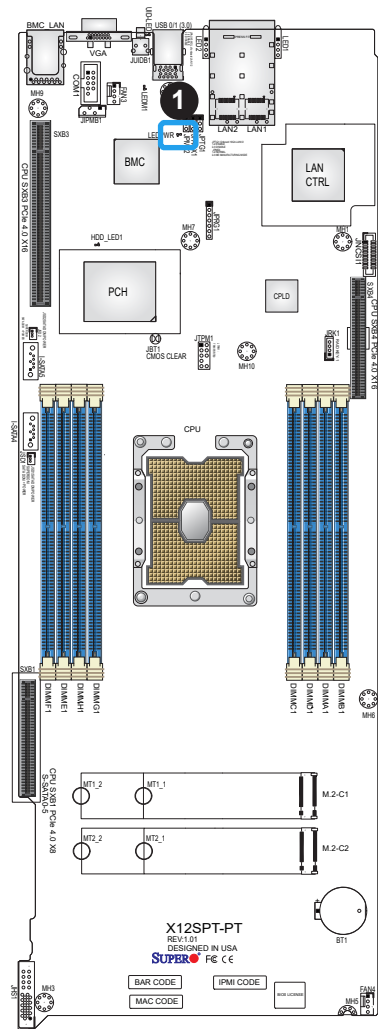


- 1. BMC LAN LEDs
- 2. LEDHDD

Onboard Power LED

The Onboard Power LED is located at LEDPWR 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 cord 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



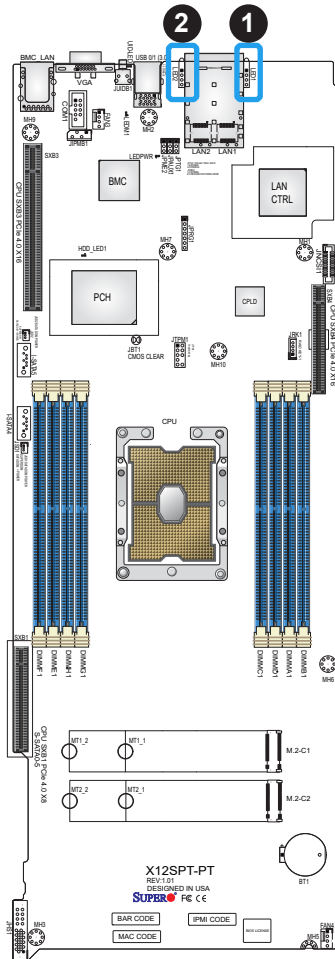
1. Onboard Power LED

SFP+ LAN Link/Activity LEDs

Two SFP+ LAN Link/Activity LED indicators (LED1 for LAN1, LED2 for LAN2) are located on the rear I/O panel of the motherboard. Each SFP+ LAN port has two LEDs. The green LED indicates activity, while the other Link LED may be green, yellow, or off to indicate the speed of the connection. Refer to the tables below for more information.

SFP+ LAN Port LEDs LED1/LED2 Assignment	
LED	LAN Port Assignment
LED1	SFP+ LAN Port (LAN1)
LED2	SFP+ LAN Port (LAN2)

SFP+ LAN Port Activity/Link LEDs (LED1/LED2) LED State		
LED	LED Color	Definition
Link (Top)	Solid Green	10 Gbps Link Speed
	Solid Yellow	1 Gbps Link Speed
Activity (Bottom)	Blinking Green	Activity



- 1. LED1 (SFP+ LEDs, for LAN1)
- 2. LED2 (SFP+ LEDs, for LAN2)

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.

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 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. Make sure that your peripherals or devices function normally.
2. If you see no any video in power on mode, turn off the system, then remove all add-on cards and cables. Check if the system can be powered on.

System Boot Failure

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

1. Remove all components from the motherboard, especially the DIMM modules.
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 all memory modules are populated with same type and speed.
3. 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 coin 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. 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, take the following steps. Also, 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. Go through the Troubleshooting Procedures and Frequently Asked Questions (FAQ) sections in this chapter or see the FAQs on our website (<http://www.supermicro.com/FAQ/index.php>) before contacting Technical Support.
2. BIOS upgrades can be downloaded from our website (http://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. An example of a Technical Support form is on our website at <http://www.supermicro.com/RmaForm/>.
5. Distributors: For immediate assistance, have your account number ready when placing a call to our Technical Support department. We can be reached by email at support@supermicro.com.

3.3 Frequently Asked Questions

Question: What type of memory does my motherboard support?

Answer: This motherboard supports up to 2TB of 3DS LRDIMM/LRDIMM/3DS RDIMM/RDIMM DDR4 ECC memory with speeds of 3200MHz and Intel Optane PMem 200 Series with speeds of up to 3200 MHz. The 2TB of memory capacity support is based on eight 256GB DDR4 DIMMs or four 512GB Intel Optane PMem 200 Series DIMMs populated on the motherboard. To enhance memory performance, do not mix memory modules of different speeds and sizes. Follow all memory installation instructions given in Section 2-4 in Chapter 2.

 **Note:** Intel Optane Persistent Memory (PMem) 200 Series are supported by the 3rd Gen. Intel Xeon Scalable (83xx/63xx/53xx/4314) series processors.

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 http://www.supermicro.com/ResourceApps/BIOS_BMC_Intel.html. 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:** The SPI BIOS chip used on this motherboard cannot be removed. Send your motherboard back to our RMA Department at Supermicro for repair. For BIOS Recovery instructions, refer to the AMI BIOS Recovery Instructions posted at <http://www.supermicro.com/support/manuals/>.

To update your BIOS under UEFI Shell

 **Note:** We do not recommend that you update your BIOS if you are not experiencing a BIOS-related problem. If you need to update your BIOS, follow the steps below to properly update your BIOS under UEFI Shell.

1. Download and save the BIOS update package to your computer.
2. Extract the files from the UEFI folder of the BIOS package to a USB flash drive.

 **Note:** The USB flash drive doesn't have to be bootable; however, it has to be formatted with the FAT/FAT32 file system.

3. Insert the USB flash drive into a USB port, boot to the Build-In UEFI Shell, and enter the following commands to start the BIOS update:

```
Shell> fs0:
```

```
fs0:\> cd UEFI
```

```
fs0:\UEFI> flash.nsh BIOSname#.###
```

4. The FLASH.NSH script will compare the Flash Descriptor Table (FDT) code in the new BIOS with the existing one in the motherboard:

a. If a different FDT is found

- A new file, STARTUP.NSH, will be created, and the system will automatically reboot in 10 seconds without you pressing any key. BIOS will be updated after the system reboots.
- You can also press <Y> to force an immediate system reboot to shorten the process. During system reboot, press the <F11> key to invoke the boot menu and boot into the build-in UEFI Shell. Your BIOS will be updated automatically.

b. If the FDT is the same

- BIOS update will be immediately performed without a system reboot initiated.

Warning: Do not shut down or reset the system while updating the BIOS to prevent possible boot failure!

5. Perform an A/C power cycle after the message indicating the BIOS update has completed.
6. Go to the BIOS setup utility, and restore the BIOS settings.

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

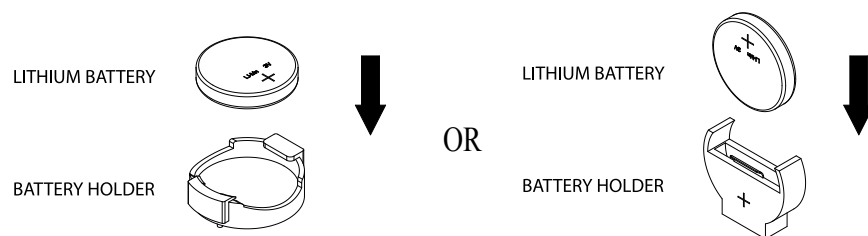
Warning: Handle used batteries carefully. Do not damage the battery in any way; a damaged battery may release hazardous materials into the environment. Do not discard a used battery in the garbage or a public landfill. Comply with the regulations set up by your local hazardous waste management agency 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 (<http://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 X12SPT-PT motherboard. The BIOS is stored on a chip and can be easily upgraded using the BMC WebUI or the SUM 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. 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.

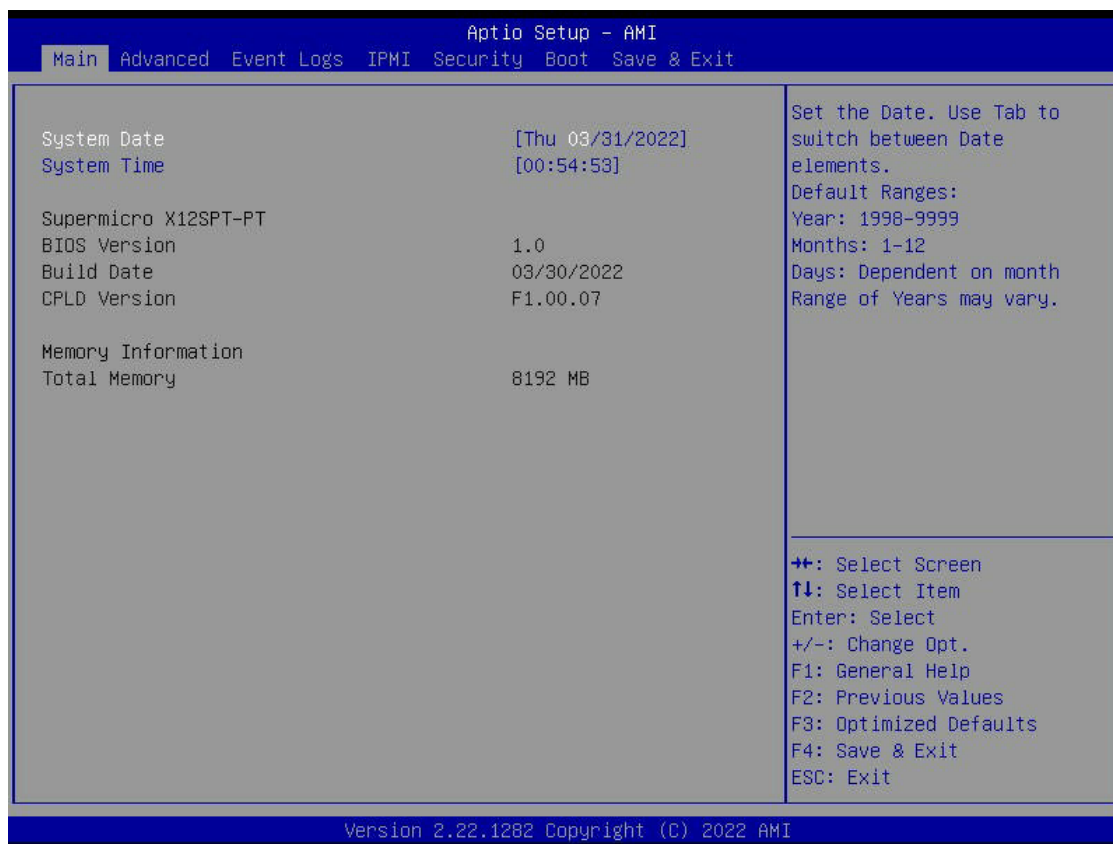
The Main BIOS screen has two main frames. The left frame displays all the options that can be configured. “Grayed-out” options cannot be configured. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it. Note that BIOS has default text messages built in, and we retain the option to include, omit, or change any of these text messages. Default values are printed in **Bold** font.

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>, <Enter>, <ESC>, <Arrow> keys, etc.) can be used at any time during the setup navigation process.

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 Language

Use this feature to change the system's default language.

System Date/System Time

Use this feature 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 Real Time Clock (RTC) reset.

Supermicro X12SPT-PT

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

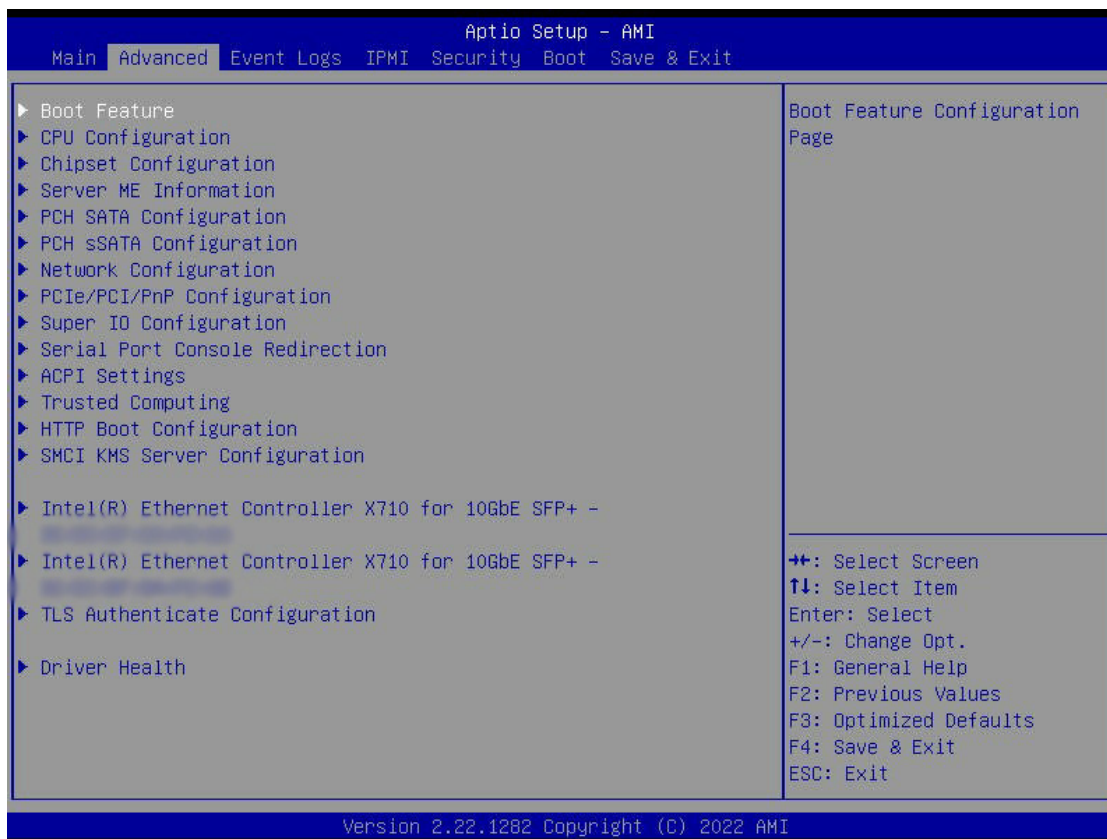
This feature displays the version of the Complex-Programmable Logical Device (CPLD) used in the system.

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 menu and press <Enter> to access the menu features.



Warning: Take Caution when changing the Advanced settings. An incorrect value may cause the system to malfunction. When this occurs, restore the setting to the manufacturer default setting.

► Boot Feature

Quiet Boot

Use this feature to select the screen between displaying Power-on Self Test (POST) messages or the OEM logo at startup. 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. Select Keep Current to use the current AddOn ROM display settings. Select Force BIOS to use the Option ROM display mode set by the system BIOS. The options are **Force BIOS** and Keep Current.

Bootup NumLock State

Use this feature to set the Power-on state for the Numlock 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 to 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 Watch Dog timer to reboot the system when it is inactive for more than 5 minutes. The options are **Disabled** and Enabled.

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

This feature allows you to determine how the watch dog function can be triggered. The options are **Reset** and NMI.

Restore on AC Power Loss

Use this feature to set the power state after a power outage. Select Power 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 in the following sections may cause the system to malfunction.

Processor Configuration

The following CPU information will be 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

►CPU1 Core Disable Bitmap

Available Bitmap: The available Bitmap will be displayed.

Core Disable Bitmap(Hex)

Enter 0 to enable all CPU cores. Enter FFFFFFFFFF to disable all CPU cores. Note that at least one core per CPU must be enabled. Disabling all cores is not allowed. The default option 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.

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:** Refer to Intel's website for detailed information.)

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.

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.

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**.

Extended APIC (Extended Advanced Programmable Interrupt Controller)

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.



Note: This will enable VT-d automatically if x2APIC is enabled.

Intel Virtualization Technology

Select Enable to use Intel Virtualization Technology to allow one platform to run multiple operating systems and applications in independent partitions, creating multiple virtual systems in one physical computer. The options are Disable and **Enable**.

Enable SMX

Select Enable to support Safer Mode Extensions (SMX). This feature 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 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**.

TME, TME-MT, TDX**Total Memory Encryption (TME) (Available when CPU supports TME capability)**

Use this feature to enable the Total Memory Encryption (TME) function for physical memory protection. The options are **Disabled** and Enabled.

Total Memory Encryption Multi-Tenant (TME-MT) (Available when "Total Memory Encryption (TME)" is set to Enabled and "Limit CPU PA to 46 bits" is set to Disabled)

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

MAX TME-MT Keys (Available when "Total Memory Encryption (TME)" is set to Enabled)

This feature displays the maximum TME-MT keys.

Software Guard Extension (SGX)**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 change to take effect. The options are **Disabled** and Enabled.

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.

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.

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**.

►Advanced Power Management Configuration

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**.

Power Performance Tuning (Available when the Power Technology is set to Custom)

This feature allows you to select whether the BIOS or Operating System chooses energy performance bias tuning. The options are **OS Controls EPB** and BIOS Controls EPB.

ENERGY_PERF_BIAS CFG Mode (Available when the Power Performance Tuning is set to BIOS Controls EPB)

The Energy Performance BIAS (EPB) feature allows you to configure CPU power and performance settings. Select Maximum Performance to set the highest performance. Select Performance to optimize performance over energy efficiency. Select Balanced Performance to prioritize performance optimization while conserving energy. Select Balanced Power to prioritize energy conservation while maintaining good performance. Select Power to optimize energy efficiency over performance. The options are Maximum Performance, Performance, **Balanced Performance**, Balanced Power, and Power.

►CPU P State Control (Available when "Power Technology" is set to Custom)

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**.

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 specify the base P1 ratio for Streaming SIMD Extensions (SSE) and AVX workloads and to pre-grant a license level. The options are **Normal**, Level 1, and Level 2.

Activate SST-BF

Use this feature to enable or disable the SST-BF. The options are **Disable** and Enable.

Configure SST-BF (Available when "Activate SST-BF" is set to Enable)

Enabling this feature allows the BIOS to configure SST-BF High Priority Cores. The options are Disable and **Enable**.

EIST PSD Function (Available when "SpeedStep" is set to Enable)

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 based on real-time energy needs of applications and optimize the power-to-performance balance for energy efficiency. The options are **HW_ALL** and **SW_ALL**.

Turbo Mode (Available when "SpeedStep" is set to Enable)

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**.

►Hardware PM State Control**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**RAPL (Running Average Power Limit) Prioritization**

This feature allows to prioritize running average power limit. The options are **Disable** and **Enable**.

►CPU C State Control**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 and **Enable**.

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, power to all caches is turned off. The options are Disable, Enable, and **Auto**.

Enhanced Halt State (C1E)

Select Enable to enable "Enhanced Halt State" support. This feature 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**.

►Package C State Control

Package C State

Use this feature to optimize and reduce CPU package power consumption in idle mode. 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, and **Auto**.

►CPU T State Control

Software Controlled T-States

Use this feature to enable Software Controlled T-States. The options are **Disable** and Enable.

T-State Throttle Level (Available when the Software Controlled T-States is set to Enable)

Use this feature to select the On-Die thermal throttling. The options are **Disable**, 6.25%, 12.5%, 18.75%, 25.0%, 31.25%, 37.5%, 43.75%, 50.0%, 56.25%, 62.5%, 68.75%, 75.0%, 81.25%, 87.5%, and 93.75%.

►Chipset Configuration

Warning: Setting wrong values in below sections may cause system to malfunction.

►North Bridge

This submenu contains features that allows you to configure Intel North Bridge parameters.

►Uncore Configuration

This section allows you to configure the following Uncore settings:

- Number of CPU
- Number of IIO
- 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 Precedent to degrade UPI features if system options are in conflict. Select Feature Precedent 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. This feature will allow 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, and Auto.

 **Note:** 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.

Link L1 Enable

Select Enable for the BIOS to activate Link L1 support. This feature 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.

XPT Remote Prefetch

Select Enable to support Extended Prediction Table (XPT) Remote Prefetch which will allow an LLC request to be duplicated and sent to an appropriate memory controller in a remote machine based on the recent LLC history to reduce latency. The options are Disable, Enable, and **Auto**.

KTI Prefetch

Select Enable for the KTI prefetcher to preload the L1 cache with data deemed relevant which will allow 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**.

Local/Remote Threshold

Use this feature to set the threshold for the Interrupt Request (IRQ) signals which handle hardware interruptions. The options are Disable, **Auto**, Low, Medium, and High.

IO Directory Cache (IODC)

Select Enable for the I/O Directory Cache (IODC) to generate snoops instead of generating memory lockups 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 WViLF.

SNC (Sub NUMA)

Select Enable to use "Sub NUMA Clustering" (SNC) which supports full SNC (2-cluster) interleave and 1-way IMC interleave. Select Auto for 1-cluster or 2-cluster support depending on the status of Integrated Memory Controller (iMC) Interleaving. The options are **Disable** and Enable SNC2 (2-clusters).

XPT Prefetch

Select Enable to support Extended Prediction Table (XPT) Prefetch which will allow an LLC request to be duplicated and sent to an appropriate memory controller based on the recent LLC history to reduce latency. The options are Disable, Enable, and **Auto**.

Snoop Throttle Configuration

Use this feature to set the level of snoop throttle for the PCH which will determine how much speed to decrease in operation when the system is in the snoop state. The options are Disabled, Low, Medium, High, and **Auto**.

PCIe Remote P2P (Peer-to-Peer) Relaxed Ordering

Select Disable to support PCIe remote peer-to-peer relaxed writing ordering which will allow hardware to enforce peer-to-peer write ordering. The options are **Disable** and Enable.

Stale AtoS (A to S)

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 deadlines in the LLC. The options are Disable, **Enable**, and Auto.

►Memory Configuration

This feature allows you to configure the Integrated Memory Controller (iMC) settings.

Enhanced PPR

Use this feature to enable or disable DRAM Test and Postpackage Repair function during POST. The options are **Disable** and Enable.

Enforce POR (Plan of Record)

Select POR to enforce POR restrictions for DDR4 memory frequency and voltage programming. The options are **POR** and Disable.

PPR Type

Post Package Repair (PPR) is a new feature available for the DDR4 Technology. PPR provides additional spare capacity within a DDR4 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 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.

Memory Frequency

Use this feature to set the maximum memory frequency for onboard memory modules. The options are **Auto**, 2133, 2200, 2400, 2600, 2666, 2800, 2933, 3000, and 3200.

Data Scrambling for DDR4

Select Enable to enable data scrambling for Intel Optane Persistent Memory (PMem) modules to enhance memory data security. Select Auto to use the Memory Reference Code (MRC) defaulting setting for PMem memory data scrambling. The options are Disable and **Enable**.

2X Refresh Enable

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

►Memory Topology

This feature displays the information of onboard memory modules as detected by the BIOS.

►Memory RAS Configuration

Use this submenu to configure the following Memory Reliability_Availability_Serviceability (RAS) settings.

Enable Pcode WA (Workaround) for SAI (Security Attribute of the Initiator) PG (Policy Group)

Pcode, a register transfer language designed for reverse engineering, translates individual processor instructions into a sequence of Pcode operations in order to facilitate the construction of data-flow graphs and disassembling of processor instructions for machine application. Select Enabled to allow Pcode to work around the SAI group policy to achieve a solution with a next-step instruction. The options are **Disabled** and Enabled.

Mirror Mode (Available when "ADDDC Sparing" below is set to Disabled)

Use this feature to configure the mirror mode settings for all 1LM/2LM memory modules installed in the system which 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**, Full Mirror Mode, and Partial Mirror Mode.

UEFI ARM Mirror (Available when ADDDC Sparing is set to Enabled)

Select Enable to support the UEFI-based address range mirroring with setup option. The options are **Disabled** and Enabled.

ARM Mirror Percentage (Available when the 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.

Correctable Error Threshold

This feature allows you to enter the threshold value for correctable memory errors. The default setting is **512**.

The following information is displayed:

- Leaky Bucket Low Bit
- Leaky Bucket High Bit

Partial Cache Line Sparing PCLS

Select Enabled to support partial cache line sparing which will allow partial of data contained in a cache line to be copied in the cache memory for safe-keeping/data security. The options are Disabled and **Enabled**.

ADDDC (Adaptive Double Device Data Correction) Sparing

Select Enable 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 lockstep 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, Enabled, and **Enable at End of POST** (Power_On Self Test).

► IIO Configuration

► CPU1 Configuration

IOU0 (IIO PCIe Port 1) / IOU1 (IIO PCIe Port 2) / IOU3 (IIO PCIe Port 4) / IOU4 (IIO PCIe Port 5)

Use this feature to configure the PCIe Bifurcation setting for a PCIe port you specified. The options are **Auto**, x4x4x4x4, x4x4x8, x8x4x4, x8x8, and x16.

► CPU PCIe 4.0x8 / CPU PCIe 4.0 x16 / CPU PCIe 4.0 x16 / M.2-C1 / M.2-C2

Link Speed

Use this feature to select the link speed for the PCIe port. The options are **Auto**, Gen 1 (2.5 GT/s), Gen 2 (5 GT/s), Gen 3 (8 GT/s), and Gen 4 (16 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 data link feature negotiation in the Data Link Feature Capabilities (DLFCAP) register. The options are Disable and **Enable**.

PCIe Port Max Payload Size

Selecting Auto for this feature enables the motherboard to automatically detect the maximum Transaction Layer Packet (TLP) size for the connected PCIe device, allowing for maximum I/O efficiency. Selecting 128B or 256B designates maximum packet size of 128 or 256. The options are 128B, 256B, 512B, and **Auto**.

► IOAT Configuration

Disable TPH

The TLP Processing Hint (TPH) is used for data-tagging with a destination ID and a few important attributes. It can send critical data to a particular cache without writing through to memory. Select No for TLP Processing Hint support which will allow a "TLP request" to provide "hints" to help optimize the processing of each transaction occurred in the target memory space. The options are **No** and Yes.

Prioritize TPH (TLP Processing Hint)

Select Enable to prioritize the TPL requests that will allow the "hints" to be sent to help facilitate and optimize the processing of certain transactions in the system memory. The options are Enable and **Disable**.

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

Select Yes to use the Intel Virtualization Technology support for Direct I/O VT-d 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.

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

Use this feature to program Access Control Services (ACS) to the PCIe Root Port Bridges. The options are **Enable** and Disable.

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

If this feature is set to Yes, I/O DMA transfer remapping and device-generated interrupts will be supported. The options are **Auto**, Enable, and Disable.

►Intel® VMD Technology

This section describes the configuration settings for the Intel Volume Management Device (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, disable VMD in the BIOS.



Note 2: PCIe slots and naming can differ depending on the PCIe devices installed on your motherboard.

NVMe Mode Switch

Select Auto to enable the VMD support for NVMe devices in the system when a VROC RAID Key is installed. Select Manual to change the NVMe mode for each port. Select VMD to enable the VMD support for each port. 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 / VMD Config for IOU 0 / VMD Config for IOU 1 / VMD Config for IOU3 / VMD Config for IOU 4

Enable/Disable VMD

Select Enable to enable Intel Volume Management Device Technology support for the root port you specified. The options are **Disable** and Enable.

Hot Plug Capable (Available when "Enable/Disable VMD" is set to Enable)

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

PCIe ASPM Support (Global)

Active-state power management (ASPM) is a power management mechanism for PCI Express devices to garner power savings while otherwise in a fully active state. The options are **Disable** and Enable.

IIO eDPC (Enhanced Downstream Port Containment) Support

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 "IIO eDPC Support" is set to On Fatal Error or On Fatal and Non-Fatal Errors)

Use this feature to enable or disable IIO enhanced DPC interrupt. The options are **Disable** and **Enable**.

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

Use this feature to enable or disable IIO enhanced DPC error correction message. The options are Disable and **Enable**.

► South Bridge

Select this submenu and press <Enter>. The following South Bridge information will display:

- USB Module Version
- 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 Disable 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, will provide 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 support. This feature will allow 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.

Port 61h Bit-4 Emulation

Select Enabled for I/O Port 61h-Bit 4 emulation support to enhance system performance. The options are **Disabled** and Enabled.

►Server ME (Management Engine) Configuration

This submenu displays the following general ME configuration settings:

- Oper. (Operation) Firmware Version
- Backup Firmware Version
- Recovery Firmware Version
- ME Firmware Status #1
- ME Firmware Status #2
- Current State
- Error Code

►PCH SATA Configuration

SATA Controller

This feature enables or disables the onboard SATA controller supported by the Intel PCH chip. The options are Disable and **Enable**.

Configure SATA as (Available when "SATA Controller" is set to Enable)

Select AHCI to configure a SATA drive you specified as an AHCI drive. Select RAID to configure a SATA drive you specified as a RAID drive. The options are **AHCI** and RAID.

Support Aggressive Link Power Management

When this feature is set to Enable, 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 **Disable** and Enable.

SATA RSTe Boot Info (Available when "Configure SATA as" is set to RAID)

Select Enable to provide full int13h support for the devices attached to SATA controller. The options are Disable and **Enable**.

SATA RAID Option ROM/UEFI Driver (Available when "Configure SATA as" is set to RAID)

Select EFI to load the EFI driver for system boot. Select Legacy to load a legacy driver for system boot. The options are Disable, **EFI**, and Legacy.

SATA Port 4 - SATA Port 5

Hot Plug

Select Enable to support Hot-plugging for the device installed on a selected SATA port which will allow you to replace the device installed in the slot without shutting down the system. The options are Disable and **Enable**.

Spin Up Device

Select Enable for Staggered Spin Up support which will allow the SATA devices you specified to spin up one at a time at boot to prevent all hard drive disks from spinning up at the same time, causing a power surge. The options are **Disable** and Enable.

SATA Device Type

Use this feature to specify if the device installed on the SATA port you specified should be connected to a Solid State drive or a Hard Disk Drive. The options are **Hard Disk Drive** and Solid State Drive.

►PCH sSATA Configuration

sSATA Controller

This feature enables or disables the onboard sSATA controller supported by the Intel PCH. The options are **Enable** and Disable.

Configure sSATA as (Available when "sSATA Controller" is set to Enable)

Select AHCI to configure an sSATA drive you specified as an AHCI drive. Select RAID to configure an sSATA drive you specified as a RAID drive. The options are **AHCI** and RAID.

sSATA RSTe Boot Info (Available when "Configure sSATA as" is set to RAID)

Select Enable for full int13h support which will allow the system to boot using a device attached to the SATA controller. The options are Disable and **Enable**.



Note: For this feature to work properly, set the CSM Storage OPRM policy to Legacy.

Support Aggressive Link Power Management

When this feature is set to Enable, the sSATA AHCI controller manages the power use of the sSATA 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 **Disable** and Enable.

sSATA RAID Option ROM/UEFI Driver (Available when "Configure sSATA as" is set to RAID)

Select EFI to load the EFI driver for system boot. Select Legacy to load a legacy driver for system boot. The options are Disable, **EFI**, and Legacy.

sSATA Port 0 - sSATA Port 5

Hot Plug

Select Enable to support Hot-plugging for the device installed on an sSATA port you specified which will allow you to replace the device installed in the slot without shutting down the system. The options are Disable and **Enable**.

Spin Up Device

Select Enable for Staggered Spin Up support which will allow the SATA devices you specified to spin up one at a time at bootup preventing all hard drive disks from spinning up at the same time, causing a power surge. The options are Enable and **Disable**. The options are **Disable** and Enable.

sSATA Device Type

Use this feature to specify if the device installed on the sSATA port you specified should be connected to a Solid State drive or a Hard Disk Drive. The options are **Hard Disk Drive** and Solid State Drive.

► 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 IPv4 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 IPv4 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. The default is **0**.

Media Detect Count (Available when "Network Stack" is set to Enabled)

Use this option to specify the number of times for the BIOS ROM to detect the presence of a LAN media either via the Internet connection or via a LAN port. The default setting is **1**.

▶ **MAC:xxxxxxxxxxx-IPv4 Network Configuration**
▶ **MAC:xxxxxxxxxxx-IPv4 Network Configuration**

Configured

Use this feature to indicate whether the above MAC address has been configured successfully. The options are **Disabled** and **Enabled**.

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

Use this feature to enable or disable DHCP. The options are **Disabled** and **Enabled**.

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

Enter the IP address in dotted-decimal notation (i.e., 192.168.10.12).

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

Enter the NetMask in dotted-decimal notation (i.e., 255.255.255.0).

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

Enter the Gateway in dotted-decimal notation (i.e., 192.168.10.1).

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

Enter the DNS Servers in dotted-decimal notation (i.e., 192.168.10.8).

Save Changes and Exit

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

▶ **MAC:xxxxxxxxxxx-IPv6 Network Configuration**
▶ **MAC:xxxxxxxxxxx-IPv6 Network Configuration**

▶ Enter Configuration Menu

The following information will display:

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 above MAC address.

DAD Transmit Count

This feature displays the number of consecutive neighbor solicitation messages have been sent while performing duplicate address detection on a tentative address.

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 address

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

New DNS address

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 PCI information will be displayed:

- PCI Bus Driver Version
- PCI Devices Common Settings

Above 4G Decoding (Available if the system supports 64-bit PCI decoding)

Select Enabled to decode a PCI device that supports 64-bit in the space above 4G Address. The options are Disabled and **Enabled**.

SR-IOV Support (Available if the system supports Single-Root Virtualization)

Select Enabled for Single-Root IO Virtualization support. The options are Disabled and **Enabled**.

ARI Support

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

Bus Master Enable

Select Enabled to enable the Bus Driver Master bit. The options are Disabled and **Enabled**.

Consistent Device Name Support

Use this feature to enable ACPI_DSM (DSM: Device Specific Method) device name support for onboard devices and slots. The options are **Disabled** and Enabled.

MMIO High Base

Use this feature to select the base memory size according to memory-address mapping for the IO hub. The options are 56T, 40T, **32T**, 24T, 16T, 4T, 2T, 1T, and 512 G.

MMIO High Granularity Size

Use this feature to select the high memory size according to memory-address mapping for the IO hub. The options are 1G, 4G, 16G, **64G**, 256G, and 1024G.

Maximum Read Request

Select Auto for the system BIOS to automatically set the maximum size for a read request for a PCIe device to enhance system performance. The options are **Auto**, 128 Bytes, 256 Bytes, 512 Bytes, 1024 Bytes, 2048 Bytes, and 4096 Bytes.

MMCFG Base

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

NVMe Firmware Source

The feature determines which type of NVMe firmware should be used in your system. The options are **Vendor Defined Firmware** and AMI Native Support.

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.

Onboard Video Option ROM

Select UEFI to allow you to boot the computer using the Unified Extensible Firmware Interface (UEFI) device installed on the onboard video port. Select Legacy to allow you to boot up the computer using a legacy device installed on the onboard video port. The options are Disabled and **EFI**.

CPU PCIe 4.0 x8 / CPU PCIe x16 / CPU PCIe x16

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

PCI / PCIX / PCIe Slot 5 OPROM

Use this feature to select which firmware function to be loaded for PCI / PCIX / PCIe Slot 5 OPROM. The options are Disabled and **EFI**.

PCI / PCIX / PCIe Slot 6 OPROM

Use this feature to select which firmware function to be loaded for PCI / PCIX / PCIe Slot 6 OPROM. The options are Disabled and **EFI**.

Onboard LAN1 Option ROM

Use this feature to select which firmware function to be loaded for LAN port 1 used for system boot. The options are Disabled and **EFI**.

►Super IO Configuration

When you select this submenu and press <Enter>, the following information will display:

- Super IO Chip AST2600

►Serial Port 1 Configuration

This submenu allows you to configure the settings of Serial Port 1.

Serial Port 1

Select Enabled to enable Serial Port 1. The options are Disabled and **Enabled**.

Device Settings (Available when "Serial Port 1" 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" 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 for Serial Port 1 are **Auto**, (IO=3F8h; IRQ=4), (IO=2F8h; IRQ=4), (IO=3E8h; IRQ=4), and (IO=2E8h; IRQ=4).

►Serial Port 2 Configuration**Serial Port 2**

Select Enabled to enable Serial Port 2. The options are Disabled and **Enabled**.

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

This feature displays the base I/O port address and the Interrupt Request address of Serial Port 2.

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

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

Serial Port 2 Attribute

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

COM 1**Console Redirection**

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

► Console Redirection Settings (Available when "Console Redirection" 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 (Bits) 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 1's in data bits is even. Select Odd if the parity bit is set to 0, and the number of 1's 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**.

Legacy OS Redirection Resolution

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

Putty KeyPad

This feature selects Function Keys and KeyPad settings for Putty which is a terminal emulator designed for the Windows OS. The options are **VT100**, LINUX, XTERMR6, SCO, ESCN, and VT400.

Redirection After BIOS POST

Use this feature to enable or disable legacy Console Redirection after BIOS POST. When set to Bootloader, legacy Console Redirection is disabled before booting the OS. When set to Always Enable, legacy Console Redirection remains enabled when booting the OS. The options are **Always Enable** and BootLoader.

SOL

Console Redirection

Select Enabled to enable SOL for Console Redirection which will allow a client machine to be connected to a host machine at a remote site for networking. 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 (Bits) 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 1's in data bits is even. Select Odd if the parity bit is set to 0, and the number of 1's 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**.

Legacy OS Redirection Resolution

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

Putty KeyPad

This feature selects Function Keys and KeyPad settings for Putty which is a terminal emulator designed for the Windows OS. The options are **VT100**, LINUX, XTERMR6, SCO, ESCN, and VT400.

Redirection After BIOS POST

Use this feature to enable or disable legacy Console Redirection after BIOS POST. When set to Bootloader, legacy Console Redirection is disabled before booting the OS. When set to Always Enable, legacy Console Redirection remains enabled when booting the OS. The options are **Always Enable** and BootLoader.

Legacy Console Redirection

Legacy Serial Redirection Port

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 **COM1** and SOL.

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

The feature allows you to configure Console Redirection settings to support Out-of-Band Serial Port management.

Console Redirection EMS

Select Enabled to use a COM port you specified for EMS Console Redirection. The options are **Disabled** and Enabled.

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

Out-of-Band Management Port

This feature selects a serial port in a client server to be used by the Windows Emergency Management Services (EMS) to communicate with a remote host server. The options are **COM1** and SOL.

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 EMS

This feature sets the transmission speed for a serial port used in Console Redirection. Make sure that the same speed is used in both host computer and the client computer. A lower transmission speed may be required for long and busy lines. The options are 9600, 19200, 57600, and **115200** (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 data-sending when the receiving buffer is full. Send a "Start" signal to start data-sending when the receiving buffer is empty. The options are **None**, Hardware RTS/CTS, and Software Xon/Xoff.

The following information will also be displayed:

- Data Bits EMS
- Parity EMS
- Stop Bits EMS

►ACPI Settings

Use submenu to configure Advanced Configuration and Power Interface (ACPI) power management settings for your system.

NUMA

Select Enabled to enable Non-Uniform Memory Access support to enhance system performance. The options are Disabled and **Enabled**.

UMA-Based Clustering

The options for this feature are Disable (All2All) and **Hemisphere (2-clusters)**. The options are only available when SNC is disabled.

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 High Performance Event Timer is used to replace the 8254 Programmable Interval Timer. The options are Disabled and **Enabled**.

►Trusted Computing (Available when a TPM device is installed and detected by the BIOS)

When a Trusted-Platform Module (TPM) device is detected in your machine, the following information will display:

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 will display:

- Active PCR banks
- Available PCR banks

TPM v1.2 Support

Select Enable to enable Trusted Platform Module (TPM) 2.0 support to enhance system integrity and data security. If there is a TPM jumper on the motherboard, also enable the jumper for this feature to work properly. Note that the OS will not show the security device when this feature is set to Enabled. Neither TCG EFI protocol nor INT1A interaction will be available for use. If you have made changes on the setting of this feature, be sure to reboot the system for the changes to take effect. The options are Disable and **Enable**.

*If this option is set to Enable, the following screen and items will display:

- Active PCR Banks
- Available PCR Banks

SHA-1 PCR Bank

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

SHA256 PCR Bank

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

Pending Operation

Use this feature to schedule a TPM-related operation to be performed by a security (TPM) device at the next system boot to enhance system data integrity. Your system will reboot to carry out a pending TPM operation. The options are **None** and TPM Clear.



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

Platform Hierarchy (for TPM Version 2.0 and above)

Select Enabled for TPM Platform Hierarchy support which will allow 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 a TPM device. The options are **Enabled** and Disabled.

Storage Hierarchy

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 **Enabled** and Disabled.

Endorsement Hierarchy

Select Enabled for Endorsement Hierarchy support which contains separate controls to address your 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 device 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 you 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 **Enabled** and Disabled.

PH (Platform Hierarchy) Randomization (for TPM Version 2.0 and above)

Select Enabled for Platform Hierarchy 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.

Disable Block Sid (Available when your motherboard supports NVMe)

Select Enabled to allow SID authentication be performed in TCG Storage devices. The options are **Disabled** and Enabled.

SMCI BIOS-Based TPM Provision Support

If this feature is set to Enabled, SMCI BIOS-based TPM provision will be supported. The options are Disabled and **Enabled**.

 **Note:** Enabling this feature will lock your TPM on the production platform, and you will not be able to delete the NV indexes.

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.

 **Note 1:** If the option for this feature (TXT Support) is set to Enabled, be sure to disable EV DFX (Device Function On-Hide 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 <http://www.supermicro.com/manuals/other/TPM.pdf>.

► HTTP Boot Configuration

HTTP Boot Policy

The options are Apply to all LANs, **Apply to each LAN**, and Boot Priority #1 instantly.

HTTPS Boot Checks Hostname

Use this feature to select whether HTTPS Boot checks the hostname of TLS certificates matches the hostname provided by the remote server. The options are **Enabled** and Disabled (WARNING: Security Risk!!).

Priority of HTTP Boot

Instance of Priority 1

This configures the order that your computer searches the physical devices for the boot sequence. The default setting for this rank targeted port is **1**.

Select IPv4 or IPv6

You can choose either one Internet Protocol version. The options are **IPv4** and IPv6.

Boot Description

The Boot Description must be filled out; otherwise the boot option for URI would not be created. (Length of description shouldn't be more than 75 characters.)

Boot URI

Highlight the feature and press <Enter> to create a boot URI. A new IPv4/IPv6 Boot option will be created according to this Boot URI. This feature is only supported on Dual or EFI Boot mode. (Length of URI shouldn't be more than 128 characters.)

Instance of Priority 2:

The priority sequence of HTTP Boot. The default setting is **0**.

► SMCI KMS Server Configuration

This submenu displays the configuration settings for the SMCI KMS server which will allow the clients to ask a server to encrypt or decrypt data without a direct access key.

SMCI KMS Server IP address

Use this feature to enter the SMCI Key Management Service (KMS) server IPv4 address in dotted-decimal notation (i.e., 255.255.255.255).

Second SMCI KMS Server IP address

Use this feature to enter the second SMCI KMS server IPv4 address in dotted-decimal notation (i.e., 255.255.255.255).

SMCI KMS TCP Port number

Use this feature to enter the SMCI KMS TCP port number. The valid range is 100 - 9999. The default setting is **5696**.

KMS Time Out

Use this feature to enter the KMS server connecting time-out (in seconds). The default setting is **5** (seconds).

SMCI KMS Server Retry Count

Use this feature to specify how many times of the connection retry to the KMS server. The valid range is 0 - 10. Press "+" or "-" on your keyboard to change the value. The default setting is **2** (retrying twice).

TimeZone

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

TCG Nvme KMS Policy

Use this feature to select the TCG NVMe KMS policy. The options are Normal Unlock, **Do Nothing**, Reset All Devices, and Delete Key Id List.

Client UserName

Press <Enter> to set the client identity (UserName). The length is 0 - 63 characters.

Client Password

Press <Enter> to set the client identity (Password). The length is 0 - 31 characters.

KMS TLS Certificate / Size**► CA Certificate**

For the CA certificate, use this feature to enroll factory defaults or load the KMS TLS certificates from the file. The options are **Update**, Delete, and Export.

► Client Certificate

For the client certificate, use this feature to enroll factory defaults or load the KMS TLS certificates from the file. The options are **Update**, Delete, and Export.

► Client Private Key

For the client private key, use this feature to enroll factory defaults or load the KMS TLS certificates from the file. The options are **Update**, Delete, and Export.

►Intel(R) Ethernet Controller X710 for 10GbE SFP+
xx:xx:xx:xx:xx:xx

►Intel(R) Ethernet Controller X710 for 10GbE SFP+
xx:xx:xx:xx:xx:xx

►Firmware Image Properties

Press <Enter> to display the following device firmware version information.

- Option ROM version
- Unique NVM/EEPROM ID
- NVM Version

►NIC Configuration

Link Speed

This feature displays the connection speed of a LAN port you specified.

Wake On LAN

If this feature is set to Enabled, the LAN port you specified will be enabled when the system is powered on. The options are Disabled and **Enabled**.

LLDP Agent

The Link Layer Discovery Protocol (LLDP) runs over the data-link layer. An LLDP agent can transmit information of the local system and/or receive information of the remote system. Three modes are available: Transmit-only mode, Receive-only mode, Transmit and receive mode. The options are Disabled and **Enabled**.

Blink LEDs

Use this feature to identify the physical network port by blinking the associated LED. Use the keyboard to select a value. The maximal value is 15 (seconds).

The following information will display as well:

- UEFI Driver
- Adapter PBA
- Device Name
- Chip Type
- PCI Device ID
- PCI Address

- Link Status
- MAC Address
- Virtual MAC Address

► TLS Authenticate Configuration

► Server CA Configuration

This submenu allows you to configure the client certificate to be used by the server.

► Enroll Certification

► Enroll Certification Using File

Use this feature to enroll certification from a file.

Certification GUID

Press <Enter> and input the certification GUID.

► 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

Press <Enter> to delete certification.

► Client Certification Configuration

► Intel(R) VROC SATA Controller



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



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



Note 3: Refer to PCH SATA0 Configuration, PCH SATA1 Configuration, and PCH SATA2 Configuration submenus in BIOS Setup main menu to set "SATA Mode Selection".

The following information is displayed.

- Intel VROC SATA driver version

► Create RAID Volume

Use this feature to create and configure the settings of the RAID volume(s).

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 have been created earlier.

► Intel(R) VROC sSATA Controller



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



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



Note 3: Refer to PCH SATA0 Configuration, PCH SATA1 Configuration, and PCH SATA2 Configuration submenus in BIOS Setup main menu to set "SATA Mode Selection".

The following information is displayed.

- Intel VROC sSATA driver version

► Create RAID Volume

Use this feature to create and configure the settings of the RAID volume(s).

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 have been created earlier.

► Intel(R) Virtual RAID on CPU



Note 1: This feature is based on your system.



Note 2: This feature is available 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 Volumes:

Intel VROC Managed Controllers:

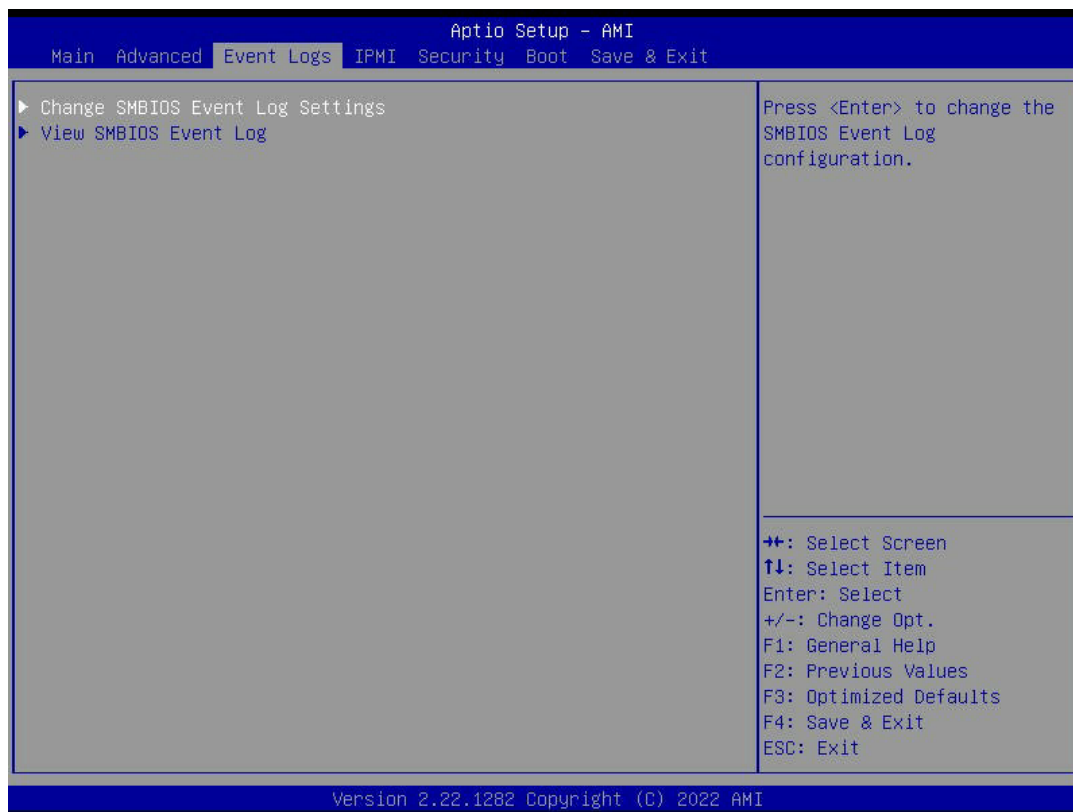
▶ **All Intel VMD Controllers**

▶ **Driver Health**

This feature displays the driver health information. You can select each one and press <Enter> to see the details.

4.4 Event Logs

Use this feature to configure the Event Log settings.



 **Note:** All values changed here do not take effect until computer is restarted.

► 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

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

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**

Select Enabled to log system boot events. The options are Enabled and **Disabled**.

MECI (Multiple Event Count Increment)

Enter the increment value for the multiple event counter. Enter a number between 1 to 255. The default setting is **1**.

METW (Multiple Event Count Time Window)

This feature is used to determine how long (in minutes) the multiple event counter should wait before generating a new event log. Enter a number between 0 to 99. The default setting is 60.

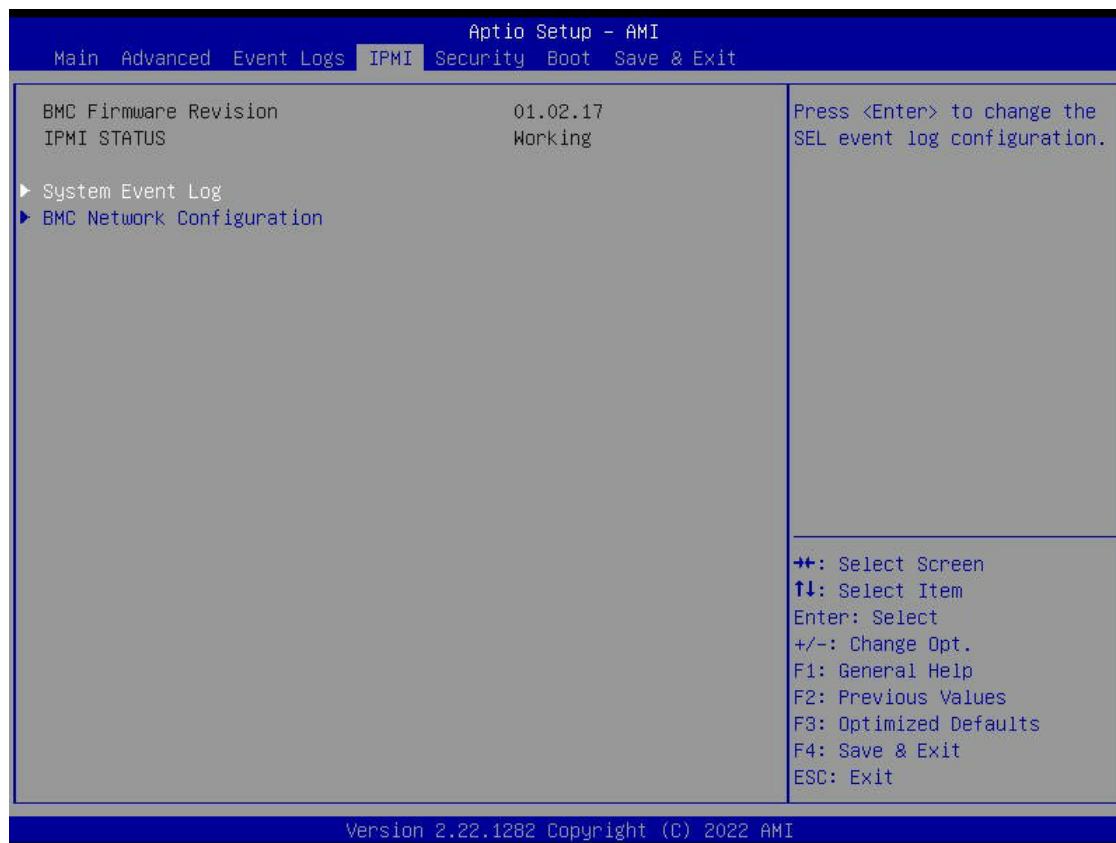
►View System Event Log

This feature allows you 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.

DATE / TIME / ERROR CODE / SEVERITY

4.5 IPMI

Use this menu to configure Intelligent Platform Management Interface (IPMI) settings.



Note: All values changed here do not take effect until computer is restarted.

- **BMC Firmware Revision:** This feature indicates the firmware revision of Baseboard Management Controller (BMC) used in your system.
- **IPMI Status:** This feature indicates the status of BMC used 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

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

This feature allows you to determine 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.

► BMC Network Configuration

Update IPMI 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

IPMI LAN Selection

Use this feature to select the type of the IPMI LAN. The default setting is **Failover**.

IPMI Network Link Status

This feature displays the status of the IPMI network link for this system. The default setting is **Dedicated LAN**.

Configuration Address Source (Available when "Update IPMI LAN Configuration" is set to Yes)

Use this feature to select the IP address source for this computer. If Static is selected, you will need to know the IP address of this computer and enter it to the system manually in the field. If DHCP is selected, AMI BIOS will search for a Dynamic Host Configuration Protocol (DHCP) server attached to the network 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 for this computer. This should be 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 6 two-digit hexadecimal numbers.

Gateway IP Address (Available when "Configuration Address Source" is set to Static)

This feature displays the 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 IPMI LAN Configuration" is set to Yes)

This feature displays the status of VLAN support. The options are **Disable** and **Enable**.

Configure IPv6 Support

IPv6 Address Status

This feature displays the status of IPv6 addresses.

IPv6 Support

Use this feature to enable IPv6 support. The options are **Enabled** and **Disabled**.

Configuration Address Source (Available when "IPv6 Support" is set to Enabled)

This feature allows you to select the source of the IP address for this computer. If Static is selected, you will need to know the IP address of this computer 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 IPv6 Address (Available when "Configuration Address Source" is set to Static)

This feature displays the station IPv6 address. Press <Enter> to change the setting.

Prefix Length (Available when "Configuration Address Source" is set to Static)

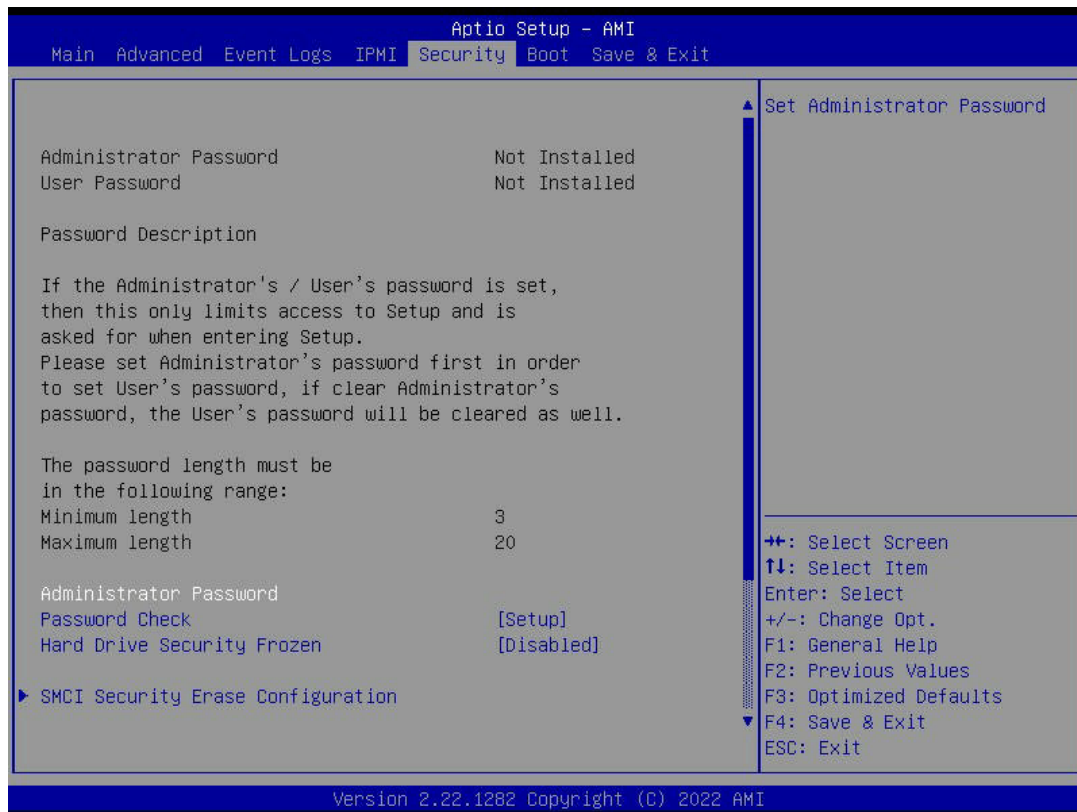
This feature displays the prefix length from BMC. Press <Enter> to change the setting.

IPv6 Router1 IP Address (Available when "Configuration Address Source" is set to Static)

Use this feature to enter the IPv6 Router1 IP address from BMC. Press <Enter> to change the setting.

4.6 Security

This menu allows you to configure the following security settings for the system.



Administrator Password

This feature indicates if an administrator password has been installed. It also allows you to set the administrator password which is required to enter the BIOS setup utility. The length of the password should be 3 to 20 characters.

User Password (Available when an Administrator Password is entered)

This feature indicates if a user's password has been installed. It also allows you to set the password which is required to enter the BIOS setup utility. This feature provides the description of the password. The length of the password should be 3 to 20 characters.

 **Note:** For detailed instructions on how to configure Secure Boot settings, refer to the Secure Boot Configuration User's Guide posted on the web page under the link: <http://www.supermicro.com/support/manuals/>.

Password Check

Select Setup for the system to check for a password at Setup. Select Always for the system to check for a password 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 Enabled and **Disabled**.

►SMCI Security Erase Configuration

This section allows you to configure the SMCI-proprietary Security Erase settings. When this section is selected, the following features will display:

- HDD Name: This feature displays the name of the HDD/SATA drive that is connected to the SMCI Security Erase Configuration submenu.
- HDD Serial Number: This feature displays the serial number of the HDD/SATA device that is connected to the SMCI Security Erase Configuration submenu.
- Security Mode: SAT3 supported.
- Estimated Time: This feature displays the estimate time needed to perform the selected Security Erase features.
- HDD User Pwd (Password) Status: This feature indicates if a password has been set as a SATA user password which will allow you to configure SMCI Security Erase settings on the HDD (SATA) device by using this SATA user password.

Security Function

Select Password to set an HDD/SATA password which will allow you to configure the security settings of the HDD/SATA device. Select Security Erase - Password to enter a SATA user password to allow you to erase the password and the contents previously stored in the HDD/SATA device. Select Security Erase - Without Password to use the manufacturer default password "11111111" as the SATA user password and allow you to erase the contents of the HDD/SATA device by using this default password. The options are **Disable**, Set Password, Security Erase - Password, and Security Erase - Without Password.

Password

Use this feature to set the SATA user password which will allow you to configure the SMCI Security Erase settings by using the SATA user password.

Lockdown Mode

Select Enabled to support Lockdown Mode which will prevent 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:

►P5:ST4000NM0033-9ZM170 (Available when the device is detected by the system)

Press <Enter> and the following information will display.

- 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

Press <Enter> and create new user passwords. For changes to take effect, reboot the system.

►Secure Boot



Note: For detailed instructions on how to configure Security Boot settings, refer to the Security Boot Configuration User's Guide posted on the web page under the link: <http://www.supermicro.com/support/manuals/>.

When you select this submenu and press the <Enter> key, the following will display:

- System Mode
- Vendor Keys
- Secure Boot

Secure Boot

Select Enabled to use 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 devices will be supported by the system. The options are Disabled and **Enabled**.

► Enter Audit Mode

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

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)

Vendor Keys

Provision Factory Defaults

Select Enabled to install factory default Secure Boot keys after the platform reset while the system is in the Setup mode. The options are **Disabled** and Enabled.

► Restore Factory Keys

Select Yes to restore manufacturer default keys used to ensure system security. The options are **Yes** and No.

► Reset to Setup Mode

This feature resets the system to Setup Mode. The options are **Yes** and No.

► Export Secure Boot Variables

This feature exports the NVRAM contents of Secure Boot variables to a storage device.

► Enroll EFI Image

This feature specifies which Extensible Firmware Interface (EFI) image should be used for the system when it operates in the Secure Boot mode.

Device Guard Ready

► Remove 'UEFI CA' from DB

Select Yes to remove UEFI CA from the database. The options are **Yes** and No.

► Restore DB defaults

Select Yes to restore database variables to the manufacturer default settings. 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. The options are **Details**, Export, Update, and Delete.

► Key Exchange Keys

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, keys numbers, and the sources of the authorized signatures. Select Update to update your "Key Exchange Keys." Select Append to append your "Key Exchange Keys." The options are **Details**, Export, Update, Append, and Delete.

► Authorized Signatures

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 your "Authorized Signatures." Select Append to append your "Authorized Signatures." The options are **Details**, Export, Update, Append, and Delete.

► Forbidden Signatures

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, keys numbers, and key sources of the forbidden signatures. Select Update to update your "Forbidden Signatures." Select Append to append your "Forbidden Signatures." The options are **Details**, Export, Update, Append, and Delete.

► Authorized TimeStamps

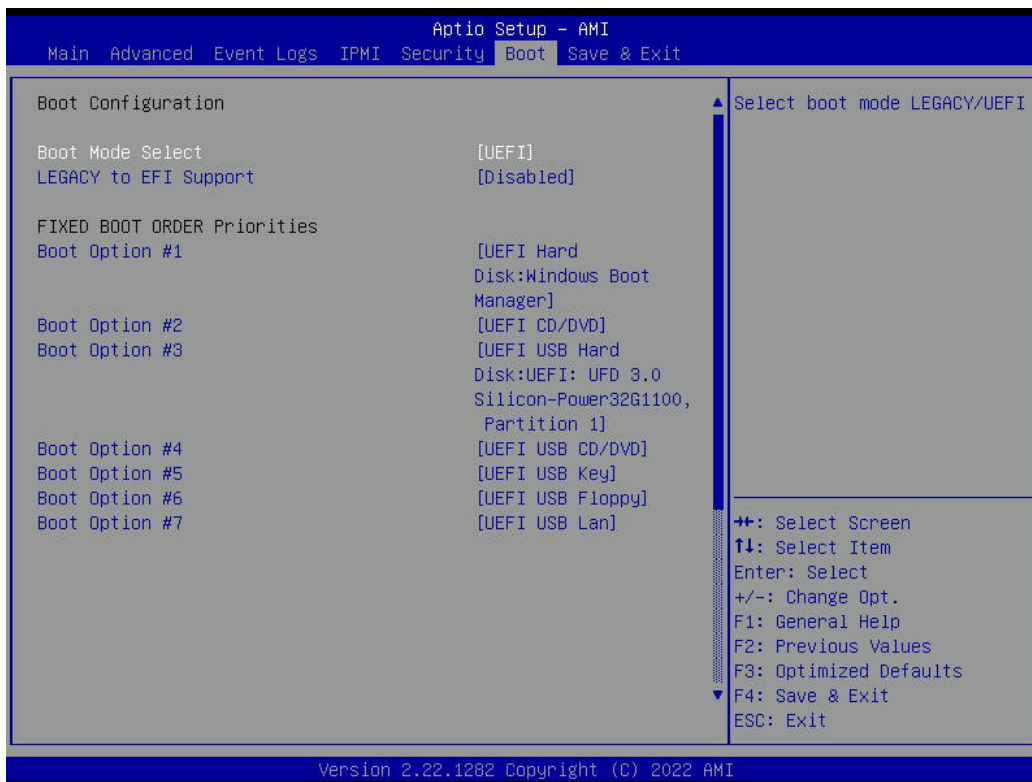
This feature allows you to set and save the timestamps for the authorized signatures which will indicate the time when these signatures are entered into the system. Select Update to update your "Authorized TimeStamps." Select Append to append your "Authorized TimeStamps." The options are **Details**, Export, Update, Append, and Delete.

► OsRecovery (OS Recovery) Signatures

This feature allows you to set and save the authorized signatures used for OS recovery. Select Update to update your "OS Recovery Signatures." Select Append to append your "OS Recovery Signatures." The options are **Details**, Export, Update, Append, and Delete.

4.7 Boot

Use this feature to configure Boot Settings:



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.

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 the feature "**Boot Mode Select**" is set to **UEFI** (default), the following items will be displayed for you to configure the boot settings:

- Boot Option #1 - Boot Option #9

When the feature "**Boot Mode Select**" is set to **Legacy**, the following items will be displayed for configuration:

- Boot Option #1 - Boot Option #8

When the feature "**Boot Mode Select**" is set to **Dual**, the following items will be displayed for configuration:

- Boot Option #1 - Boot Option #17

► **Add New Boot Option (Available when any storage device is detected by the BIOS)**

This feature allows you to add a new boot option to the boot priority features for system boot.

Add boot option

This feature allows you 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

This feature allows you to specify the file path for the new boot option.

Create

After the name and the file path for the boot option are set, press <Enter> to create the new boot option in the boot priority list.

► **Delete Boot Option**

This feature allows you to select a boot device to delete from the boot priority list.

Delete Boot Option

This feature allows you to remove an EFI boot option from the boot priority list.

► **UEFI Hard Disk Drive BBS Priorities**

This feature allow you to set the system boot order of detected devices.

► **UEFI USB Key Drive BBS Priorities**

This feature allow you to set the system boot order of detected devices.

► **UEFI NETWORK Drive BBS Priorities**

This feature sets the system boot order of detected devices.

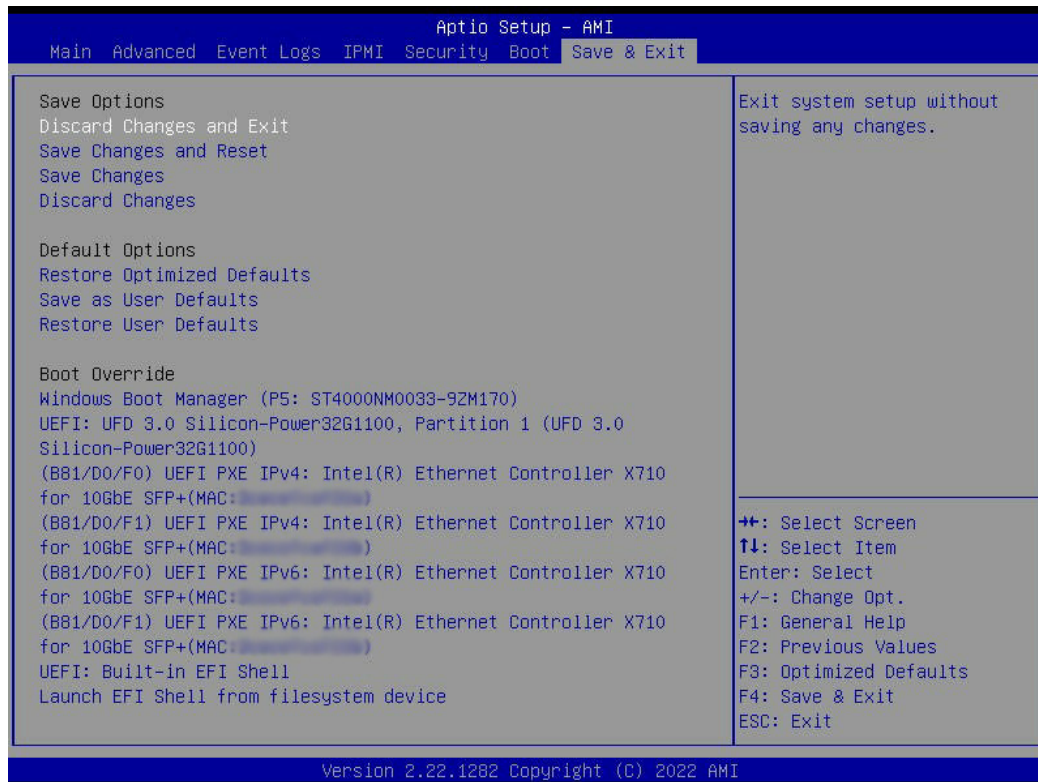
- Boot Option #1 - Boot Option #4

►UEFI Application Boot Priorities

- Boot Option #1

4.8 Save & Exit

Select the Save & Exit menu from the BIOS setup screen to configure the settings below.



Save Options

Discard Changes and Exit

Select this option to exit from the BIOS setup utility without making any permanent changes to the system configuration and reboot the computer.

Save Changes and Reset

When you have completed the system configuration changes, select this option to leave the BIOS setup utility and reboot the computer for the new system configuration parameters to become effective.

Save Changes

When you have completed the system configuration changes, select this option to save all changes you've made. This will not reset (reboot) the system.

Discard Changes

Select this option and press <Enter> to discard all the changes you've made and return to the AMI BIOS setup utility.

Default Options

Restore Optimized Defaults

To set this feature, select Restore Default Values from the Exit menu and press <Enter> to load manufacturer default settings which are intended for maximum system performance but not for maximum stability.

Save as User Defaults

To set this feature, select this feature and press <Enter> to save all changes on the default values you entered to the BIOS setup utility for future use.

Restore User Defaults

To set this feature, select Restore the User Default Values from the Exit menu and press <Enter>. Use this feature to retrieve user-defined default settings that have been saved previously.

Boot Override

This feature allows you to override the Boot priorities sequence in the Boot menu, and immediately boot the system with a device you specified instead of the one specified in the boot list. This is a one-time override.

Appendix A

BIOS POST Codes

A.1 BIOS POST Codes

The AMI BIOS supplies additional checkpoint codes, which are documented online at <http://www.supernmicro.com/support/manuals/> ("AMI BIOS POST Codes User's Guide").

For information on AMI updates, refer to <http://www.ami.com/products/>.

Appendix B

Software

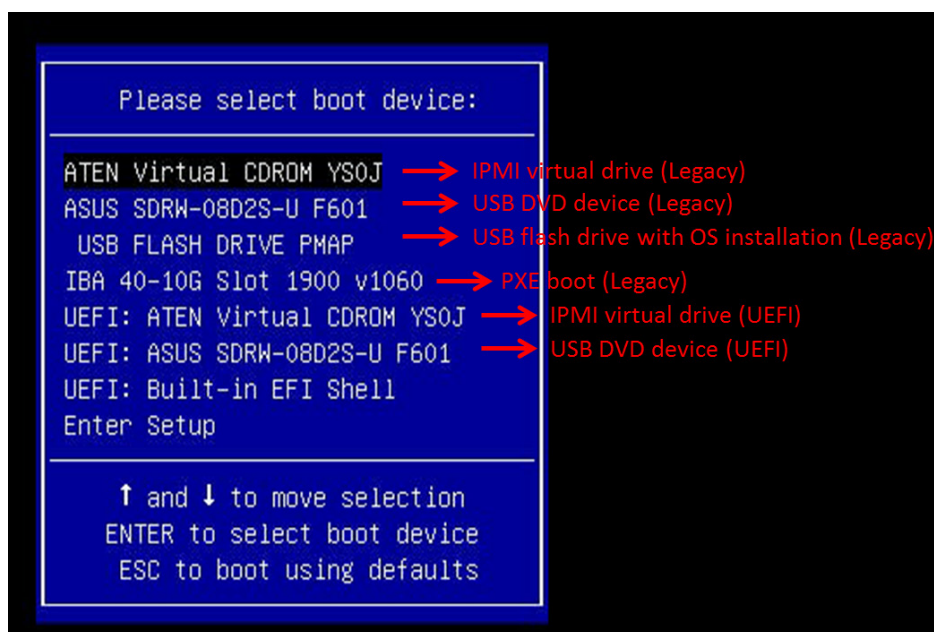
After the hardware has been installed, you can install the Operating System (OS), configure RAID settings, and install the drivers.

B.1 Microsoft Windows OS Installation

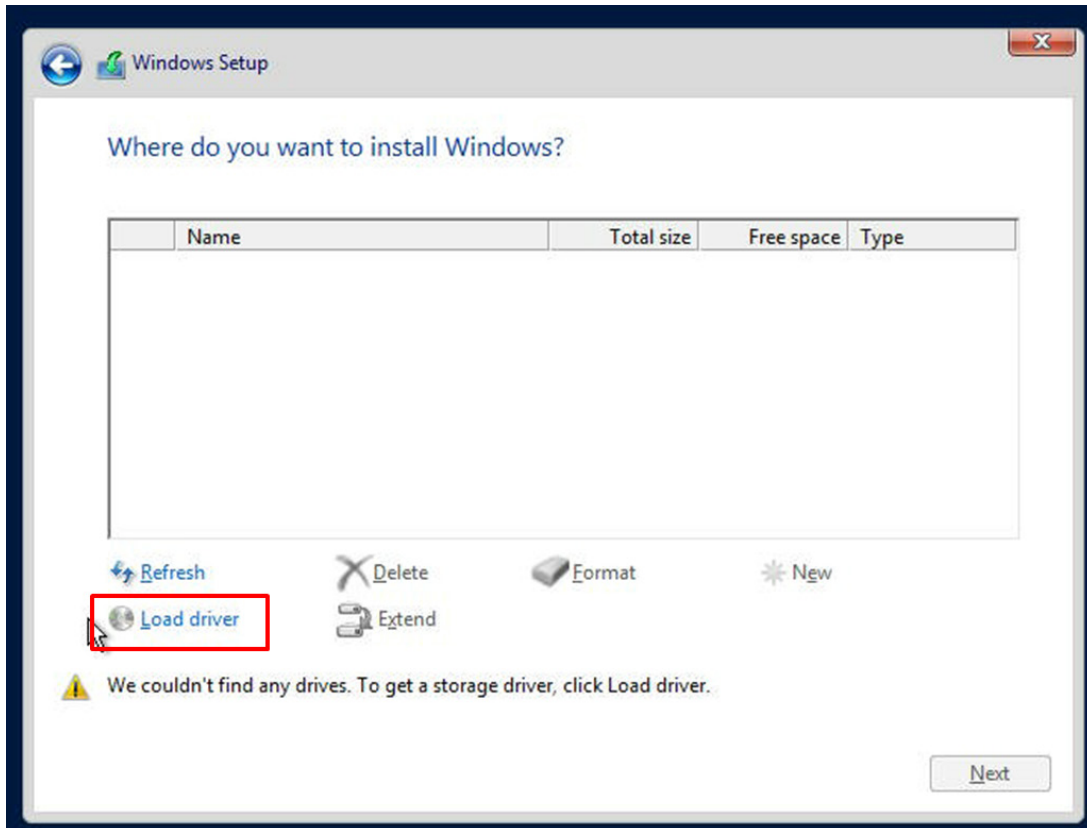
If you will be using RAID, you must configure RAID settings before installing the Windows OS and the RAID driver. Refer to the RAID Configuration User Guides posted on our website at www.supermicro.com/support/manuals.

Installing the OS

1. Create a method to access the MS Windows installation ISO file. That can be a USB flash or media drive, or the BMC KVM console.
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.

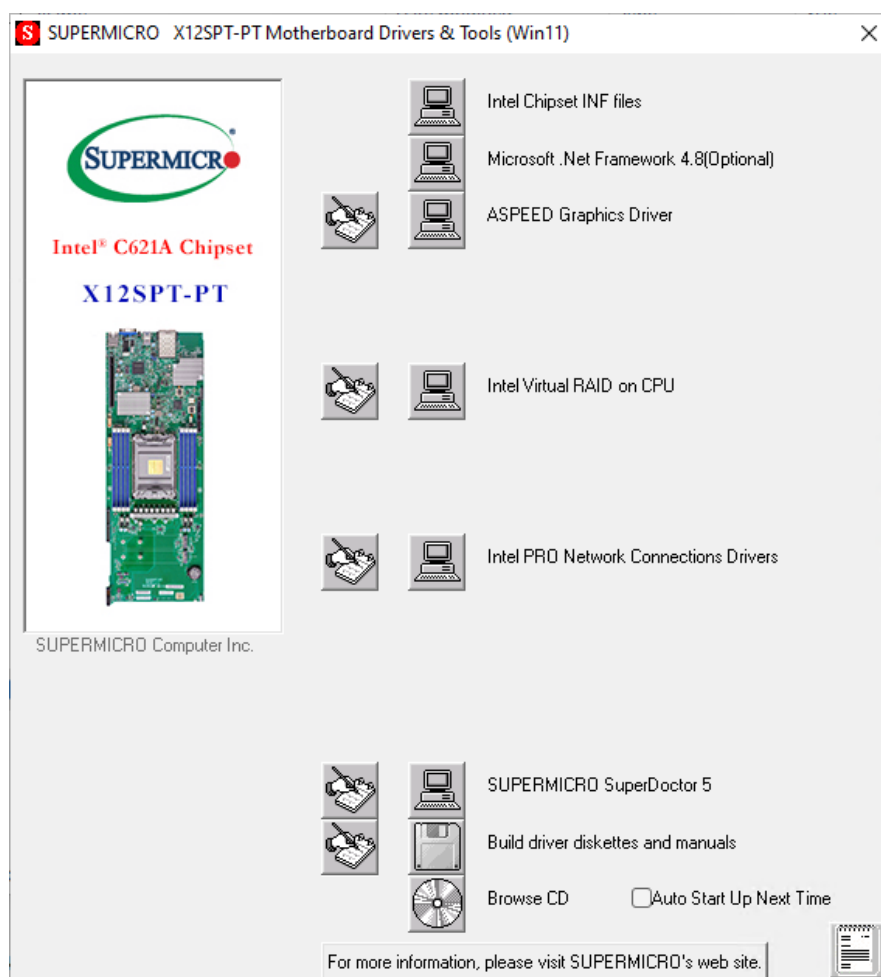
B.2 Driver Installation

The Supermicro website that 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 <http://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.

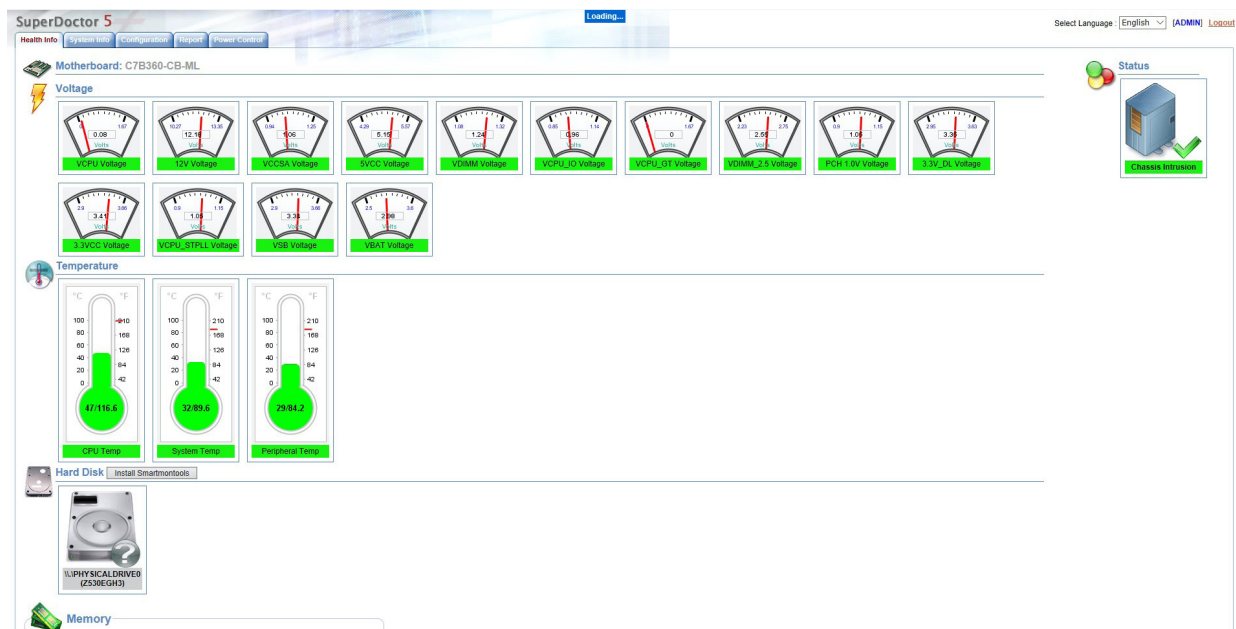


Note: Click the icons showing a hand writing on paper to view the readme files for each item. Click the computer icons to the right of these items to install each item (from top to bottom) one at a time. **After installing each item, you must re-boot the system before moving on to the next item on the list.** The bottom icon with a CD on it allows you to view the entire contents.

B.3 SuperDoctor® 5

The Supermicro SuperDoctor 5 is a program that functions in a command-line or web-based interface for Windows and Linux operating systems. The program monitors such system health information as CPU temperature, system voltages, system power consumption, fan speed, and provides alerts via email or Simple Network Management Protocol (SNMP).

SuperDoctor 5 comes in local and remote management versions and can be used with Nagios to maximize your system monitoring needs. With SuperDoctor 5 Management Server (SSM Server), you can remotely control power on/off and reset chassis intrusion for multiple systems with SuperDoctor 5 or BMC. SuperDoctor 5 Management Server monitors HTTP and SMTP services to optimize the efficiency of your operation.



B.4 BMC

The X12SPT-PT 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, visit our website at: <http://www.supermicro.com/products/nfo/BMC.cfm>.

B.5 Logging into the BMC

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, 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, visit our website at <http://www.supermicro.com/bmcpassword>.

Appendix C

Standardized Warning Statements

The following statements are industry standard warnings, provided to warn the user of situations where a potential bodily injury may occur. 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.

These warnings may also be found on our website at http://www.supermicro.com/about/policies/safety_information.cfm.

Battery Handling



Warning! There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions

電池の取り扱い

電池交換が正しく行われなかった場合、破裂の危険性があります。交換する電池はメーカーが推奨する型、または同等のものを使用下さい。使用済電池は製造元の指示に従って処分して下さい。

警告

電池更換不當會有爆炸危險。請只使用同類電池或制造商推薦的功能相當的電池更換原有電池。請按製造商的說明處理廢舊電池。

警告

電池更換不當會有爆炸危險。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。

Warnung

Bei Einsetzen einer falschen Batterie besteht Explosionsgefahr. Ersetzen Sie die Batterie nur durch den gleichen oder vom Hersteller empfohlenen Batterietyp. Entsorgen Sie die benutzten Batterien nach den Anweisungen des Herstellers.

Attention

Danger d'explosion si la pile n'est pas remplacée correctement. Ne la remplacer que par une pile de type semblable ou équivalent, recommandée par le fabricant. Jeter les piles usagées conformément aux instructions du fabricant.

¡Advertencia!

Existe peligro de explosión si la batería se reemplaza de manera incorrecta. Reemplazar la batería exclusivamente con el mismo tipo o el equivalente recomendado por el fabricante. Desechar las baterías gastadas según las instrucciones del fabricante.

אזהרה!

קיימת סכנת פיצוץ של הסוללה במידה והוחלפה בדרך לא תקינה. יש להחליף את הסוללה בסוג התואם מחברת יצרן מומלצת. סילוק הסוללות המשומשות יש לבצע לפי הוראות היצרן.

هناك خطر من انفجار في حالة اسبدال البطارية بطريقة غير صحيحة فاعلil

اسبدال البطارية

فقط بنفس النوع أو ما يعادلها مما أوصت به الشركة المصنعة

جخلص من البطاريات المسحمة وفقا لعليمات الشركة الصانعة

경고!

배터리가 올바르게 교체되지 않으면 폭발의 위험이 있습니다. 기존 배터리와 동일하거나 제조사에서 권장하는 동등한 종류의 배터리로만 교체해야 합니다. 제조사의 안내에 따라 사용된 배터리를 처리하여 주십시오.

Waarschuwing

Er is ontplofingsgevaar indien de batterij verkeerd vervangen wordt. Vervang de batterij slechts met hetzelfde of een equivalent type die door de fabrikant aanbevolen wordt. Gebruikte batterijen dienen overeenkomstig fabrieksvoorschriften afgevoerd te worden.

Product Disposal



Warning! Ultimate disposal of this product should be handled according to all national laws and regulations.

製品の廃棄

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。

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。

Warnung

Die Entsorgung dieses Produkts sollte gemäß allen Bestimmungen und Gesetzen des Landes erfolgen.

¡Advertencia!

Al deshacerse por completo de este producto debe seguir todas las leyes y reglamentos nacionales.

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.

סילוק המוצר

אזהרה!

סילוק סופי של מוצר זה חייב להיות בהתאם להנחיות וחוקי המדינה.

عند التخلص النهائي من هذا المنتج ينبغي التعامل معه وفقا لجميع القوانين واللوائح الوطنية

경고!

이 제품은 해당 국가의 관련 법규 및 규정에 따라 폐기되어야 합니다.

Waarschuwing

De uiteindelijke verwijdering van dit product dient te geschieden in overeenstemming met alle nationale wetten en reglementen.