X12QCH+

USER'S MANUAL

Revision 1.0a

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Manual Revision 1.0a

Release Date: June 02, 2021

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 X12QCH+ motherboard.

About This Motherboard

The Supermicro X12QCH+ supports quad 3rd Gen Intel® Xeon® Scalable Processors (in Socket P5 LGA 4189) with up to 112 CPU cores and a thermal design power (TDP) of up to 250W. Built with the Intel C621A chipset, the X12QCH+ supports up to 12.2TB of 3DS LRDIMM/LRDIMM/3DS RDIMM/RDIMM DDR4 ECC memory with speeds of 3200/2933/2666MHz in 48 DIMMs and up to 18.4TB of Intel® Optane™ PMem 200 Series memory with speeds of up to 2666MHz. (See the notes below). This motherboard features superior IO expandability, which includes two PCIe 3.0 x16 slots and four PCIe 3.0 x8 slots from CPU1/CPU2 for riser/cable support, 12 slots from CPU3/CPU4 for 24 NVMe connection support, 12 SATA 3.0 ports, two NVMe/SATA M.2 slots, and three USB ports. It also offers the most advanced data protection capability that encompasses TPM (Trusted Platform Module) and RoT (Root of Trust) support. The X12QCH+ is optimized for high-performance, high-end computing platforms and is ideal for Virtualization, Oracle/SAP Database, financial Servers, and enterprise applications. Please note that this motherboard is intended to be installed and serviced by professional technicians only. For processor/memory updates, please refer to our website at http://www.supermicro.com/products/.

Note 1: Intel Optane PMem 200 Series memory is supported by the 3rd Gen Intel Xeon Scalable Processors (83xx/63xx/53xx Series).

Note 2: Memory speed support depends on the processors used in the system.

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.

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

Contacting Supermicro

Headquarters

Address: Super Micro Computer, Inc.
980 Rock Ave.
San Jose, CA 95131 U.S.A.
Tel: +1 (408) 503-8000
Fax: +1 (408) 503-8008
Email: marketing@supermicro.com (General Information)
support@supermicro.com (Technical Support)
Website: www.supermicro.com

Europe

Address: Super Micro Computer B.V.
Het Sterrenbeeld 28, 5215 ML
's-Hertogenbosch, The Netherlands
Tel: +31 (0) 73-6400390
Fax: +31 (0) 73-6416525
Email: sales@supermicro.nl (General Information)
support@supermicro.nl (Technical Support)
rma@supermicro.nl (Customer Support)
Website: www.supermicro.nl

Asia-Pacific

Address: Super Micro Computer, Inc.
3F, No. 150, Jian 1st Rd.
Zhonghe Dist., New Taipei City 235
Taiwan (R.O.C)
Tel: +886-(2) 8226-3990
Fax: +886-(2) 8226-3992
Email: support@supermicro.com.tw
Website: www.supermicro.com.tw

Table of Contents

Chapter 1

Introduction

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

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

1.1 Checklist

This motherboard is intended to be used in a SMCI-proprietary server as a part of an integrated solution. It will not be shipped as a standard, independent product. There will be no shipping package provided for this motherboard.

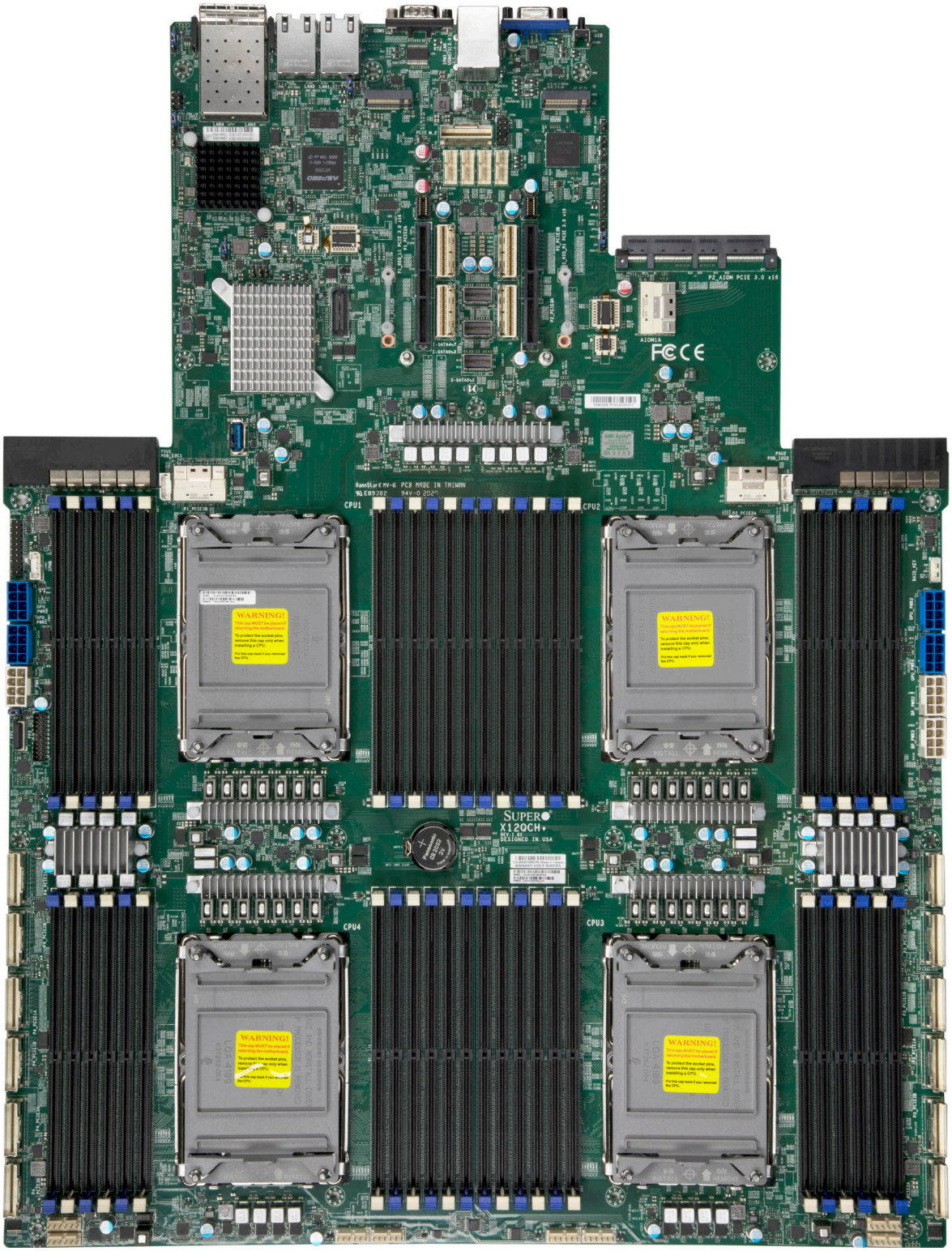
Important Links

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

- 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/
- If you have any questions, please contact our support team at: support@supermicro.com

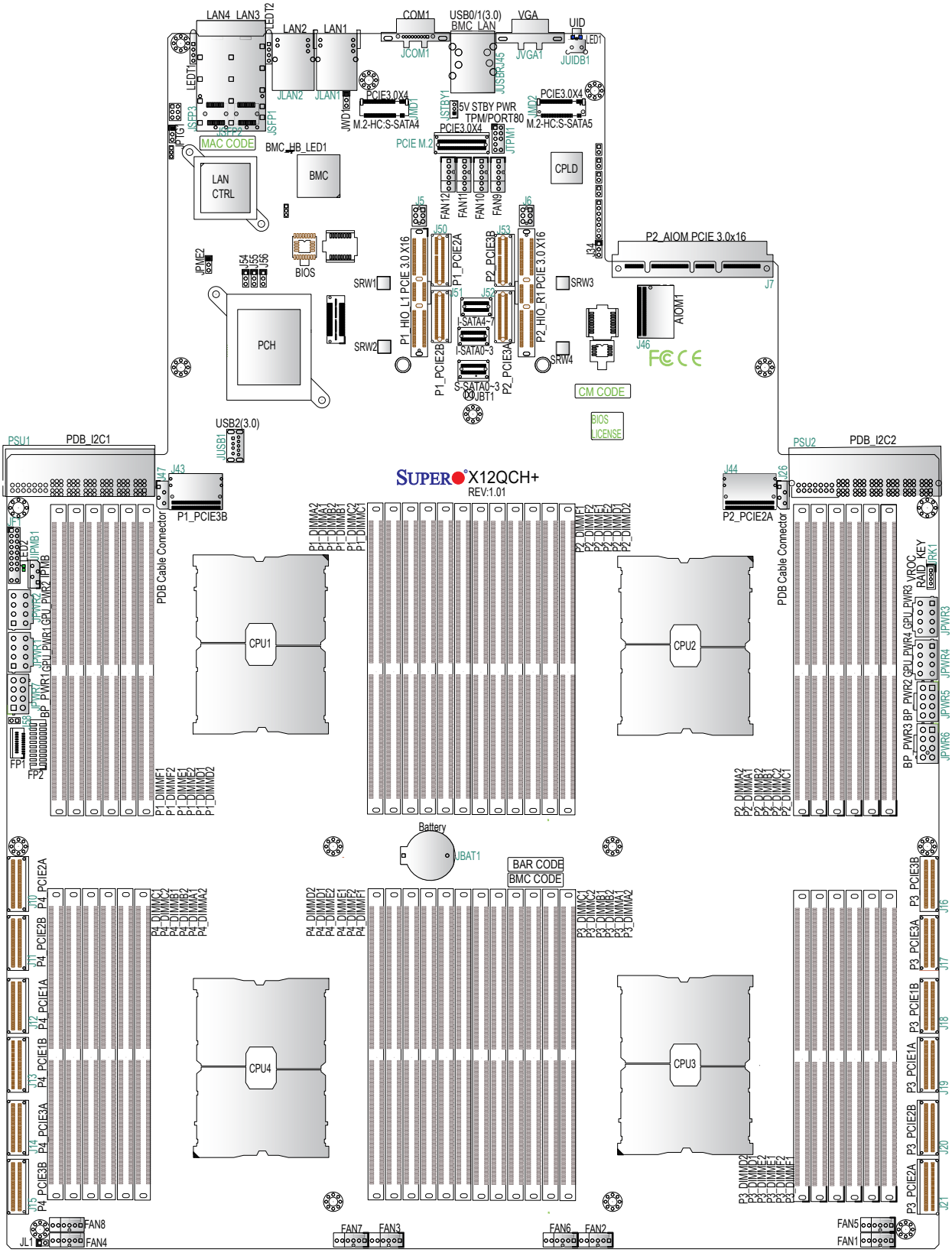
This manual may be periodically updated without notice. Please check the Supermicro website for possible updates to the manual revision level.

Figure 1-1. X12QCH+ Motherboard Image



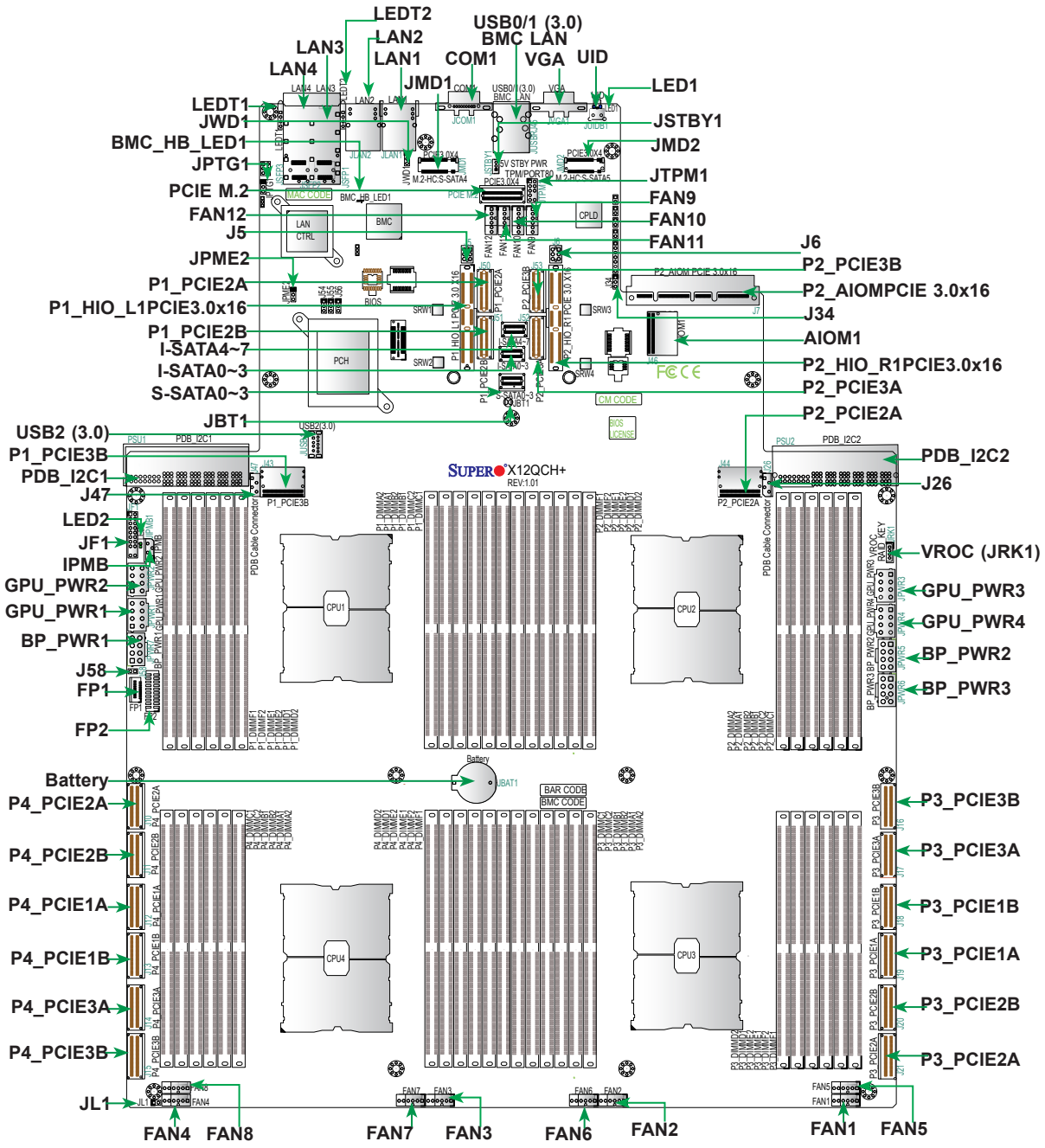
Note: All graphics shown in this manual were based upon the latest PCB revision available at the time of publication of the manual. The motherboard you received may or may not look exactly the same as the graphics shown in this manual.

Figure 1-2. X12QCH+ Motherboard Layout
(not drawn to scale)



Note: Components not documented are for internal testing only.

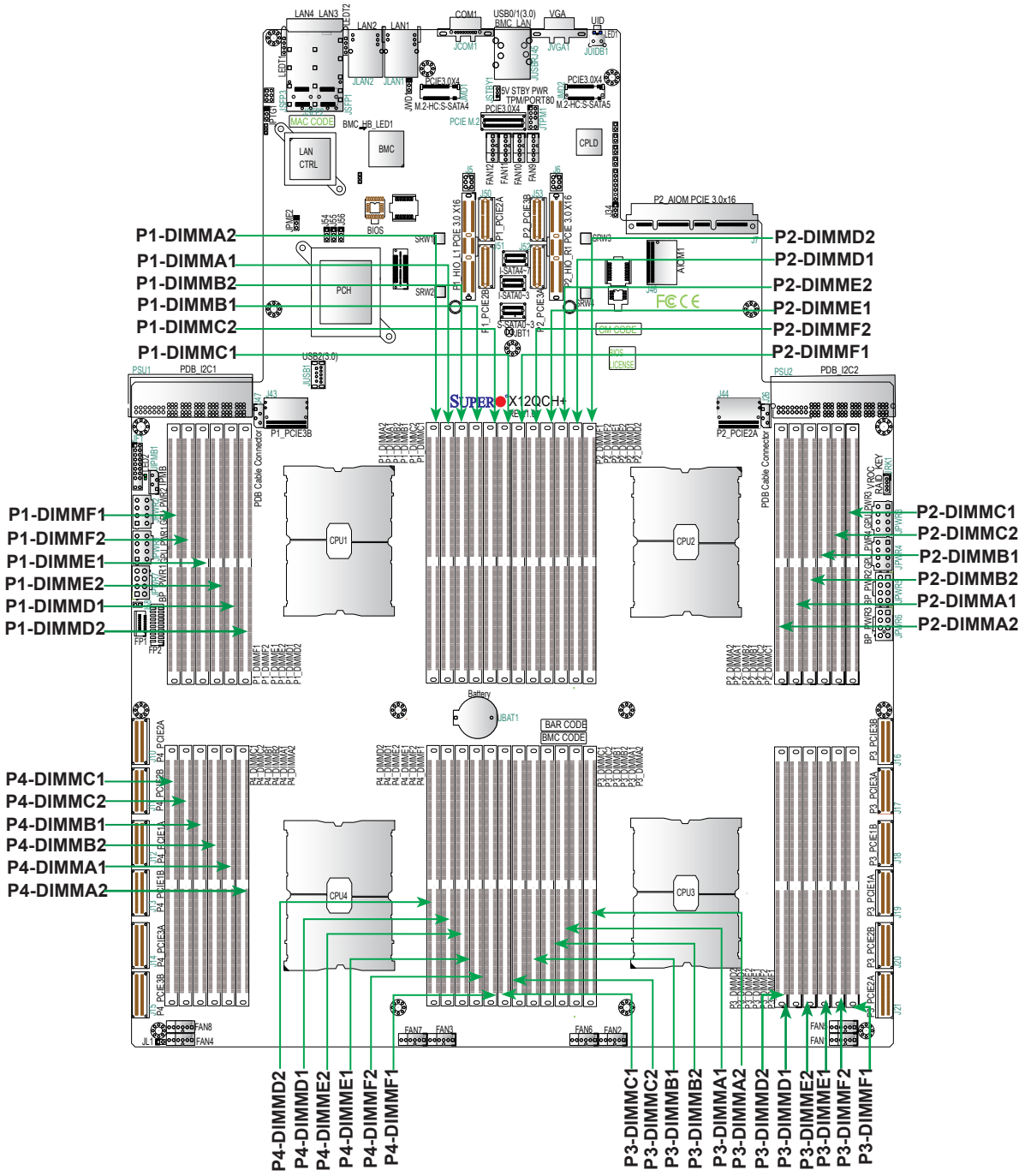
Quick Reference (Jumpers/Connectors/LED Indicators)



Notes:

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

Quick Reference (Memory DIMM Modules)



Notes:

- See Chapter 2 for detailed information on jumpers, I/O ports, and JF1 front panel connections.
- 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
J34	Power-Failure Throttling Enable	Pins 1-2 (Normal)
J58	Select Switch for FP1_Reset Button or UID Button	Closed (UID)
JBT1	Clear CMOS	Open (Normal)
JPME2	Manufacturing Mode (ME) Select	Pins 1-2 (Normal)
JPTG1	10G LAN Enable/Disable	Pins 1-2 (Enabled)
JWD1	Watch Dog Timer Enable	Pins 1-2 (Reset to System)

LED	Description	Status
BMC_HB_LED1	BMC Heartbeat LED	Blinking Green: BMC Normal
LED1	Unit Identifier (UID) LED	Solid Blue: Unit Identified
LED2	Onboard Power LED	Solid Green: Power On
LEDT1	10G LAN Activity LED	Green: LAN4: Active
LEDT2	10G LAN Activity LED	Green: LAN3: Active

Connector	Description
AIOM1 (J46)	PCIe 3.0 x8 AIOM (Advanced I/O Module) slot
Battery (JBAT1)	Onboard CMOS battery
COM1 (JCOM1)	Rear I/O COM port
FAN1 - FAN12	System cooling fan headers
FP1	Front Control Panel header with I^2C
FP2	Front Control Panel header with USB and VGA support
IPMB (JIPMB1)	4-pin BMC External I^2C header (for an BMC-supported card)
BMC_LAN (JUSBRJ45)	Dedicated BMC LAN port
J5/J6	6-pin power connector used for PCIe 3.0 x16 HIO left side slot (P1_HIO_L1PCIE) (J5)/ power connector for right side slot (P2_HIO_R1PCIE) (J6)
J26/J47	PDB (Power Delivery Board) cable connector for CPU3 (J47)/PDB cable connector for CPU4 (J26)
JF1	Front Control Panel header
JL1	Chassis Intrusion header
BP_PWR1/2/3	8-pin power connectors 1/2/3 used for backplane devices
GPU_PWR1/2/3/4	8-pin power connectors 1/2/3/4 for GPU use
JSTBY1	5V standby power header
JTPM1	Trusted Platform Module/Port 80 connector
LAN1, LAN2 (JLAN1, JLAN2)	Ethernet (RJ45) 10G LAN Port1/10G LAN Port2
LAN3, LAN4 (JLAN3, JLAN4)	10G LAN Port3/10G LAN Port4 (w/SFP28 support)
P2_AIOM PCIE 3.0 x16 Slot (J7)	PCIe 3.0 x16 AIOM slot supported by CPU2 (J7)
P1_HIO_L1PCIE/P2_HIO_R1PCIE	PCIe 3.0 x16 HIO (High_Speed I/O) left_side slot supported by CPU1/PCIe 3.0 x16 HIO right_side slot supported by CPU2
P1_PCIE2A/P1_PCIE2B (J50/J51)	SMCI_proprietary PCIe 3.0 x8 slots supported by CPU1
P2_PCIE3A/P1_PCIE3B (J52/J53)	SMCI_proprietary PCIe 3.0 x8 slots supported by CPU2
P1_PCIE3B/P2_PCIE2A (J43/J44)	PCIe 3.0 x8 slots supported by CPU1 (J43) & CPU2 (J44)

P3-PCIE1A/1B/2A/2B/3A/3B	PCIe 3.0 x8 slots supported by CPU3 (J19/J18/J21/J20/J17/J16)
P4-PCIE1A/1B/2A/2B/3A/3B	PCIe 3.0 x8 slots supported by CPU4 (J12/J13/J10/J11/J14/J15)
PDB_I2C1/PDB_I2C2 (PSU1/ PSU2)	PDB (Power Delivery Board) I²C1 (PSU1)/PDB I²C2 (PSU2)
PCIE M.2	PCIe 3.0 x4 M.2 slot (with 2280 and 22110 support)
(I-)SATA 0-3, (I-)SATA 4-7	Intel® PCH SATA 3.0 connectors 0-3, 4-7 (with RAID 0, 1, 5, 10)
(S-)SATA 0-3	S-SATA 3.0 Connector 0-3 (supported by Intel PCH)
(M.2-HC) S-SATA 4/5 (JMD1/ JMD2)	PCIe 3.0 x4 M.2 slots for NVMe/SATA SSDs (with support of M-Key 2280, and 22110 via SlimSAS x8 cables)
UID (JUIDB1)	Unit Identifier (UID) button
USB0/1 (3.0) (JUSBRJ45)	Rear I/O USB 3.0 ports 0/1
USB2 (3.0) (JUSB1)	Internal Type A USB 3.0 header
VGA (JVGA1)	Rear VGA port on the I/O backpanel
VROC (JRK1)	Intel VROC key header for NVMe RAID support (See the note below)

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

Motherboard Features

Motherboard Features	
CPU	
• Supports four 3rd Gen Intel Xeon Scalable Processors (in Socket P5 LGA 4189) with up 112 cores and a thermal design power (TDP) of up to 250W	
Memory	
• Supports up to 12.2TB of 3DS LRDIMM/LRDIMM/3DS RDIMM/RDIMM DDR4 (288-pin) ECC memory with speeds of 3200/2933/2666MHz in 48 memory slots and up to 18.4TB of Intel Optane PMem 200 Series memory with speeds of up to 2666MHz **Note 1**: Intel Optane PMem 200 Series memory is supported by the 3rd Gen Intel Xeon Scalable Processors (83xx/63xx/53xx Series) only. **Note 2:** Memory speed and capacity support depends on the processors used in the system.	
DIMM Size	
• Up to 256 GB at 1.2V **Note:** For the latest CPU/memory updates, please refer to our website at http://www.supermicro.com/products/motherboard.	
Chipset	
• Intel PCH C621A	
Expansion Slots	
• One PCIe 3.0 x16 AIOM slot supported by CPU2 (P2_AIOM PCIE 3.0 x16 Slot: J7) • Two PCIe 3.0 x16 High_Speed I/O (HIO) slots: One slot on the left side supported by CPU1 (P1_HIO_L1PCIE) and one slot on the right side supported by CPU2 (P2_HIO_R1PCIE) • Two SMCI_proprietary PCIe 3.0 x8 slots supported by CPU1 (P1_PCIE2A/P1_PCIE2B: J50/J51) • Two SMCI_proprietary PCIe 3.0 x8 slots supported by CPU2 (P2_PCIE3A/P1_PCIE3B: J52/J53) • Two PCIe 3.0 x8 slots: One slot supported by CPU1 (P1_PCIE3B: J43) and one slot supported by CPU2 (P2_PCIE2A: J44) • Six PCIe 3.0 x8 slots supported by CPU3 (P3-PCIE1A/1B/2A/2B/3A/3B: J19/J18/J21/J20/J17/J16) • Six PCIe 3.0 x8 slots supported by CPU4 (P4-PCIE1A/1B/2A/2B/3A/3B: J12/J13/J10/J11/J14/J15) • Two PCIe 3.0 x4 M.2 slots for NVMe/SATA SSDs (with M-Key 2280 and 22110 support via SlimSAS x8 cables) ((M.2-HC) S-SATA 4/5: JMD1/JMD2)	
Network	
• Two 10G RJ45 Based-T + Two 10G SFP28 Ethernet LAN ports supported by Intel X710-TM4 • One Dedicated BMC LAN located on the rear I/O panel (via AST2500 BMC)	
Baseboard Management Controller (BMC)	
• ASPEED AST2500 BMC	
Graphics	
• Graphics controller & VGA support via ASPEED AST2500 BMC	
I/O Devices	
• Serial (COM) Port	• One (serial port on the rear I/O panel (COM1)

• SATA 3.0	• Eight I-SATA 3.0 ports at 6 Gb/s (I-SATA0-3, 4-7) • Four S-SATA 3.0 ports at 6 Gb/s (S-SATA0-3) • Two PCIe 3.0 x4 M.2 slots for NVMe/SATA SSDs (with M-Key 2280 and 22110 support) (via SlimSAS x8 cable) (M.2-HC: S-SATA 4/5)
• Video (VGA) Connections	• One VGA port on the rear I/O panel (JVGA1) • One Front Control Panel header with USB and VGA (FP2)

Peripheral Devices

- Two USB 3.0 ports on the rear I/O panel (USB0/1)
- One internal USB 3.0 Type A header for front access (USB2)

BIOS

- AMI BIOS
- ACPI 3.0 or later, PCI firmware 4.0 support, SPI dual/quad speed support, riser card auto detection support, RTC (Real Time Clock) wake-up, 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 +12V, +5V/+5V standby, +3.3V, and +3.3V standby
- Onboard temperature monitoring for CPU, VRM, LAN, PCH, system, and memory
- 7+1 CPU switch phase voltage regulator
- CPU thermal trip support
- Platform Environment Control Interface (PECI)

Fan Control

- Fan status monitoring via BMC connections
- Single cooling zone
- Low-noise fan speed control
- Twelve 6-pin fan headers

System Management

- SuperDoctor® 5
- Chassis intrusion header and detection
- Server platform service

Firmware Integrity/System Security

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

LED Indicators

- Power LED (LED2)
- UID/remote UID (LED1)
- 10G LAN activity LEDs (LEDT1/LEDT2)
- BMC Heatbeat LED (BMC_HB_LED1)

Dimensions
• 16.80" (L) x 21.90" (W) ATX (426.72 mm x 556.26 mm)

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

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

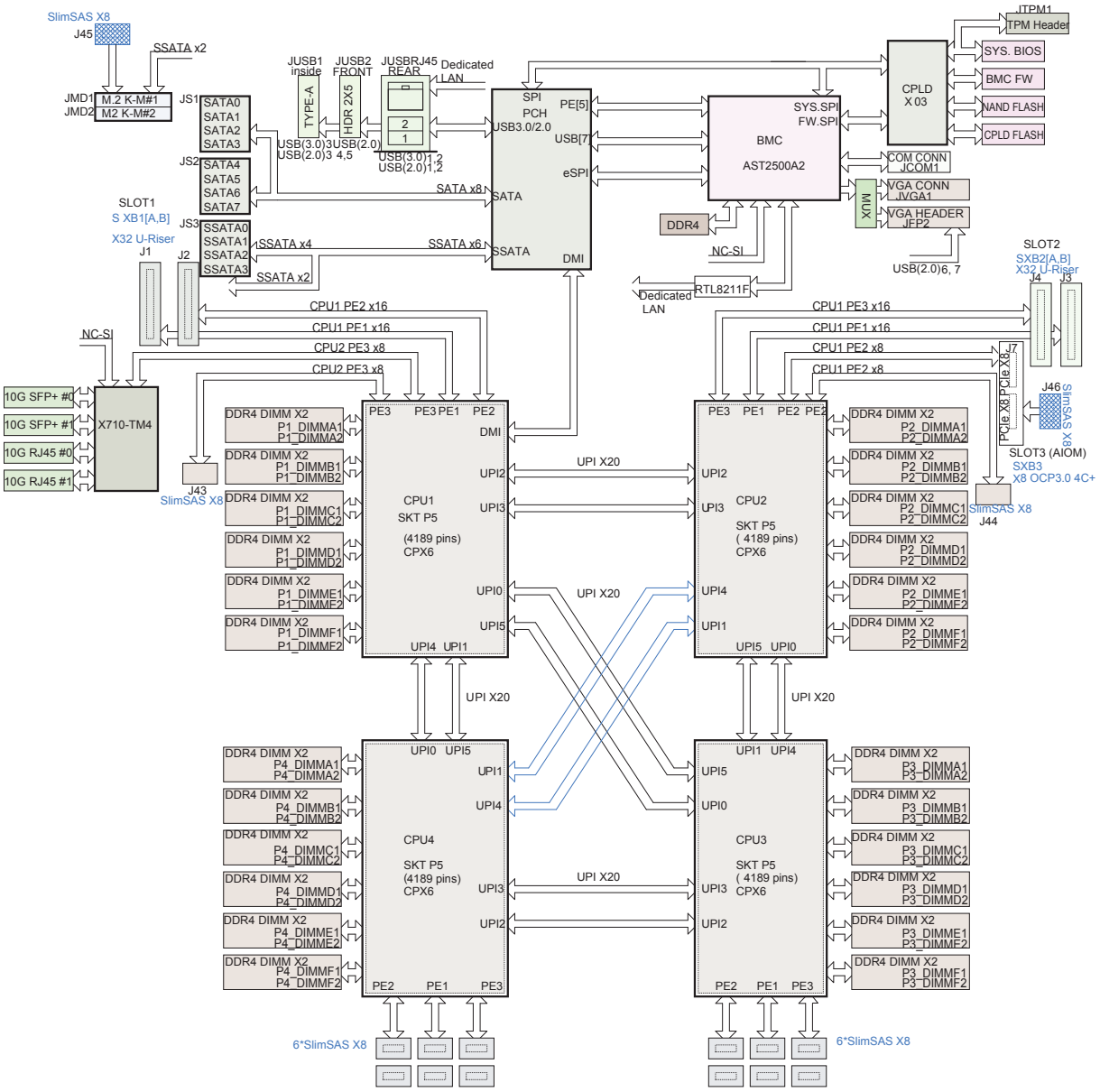


Figure 1-3.
System Block Diagram

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 Processors (Socket P5) and the Intel C621A chipset, the X12QCH+ motherboard provides system performance, energy efficiency, and feature sets optimized for high-performance computing, virtualization, Oracle/SAP database, and financial/enterprise servers.

With the support of the new Intel microarchitecture, the X12QCH+ dramatically increases system performance for a multitude of platform applications.

Features supported

- Performance improvements with higher core counts (up to 6 UPIs/socket @10.4 GT/s)
- Vector Neural Network Instructions (VNNI) and BFloat 16 support to accelerate AI/deep learning training. (This motherboard supports new instructions that include VNNI and BFloat 16 for AI/deep learning training.)
- New hardware-enhanced security features help protect platform & data without compromising performance

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, CPU, and battery 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 IPMI interface.

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 user-defined threshold, system/CPU cooling fans will be turned on to prevent the CPU or the system from overheating.

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

System Resource Alert

This feature is available when used with SuperDoctor 5® in the Windows OS or in the Linux 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 10/12 operating systems. For detailed information regarding OS support, please refer to the Supermicro website.

1.6 Power Supply

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

The X12QCH+ motherboard accommodates two SMCI-proprietary Power Delivery Boards (PDB) (PSU1/PSU2) that are used to provide power to your system. Although most power supplies generally meet the specifications required by the CPU, some are inadequate. In addition to PSU1/PSU2, three 8-pin power connectors (BP_PWR1/2/3) are required for backplane device use, and another four 8-pin power connectors (GPU_PWR 1/2/3/4) are also required to support GPU devices. All these power supplies are needed to ensure adequate power supply to the system.

1.7 Serial Port

The X12QCH+ motherboard supports one serial communication connector. COM Port 1 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, 500 K, or 1 Mb/s, which support high-speed serial communication devices.

1.8 Intel® Optane™ Persistent Memory 200 Series Overview

The 3rd Gen Intel Xeon Scalable Processors (83xx/63xx/53xx Series) support Intel® Optane™ Persistent Memory 200 Series or Next Generation Intel® Optane™ PMem technology depending on the processors used in the system. Intel® Optane™ PMem 200 Series memory offers data persistence at higher capacities than the traditional DDR4 memory modules. It also provides increased storage capabilities for higher performance computing platforms with flexible configuration options.

Note: Intel® Optane™ Peristent Memory 200 Series is supported by the 3rd Gen Intel Xeon Scalable Processors (83xx/63xx/53xx Series) only.

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

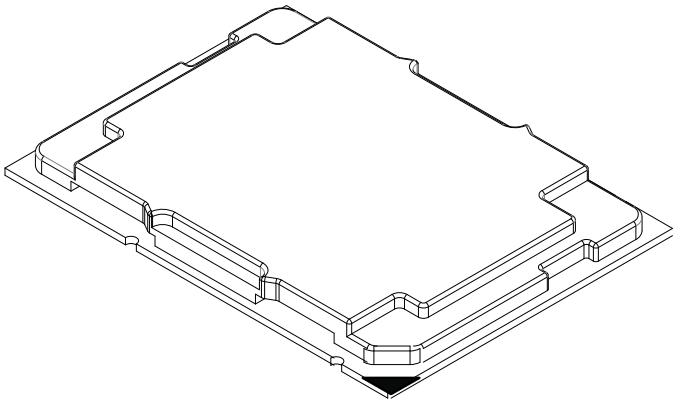
The motherboard is shipped in antistatic packaging to avoid static damage. When unpacking the motherboard, make sure that the person handling it is static protected.

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:

- Please carefully follow the instructions given on the previous page to avoid ESD-related damages.
- Unplug the AC power cords from all power supplies after shutting down the system.
- Check that the plastic protective cover is on the CPU socket and none of the socket pins are bent. If they are, contact your retailer.
- When handling the processor, avoid touching or placing direct press ure 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.

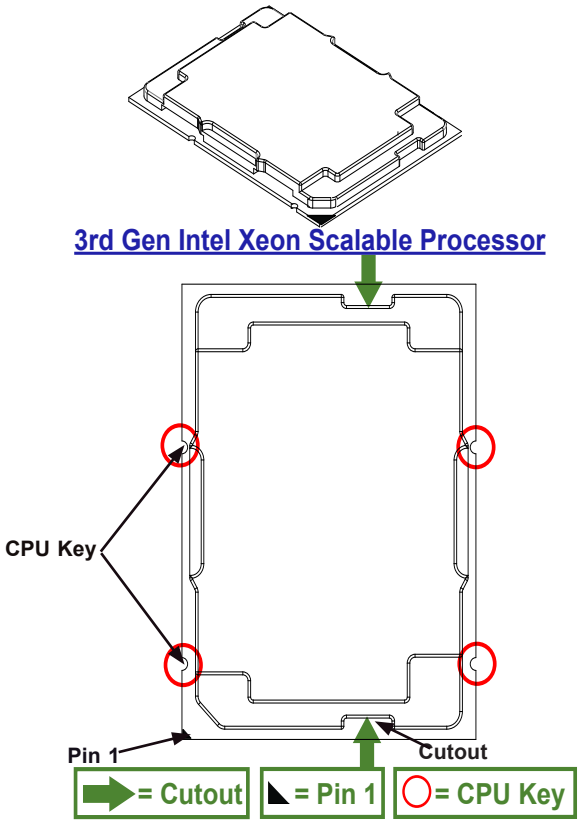
The 3rd Gen Intel Xeon Scalable Processor



Processor Top View

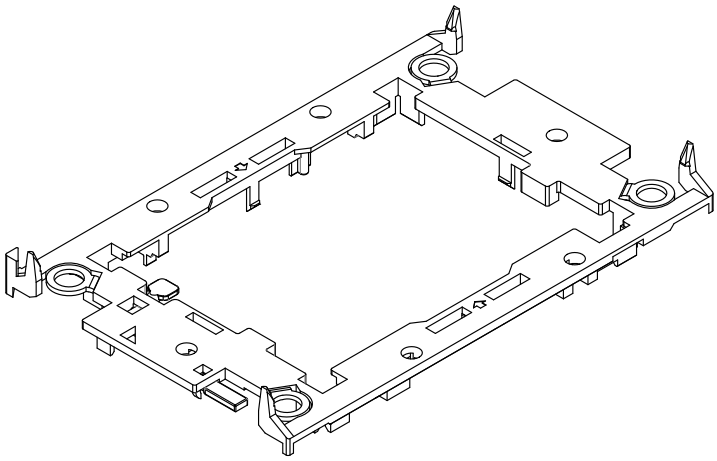
1. The 3rd Gen Intel Xeon Scalable Processor

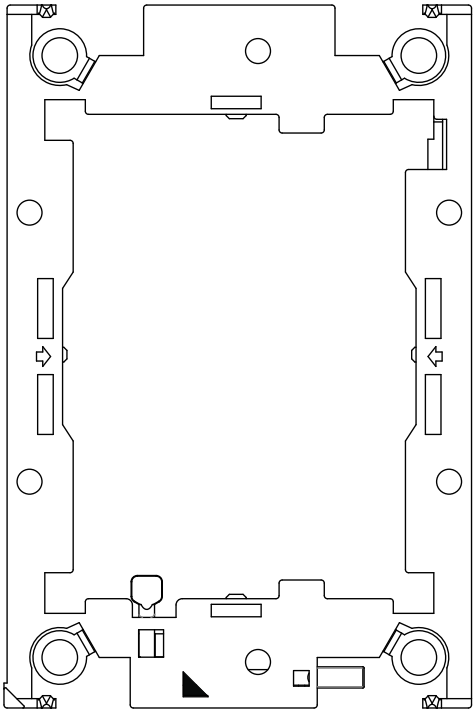
Processor Top View (3D)



2. Processor Carriers

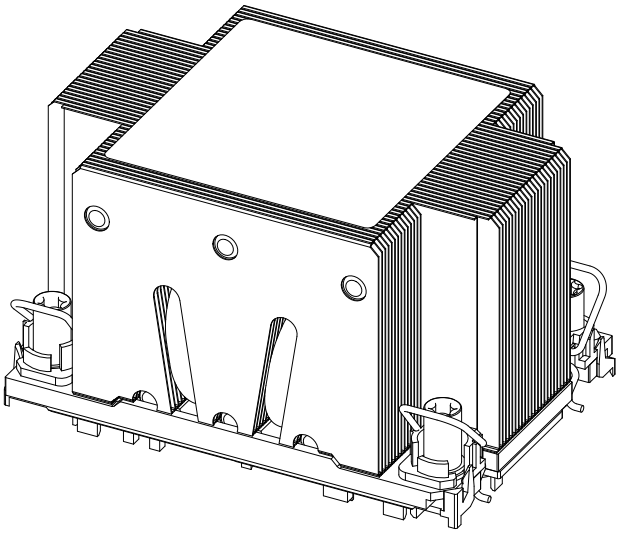
Carrier Top View





Carrier Bottom View

3. Heatsink

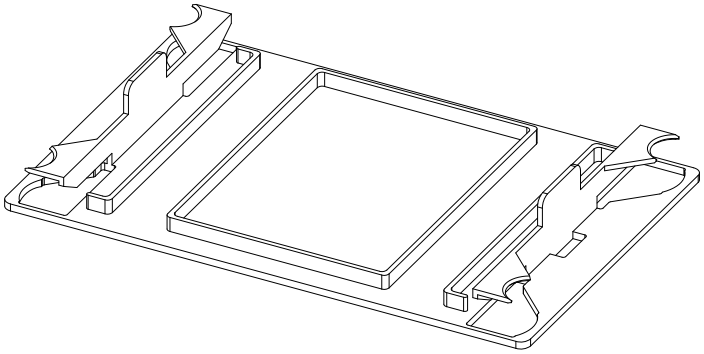


Note: Exercise extreme care when handling the heatsink. Pay attention to the edges of heatsink fins which can be sharp! To avoid damaging the heatsink, please do not apply excessive force on the fins when handling the heatsink.

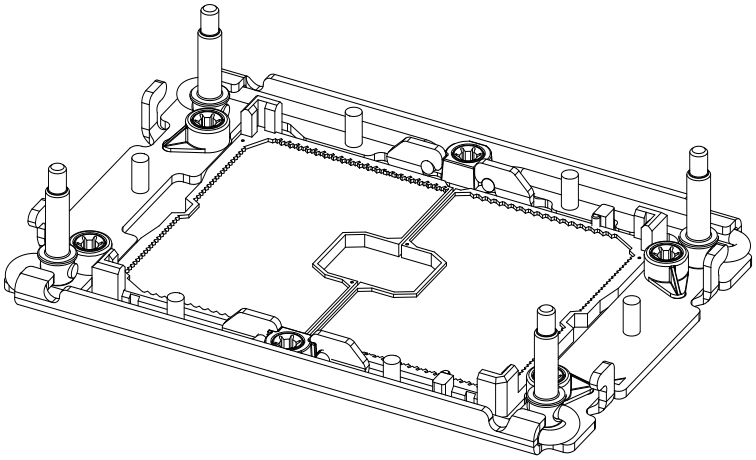
Overview of the CPU Socket

The CPU socket is protected by a plastic protective cover.

Plastic Protective Cover



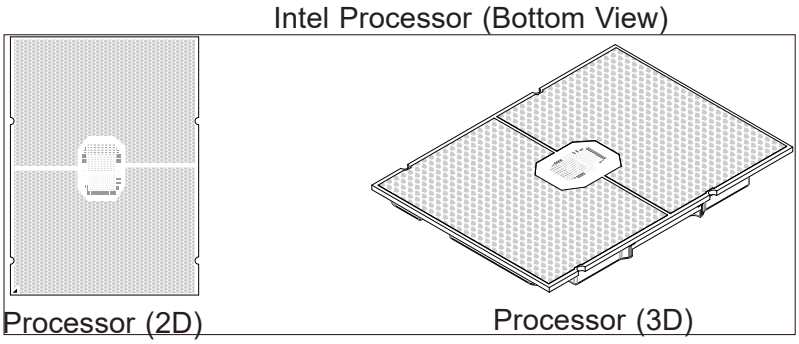
CPU Socket



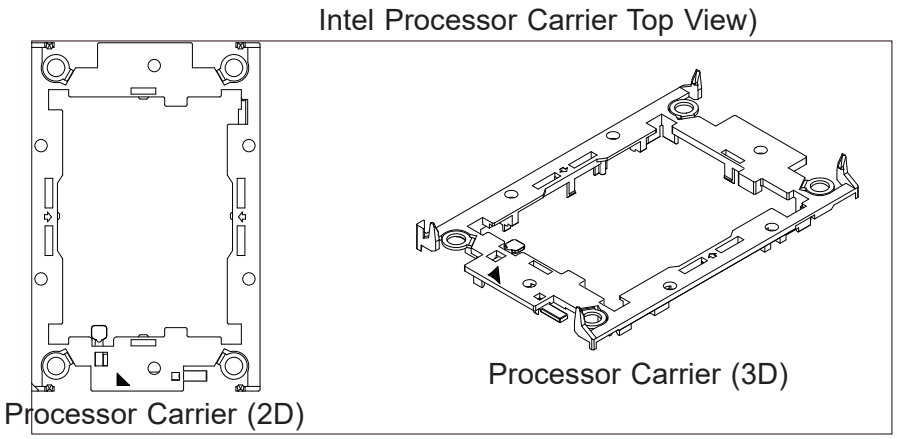
Overview of the Processor Carrier Assembly

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.

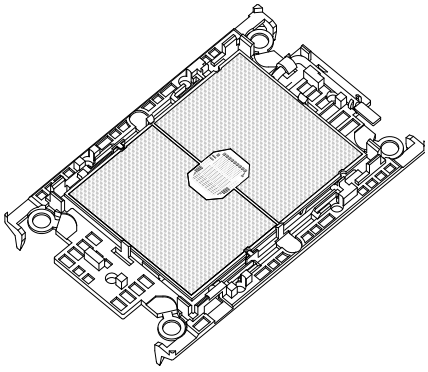
1. 3rd Gen Intel Xeon Scalable Processor



2. Processor Carrier



3. Processor Carrier Assembly

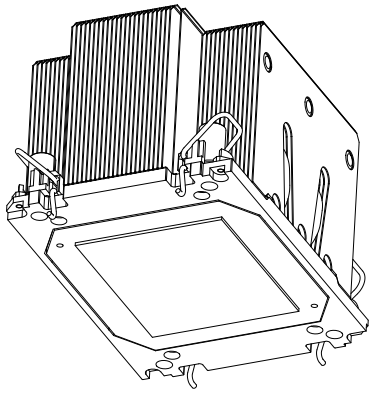


(Carrier with the Processor Installed)

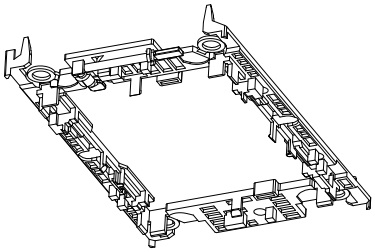
Overview of the Processor Heatsink Module

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

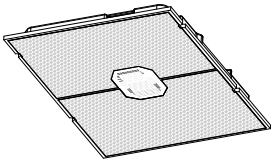
1. Heatsink (with Thermal Grease)



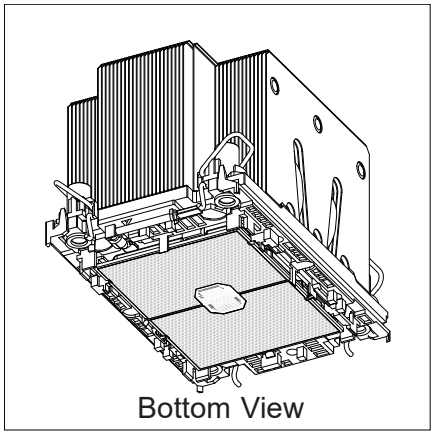
2. Processor Carrier



3. Intel Xeon Scalable Family Processor



4. Processor Heatsink Module (PHM)



Bottom View

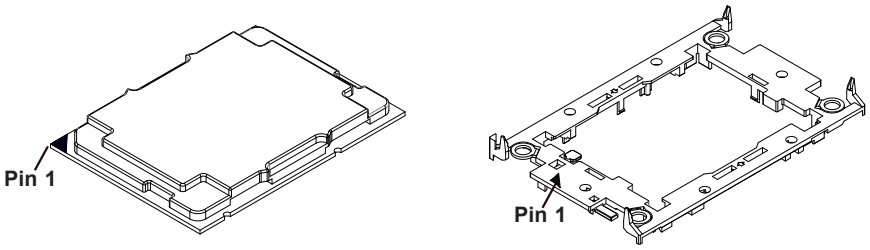
Creating the Processor Carrier Assembly

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

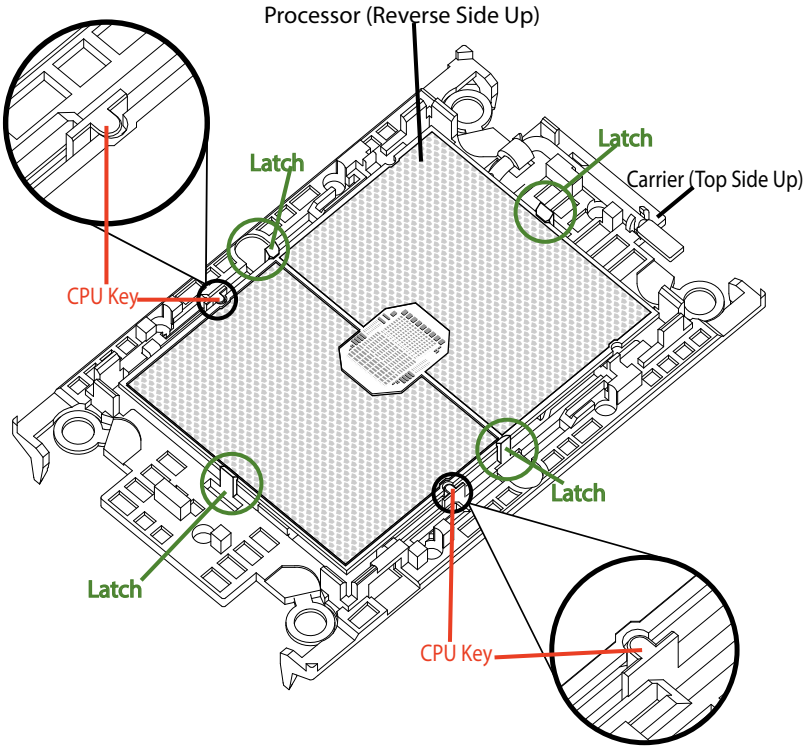
To create the processor carrier assembly, please follow the steps below:

Note: Before installation, be sure to follow the instructions given on Page 1 & 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. Please note that the triangle indicates Pin 1 location.

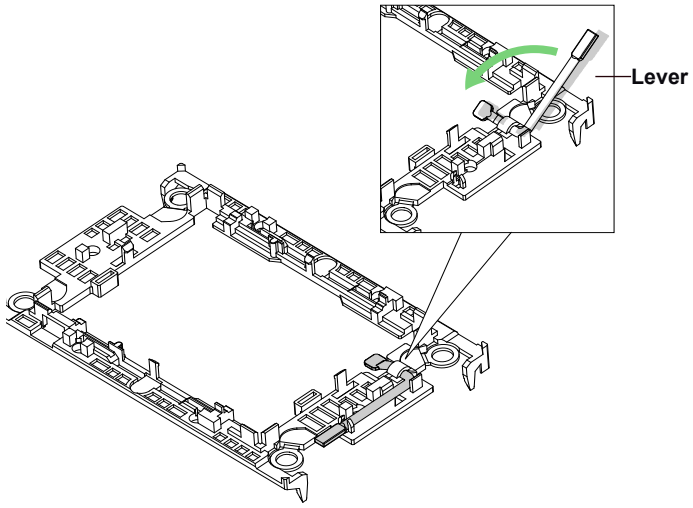


2. First, turn over the processor carrier and locate Pin 1 on the CPU and Pin 1 on the carrier. Then, turn the processor over with the processor reverse side (gold contacts) facing up and locate CPU keys on the processor. Finally, locate the CPU keys and four latches on the carrier as shown below.



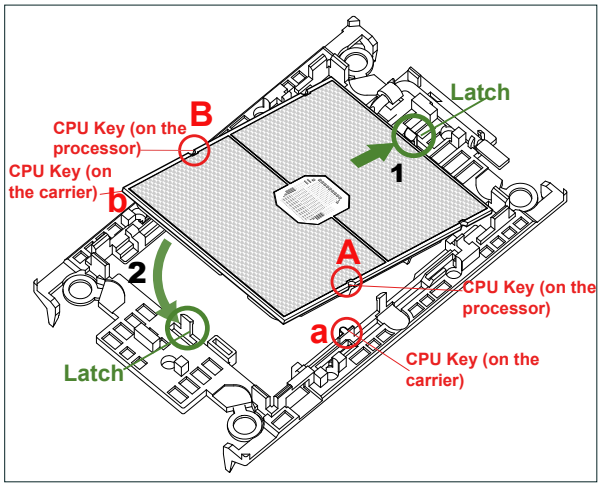
(Carrier with the Processor Installed)

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

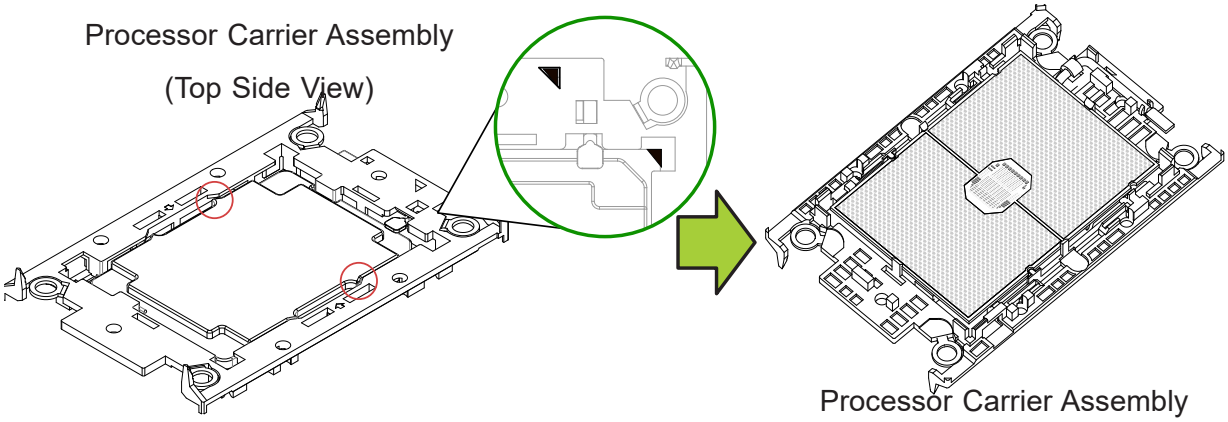


4. Using Pin 1 as a guide, carefully align the CPU keys (A & B) on the processor against the CPU keys on the carrier (a & b) as shown in the drawing below.

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.

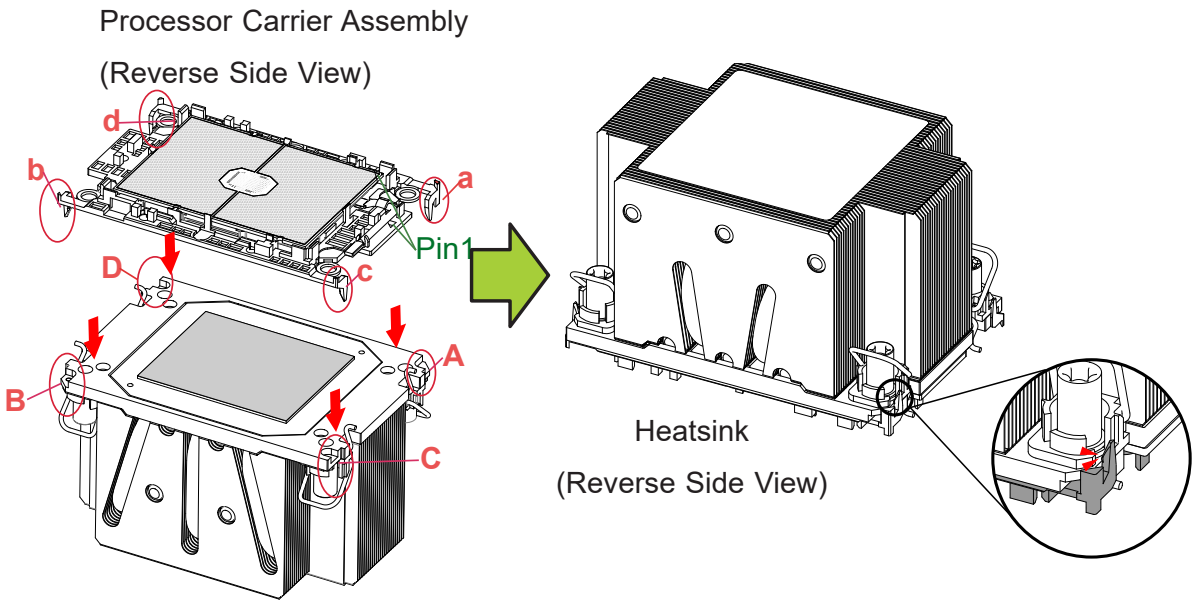


Creating the Processor Heatsink Module (PHM)

After creating the processor carrier assembly, please 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.

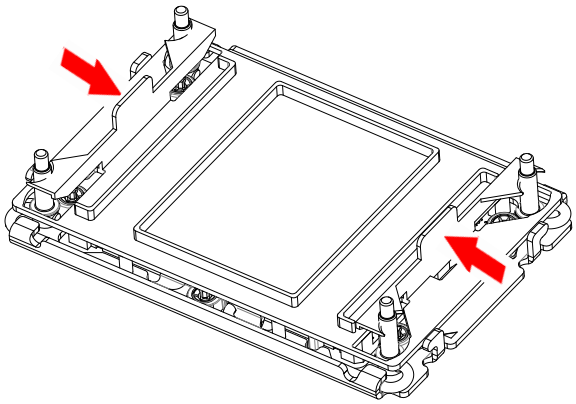
1. Turn the heatsink over with the thermal grease, which is on the reverse side of the heatsink, facing up. Pay attention to the two triangle cutouts (A, B) located at the diagonal corners of the heatsink as shown in the drawing below.
2. Hold the processor carrier assembly top side (with thermal grease) 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, and align the corners marked "b", "c", "d" on processor assembly against the corners marked "B", "C", "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", "d" on the processor carrier assembly into the corners of the heatsink marked "B", "C", "D" making sure that all plastic clips are properly attached to the heatsink.



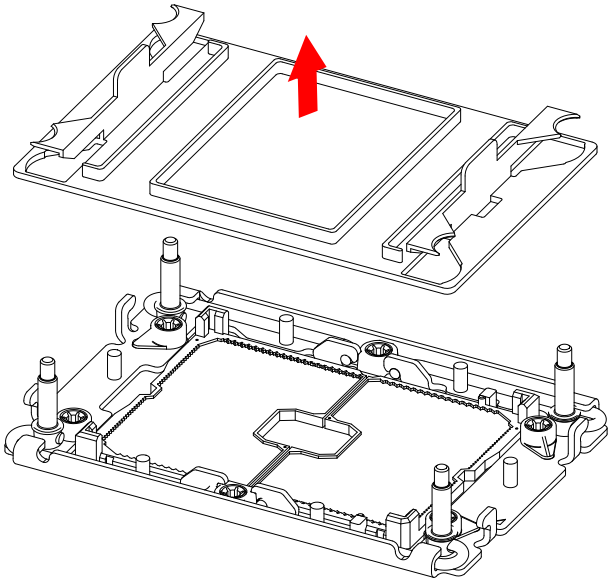
Preparing the CPU Socket for Installation

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.

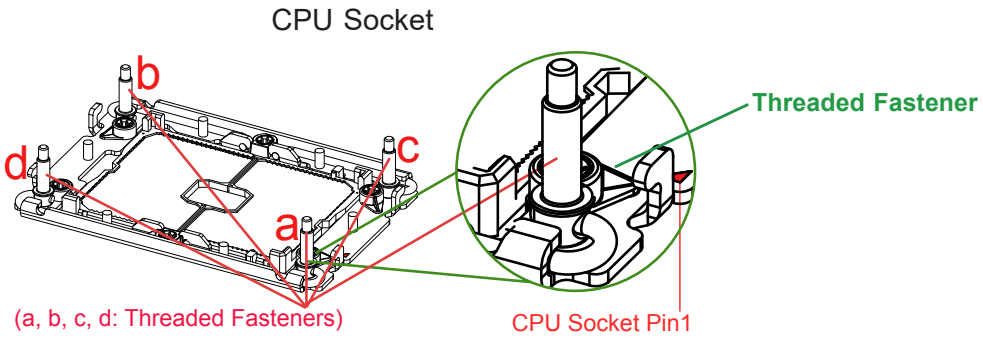


2. Pull up the protective cover from the socket.

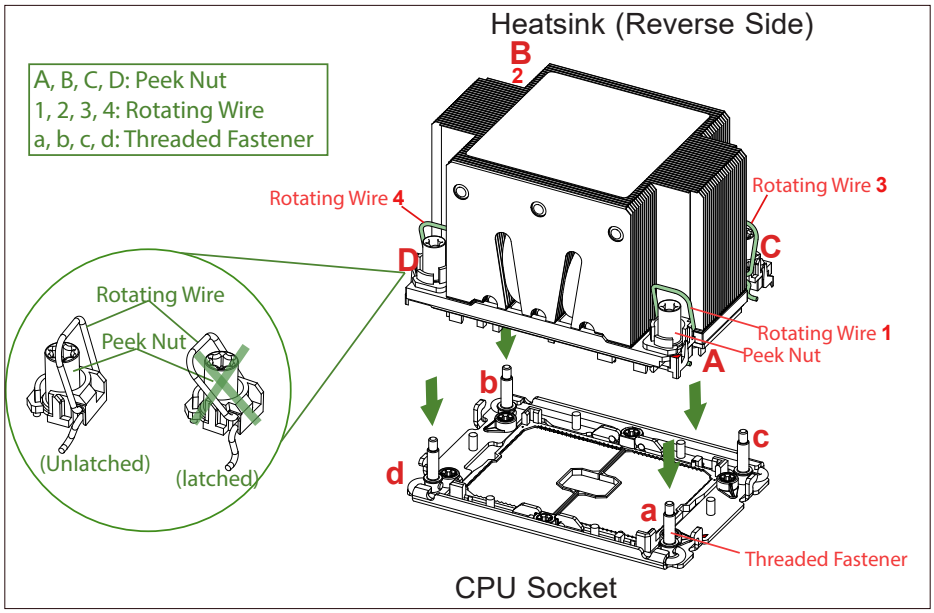
Preparing to Install the Processor Heatsink Module (PHM) into the CPU Socket

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

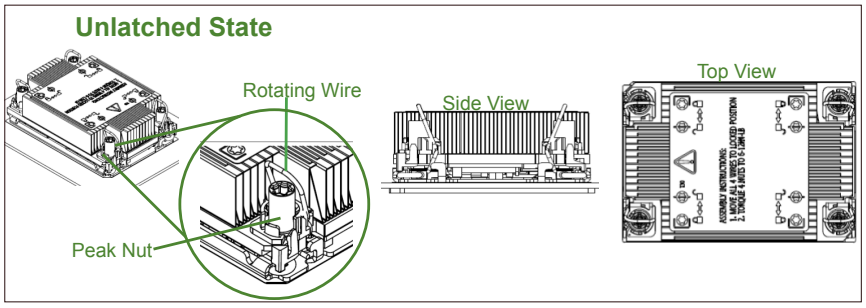
1. Locate four threaded fasteners (a, b, c, d) on the CPU socket.



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.



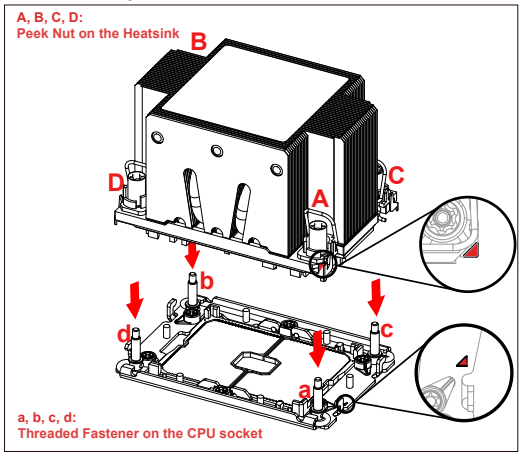
3. Check the rotating wires (1, 2, 3, 4) to make sure that they are at unlatched positions as shown in the drawing below before installing the PHM into the CPU socket.



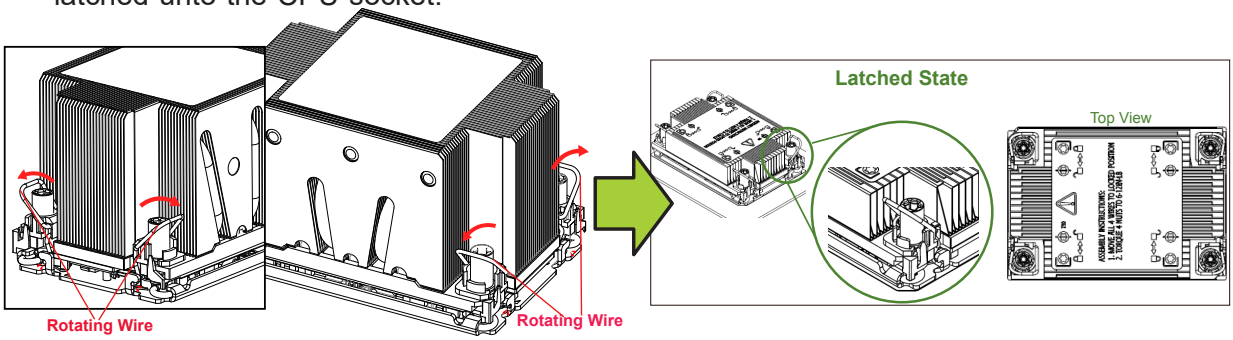
Installing the Processor Heatsink Module (PHM)

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", "D" on the heatsink against threaded fasteners "b", "c", "d" on the CPU socket, making sure that all peek nuts on the heatsink are properly aligned with the correspondent threaded fasteners on the CPU socket.

2. Once they are aligned, gently place the heatsink on top the CPU socket, making sure that each peek nut is properly attached to its corresponding threaded fastener.

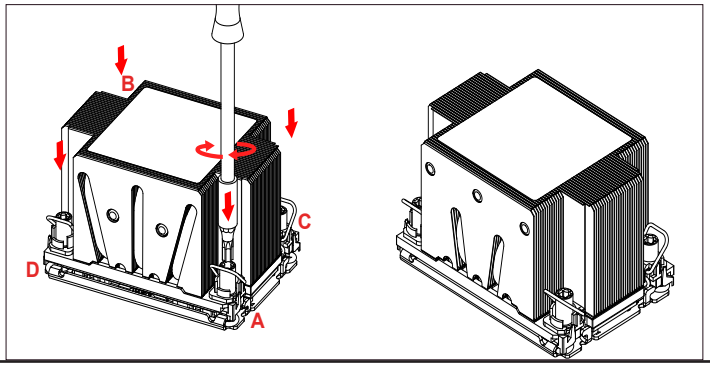


3. Press all four rotating wires outwards and make sure that the heatsink is securely latched unto the CPU socket.



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.

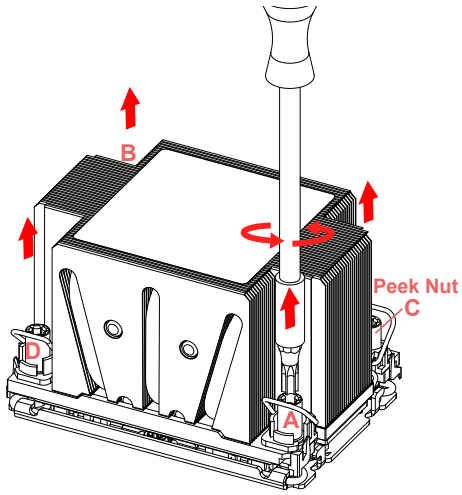
5. Examine all corners heatsink to ensure that the PHM is firmly attached to the CPU socket.



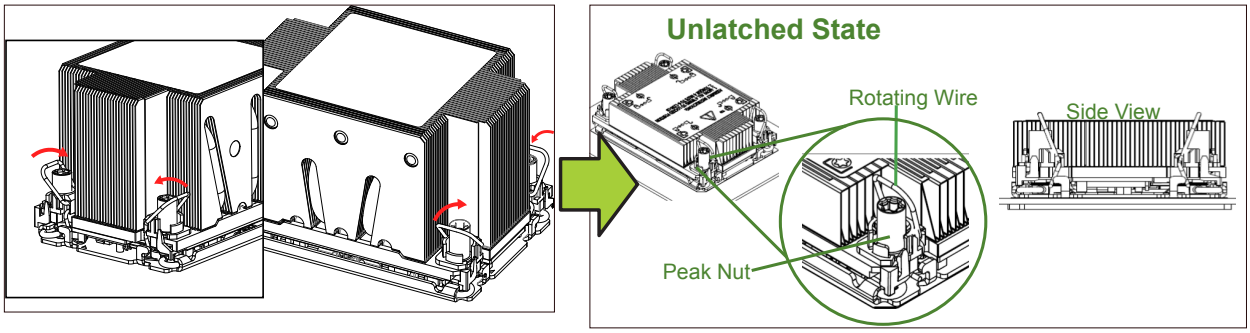
Removing the Processor Heatsink Module from the CPU Socket

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:

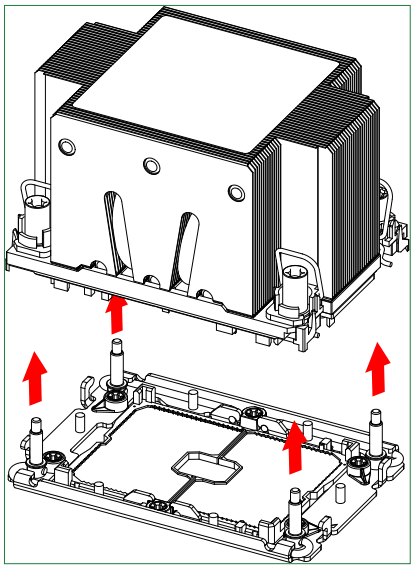
1. Use a T30-bit screwdriver to loosen the four peek nuts on the heatsink in the sequence of #A, #B, #C, and #D.



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.

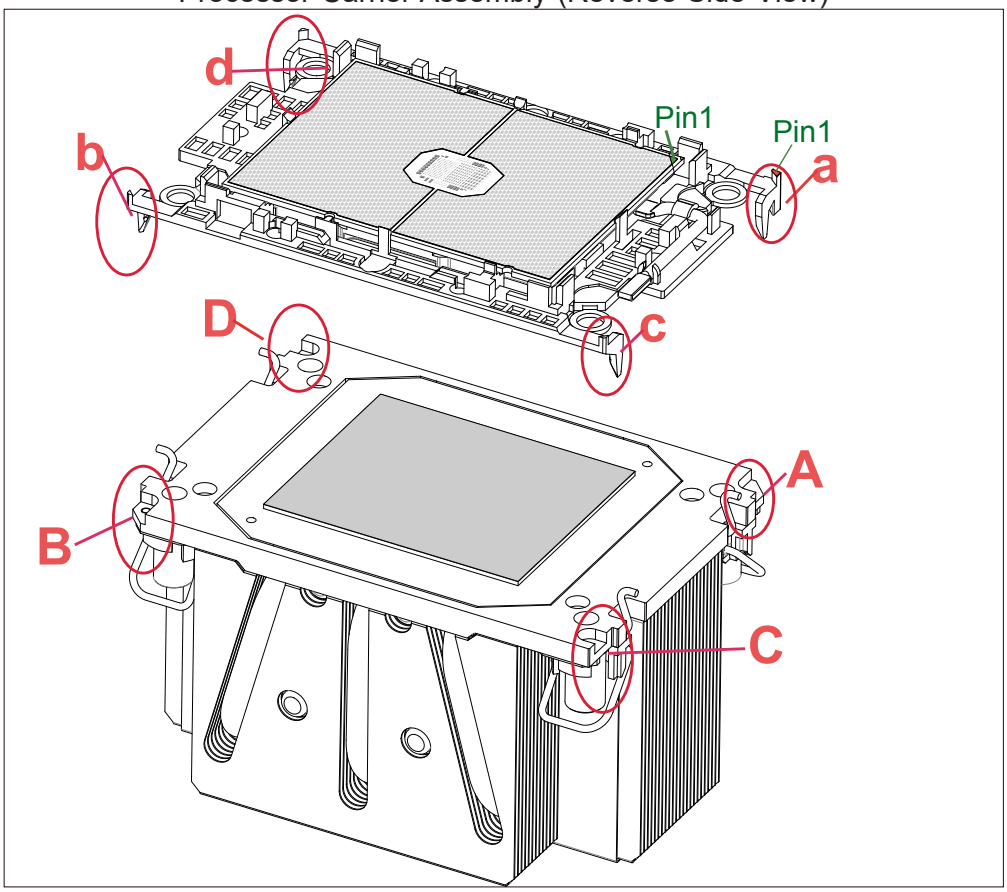


Removing the Processor Carrier Assembly from the Processor Heatsink Module (PHM)

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

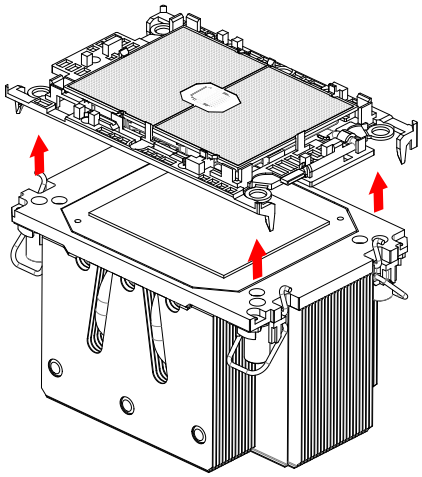
1. Detach four plastic clips (marked a, b, c, d) on the processor carrier assembly from the four corners of heatsink (marked A, B, C, D) in the drawings below.

Processor Carrier Assembly (Reverse Side View)



Heatsink (Reverse Side View)

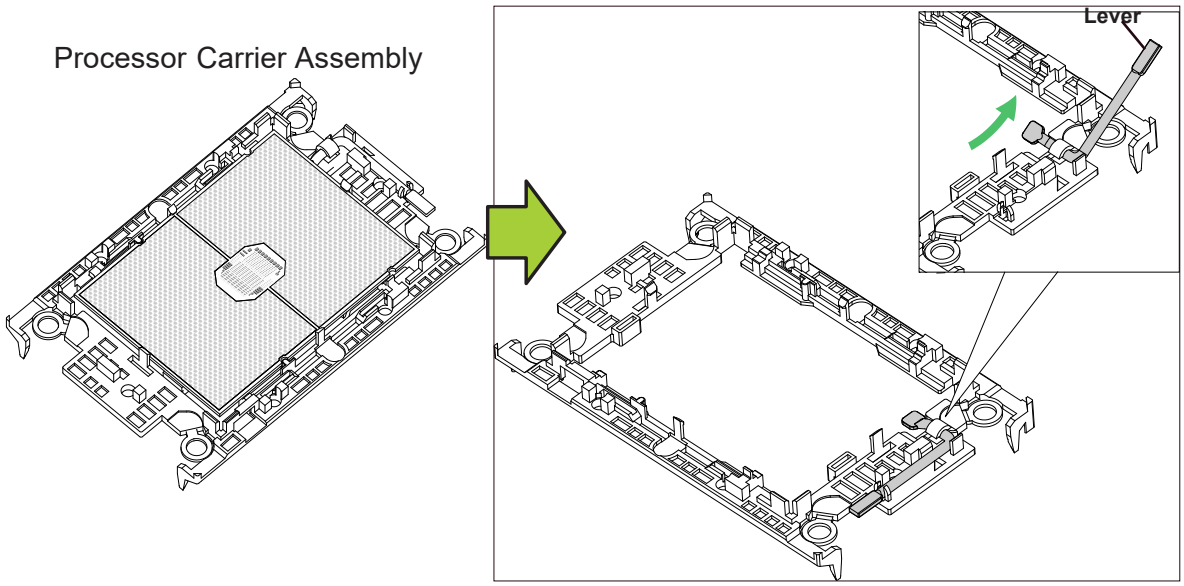
2. When all plastic clips are detached from the heatsink, remove the processor carrier assembly from the heatsink



Removing the Processor from the Processor Carrier Assembly

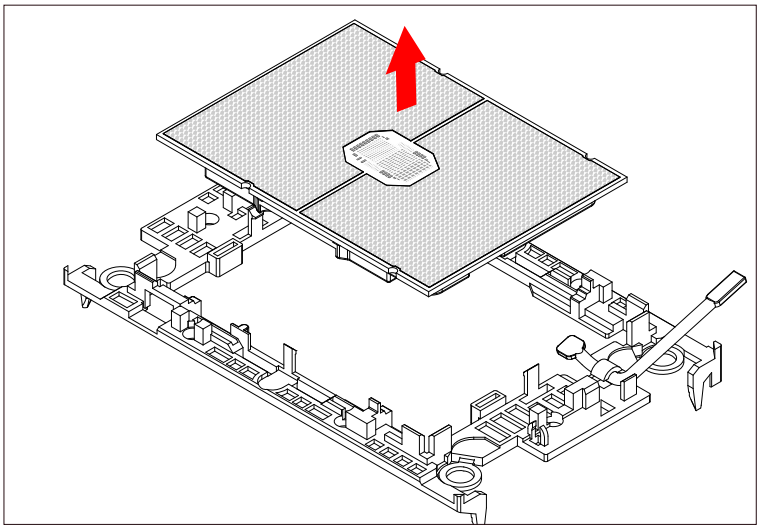
Once you have removed the processor carrier assembly from the PHM, you are ready to remove the processor from the processor carrier by following the steps below.

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, please handle the processor with care.



2.3 Motherboard Installation

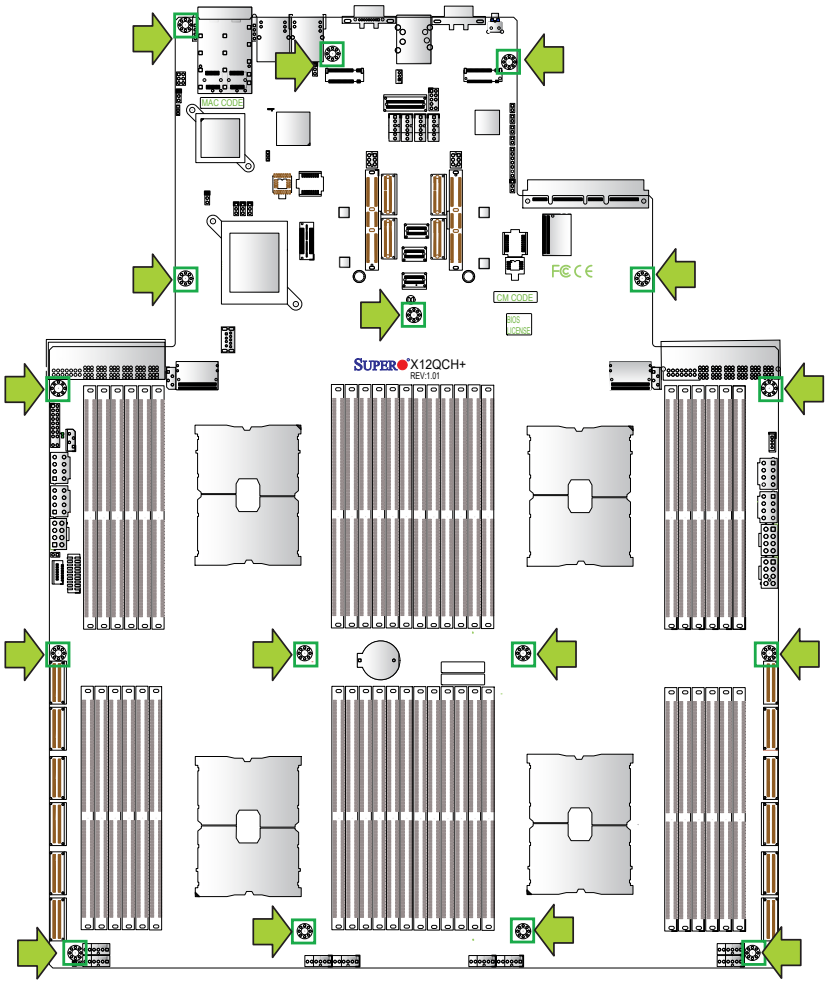
All motherboards have standard mounting holes to fit different types of chassis. Make sure that the locations of all the mounting holes for both the motherboard and the chassis match. Although a chassis may have both plastic and metal mounting fasteners, metal ones are highly recommended because they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

Tools Needed

Phillips Screwdriver (16)

Phillips Screws (16)

Standoffs (16) as Needed



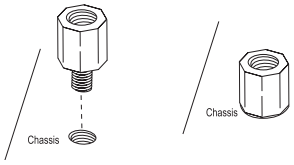
Location of Mounting Holes

Note 1: To avoid damaging the motherboard and its components, please do not use a force greater than 8 lbf-in on each mounting screw during motherboard installation.
Note 2: Some components are very close to the mounting holes. Please take precautionary measures to avoid damaging these components when installing the motherboard to the chassis.

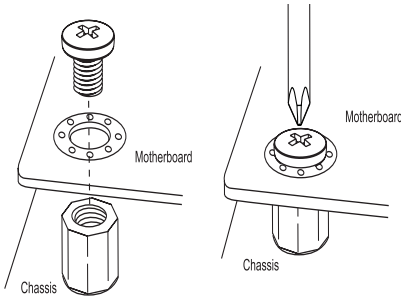
Installing the Motherboard

1. Install the I/O shield into the back of the chassis, if applicable.

2. Locate the mounting holes on the motherboard. See the previous page for the location.



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



4. Install standoffs in the chassis as needed.

5. Install the motherboard into the chassis carefully to avoid damaging other motherboard components.

6. Using the Phillips screwdriver, insert a pan head #6 screw into a mounting hole on the motherboard and its matching mounting hole on the chassis.

7. Repeat Step 5 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 motherboard supports up to 12TB of 3DS LRDIMM/LRDIMM/3DS RDIMM/RDIMM DDR4 (288-pin) 3200/2933/*2666/2400/2133MHz modules in 48 slots This motherboard also supports up to 18TB memory with Intel® Optane™ PMem 200 Series memory modules installed based on the Intel® Optane™ PMem population table on page 44.

Note. Intel® Optane™ PMem 200 Series 2666MHz (max.) memory is supported by this motherboard.

Memory Installation Sequence

Memory modules for this motherboard are populated using the "Fill First" method. The blue memory slot of each channel is considered the "first DIMM module" of the channel, and the black slot, the second module of the channel. When installing memory modules, be sure to populate the blue memory slots first and then populate the black slots.

General Memory Population Requirements

1. Be sure to use the memory modules of the same type and speed on the motherboard. Mixing of memory modules of different types and speeds is not allowed.
2. Using unbalanced memory topology such as populating two DIMMs in one channel while populating one DIMM in another channel on the same motherboard will result in reduced memory performance.
3. Populating memory slots with a pair of DIMM modules of the same type and size will result in interleaved memory, which will improve memory performance.

DDR4 Memory Support

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)	
				1DPC (1-DIMM Per Channel)	2DPC (2-DIMM Per Channel)
		8Gb	16Gb	1.2 V	1.2 V
RDIMM	SRx8	8GB	16GB	3200	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	3200
LRDIMM - 3Ds	(4R/8R) X4	4H-128 GB	2H- 128 GB 4H-256 GB	3200	3200

Key Parameters for DIMM Configurations	
Parameters	Possible Values
Number of Channels	8
Number of DIMMs per Channel	1DPC (1 DIMM Per Channel) or 2DPC (2 DIMMs Per Channel)
DIMM Type	RDIMM (w/ECC), 3DS RDIMM, LRDIMM, 3DS LRDIMM
DIMM Construction	non-3DS RDIMM Raw Cards: A/B (2Rx4), C (1Rx4), D (1Rx8), E (2Rx8) 3DS RDIMM Raw Cards: A/B (4Rx4) non-3DS LRDIMM Raw Cards: D/E (4Rx4) 3DS LRDIMM Raw Cards: A/B (8Rx4)

Note: 3200MHz (max) DDR4 memory is supported by this motherboard.

DDR4 Memory Population Table

Note. Unbalanced memory configuration decreases memory performance and is not recommended for Supermicro motherboards.

Memory Population Table (w/Half Memory Configuration Support) (with 24 DIMM Slots Installed)

DDR4 Memory Population Table for the 4-way X12MP Motherboards with Half Memory Configuration Support (with 4 CPUs & 24 DIMMs Installed)	
4 CPUs & 24 DIMMs (6 DIMMs per CPU)	**Memory Population Sequence**
CPU1 + 6 DIMMs	CPU1: P1-DIMMC1/P1-DIMMB1/P1-DIMMA1/P1-DIMMD1/P1-DIMME1/P1-DIMMF1
CPU2 + 6 DIMMs	CPU2: P2-DIMMC1/P2-DIMMB1/P2-DIMMA1/P2-DIMMD1/P2-DIMME1/P2-DIMMF1
CPU3 + 6 DIMMs	CPU3: P3-DIMMC1/P3-DIMMB1/P3-DIMMA1/P3-DIMMD1/P3-DIMME1/P3-DIMMF1
CPU4 + 6 DIMMs	CPU4: P4-DIMMC1/P4-DIMMB1/P4-DIMMA1/P4-DIMMD1/P4-DIMME1/P4-DIMMF1

Memory Population Table for (with Full Memory Configuration Support) (with 48 DIMM Slots Installed)

DDR4 Memory Population Table for the 4-way X12MP Motherboards with Full Memory Configuration Support (with 4 CPUs & 48 DIMMs Installed)	
4 CPUs & 48 DIMMs (12 DIMMs per CPU board)	**Memory Population Sequence**
CPU1 + 12 DIMMs	CPU1: P1-DIMMC1/P1-DIMMC2/P1-DIMMB1/P1-DIMMB2/P1-DIMMA1/P1-DIMMA2/ P1-DIMMD2/P1-DIMMD1/P1-DIMME2/P1-DIMME1/P1-DIMMF2/P1-DIMMF1
CPU2 + 12 DIMMs	CPU2: P2-DIMMC1/P2-DIMMC2/P2-DIMMB1/P2-DIMMB2/P2-DIMMA1/P2-DIMMA2/ P2-DIMMD2/P2-DIMMD1/P2-DIMME2/P2-DIMME1/P2-DIMMF2/P2-DIMMF1
CPU3 + 12 DIMMs	CPU3: P3-DIMMC1/P3-DIMMC2/P3-DIMMB1/P3-DIMMB2/P3-DIMMA1/P3-DIMMA2/ P3-DIMMD2/P3-DIMMD1/P3-DIMME2/P3-DIMME1/P3-DIMMF2/P3-DIMMF1
CPU4 + 12 DIMMs	CPU4: P4-DIMMC1/P4-DIMMC2/P4-DIMMB1/P4-DIMMB2/P4-DIMMA1/P4-DIMMA2/ P4-DIMMD2/P4-DIMMD1/P4-DIMME2/P4-DIMME1/P4-DIMMF2/P4-DIMMF1

Intel® Optane™ PMem 200 Series Memory Population with Full Configutation (48-DIMMs Installed)

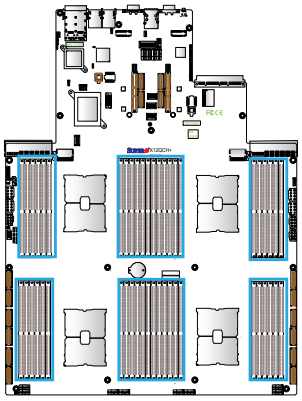
Note 1. Unbalanced memory configuration decreases memory performance and is not recommended for Supermicro motherboards.

Note 2. Intel® Optane™ PMem 200 Series memory is supported by the 3rd Gen Intel Xeon Scalable Processors (83xx/63xx/53xx Series) only.

PMem 200 Series Population Table with 48 DIMM Support (with 48 DIMM Slots Installed)

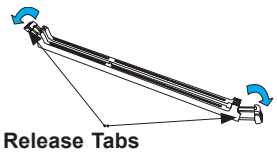
Symmetric Population												
2-2-2	**(For Channel Configuration: 2-2-2)**											
Modes												
CPU1	P1-DIMMF1	P1-DIMMF2	P1-DIMME1	P1-DIMME2	P1-DIMMD1	P1-DIMMD2	P1-DIMMA2	P1-DIMMA1	P1-DIMMB2	P1-DIMMB1	P1-DIMMC2	P1-DIMMC1
AD	DRAM1	***PMem***	DRAM1	***PMem***	DRAM1	***PMem***	***PMem***	DRAM1	***PMem***	DRAM1	***PMem***	DRAM1
CPU2	P2-DIMMF1	P2-DIMMF2	P2-DIMME1	P2-DIMME2	P2-DIMMD1	P2-DIMMD2	P2-DIMMA2	P2-DIMMA1	P2-DIMMB2	P2-DIMMB1	P2-DIMMC2	P2-DIMMC1
AD	DRAM1	***PMem***	DRAM1	***PMem***	DRAM1	***PMem***	***PMem***	DRAM1	***PMem***	DRAM1	***PMem***	DRAM1
CPU3	P3-DIMMF1	P3-DIMMF2	P3-DIMME1	P3-DIMME2	P3-DIMMD1	P3-DIMMD2	P3-DIMMA2	P3-DIMMA1	P3-DIMMB2	P3-DIMMB1	P3-DIMMC2	P3-DIMMC1
AD	DRAM1	***PMem***	DRAM1	***PMem***	DRAM1	***PMem***	***PMem***	DRAM1	***PMem***	DRAM1	***PMem***	DRAM1
CPU4	P4-DIMMF1	P4-DIMMF2	P4-DIMME1	P4-DIMME2	P4-DIMMD1	P4-DIMMD2	P4-DIMMA2	P4-DIMMA1	P4-DIMMB2	P4-DIMMB1	P4-DIMMC2	P4-DIMMC1
AD	DRAM1	***PMem***	DRAM1	***PMem***	DRAM1	***PMem***	***PMem***	DRAM1	***PMem***	DRAM1	***PMem***	DRAM1

DIMM Installation

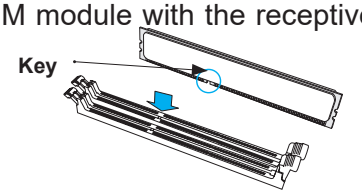


1. Insert the desired number of DIMMs into the memory slots based on the recommended DIMM population tables in the previous section. Locate DIMM memory slots on the motherboard as shown on the right.

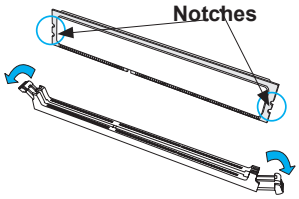
2. Push the release tabs outwards on both ends of the DIMM slot to unlock it.



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

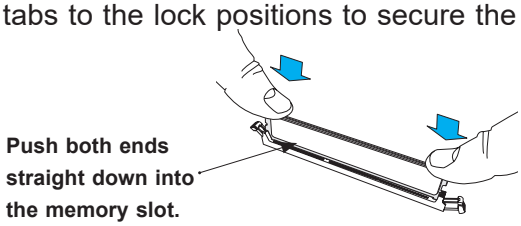


4. Align the notches on both ends of the module against the receptive points on the ends of the slot.



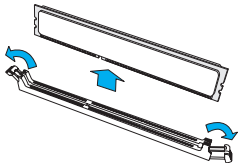
5. Push both ends of the module straight down into the slot until the module snaps into place.

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! Please do not use excessive force when pressing the release tabs on the ends of the DIMM socket to avoid causing any damage to the DIMM module or the DIMM socket. Please

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.

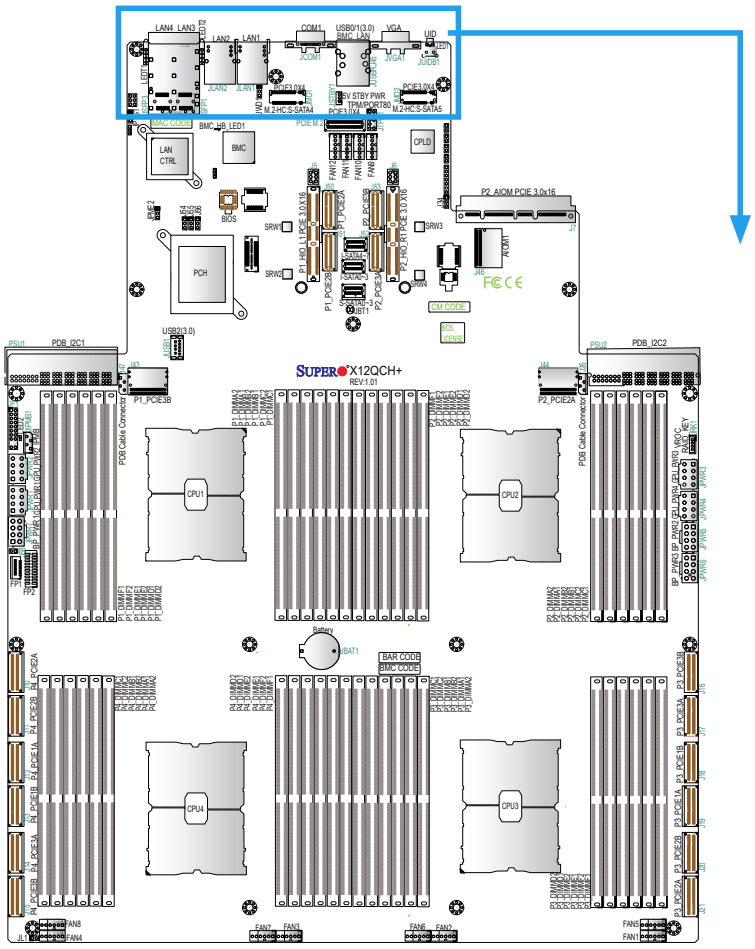
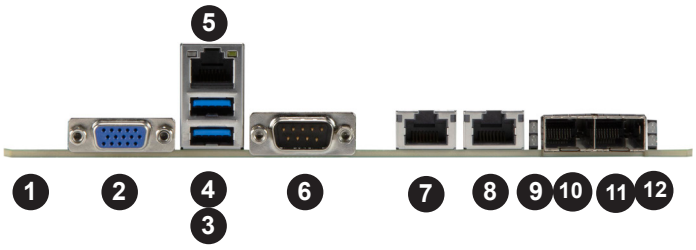


Figure 2-1. I/O Port Locations and Definitions



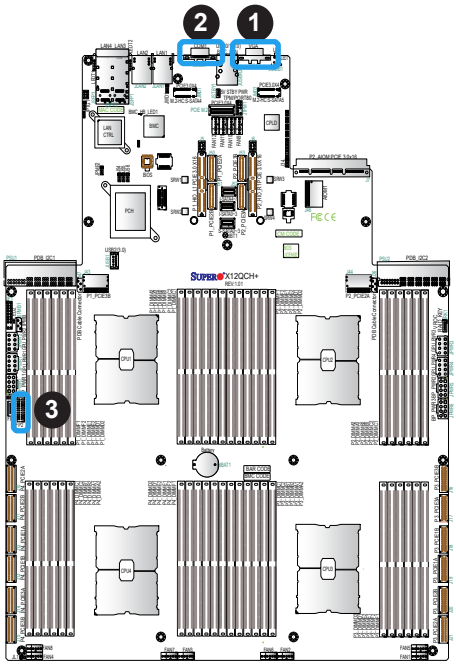
Rear I/O Ports					
#	Description	#	Description	#	Description
1	UID Switch/LED (on the motherboard)	5	BMC_LAN	9	LEDT2 (LAN3 LED)
2	VGA	6	COM1	10	(10G) LAN3
3	USB 0 (3.0)	7	(10G) LAN1	11	(10G) LAN4
4	USB 1 (3.0)	8	(10G) LAN2	12	LEDT1 (LAN4 LED)

VGA Connections

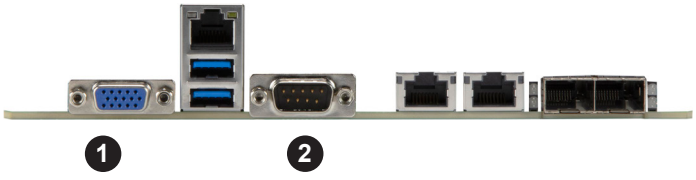
There are two VGA connections in your system. The rear VGA port is located at JVGA1 on the rear I/O panel, and the front VGA header is located at FP2 on the motherboard. These VGA connections provide analog interface support between the computer and the video displays. Refer to the layout below for the locations of VGA connections.

COM Port

A COM (communication) port that supports serial link interface is located on the rear I/O panel. Refer to the layout below for the location of COM1.

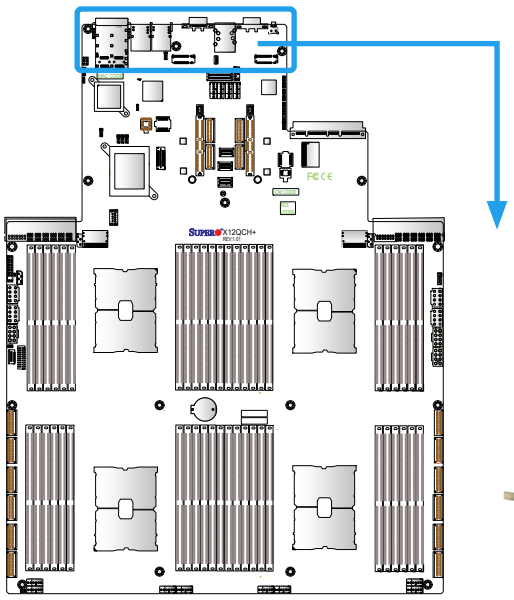


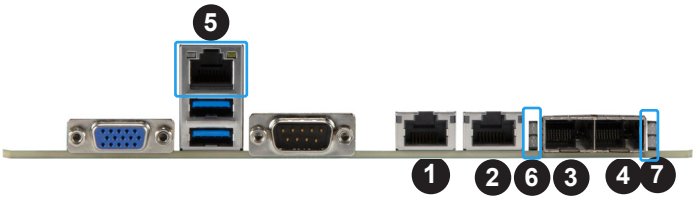
1. Rear VGA Port (JVGA1)
2. COM1
3. Front VGA Header (JFP2)



10G LAN Ports (LAN1/LAN2/LAN3/LAN4) & BMC LAN

Four 10G LAN ports (LAN1/LAN2/LAN3/LAN4) and an BMC dedicated LAN (BMC LAN) are located on the rear I/O panel. LAN1/LAN2 ports are supported by the RJ45 ethernet connections and require RJ45 cables. LAN3/LAN4 ports support SFP28. The dedicated BMC LAN, located above the USB0/1 ports on the rear I/O panel, provides LAN support for the BMC (Baseboard Management Controller). The LEDs for LAN1/LAN2 are on the LAN connectors. The LED indicator for LAN3 is located on LEDT2, and LED for LAN4 is on LEDT1. Please also refer to the LED Indicator section for LAN LED information.





1. 10G LAN1(RJ45)
2. 10G LAN2 (RJ45)
3. 10G LAN3(SFP28)
4. 10G LAN4 (SFP28)
5. BMC LAN (via BMC)
6. LEDT2 (LAN3 LED)
7. LEDT1 (LAN4 LED)

Universal Serial Bus (USB) Ports and Headers

Two USB 3.0 ports (USB0/1) are located on the rear I/O panel, and an internal Type A USB 3.0 header (USB2) is located on the motherboard to provide front access. These USB ports and headers can be used for USB support via USB cables (not included).

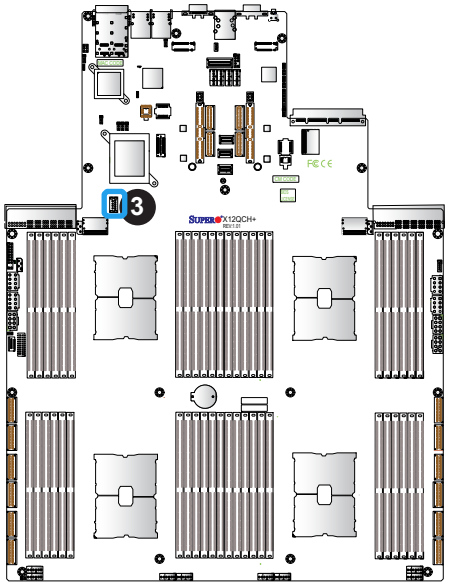
Rear I/O Panel USB 0/1 (3.0) Pin Definitions

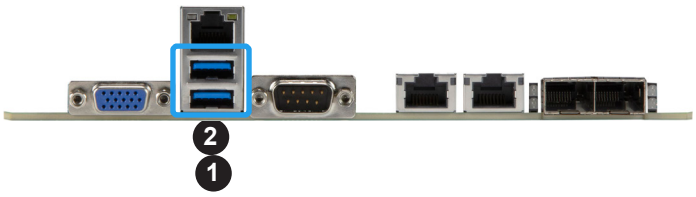
Pin#	Definition	Pin#	Definition
A1	VBUS	B1	Power
A2	D-	B2	USB_N
A3	D+	B3	USB_P
A4	GND	B4	GND
A5	Stda_SSRX-	B5	USB3_RN
A6	Stda_SSRX+	B6	USB3_RP
A7	GND	B7	GND
A8	Stda_SSTX-	B8	USB3_TN
A9	Stda_SSTX+	B9	USB3_TP

Type A USB 2 (3.0) Pin Definitions

Pin#	Definition	Pin#	Definition
1	VBUS	5	SSRX-
2	USB_N	6	SSRX+
3	USB_P	7	GND
4	Ground	8	SSTX-
		9	SSTX+

1. Rear I/O Panel USB0 (3.0)
2. Rear I/O Panel USB1 (3.0)
3. Type A USB2 (3.0)



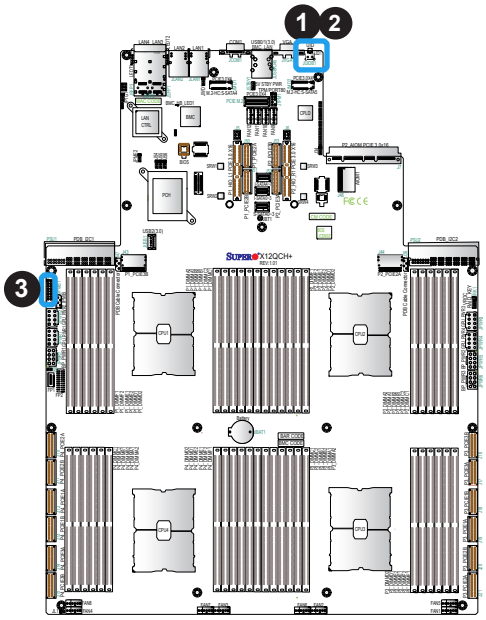


Unit Identifier Switch and UID LED Indicator

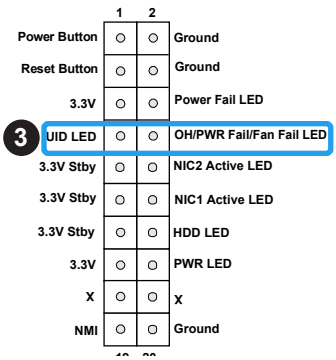
A Unit Identifier (UID) switch and a rear UID LED (LED1) are located on the rear I/O panel. The front UID LED is located on pins 7 & 8 of the front panel control header (JF1). When you press the rear UID switch, both front and rear UID LEDs will be turned on. Press the UID switch again to turn off the LED indicators. The UID indicators provide easy identification of a system that may be in need of service.

Note: UID can also be triggered via BMC on the motherboard. For more information on BMC, please refer to the BMC User's Guide posted on our website at http://www.supermicro.com.

UID LED Pin Definitions	
Color	**Status**
Blue: On	Unit Identified

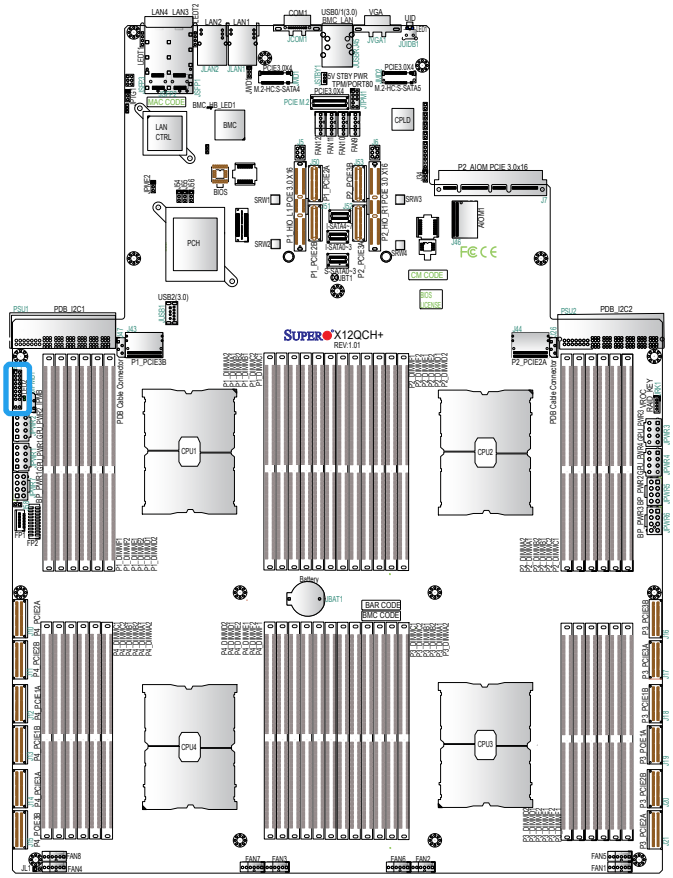


1. UID Switch
2. Rear UID LED (LED1)
3. Front UID LED



2.6 Front Control Panel

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



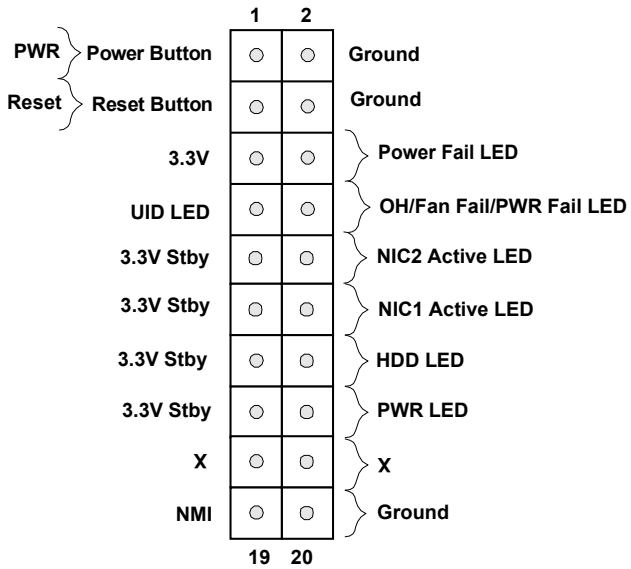


Figure 2-2. JF1 Header Pins

Power Button

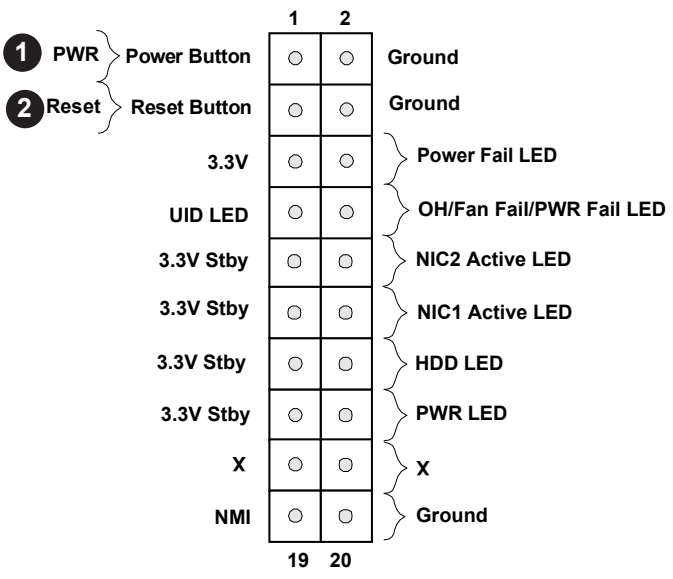
The Power Button connection is located on pins 1 and 2 of JF1. Momentarily contacting both pins will power on/off the system. Refer to the table below for pin definitions.

Power Button Pin Definitions (JF1)	
Pin#	**Definition**
1	Signal
2	Ground

Reset Button

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

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



1. PWR Button
2. Reset Button

Power Fail LED

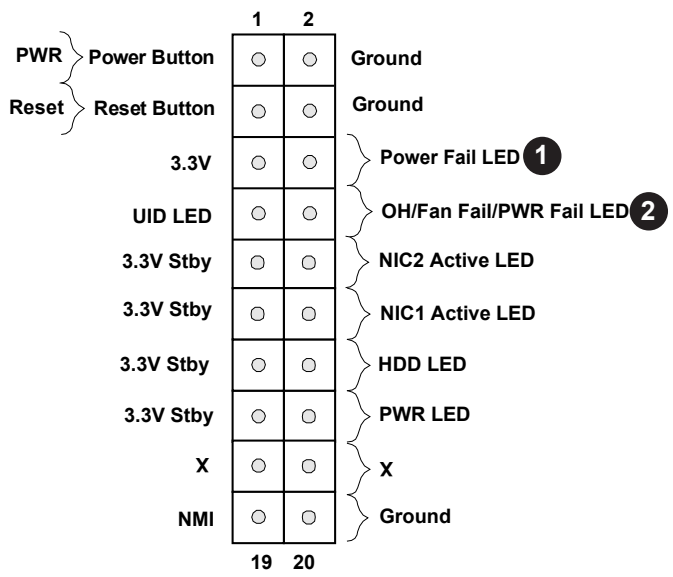
The Power Fail LED connection is located on pins 5 and 6 of JF1. Refer to the table below for pin definitions.

Power Fail LED Pin Definitions (JF1)	
Pin#	**Definition**
5	3.3V
6	PWR Supply Fail

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

The Information LED (OH/Fan Fail/PWR Fail/UID LED) connection is located on pins 7 and 8 of JF1. The LED on pin 7 is active when the UID switch on the rear I/O panel is pressed. The LED on pin 8 provides warnings of overheat, power failure, or fan failure. Refer to the tables below for more information.

Information LED-UID/OH/PWR Fail/Fan Fail LED Pin Definitions (Pin 7 & Pin 8 of JF1)	
Status	**Description**
Solid red	An overheat condition has occurred. (This may be caused by cable congestion).
Blinking red (1Hz)	Fan failure: check for an inoperative fan.
Blinking red (0.25Hz)	Power failure: check for a non-operational power supply
Solid blue	Local UID is activated. Use this function to locate a unit in a rack mount environment that might be in need of service.
Blinking blue (300 msec)	Remote UID is on. Use this function to identify a unit from a remote location that might be in need of service.



1. Power Fail LED
2. Information LED

NIC1/NIC2 (LAN1/LAN2)

The NIC (Network Interface Controller) LED connection for LAN port 1 is located on pins 11 and 12 of JF1, and LAN port 2 is on pins 9 and 10. These LAN ports support 10G LAN Ethernet connections. Attach the NIC LED cables here to display network activity. Refer to the table below for pin definitions.

LAN1/LAN2 LED Pin Definitions (JF1)

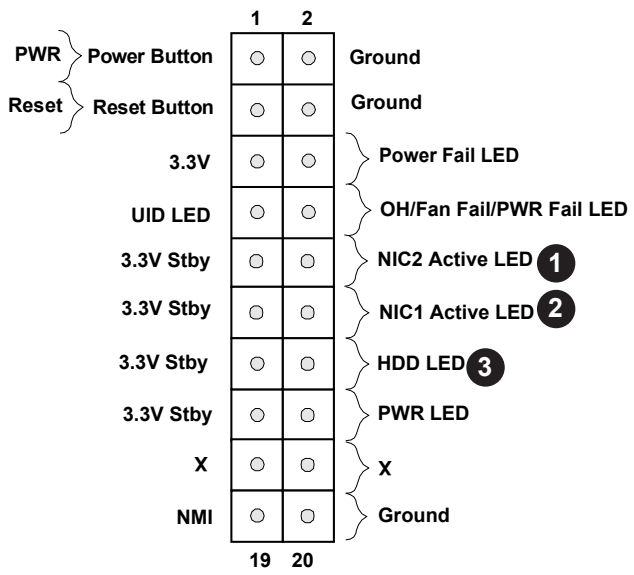
Pin#	Definition
9	NIC 2 Activity LED
11	NIC 1 Activity LED

HDD LED

The HDD LED connection is located on pins 13 and 14 of JF1. Attach a cable to pins 13 and 14 to show hard drive activity status. Refer to the table below for pin definitions.

HDD LED Pin Definitions (JF1)

Pins	Definition
13	3.3V Stdby
14	HDD Active



1. NIC2 LED
2. NIC1 LED
3. HDD LED

Power LED

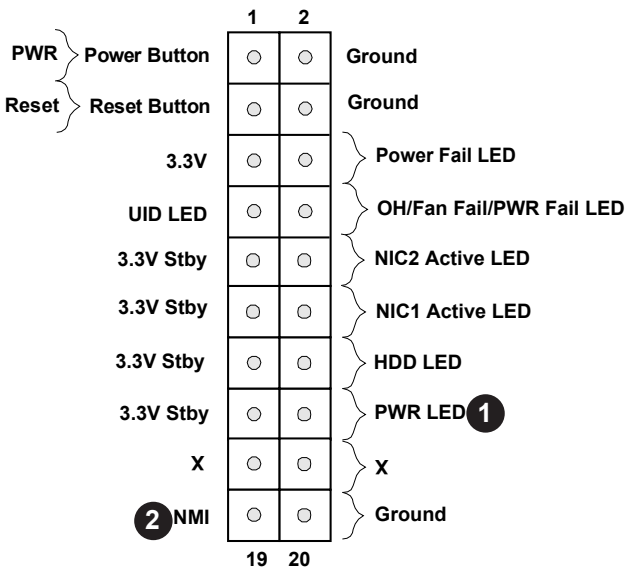
The Power LED connection is located on pins 15 and 16 of JF1. Refer to the table below for pin definitions.

Power LED Pin Definitions (JF1)	
Pins	**Definition**
15	3.3V
16	PWR LED

NMI Button

The non-maskable interrupt (NMI) button header is located on pins 19 and 20 of JF1. Refer to the table below for pin definitions.

NMI Button Pin Definitions (JF1)	
Pins	**Definition**
19	Control
20	Ground



1. PWR LED
2. NMI

2.7 Connectors/Headers

Power Connections

Power Supply Connectors

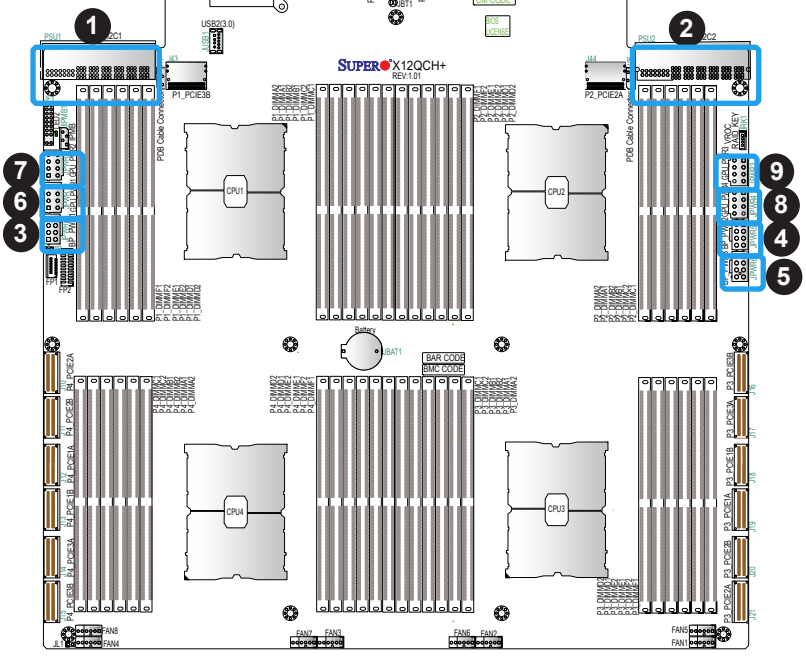
Two Power Delivery I²C1/2 Boards (PDB), located at PSU1/PSU2, are used to provide main power to your system. In addition, three 8-pin power connectors (BP_PWR1/2/3) are used for backplane devices. Another four 8-pin power connectors (GPU_PWR1/2/3/4) are for GPU device use. These 8-pin power connectors meet the ATX SSI EPS 12V specification and must be connected to your power supply to provide adequate power to your system.

Important: To provide adequate power to your system, be sure to connect the Power Delivery Boards (PSU1/2) and all 8-pin PWR connectors (BP_PWR1/2/3 & GPU_ PWR1/2/3/4) to the power supply. Failure to do so may void the manufacturer warranty on your power supply and motherboard.

12V 8-pin Power Pin Definitions

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

Required Connection



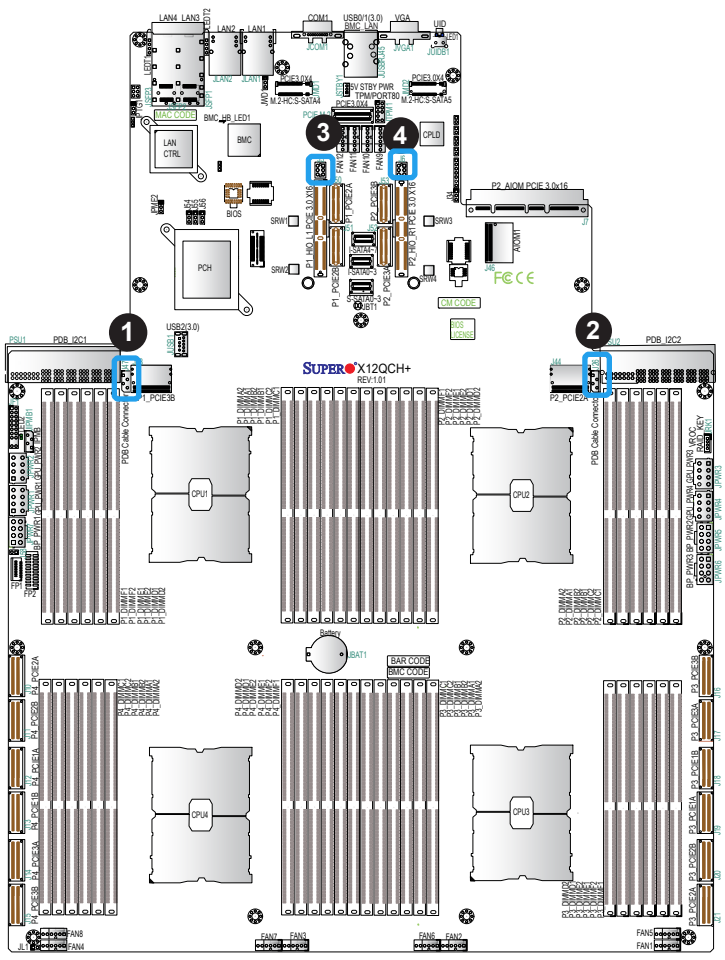
1. PDB I²C1 (PSU1)
2. PDB I²C2 (PSU2)
3. BP_PWR1
4. BP_PWR2
5. BP_PWR3
6. GPU_PWR1
7. GPU_PWR2
8. GPU_PWR3
9. GPU_PWR4

PDB Cable Connectors for CPU3/CPU4

Two PDB (Power Delivery Board) cable connectors for CPU3 and CPU4 are located at J26 and J47. J47 is used for CPU3, and J26 is for CPU4. See the layout below for the locations for J47 and J26.

Power Connectors for PCIe 3.0 x16 HIO Slots (J5/J6)

Two 6-pin power connectors used for PCIe 3.0 x16 High_Speed (HIO) slots are located at J5/J6. J5 is used for the left side PCIe 3.0 x16 slot (P1_HIO_L1PCIE), while J6 is for the right side PCIe 3.0 x16 slot (P2_HIO_R1PCIE). See the layout below for the locations for J5 and J6.

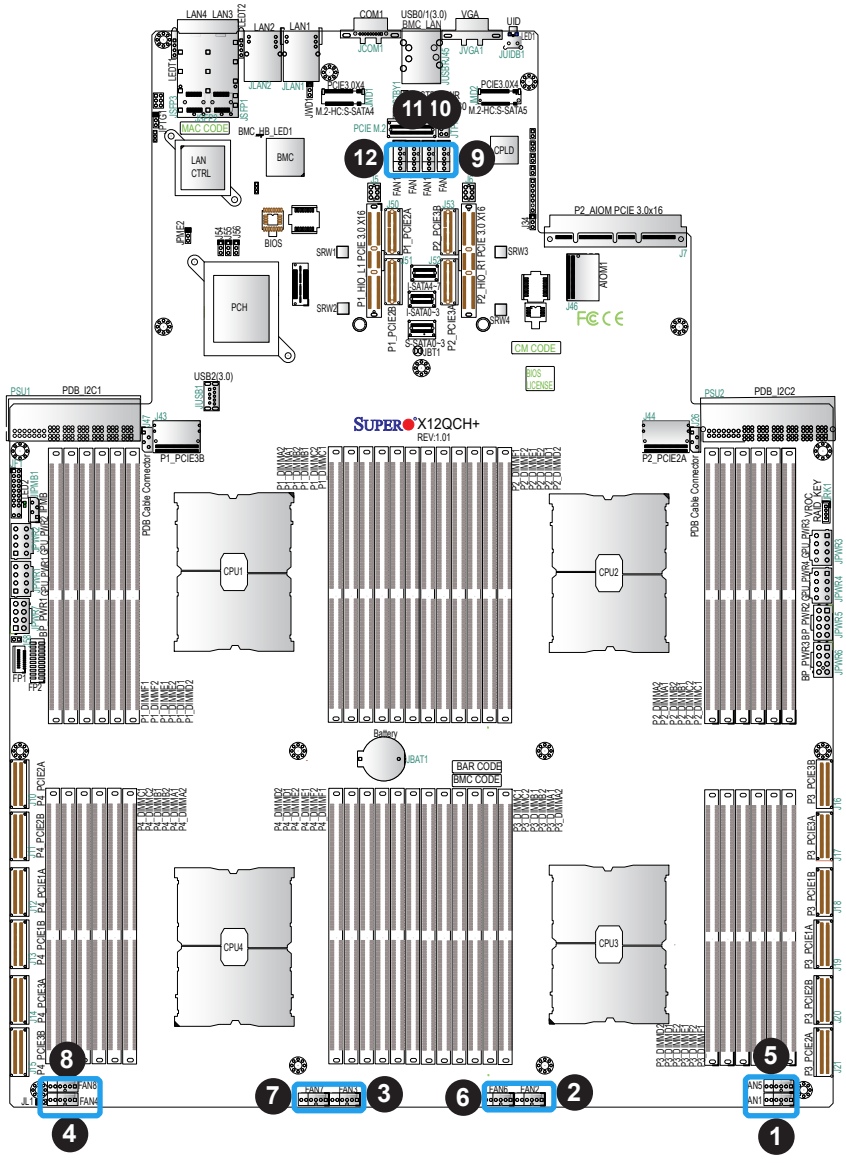


1. PDB Cable Connector for PSU1 (J47)
2. PDB Cable Connector for PSU2 (J26)
3. Power Connector for PCIe 3.0 x16 Left Side Slot (J5)
4. Power Connector for PCIe 3.0 x16 Right Side Slot (J6)

Headers

Fan Headers

There are twelve 6-pin fan headers (FAN1 - FAN12) on the motherboard. The fan speed control for these fans are supported by Thermal Management via the BMC 2.0 interface. Refer to the layout below for the locations of the fan headers.

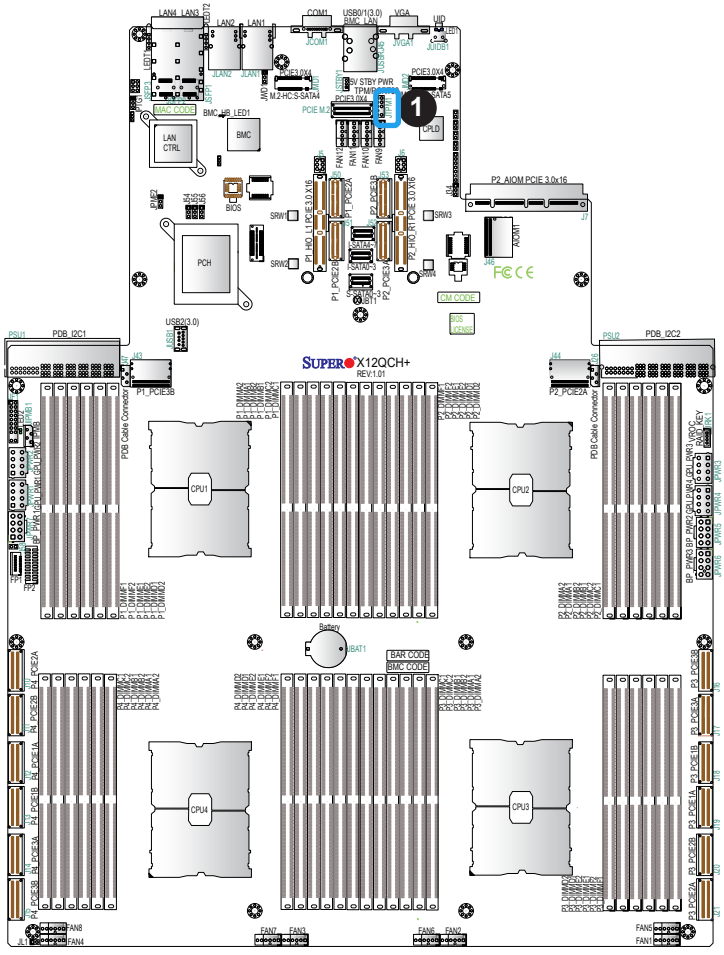


1. FAN1
2. FAN2
3. FAN3
4. FAN4
5. FAN5
6. FAN6
7. FAN7
8. FAN8
9. FAN9
10. FAN10
11. FAN11
12. FAN12

TPM/Port 80 Header

The JTPM1 header is used to connect a Trusted Platform Module (TPM)/Port 80, which is available from Supermicro (optional). A TPM/Port 80 connector is a security device that supports encryption and authentication in hard drives. It allows the motherboard to deny access if the TPM associated with the hard drive is not installed in the system. See the layout below for the location of the TPM header. Please 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 Stdby	10	SPI_IRQ#

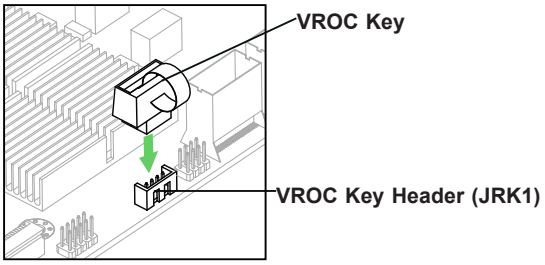


1. TPM Header

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. Please refer to the layout below for the location of JRK1.

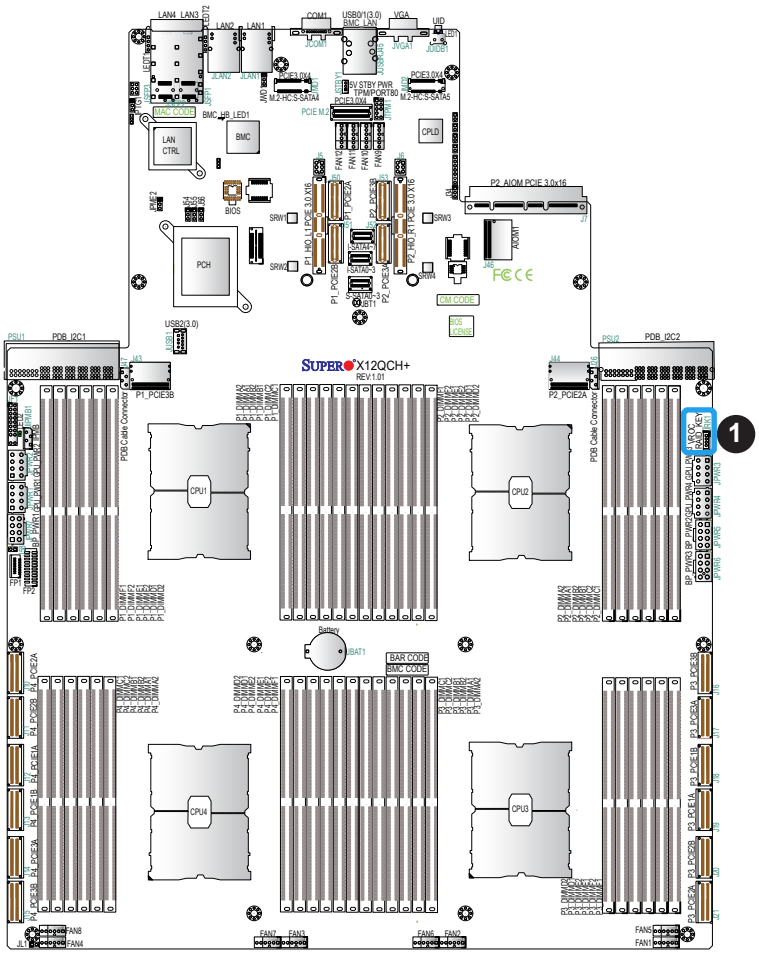
Intel VROC Key Pin Definitions	
Pin#	**Definition**
1	Ground
2	3.3V Standby
3	Ground
4	PCH RAID Key



Note 1: For detailed instructions on how to configure VROC RAID settings, please refer to the VROC RAID Configuration User's Guide posted on the web page under the link: http://www.supermicro.com/support/manuals/.

Note 2: The graphics contained in this user's manual are for illustration only. The components installed in your system may or may not look exactly the same as the graphics shown in the manual.

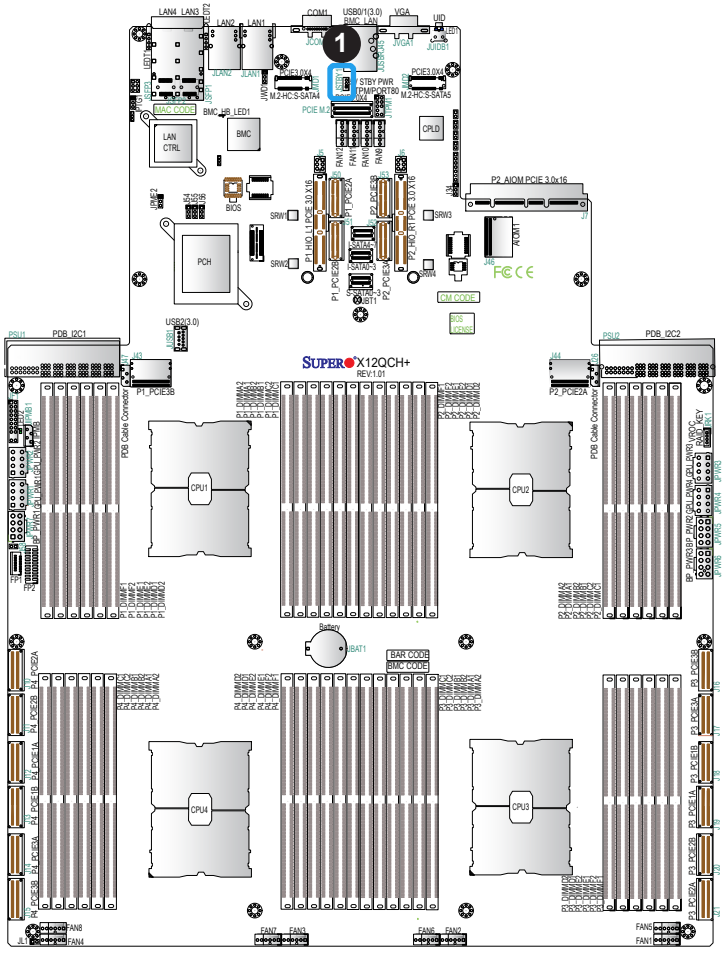
1. VROC RAID Key (JRK1)



Standby Power

The Standby Power header is located at JSTBY1 on the motherboard. You must have a card with a Standby Power connector and a cable to use this feature. Refer to the table below for pin definitions.

Standby Power Pin Definitions	
Pin#	**Definition**
1	+5V Standby
2	Ground
3	No Connection

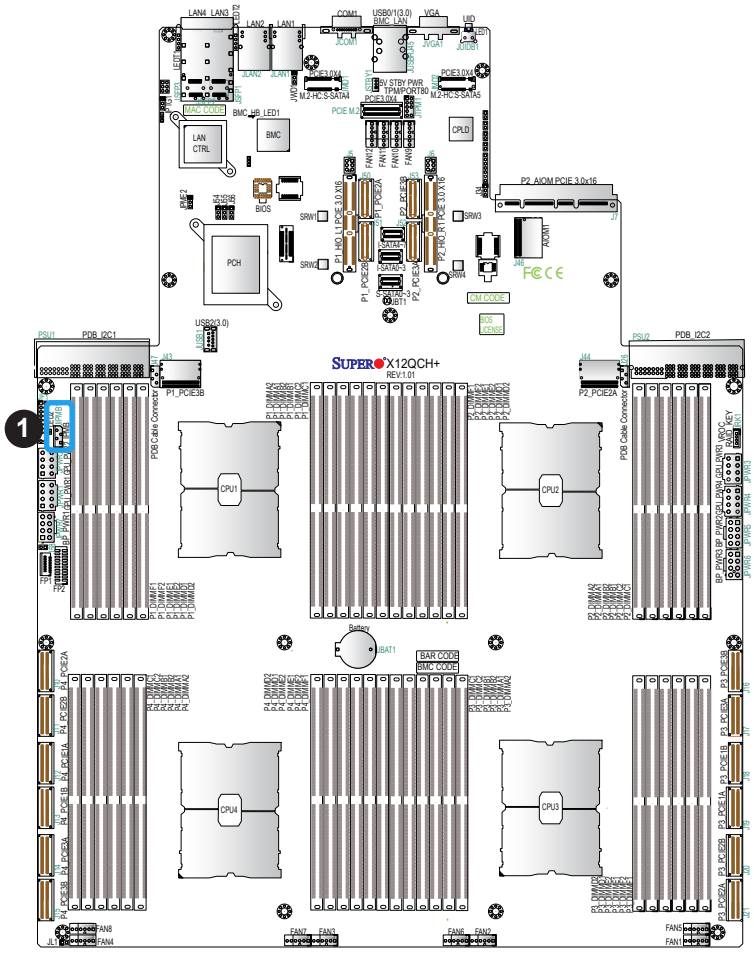


1. Standby Power

4-pin BMC External I²C Header

A System Management Bus header for BMC 2.0 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 I²C Header Pin Definitions	
Pin#	**Definition**
1	Data
2	Ground
3	Clock
4	No Connection

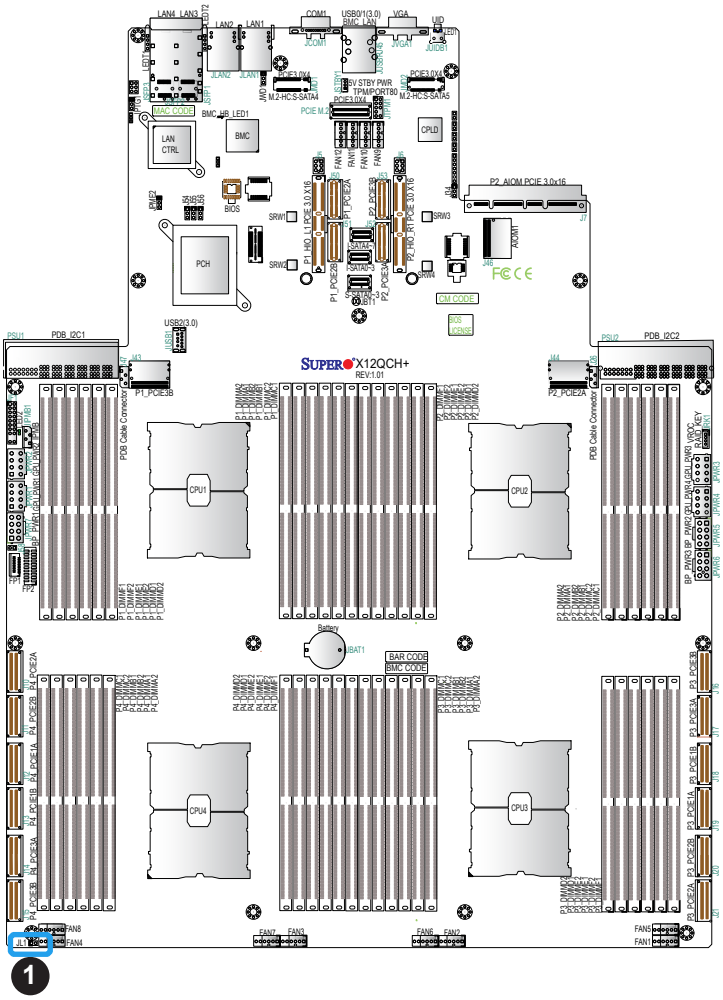


1. BMC External Header

Chassis Intrusion

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

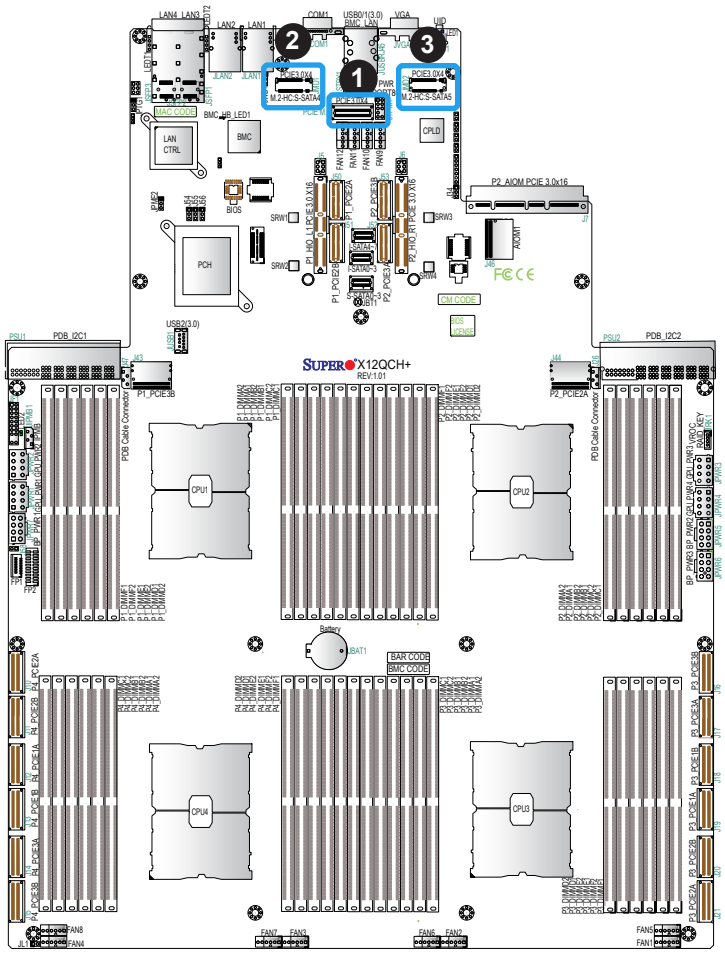
Chassis Intrusion Pin Definitions	
Pin#	**Definition**
1	Intrusion Input
2	Ground



1. Chassis Intrusion

PCIe M.2 Slot & M.2-HC S-SATA4/5 Slots

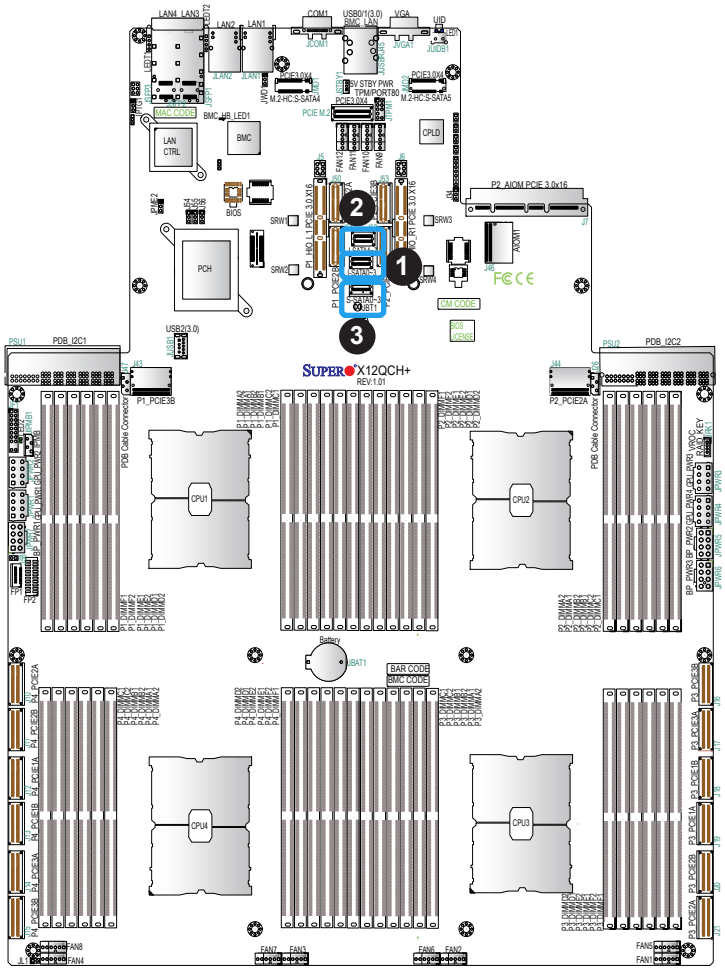
A PCIe 3.0 M.2 slot (PCIE M.2) is located next to the TPM/Port80 on the motherboard. In addition, two M.2-HC S-SATA slots, located on JMD1/JMD2, also support PCIe 3.0 x4 for NVMe/SATA Solid State Devices (SSDs). These M.2 slots support 2280 and 22110 form factors via SlimSAS x8 cables (required). The M.2 slots allow for a variety of card sizes with increased functionality and spatial efficiency. See the layout below for the locations for PCIe M.2 and M.2-HC S-SATA slots.



1. PCIe M.2 Slot (PCIE M.2)
2. M.2 HC-SATA 4 Slot (JMD1)
3. M.2 HC-SATA 5 Slot (JMD2)

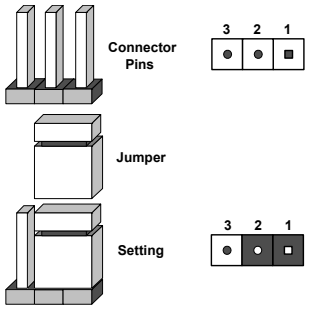
I-SATA 3.0 and S-SATA 3.0 Connectors

The X12QCH+ has eight I-SATA 3.0 ports (I-SATA0-3, I-SATA4-7) and four S-SATA (S-SATA0-3) on the motherboard in addition to the M.2 HC-S-SATA 4/5 slots mentioned on the previous page. These SATA ports are supported by the C621A chipset and provide efficient connections. See the layout below for the locations of I-SATA 3.0 and S-SATA 3.0 connectors.



1. I-SATA0-3
2. I-SATA4-7
3. S-SATA0-3

2.8 Jumper Settings



How Jumpers Work

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

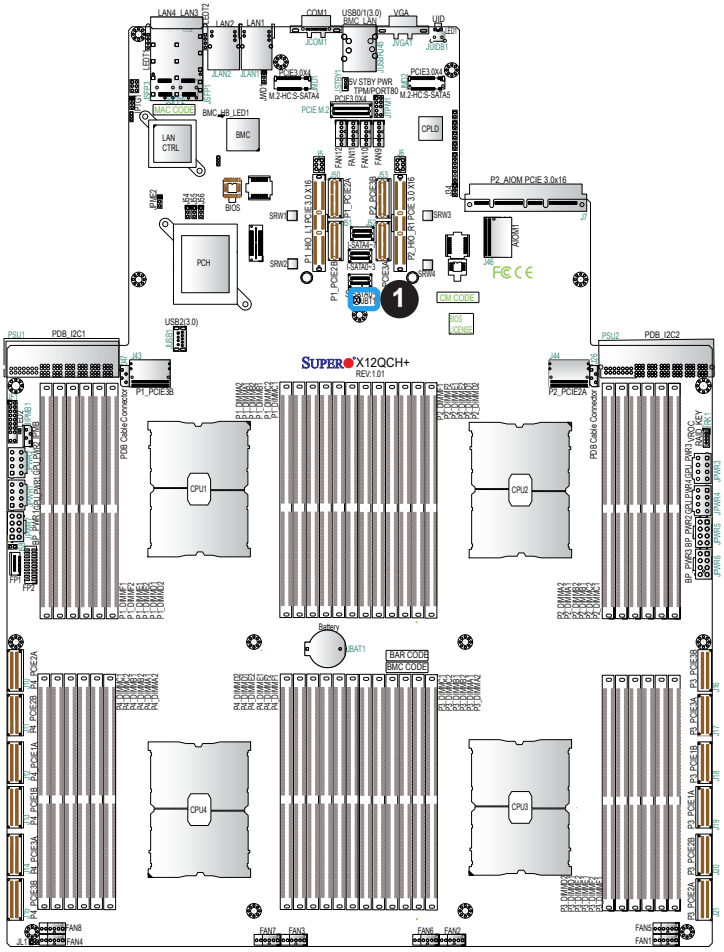
CMOS Clear

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 1: Clearing CMOS will also clear all passwords.
Note 2: Do not use the PW_ON connector to clear CMOS.

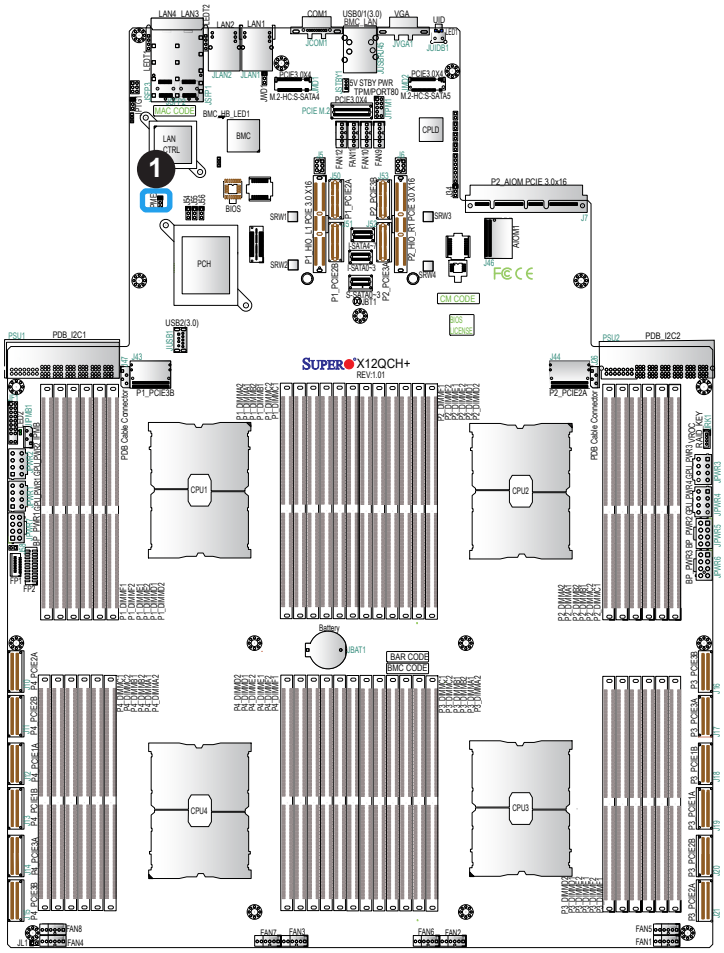


1. Clear CMOS

Manufacturing Mode (ME Mode Select)

Close pins 2-3 of jumper JPME2 to bypass SPI flash security and force the system to operate in the manufacturing mode, which will allow the user to flash the system firmware from a host server for system setting modifications. Refer to the table below for jumper settings. The default setting is Normal.

ME Select Jumper Settings	
Jumper Setting	**Definition**
Pins 1-2	Normal (Default)
Pins 2-3	Manufacturer Mode

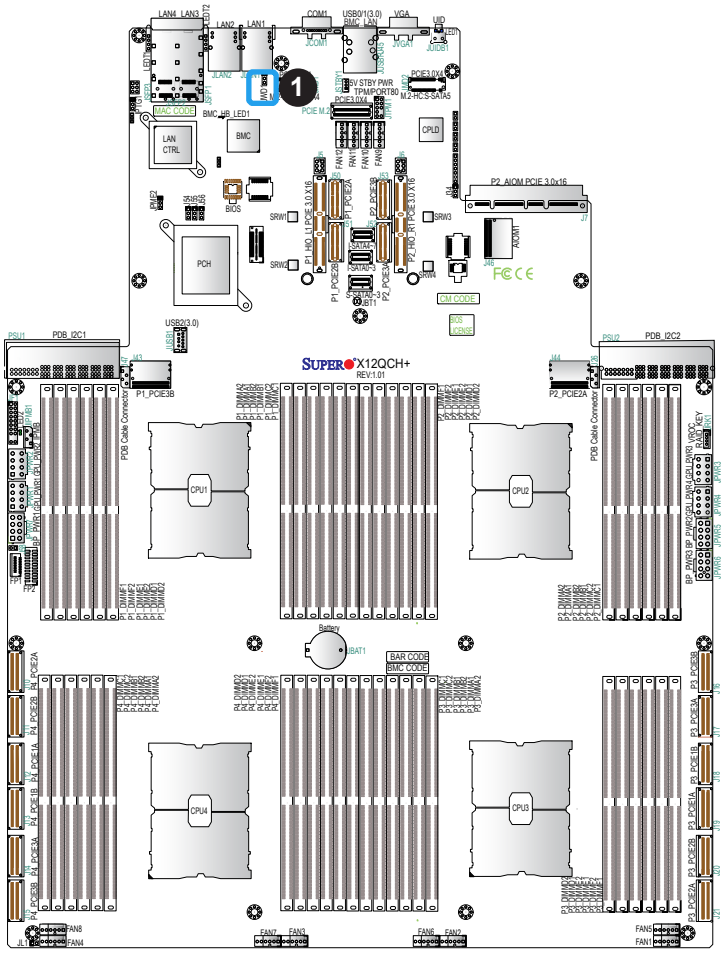


1. ME Select

Watch Dog Timer Enable

Watch Dog timer is a system monitor that can reboot the system when a software application hangs. Close pins 1-2 of the Watch Dog jumper (JDW1) to reset the system if an application hangs. Close pins 2-3 of JDW1 to generate a non-maskable interrupt (NMI) signal for the application that hangs. Refer to the table below for jumper settings. For this function to work properly, please also enable the Watch Dog setting in the BIOS.

Watch Dog Timer Jumper (JDW1) Jumper Settings	
Jumper Setting	**Definition**
Pins 1-2	Reset (Default)
Pins 2-3	NMI
Open	Disabled

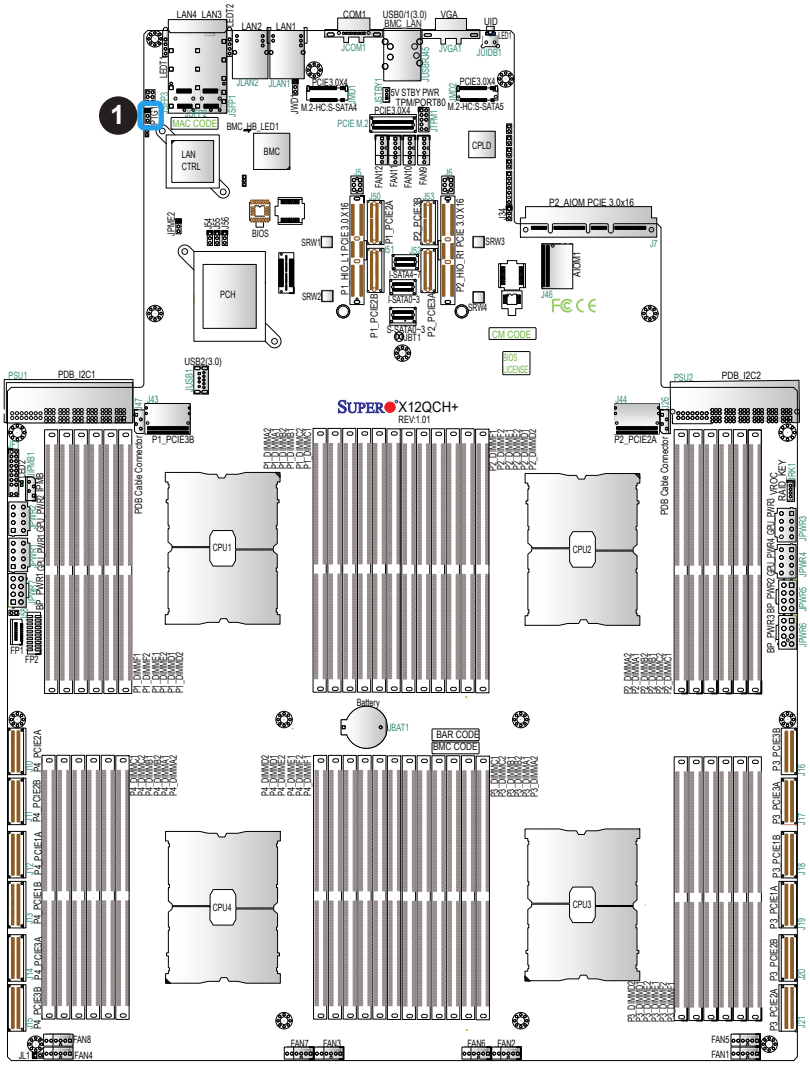


1. Watch Dog Enable

10G LAN Ports Enable/Disable

Jumper JPTG1 allows the user to enable the onboard 10G LAN ports. The default setting is pins 1-2 to enable the connection. Refer to the table below for jumper settings.

10G LAN Enable/Disable Jumper Settings	
Jumper Setting	**Definition**
Pins 1-2	Enabled (Default)
Pins 2-3	Disabled

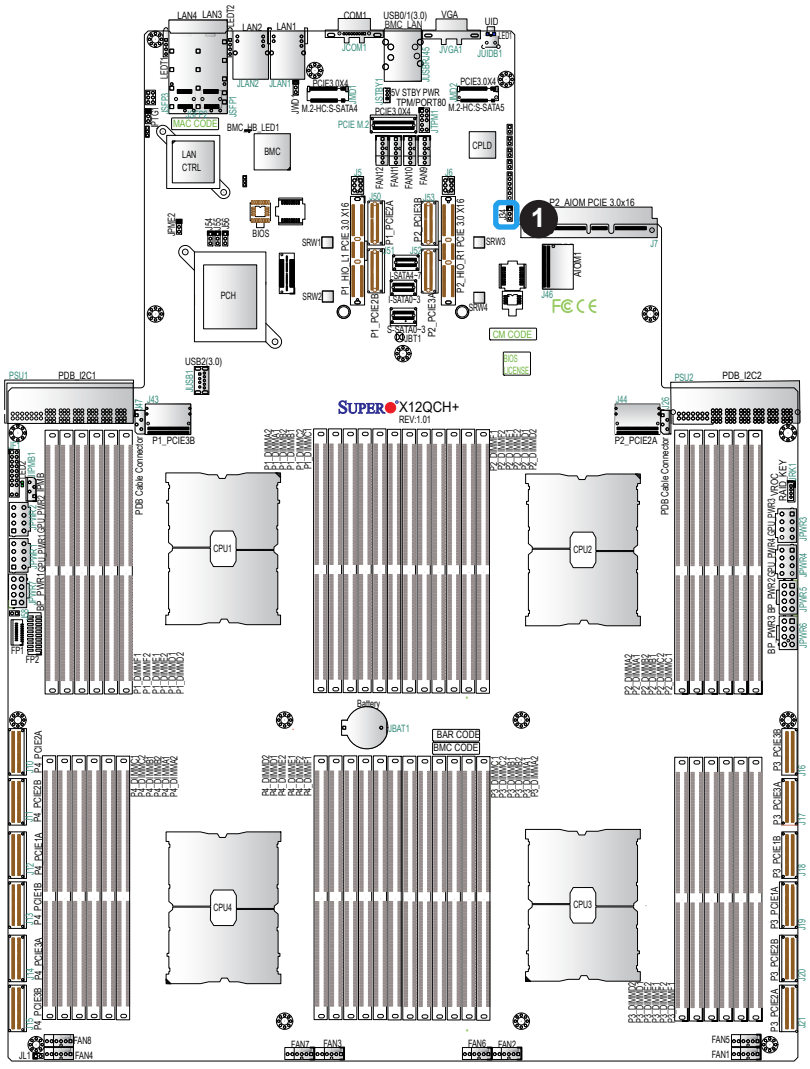


1. 10G LAN Enable

Power-Failure Throttling Enable

J34 is a power-failure throttling jumper which will allow the user to enable the CPU throttling mode when a power failure occurs. The default setting is on pins 1 and 2 for normal operation. See the table below for jumper settings.

Power-Failure Throttling Jumper Settings	
Jumper Setting	**Definition**
Pins 1-2	Normal (Default)
Pins 2-3	Power-Failure Throttling Enable



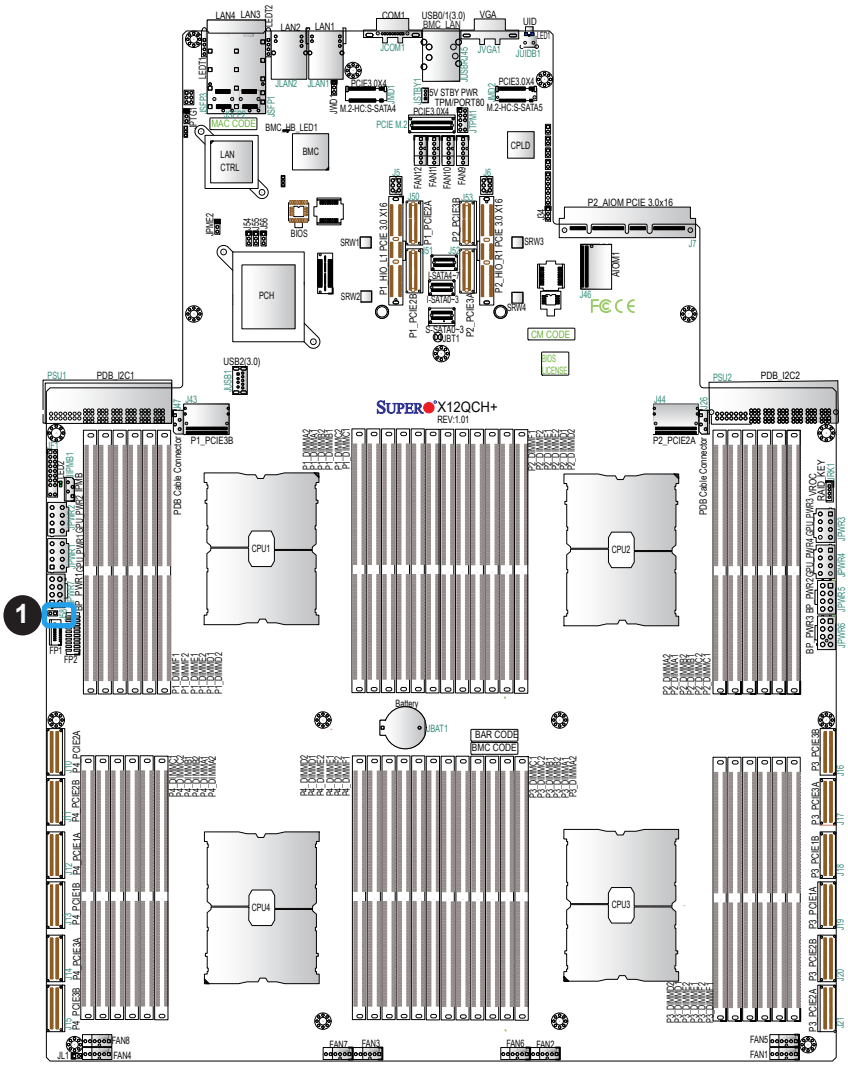
1. Power-Failure Throttling Enable Jumper

Select Switch for FP1_Reset Button or UID Button

Jumper J58 is used to select between the FP1_Reset button and the UID button. The default setting is to close J58 to use the UID button. See the table below for jumper settings.

Select Switch for FP1_Reset Button & UID Button Jumper Settings	
Jumper Setting	**Definition**
Closed	UID Button (Default)
Open	FP1_Reset Button

1. UID Button Selected



2.9 LED Indicators

10G LAN1/LAN2 LEDs

Two RJ45 Ethernet 10G LAN ports (LAN 1 and LAN 2) are located on the rear I/O panel of the motherboard. Each Ethernet LAN port has two LEDs. The green LED indicates activity, while the other Link LED may be green, amber, or off to indicate the speed of the connection. Refer to the tables below for more information.

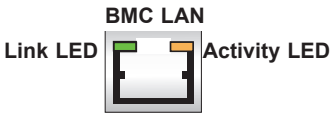
10G LAN1/2 Activity LED (Right) LED State		
Color	**Status**	**Definition**
Green	Flashing	Active

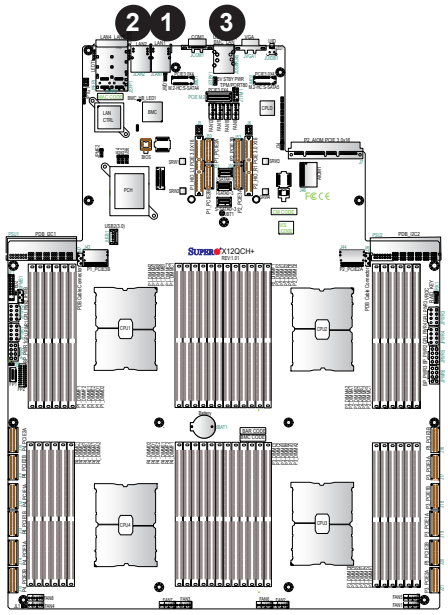
LAN1/2 Link LED (Left) LED State	
LED Color	**Definition**
Green	10Gbps

BMC LAN LEDs

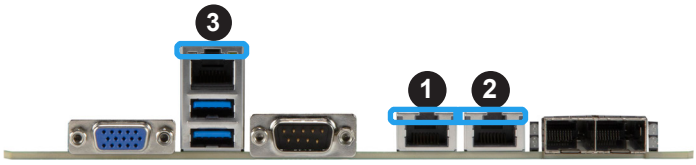
In addition to LAN1 and LAN2, an BMC LAN is also located on the rear I/O panel. The amber LED on the right indicates activity, while the green LED on the left indicates the speed of the connection. Refer to the table below for more information.

BMC LAN LEDs		
	Color/State	**Definition**
Link (left)	Green: Solid Amber: Solid	100 Mbps 1 Gbps
Activity (Right)	Amber: Blinking	Active





1. LAN 1 LEDs
2. LAN 2 LEDs
3. BMC LAN LEDs

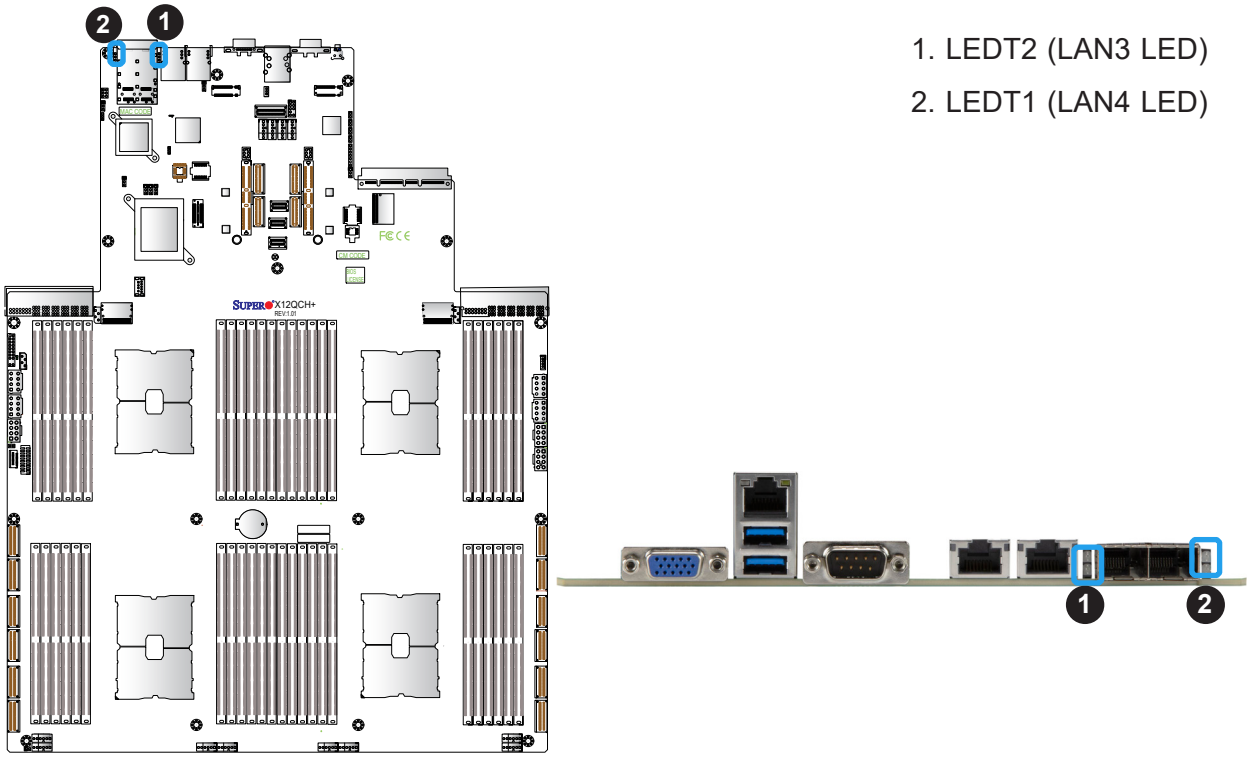


10G LAN3/4 LEDs

Two 10G LAN ports (LAN3/LAN4) that support SFP 28 are also located on the rear I/O panel of the motherboard. The activity LED for LAN3 is located on LEDT2, while the activity LED for LAN4 is on LEDT1. Refer to the tables below for more information.

10G LAN3/4 Activity LED Indicators LED State	
LED#	**LAN#**
LEDT1	LAN4
LEDT2	LAN3

10G LAN3/4 Activity LEDs LED State		
Color	**Status**	**Definition**
Green	Flashing	Active

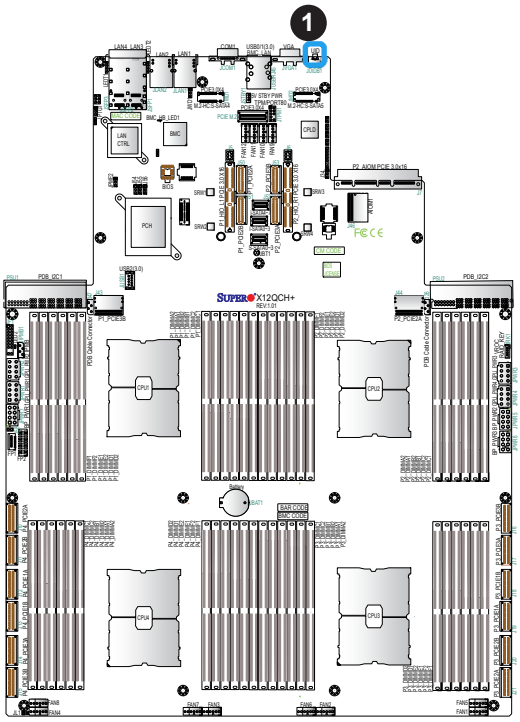


1. LEDT2 (LAN3 LED)
2. LEDT1 (LAN4 LED)

Unit ID LED

A rear UID LED indicator (LED1) is located next to the UID switch on the motherboard. This UID indicator provides easy identification of a system unit that may need service.

UID LED LED Indicator	
LED Color	**Definition**
Blue: On	Unit Identified

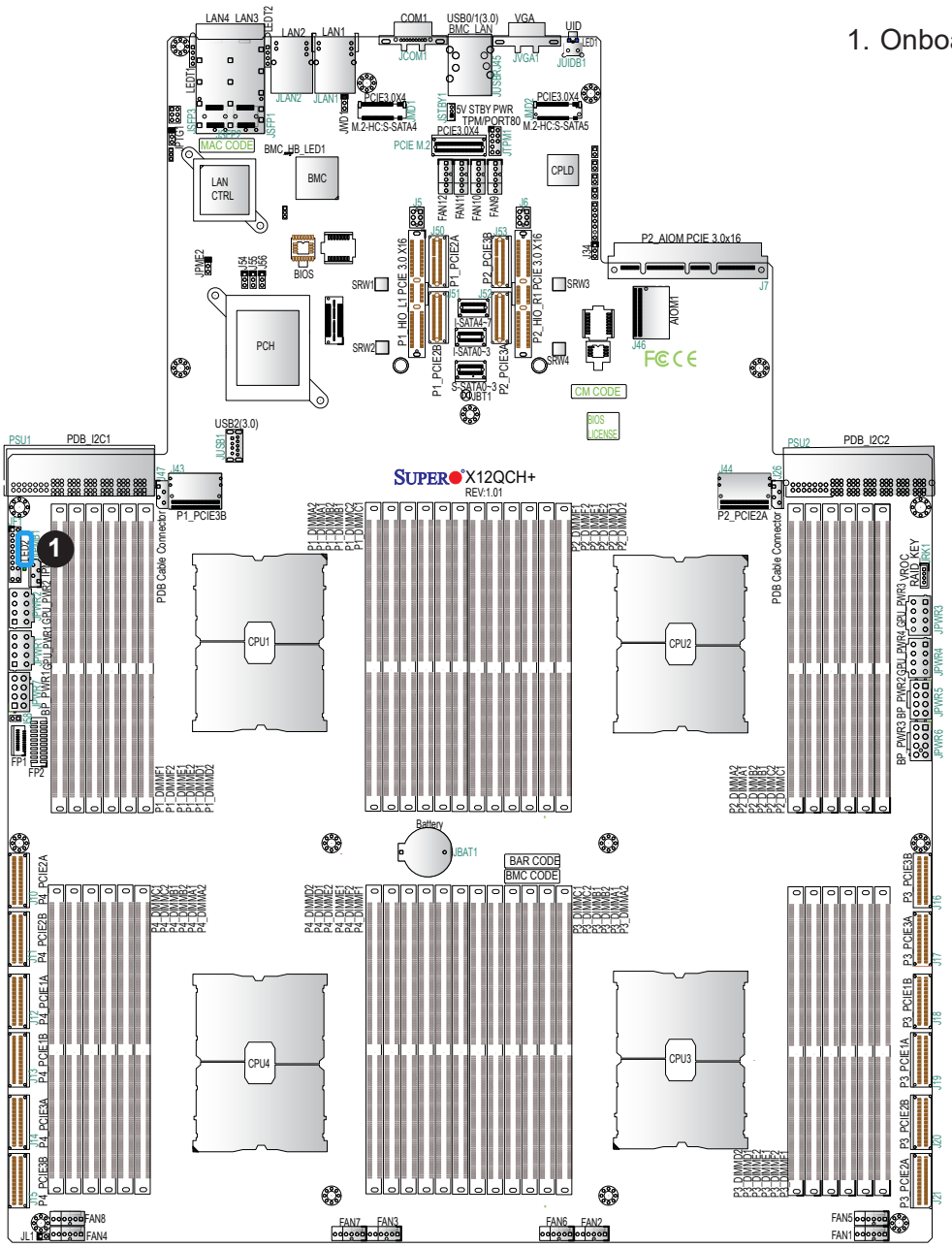


1. Rear UID LED

Onboard Power LED

The Onboard Power LED is located at LED2 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
Green	System Power On



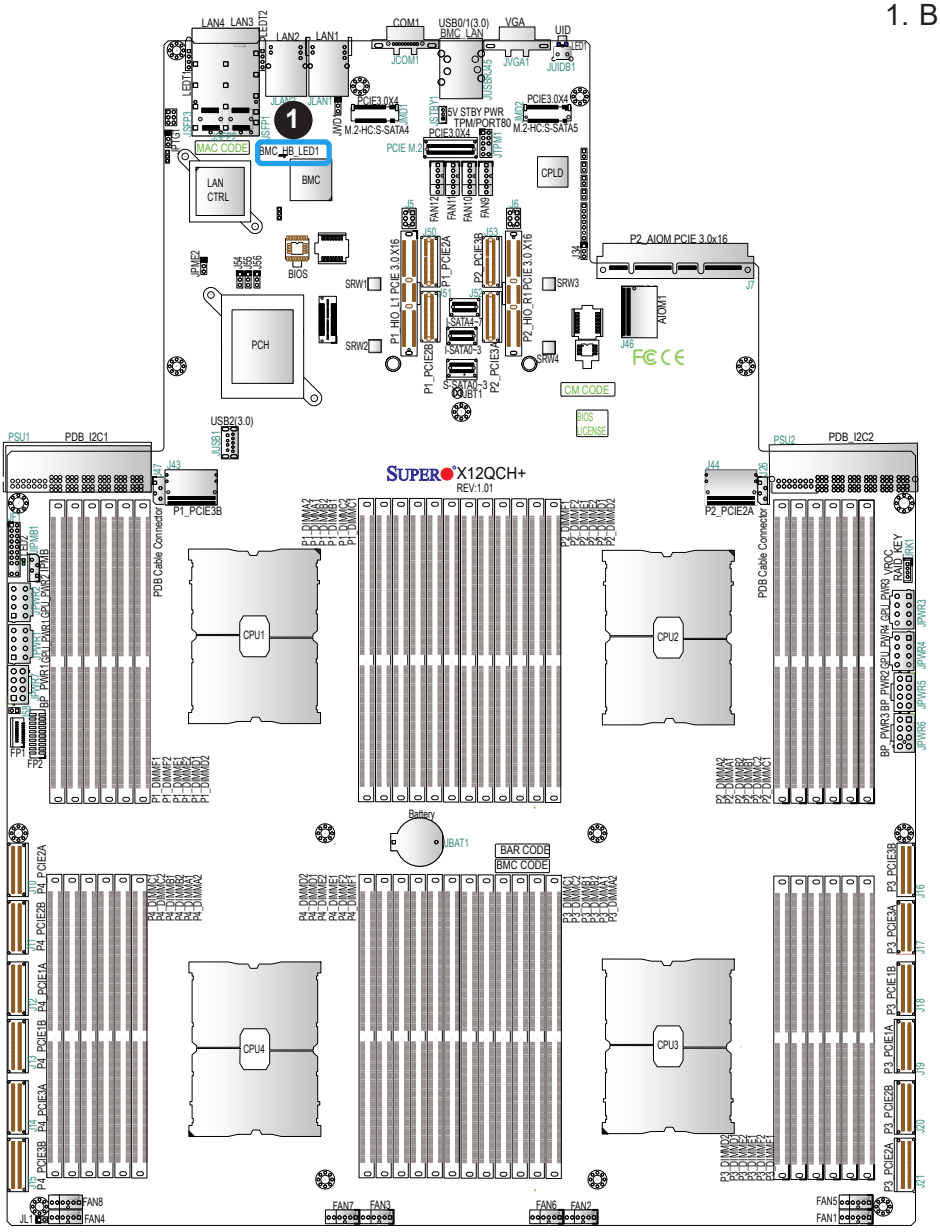
1. Onboard Power LED

BMC Heartbeat LED

A BMC Heartbeat LED is located at BMC_HB_LED1 on the motherboard. When this LED is blinking, the BMC is functioning normally. Refer to the table below for more information.

BMC Heartbeat LED Indicator	
LED Color	**Definition**
Green: Blinking	BMC Normal

1. BMC Heatbeat LED



Chapter 3

Troubleshooting

3.1 Troubleshooting Procedures

Use the following procedures to troubleshoot your system. If you have followed all of the procedures below and still need assistance, refer to the 'Technical Support Procedures' and/or 'Returning Merchandise for Service' section(s) in this chapter. Always disconnect the AC power cord before adding, changing or installing any non hot-swap hardware components.

Before Power On

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

No Power

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

No Video

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

System Boot Failure

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

1. Remove all components from the motherboard, especially the DIMM modules. Make sure that system power is on.
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

When memory error beep codes are not available for your system, check the following:

1. Make sure that the memory modules are compatible with the system and are properly installed. See Chapter 2 for installation instructions. (For memory compatibility, refer to the "Tested Memory List" link on the motherboard's product page to see a list of supported memory.)
2. Check if different speeds or different types of DIMMs have been installed. It is strongly recommended that you use the same RAM type and speed for all DIMM modules in the system.
3. Make sure that you are using the correct type of ECC DDR4 modules recommended by the manufacturer.
4. Check for bad DIMM modules or slots by swapping a single module among all memory slots and check the results.

Losing the System's Setup Configuration

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

When the System Becomes Unstable

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

1. CPU/BIOS support: Make sure that your CPU is supported and that you have the latest BIOS installed in your system.

2. Memory support: Make sure that the memory modules are supported by testing the modules using memtest86 or a similar utility.

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

3. HDD support: Make sure that all hard disk drives (HDDs) work properly. Replace the bad HDDs with good ones.

4. System cooling: Check the system cooling to make sure that all heatsink fans and CPU/system fans, etc., work properly. Check the hardware monitoring settings in the BMC to make sure that the CPU and system temperatures are within the normal range. Also check the front panel Overheat LED and make sure that it is not on.

5. Adequate power supply: Make sure that the power supply provides adequate power to the system. Make sure that all power connectors are connected. Please refer to our website for more information on the minimum power requirements.

6. Proper software support: Make sure that the correct drivers are used.

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

1. Source of installation: Make sure that the devices used for installation are working properly, including boot devices such as CD/DVD.

2. Cable connection: Check to make sure that all cables are connected and working properly.

3. Using the minimum configuration for troubleshooting: Remove all unnecessary components (starting with add-on cards first), and use the minimum configuration (but with the CPU and a memory module installed) to identify the trouble areas. Refer to the steps listed in Section A above for proper troubleshooting procedures.

4. Identifying bad components by isolating them: If necessary, remove a component in question from the chassis, and test it in isolation to make sure that it works properly. Replace a bad component with a good one.

5. Check and change one component at a time instead of changing several items at the same time. This will help isolate and identify the problem.

6. To find out if a component is good, swap this component with a new one to see if the system will work properly. If so, then the old component is bad. You can also install the component in question in another system. If the new system works, the component is good and the old system has problems.

3.2 Technical Support Procedures

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

1. Please go through the Troubleshooting Procedures and Frequently Asked Questions (FAQ) sections in this chapter or see the FAQs on our website (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, please have your account number ready when placing a call to our Technical Support department. We can be reached by email at support@supermicro.com.

3.3 Frequently Asked Questions

Question: What type of memory does my motherboard support?

Answer: This motherboard supports up to 12.2TB of 3DS LRDIMM/LRDIMM/3DS RDIMM/RDIMM DDR4 (288-pin) ECC memory with speeds of 3200/2933/2666MHz in 48 memory slots and up to 18.4TB of Intel® Optane™ PMem 200 Series memory with speeds of up to 2666MHz. (See the note below). To enhance memory performance, do not mix memory modules of different speeds and sizes. Please follow all memory installation instructions given on Section 2-4 in Chapter 2.

Note: Intel® Optane™ PMem 200 Series memory is supported by the 3rd Gen Intel Xeon Scalable Processors (83xx/63xx/53xx Series) only.

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. Please check our BIOS warning message and the information on how to update your BIOS on our website. Select your motherboard model and download the BIOS file to your computer. Also, check the current BIOS revision to make sure that it is newer than your BIOS before downloading.

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

Note 2: For BIOS Update and Recovery instructions, please refer to the Firmware Update and Recovery Instructions for Supermicro's X12 Motherboards User's Guide posted at http://www.supermicro.com/support/manuals/.

3.4 Battery Removal and Installation

Battery Removal

To remove the onboard battery, follow the steps below:

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

Proper Battery Disposal

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

Battery Installation

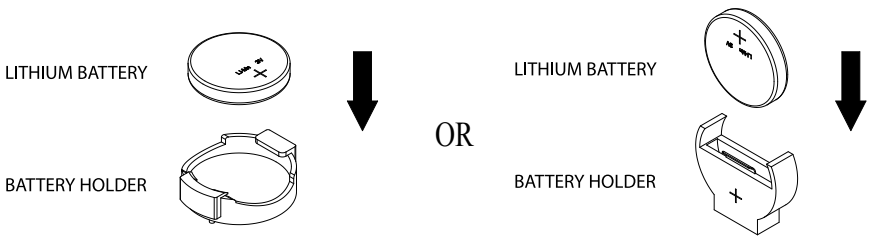
To install an onboard battery, follow the steps 1 and 2 below:

1. Power off your system and unplug your power cable.
2. Locate the onboard battery as shown below.

2. Identify the battery's polarity. The positive (+) side should be facing up.

3. 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 X12QCH+ motherboard. The BIOS is stored on a chip and can be easily upgraded using a flash program.

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

Starting the Setup Utility

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

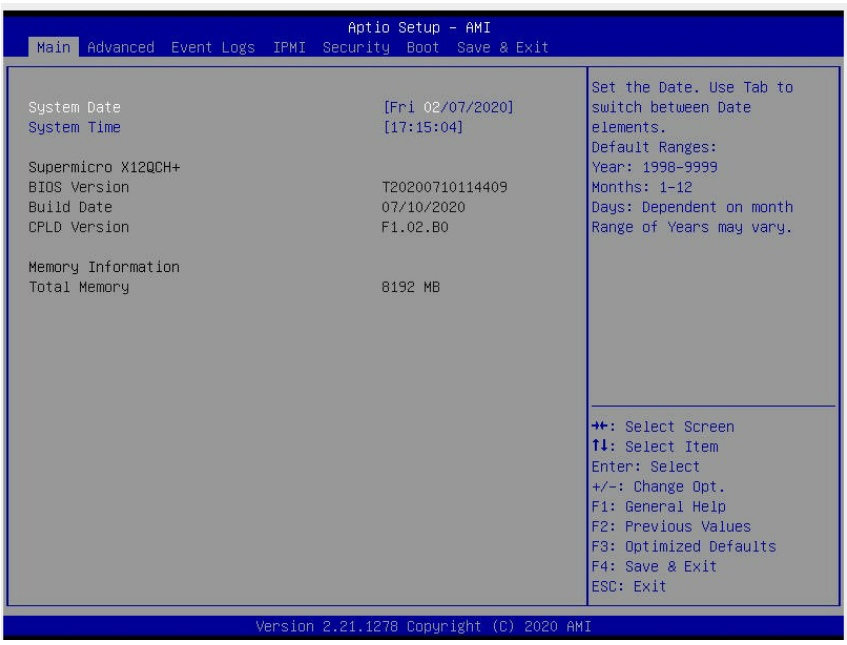
The Main BIOS screen has two main frames. The left frame displays all the options that can be configured. “Grayed-out” options cannot be configured. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is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

A "▶" indicates a submenu. Highlighting such an item and pressing the <Enter> key will open the list of settings within that submenu.

The BIOS setup utility uses a key-based navigation system called hot keys. Most of these hot keys (<F1>, <F2>, <F3>, <F4>, <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 Date/System Time

Use this feature to change the system date and time. To change system date and time settings, please 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 Day MM/DD/YYYY format. The time is entered in HH:MM:SS format.

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

Supermicro X12QCH+

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 CPLD (Complex-Programmable Logical Device) used in the system.

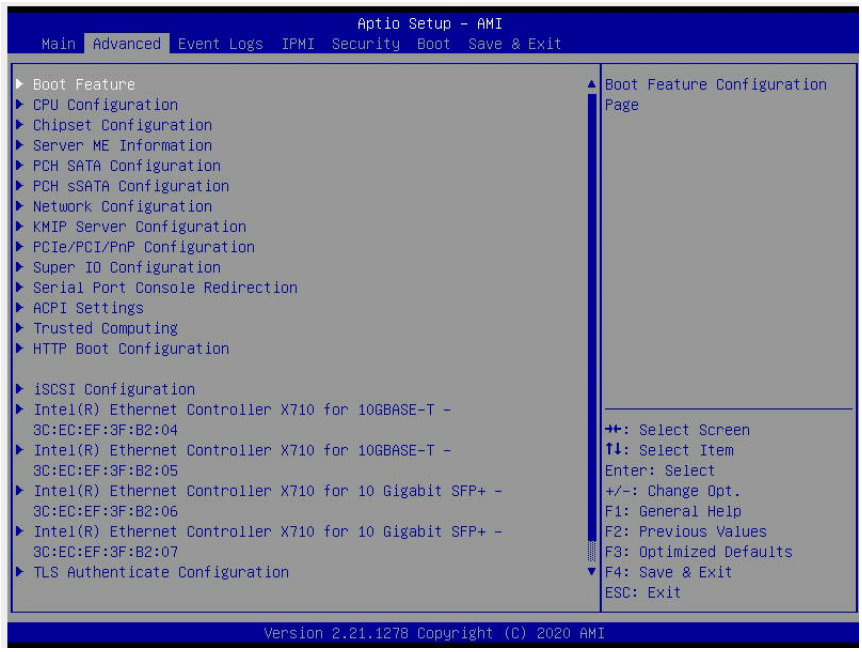
Memory Information

Total Memory

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

4.3 Advanced Setup Configurations

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



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

▶Boot Feature

Quiet Boot

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

Note: POST message is 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 Off and **On**.

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 EFI (Extensible Firmware Interface) 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 Enabled and **Disabled.**

CPLD Watch Dog

Use this feature to configure the Watch Dog timer setting for the CPLD (Complex Programmable Logical Devices). If this feature is set to Power On, the CPLD watch dog timer will be enabled when the system power is turned on, and it will remained enabled until the power is turned off. Select POST to enable the CPLD watch dog timer at the early stage of POST (Power On Self Test) and disable it at the end of POST. Select OS to enable the CPLD watch dog timer upon the OS bootup. The options are Power On, POST, OS, and **Disabled.**

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 4 seconds or longer. Select Instant Off to instantly power off the system as soon as the user presses the power button. The options are 4 Seconds Override and **Instant Off.**

▶CPU Configuration

Warning: Setting the wrong values in the sections below 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
- L2 Cache RAM
- L3 Cache RAM
- Processor 0 Version
- Processor 1 Version
- Processor 2 Version
- Processor 3 Version

▶CPU1 Core Disable Bitmap

Hyper-Threading (ALL)

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

Hardware Prefetcher (Available when supported by the CPU)

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

Adjacent Cache Prefetch (Available when supported by the CPU)

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 Disable and **Enable**. (**Note**: Reboot the system for the changes you've made to take effect. Refer to Intel's website for detailed information.

DCU Streamer Prefetcher (Available when supported by the CPU)

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

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.

Enable Intel® TXT

Select Enabled to enable Intel Trusted Execution Technology (TXT) support to enhance system security and data integrity. The options are **Disable** and Enable.

Note: For more information on TPM, please refer to the TPM manual at http://www.supermicro.com/manuals/other.

VMX

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

Note: Please reboot the system for any change of the setting to take effect.

Enable SMX

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

PPIN Control

Select Unlock/Enable to use the Protected-Processor Inventory Number (PPIN) in the system. The options are **Unlock/Enable** and Lock/Disable.

AES-NI

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

▶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 Power Technology is set to Custom)

Select BIOS to allow the system BIOS to configure the Power-Performance Tuning Bias setting. The options are BIOS Controls EPB and **OS Controls EPB**.

ENERGY_PERF_BIAS_CFG Mode (ENERGY PERFORMANCE BIAS CONFIGURATION Mode) (Available when Power Performance Tuning is set to BIOS Controls EPB)

Use this feature to configure the optimal operation setting for your machine by achieving the desired system performance level and energy saving (efficiency) level at the same time. Select Maximum Performance to maximize system performance to its highest potential; however, this may consume maximal amount of power as energy is needed to fuel processor operation. 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)

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

Config (Configuring) TDP (Available on Select SKUs of the 3rd Gen Xeon Scalable Processors are Used)

Select Enable for the user to configure the maximum CPU TDP (Thermal Design Power) level for the system. The TDP level is subject to chassis and heatsink cooling restrictions. For proper thermal management, please check the chassis and heatsink specifications for proper CPU TDP sizing. The options are **Enable** and Disable.

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

Use this feature to configure the processor's P-State coordination settings. During a P-State, the voltage and frequency of the processor will be reduced when it is in operation. This makes the processor more energy efficient, resulting in further energy gains. 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 CPUs used in the system. The options are Disable and **Enable**.

▶Hardware PM (Power Management) State Control (Available when "Power Technology" is set to Custom)

Hardware P-States

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

▶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 **Enable**, and Disable.

CPU C6 Report (Available when Autonomous Core C-State is set to Disable)

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 **Auto**, Enable, and Disable.

Enhanced Halt State (C1E) (Available when Autonomous Core C-State is set to Disable)

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

▶Package C State Control (Available when Power Technology is set to Custom)

Package C State

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

▶CPU T State Control Available when Power Technology is set to Custom)

Software Controlled T-States

If this feature is set to Enable, CPU throttling will be controlled by the OS, which will reduce the speed of CPU. The options are Enable and **Disable**.

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

Select Enable to configure the on-die thermal throttling setting. 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 the wrong values in the following items may cause the system to malfunction.

▶North Bridge

This feature allows the user to configure the settings for the Intel North Bridge.

▶Uncore Configuration

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

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

XPT Remote Prefetch

Select Enable to support XPT (Extended Prediction Table) 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 Enable, Disable, 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 **Auto**, Enable, and Disable.

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 IODC (I/O Directory Cache) to generate snoops instead of generating memory lockups for remote IIO (InvIToM) 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 InvItoM Hybrid Push, InvItoM AllocFlow, Enable for Remote InvItoM Hybrid AllocNonAlloc, and Enable for Remote InvItoM and Remote WCiLF.

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 IMC (Integrated Memory Controller) Interleaving. The options are **Disable**, Enable, and Auto.

XPT Prefetch

Select Enable for XPT (Extended Prediction Table) Prefetch support 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 Enable, Disable, and **Auto**.

D2K Credit Configuration

Use this feature to set the level of "Data to Knowledge" (D2K) needed for Value Network Analysis (VNA) to improve BL credit efficiency for proper redistribution. The options are Low, **Medium**, and High.

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 Disable, Low, Medium, High, and **Auto**.

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 **Enable**, Disable, and Auto.

▶Memory Configuration

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 Soft PPR, **Hard PPR**, and PPR Disabled.

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. (**Note**: Support for 3200 MHz is dependent on the CPU SKU.)

Data Scrambling for DDR4

Select Enable to enable data scrambling for DDR4 memory to enhance system performance and security. Select Auto for the default setting of the Memory Reference Code (MRC) to set configure data scrambling for DDR4 setting. The options are **Enable** and Disable.

2X Refresh Enable

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

▶Memory Topology

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

- P1 DIMMA1: 3200MT/s Hynixx DRx4 32GB RDIMM

▶Memory RAS (Reliability_Availability_Serviceability) Configuration

Use this submenu to configure the following Memory RAS settings.

Mirror Mode

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** and Full Mirror Mode.

Memory Rank Sparing (Available when Mirror Mode is set to Disabled)

Select Enable to support memory-rank sparing to optimize memory performance. The options are Enabled and **Disabled**.

Note: This feature will only be available when memory mirror mode is set to Mirror Mode 1LM or an AEP device is plugged in.

Correctable Error Threshold

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

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. Please note that virtual lockstep mode will only start to work for ADDDC after a faulty DRAM module is spared. The options are Enabled and **Disabled**.

SDDC

SDDC (Single Device Data Correction) checks and corrects single-bit or multiple-bit (4-bit max.) memory faults that affect an entire single x4 DRAM device. The options are Enabled and **Disabled**. (**Note**: SDDC is available when it is supported by the processors installed on the motherboard.)

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

▶IIO Configuration

▶CPU1 Configuration/CPU2 Configuration

IOU0 (IIO PCIe Port 1)

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

IOU1 (IIO PCIe Port 2)

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

IOU3 (IIO PCIe Port 4)

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

▶IOAT Configuration

Disable TPH

TPH **(**TLP Processing Hint) 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 "TPL request" to provide "hints" to help optimize the processing of each transaction occurred in the target memory space. The options are Yes and **No**.

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 Intel Virtualization Technology support for Direct I/O VT-d by reporting the I/O device assignments to the VMM (Virtual Machine Monitor) 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 **No** and Yes.

ACS (Access Control Services) Control (Available when Intel® VT for Directed I/O (VT-d) is set to Yes)

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

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

If this feature is set to Yes, I/O DMA transfer remapping and device-generated interrupts will be supported. The options are **Auto**, Yes, and No.

Posted Interrupt

Select Yes to support VT_D Posted Interrupt which will allow external interrupts to be sent directly from a direct-assigned device to a client machine in non-root mode to improve virtualization efficiency by simplifying interrupt migration and lessening the need of physical interrupts. The options are **Yes** and No.

ATS (Address Translation Services)

Select Yes to enable ATS support for the Non-Isoch VT-d engine for system performance enhancement. The options are **Yes** and No.

Coherency Support (Non-Isoch)

Select Yes for the Non-Isoch VT-d engine to pass through DMA (Direct Memory Access) to enhance system performance. The options are **Yes** and No.

▶Intel® VMD (Volume Management Device) Technology

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

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

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

▶Intel® VMD for Volume Management Device on CPU1

VMD Configuration for IOU 0/VMD Configuration for IOU 1/VMD Configuration for IOU 3/VMD Configuration for IOU 4

Enable/Disable VMD

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

*If Enable/Disable VMD is set to Enable to a port specified by the user, the following items will display for the port selected.

M.2 HC: S-SATA4 VMD/M.2 HC: S-SATA5 VMD (Available on VMD Configuration for IOU 3 only)

Select Enable to enable Intel Volume Management Device Technology support for the (M.2 HC S-SATA4/5) root port. The options are Enable and **Disable**. .

Hot Plug Capable

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

CfgBar Size

Use this feature to set the VMD Configuration Bar size (in bits. Minimum is 20 bits and maximum is 27 bits.) **The default setting is 25 (bits)**.

CfgBar Attribute

Use this feature to set the VMD Configuration Bar attribute (e.g. 64-bit or Prefetchable.) The options are 32-bit non-prefetchable, 64-bit non-prefetchable, and **64-bit prefetchable**.

MemBar1 Size

Use this feature to set the VMD Memory Bar1 size (in bits. Minimum is 20 bits.) **The default setting is 25 (bits)**.

MemBar1 Attribute

Use this feature to set the VMD Memory Bar1 attribute (e.g. 64-bit or Prefetchable.) The options are **32-bit non-prefetchable**, 64-bit non-prefetchable, and 64-bit prefetchable.

MemBar2 Size

Use this feature to set the VMD Memory Bar2 size (in bits. Minimum is 20 bits.) **The default setting is 20 (bits)**

MemBar2 Attribute

Use this feature to set the VMD Memory Bar2 attribute (e.g. 64-bit or Prefetchable.) The options are 32-bit non-prefetchable, **64-bit non-prefetchable**, and 64-bit prefetchable.

▶South Bridge

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 XHCI (Extensible Host Controller Interface) hand-off. The XHCI ownership change should be claimed by the XHCI driver. The options are Disabled and **Enabled**.

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 Enable for PCH PCIe Spread Spectrum Clocking support, which will allow the BIOS to monitor and attempt to reduce the level of Electromagnetic Interference caused by the components whenever needed. The options are Enable and **Disable**.

Port 61h Bit-4 Emulation

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

▶Server ME (Management Engine) Configuration

This feature displays the following system ME configuration settings.

- General ME Configuration
- 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

This feature allows the BIOS to display the following information regarding SATA devices:

SATA Controller

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

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

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

SATA RSTe Boot Info (Available when Configure SATA 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. (**Note**: For this feature to work properly, please set the CSM Storage OPRM policy to Legacy.) The options are Disable and **Enable**.

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 Enable and **Disable**.

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 0 - SATA Port 7

Hot Plug

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

Spin Up Device

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

SATA Device Type

Use this feature to specify if the device installed on the SATA port specified by the user 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

This feature allows the BIOS to display the following information regarding sSATA devices:

sSATA Controller

This featured 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 specified by the user as an AHCI drive. Select RAID to configure an sSATA drive specified by the user 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. (**Note**: For this feature to work properly, please set the CSM Storage OPRM policy to Legacy.) The options are Disable and **Enable**.

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 specified by the user which will allow the user to replace the device installed in the slot without shutting down the system. The options are **Enable** and Disabled.

Spin Up Device

Select Enable for Staggered Spin Up support which will allow the SATA devices specified by the user 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 Enable and **Disable**.

sSATA Device Type

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

▶Network Stack Configuration

Network Stack

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

If "Network Stack" is set to Enabled, the following items will display:

IPv4 PXE Support

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

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 Enabled and **Disabled**.

IPv6 PXE Support

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

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 Enabled and **Disabled**.

PXE Boot Wait Time

Use this feature to set the wait time (in seconds) upon which the system BIOS will wait for user 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 Time

Use this feature to select the wait time in seconds for the BIOS ROM to detect the presence of a LAN media either via the Internet connection or a LAN port. The default is **1**.

▶MAC: B03AF2B6059F-IPv4 Network Configuration/MAC: 3CECEF3FB204-IPv4 Network Configuration/MAC: 3CECEF3FB205-IPv4 Network Configuration/ MAC: 3CECEF3FB206-IPv4 Network Configuration/MAC: 3CECEF3FB207-IPv4 Network Configuration

Configured

This feature indicates whether the device installed in the address shown above is configured successfully. It also allows the user to disable or enable the device installed in this address. The options are Enabled and **Disabled**.

**When the feature-Configured is set Enabled, the following features will display:*

Enable DHCP

Select Enabled to enable DHCP (Dynamic Host Configuration Protocol) support. The options are Enabled and **Disabled.**

**When the feature Enable DHCP is set Disabled, the following features will display:*

Local IP Address (Available when Enable DHCP is set to Disabled)

Use this feature to set the local IP address for your machine.

Local Netmask (Available when Enable DHCP is set to Disabled)

Use this feature to configure the local netmask setting for your machine.

Local Gateway (Available when Enable DHCP is set to Disabled)

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

Local DNS Servers (Available when Enable DHCP is set to Disabled)

Use this feature to select servers to be used as your local DNS (Domain Name System) machines.

Save Changes and Exit

Use this feature to save the changes that have been made and exit from this submenu.

▶MAC: 3CECEF3FB204-IPv6 Network Configuration/MAC: 3CECEF3FB205-IPv6 Network Configuration/MAC: 3CECEF3FB206-IPv6 Network Configuration/MAC: 3CECEF3FB207-IPv6 Network Configuration

▶Enter Configuration Menu

The following features will display:

Interface Name

Interface Type

MAC address

Host addresses

Route Table

Gateway Addresses

DNS addresses

Interface ID

DAD Transmit Count

Policy

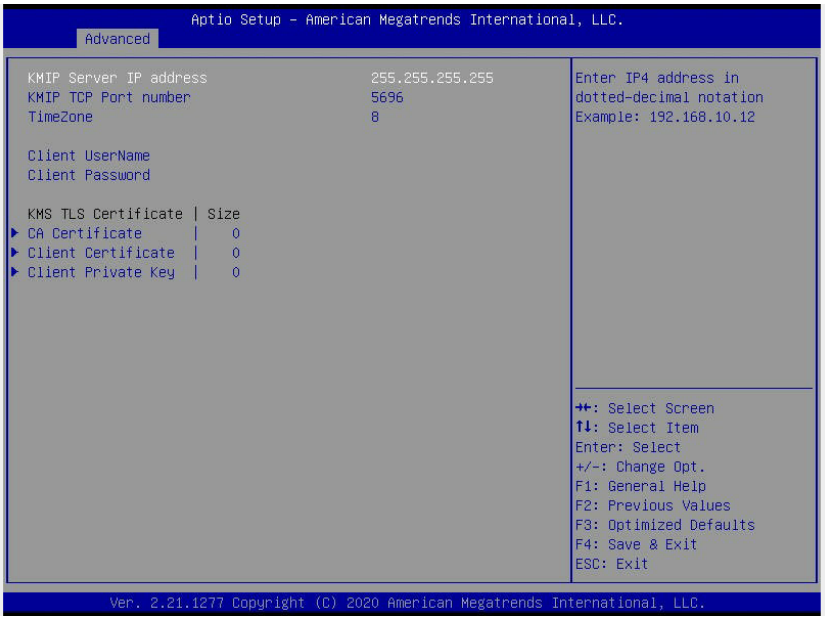
This feature allows the user to determine how the policy is to be configured. The options are **automatic** and manual.

Save Changes and Exit

Use this feature to save the changes that have been made and exit from this submenu.

▶KMIP Server Configuration

This feature displays the configuration settings for the KMIP (Key Management Interoperability Protocol) server, which will allow the clients to ask a server to encrypt or decrypt data without a direct access key.



KMIP Server IP Address

This feature displays the IP address for the KMIP server.

KMIP TCP Port Number

This feature displays the KMIP TCP Port number.

TimeZone

This feature displays the time zone where the KMIP server is located at.

Client UserName

Use this feature to enter a Username for the KMIP server.

Client Password

Use this feature to enter a password for the KMIP server.

KMS TLS Certificate | Size

This feature displays the Transport Layer Security (TLS) Certificate and its size.

▶CA Certificate

▶Client Cerificate

▶Client Private Key

▶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 **Enabled** and Disabled.

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

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

ARI Support

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

Bus Master Enable

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

MMIOHBase

Use this feature to select the base memory size according to memory-address mapping for the IO hub. The base memory size must be between 4032G to 4078G. The options are 56T, 40T, **32T**, 24T, 16T, 4T, 2T, 1T, 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 MMCFG (Memory-Mapped Configuration) base is assigned to onboard PCI devices. The options are 1G, 1.5G, 1.75G. 2G, 2.25G, 3G, and **Auto**.

NVMe Firmware Source

This feature determines which type of the 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 EFI to allow the user to boot the computer using the EFI (Extensible Firmware Interface) device installed on the onboard video port. Select Legacy to allow the user to boot the computer using a legacy device installed on the onboard video port. The options are Disabled and **EFI**.

M.2 HC: S-SATA4 PCIE 3.0 x4 OPROM/M.2 HC: S-SATA5 PCIE 3.0 x4 OPROM/AIOM: CPU2 PCIE 3.0 OPROM

Select EFI to allow the user to boot the computer using an EFI (Extensible Firmware Interface) device installed on the PCIe slot specified by the user. Select Legacy to boot the computer using a legacy device installed on the PCIe slot specified by the user. The options are Disabled and **EFI**. (**Note:** Riser card names may differ in each system.)

Onboard LAN1 Option ROM

Select PXE to boot up your system using a legacy device installed on LAN 1 port. Select EFI to boot up your system using an EFI (Extensible Firmware Interface) device installed on LAN 1 port. The options are Disabled and **EFI**.

▶Super IO Configuration

Super IO Chip AST2500

▶Serial Port 1 Configuration

Serial Port 1

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

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 a serial port specified by the user.

Change Settings

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 a serial port specified. 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).

▶SOL (Serial Over LAN) Configuration

SOL

Select Enabled to enable SOL. The options are **Enabled** and Disabled.

Device Settings (Available when SOL is set to Enabled)

This feature displays the base I/O port address and the Interrupt Request address of a serial port specified by the user.

Change Settings

This feature specifies the base I/O port address and the Interrupt Request address of SOL. Select Auto for the BIOS to automatically assign the base I/O and IRQ address to a serial port specified. 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 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 Enabled and **Disabled**.

*If the item above set to Enabled, the following items will become available for configuration:

COM 1

▶Console Redirection Settings (for COM 1)

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 ANSI, VT100, **VT100+**, and VT-UTF8.

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 **Enabled** and Disabled**.**

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 the option - Bootloader is selected, Legacy Console Redirection is disabled before booting the OS. When the option - Always Enable is selected, Legacy Console Redirection remains enabled upon OS bootup. The options are **Always Enable** and Bootloader.

SOL (Serial-Over-LAN)

Console Redirection (for SOL)

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

*If the item above set to Enabled, the following items will become available for user's configuration:

▶Console Redirection Settings (for SOL)

Use this feature to specify how the host computer will exchange data with the client computer, which is the remote computer used by the user.

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 ANSI, VT100, **VT100+**, and VT-UTF8.

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 data-sending 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 **Enabled** and Disabled**.**

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 the option - Bootloader is selected, Legacy Console Redirection is disabled before booting the OS. When the option - Always Enable is selected, Legacy Console Redirection remains enabled upon OS bootup. The options are **Always Enable** and Bootloader.

▶Legacy Console Redirection Settings

Legacy Console Redirection Port

Use this feature to select the COM port to display redirection of Legacy OS and Legacy OPROM messages. The options are **COM1** and SOL.

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

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

Console Redirection (for EMS)

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

*If the item above set to Enabled, the following items will become available for user's configuration:

▶Console Redirection Settings (for EMS)

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 (Console Redirection).

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 ANSI, VT100, VT100+, and **VT-UTF8**.

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 setting for each these features is displayed:

Data Bits EMS

Parity EMS

Stop Bits EMS

▶ACPI Settings

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

NUMA Support (Available when the OS supports this feature)

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

WHEA Support

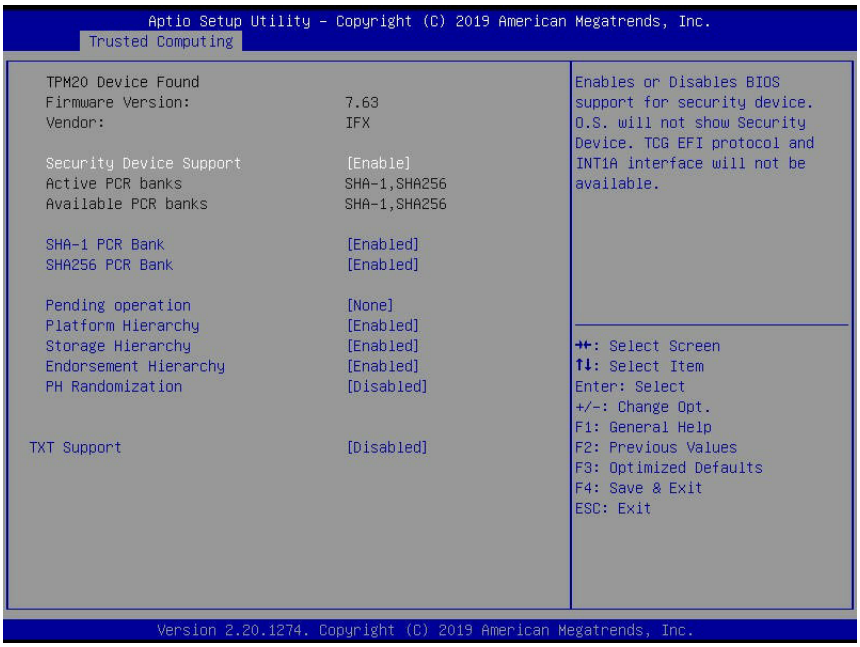
Select Enabled to support the Windows Hardware Error Architecture (WHEA) platform and provide a common infrastructure for the system to handle hardware errors within the Windows OS environment to reduce system crashes and to enhance system recovery and health monitoring. The options are **Enabled** and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

High Precision 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 **Enabled** and Disabled.

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

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



- TPM2.0 Device Found
- Firmware Version
- Vendor

Security Device Support

Select Enable to use this feature to enhance data integrity and system security. Please note that the OS will not show the security device. Neither TCG EFI protocol nor INT1A interaction will be made available for use. If there is a TPM jumper installed on the motherboard, please also enable the jumper for this feature to work properly. If you have made changes on the setting on this feature, be sure to reboot the system for the change 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 security and data integrity. The options are **Enabled** and Disabled.

SHA256 PCR Bank

Select Enabled to enable SHA256 PCR Bank support to enhance system security and data integrity. 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 the 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 the user's privacy concerns because the primary keys in this hierarchy are certified by the TPM or a manufacturer to be constrained to an authentic TPM device that is attached to an authentic platform. A primary key can be an encrypted, and a certificate can be created using TPM2_ ActivateCredential. It allows the user to independently enable "flag, policy, and authorization value" without involving other hierarchies. A user with privacy concerns can disable the endorsement hierarchy while still using the storage hierarchy for TPM applications and 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.

TXT Support

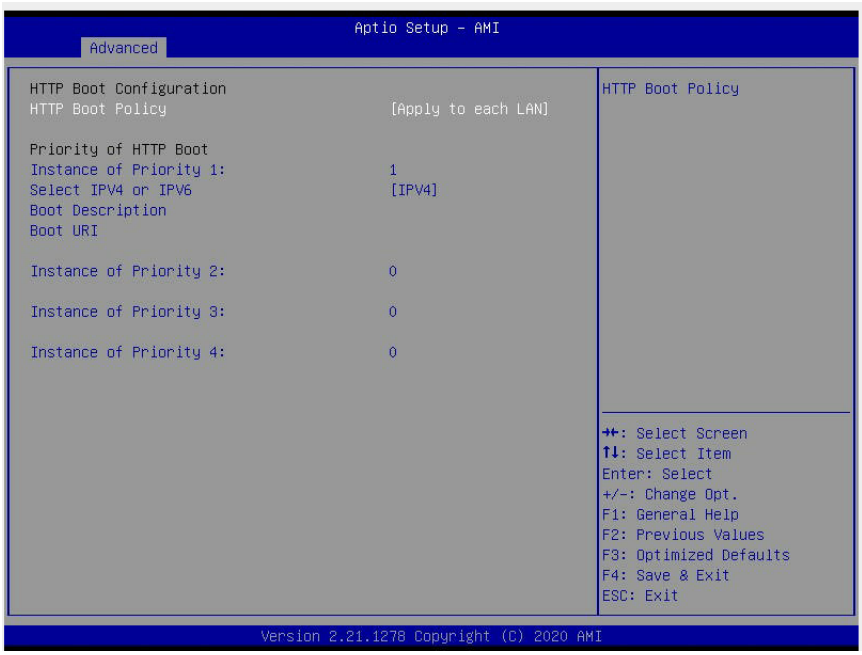
Select Enabled to enable Intel Trusted Execution Technology (TXT) support to enhance system security and data integrity. The options are **Disabled** and Enabled.

Note 1: If the option for this item (TXT Support) is set to Enabled, be sure to disable EV DFX (Device Function On-Hide) support for the system to work properly. (EV DFX is under "IIO Configuration" in the "Chipset/North Bridge" submenu).

Note 2: For more information on TPM, please refer to the TPM manual at http://www.supermicro.com/manuals/other.

▶HTTP Boot Configuration

This feature allows the user to configure HTTP Boot settings. When you select this submenu and press <Enter>, the following screen will display:



HTTP Boot Policy

Use this feature to select the device where HTTP should boot to. The options are Apply to all LANs, **Apply to each LAN**, Boot Priority #1 instantly.

Priority of HTTP Boot

This feature will display the following items:

Instance of Priority 1:

Select IPV4 or IPV6

Boot Description

Boot URI

This feature allows the user to enter the Boot URI address.

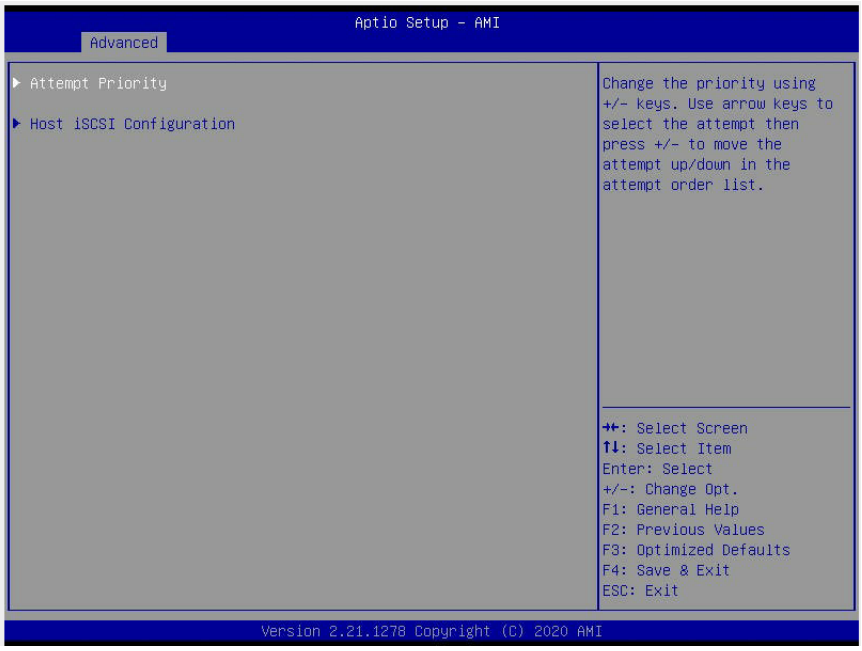
Instance of Priority 2:

Instance of Priority 3:

Instance of Priority 4:

▶iSCSI Configuration

This submenu displays iSCSI configuration information:



▶Attempt Priority

Attempt Priority

Use this feature to change the priority of iSCSI attempt using the + or - keys. The options are **Host Attempt**, Redfish Attempt, and Rst Attempt.

Commit Changes and Exit

Select this feature to save the changes you've made and exit from the program.

▶Host iSCSI Configuration

▶Add an Attempt

▶Delete Attempts

▶Change Attempt Order

▶Intel® Ethernet Controller X710 for 10GBASED-T - 3C:EC:EF:3F:B2:04

▶Intel® Ethernet Controller X710 for 10GBASED-T - 3C:EC:EF:3F:B2:05

▶Intel® Ethernet Controller X710 for 10 Gigabit SFP+ - 3C:EC:EF:3F:B2:06

▶Intel® Ethernet Controller X710 for 10 Gigabit SFP+ - 3C:EC:EF:3F:B2:07

These features display the following information of an X710 LAN controller specified by the user:

▶NIC Configuration

Link Speed

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

Wake On LAN

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

LLDP Agent

Select Enabled to enable the Link Layer Discovery Protocol (LLDP) agent which will provide the basic device information of a device to other devices on the same Local Area Network periodically (about 30 seconds). The options are **Enabled** and Disabled.

Blink LEDs

This feature displays the number of blinking LED indicators of the LAN port specified by the user.

The following information will be displayed 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

When this submenu is selected, the following items will display:

▶Server CA Configuration

This feature allows the user to configure the client certificate that is to be used by the server.

▸Enroll Certification

This feature allows the user to enroll the certificate in the system.

▸Enroll Cert (Certification) Using File

This feature allows the user to enroll the security certificate in the system by using a file.

Cert (Certification) GUID (Global Unique Identifier)

This feature displays the GUID for this system.

▸Commit Changes and Exit

Select this feature to save the changes you have made and exit from the system.

▸Discard Changes and Exit

Select this feature to discard the changes you have made and exit from the system.

▸Delete Certification

If this feature is set to Enable, the certificate enrolled in the system will be deleted. The options are Enable and **Disable**.

▶Client Certification Configuration

This feature allows the user to configure the client certificate to be used by the server.

▸Enroll Certification

This feature allows the user to enroll the certificate in the system.

▶Enroll Cert (Certification) Using File

This feature allows the user to enroll the security certificate in the system by using a file.

Cert (Certification) GUID (Global Unique Identifier)

This feature displays the GUID for this system.

▶Commit Changes and Exit

Select this feature to save the changes you have made and exit from the system.

▶Discard Changes and Exit

Select this feature to discard the changes you have made and exit from the system.

▶Delete Certification

If this feature is set to Enable, the certificate enrolled in the system will be deleted. The options are Enable and **Disable**.

▶Driver Health

This feature displays the following health information of a LAN controller specified by the user:

▶Intel® 40GbE 4.0.15 Healthy

Controller 62f66C18 Child 0 Heathy

Intel® Ethernet Controller X710 for 10GBASE-T Healthy

▶Intel® 40GbE 4.0.15 Healthy

Controller 62f65018 Child 0 Heathy

Intel® Ethernet Controller X710 for 10GBASE-T Healthy

▶Intel® 40GbE 4.0.15 Healthy

Controller 62f65598 Child 0 Heathy

Intel® Ethernet Controller X710 for 10 Gigabit SFP+ Healthy

▶Intel® 40GbE 4.0.15 Healthy

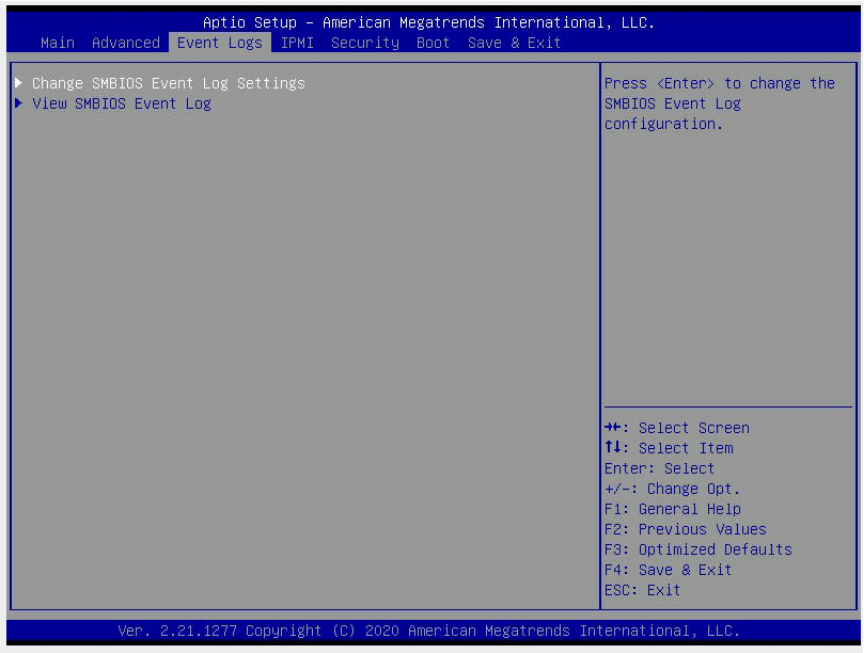
Controller 62f65418 Child 0 Heathy

Intel® Ethernet Controller X710 for 10 Gigabit SFP+ Healthy

4.4 Event Logs

Use this feature to configure Event Log settings.

Note: After you've made a change on a setting below, please be sure to reboot the system for the change to take effect.



▶Change SMBIOS Event Log Settings

Enabling/Disabling Options

SMBIOS Event Log

Select Enabled to enable SMBIOS (System Management BIOS) Event Logging during system boot. The options are **Enabled** and Disabled.

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) should the multiple event counter wait before generating a new event log. Enter a number between 0 to 99. The default setting is **60**.

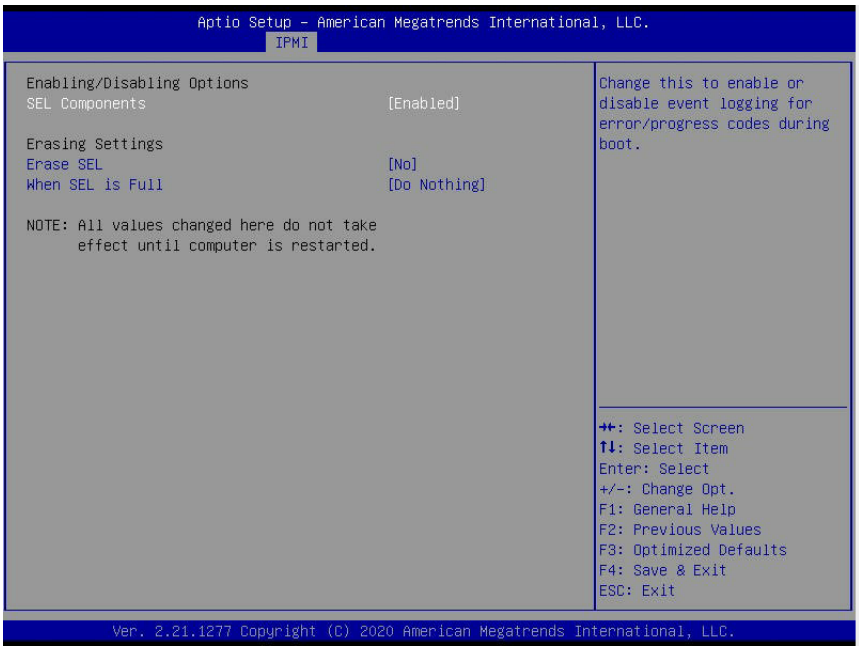
▶View System Event Log

This feature allows the user to view the event in the system event log. Select this item and press <Enter> to view the status of an event in the log. The following categories will be displayed:

Date/Time/Error Code/Severity

4.5 BMC

Use this feature to configure Intelligent Platform Management Interface (BMC) settings.



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

- **BMC Firmware Revision**: This feature indicates the firmware revision of the BMC (Baseboard Management Controller) used in your system.
- **BMC 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 **Enabled** and Disabled.

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 the user 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 BMC LAN Configuration

Select Yes for the BIOS to implement all IP/MAC address changes upon next system boot. The options are **No** and Yes.

****Configure IPv4 Support****

BMC LAN Selection

This feature allows the user to select the type of the BMC LAN. The default setting is **Failover**.

BMC Network Link Status

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

Configuration Address Source (When Update BMC LAN Configuration is set to Yes)

This feature allows the user 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 DHCP (Dynamic Host Configuration Protocol) server attached to the network and request the next available IP address for this computer. The options are **DHCP** and Static.

Station IP Address: This feature displays the Station IP address for this computer. This should be in decimal and in dotted quad form (i.e., 172.29.197.196).

Subnet Mask: 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: 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 the item: Update BMC LAN Configuration is set to Yes)

This feature displays the status of VLAN support. The default setting is **Disabled**.

****Configure IPv6 Support****

IPv6 Address Status: This feature displays the status of IPv6 addresses.

IPv6 Support (Available when the item: Update BMC LAN Configuration is set to Yes)

Select Enabled for IPv6 support. The options are **Enabled** and Disabled.

Configuration Address Source (Available when the item: Update BMC 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 DHCP (Dynamic Host Configuration Protocol) server attached to the network and request the next available IP address for this computer. The options are DHCP and Static.

Station IPv6 Address

This feature displays the station IPv6 address.

Prefix Length

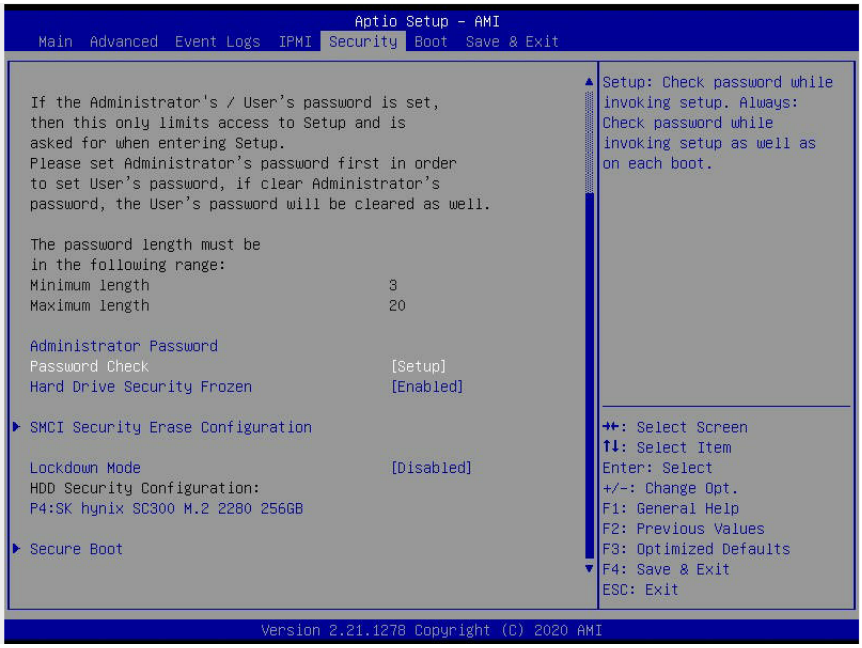
This feature displays the prefix length.

IPv6 Router IP Address

This feature displays the IPv6 router IP address.

4.6 Security Settings

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



Administrator Password

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

User Password

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

Password Check

Select Setup for the system to check for a password at Setup. Select Always for the system to check for a password upon system boot 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 the HDDs to protect key data in hard drives from being altered. The options are **Enabled** and Disabled.

▸SMCI Security Erase Configuration

This section allows the user 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.
- 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 the user 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 the user to configure the security settings of the HDD/SATA device. Select Security Erase - Password to enter a SATA user password to allow the user 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 "111111111" as the SATA user password and allow the user to erase the contents of the HDD/SATA device by using this default password. The options are **Disabled**, Set Password, Security Erase-Password, and Security Erase-Without Password.

Password

Use this feature to set the SATA user password which will allow the user 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 changed in an effort to preserve system integrity and security. The options are Enabled and **Disabled**.

▸Secure Boot

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

- System Mode
- Vendor Key
- Secure Boot

Secure Boot

Select Enabled to use Secure Boot settings. The options are Enabled and **Disabled**.

Secure Boot Mode

Use this feature to select the desired secure boot mode for the system. The options are Standard and **Custom**.

CMS Support

If this feature is set to Enabled, legacy devices will be supported by the system. The options are **Enabled** and Disabled.

▸Enter Audit Mode

This feature allows to user to enter the Audit Mode workflow. Please note that changing from User Mode to Audit Mode will erase PK (Platform Key) variables.

▸Key Management

Vendor Keys

Provision Factory Defaults

Select Yes to install manufacturer default keys for system security use. The options are Enabled and **Disabled**.

▸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.

▸Export Secure Boot Variables

This feature is used to copy the NVRAM contents of Secure Boot variables to a storage device.

▸Enroll EFI Image

Select this feature and press <Enter> to specify which EFI (Extensible Firmware Interface) 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)

This feature allows the user to enter and configure a set of values to be used as platform firmware keys for the system. The sizes, keys numbers, and key sources of the platform keys will be indicated as well. Select Update to update the platform key.

▸Key Exchange Keys

This feature allows the user to enter and configure a set of values to be used as Key-Exchange-Keys for the system. The sizes, keys numbers, and key sources of the Key-Exchange-Keys will be indicated as well. Select Update to update your "Key Exchange Keys". Select Append to append your "Key Exchange Keys".

▸Authorized Signatures

This feature allows the user 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 settings are Update and Append.

▸Forbidden Signatures

This feature allows the user 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 settings are Update and Append.

▸Authorized TimeStamps

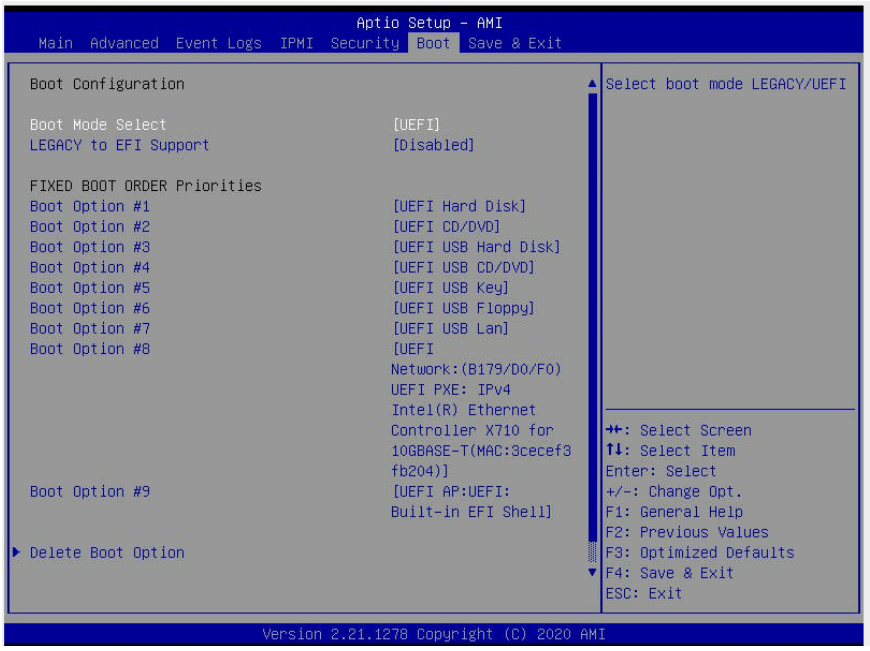
This feature allows the user to set and save the timestamps for the authorized signatures which will indicate the time when these signatures are entered into the system. Select Update to update your "Authorized TimeStamps". Select Append to append your "Authorized TimeStamps". The settings are Update,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

▸Os Recovery Signatures

This feature allows the user 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 settings are Update, and Append.

4.7 Boot Settings

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 (Unified Extensible Firmware Interface)**, and Dual.

Legacy to EFI Support

Select Enabled for the system to boot from an EFI OS when the Legacy OS fails. The options are Enabled and **Disabled**.

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 **Dual** (default), the following items will be displayed for the user to configure the boot settings:

- Boot Option #1 ~ Boot Option #17

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 UEFI, the following items will be displayed for configuration:

- Boot Option #1 ~ Boot Option #9

Add New Boot Option

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

Add Boot Option

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

Delete Boot Option

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

▶Add New Driver Option

This feature allows the user to select a new driver to add to the boot priority list.

Add Driver Option

This feature allows the user to specify the name of the driver to be added to the boot priority list.

Path for Drover Option

This feature allows the user to specify the path to the driver that will be added to the boot priority list.

Driver Option File Path

This feature allows the user to specify the file path of the driver that will be added to the boot priority list.

Create

After the driver option name and the file path are set, press <Enter> to enter to submenu and click OK to create the new boot option drive.

▶Delete Driver Option

This feature allows the user to select a boot driver to delete from the boot priority list.

Delete Drive Option
Select the target boot driver to delete from the boot priority list.

▶Hard Disk Drive BBS Priorities

Boot Option #1

▶USB Key Drive BBS Priorities

Boot Option #1

▶UEFI Application Boot Priorities
Boot Option #1

▶Network Drive BBS Priorities
Boot Option #1

▶Hard Disk Drive BBS Priority

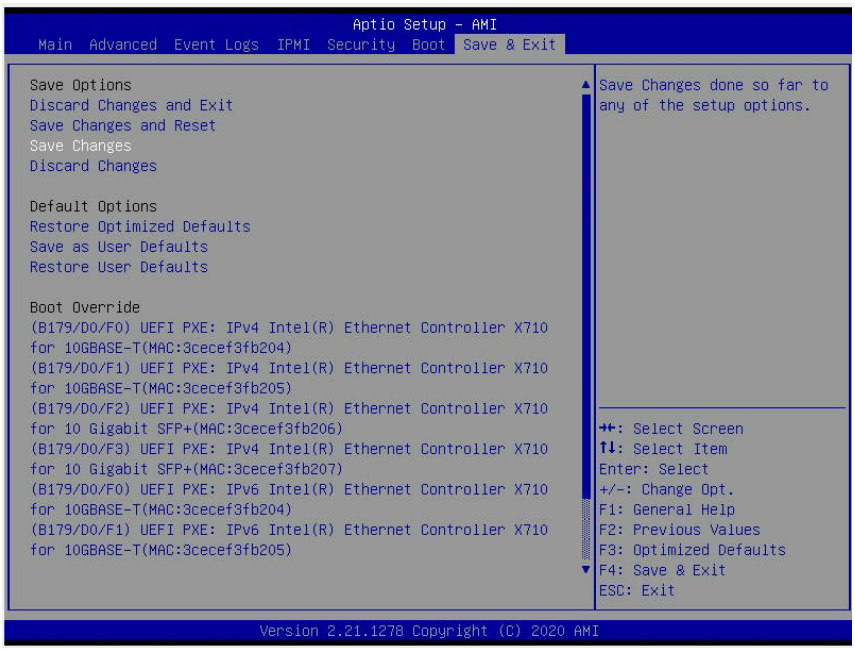
Boot Option #1

▶Network Drive BBS Priority

Boot Option #1 ~ Boot Option #3

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 Defaults 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 entered by the user to the BIOS setup utility for future use.

Restore User Defaults

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

Boot Override

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

Appendix A

Software Installation

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

A.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 might be a DVD, perhaps using an external USB/SATA DVD drive, or a USB flash 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.

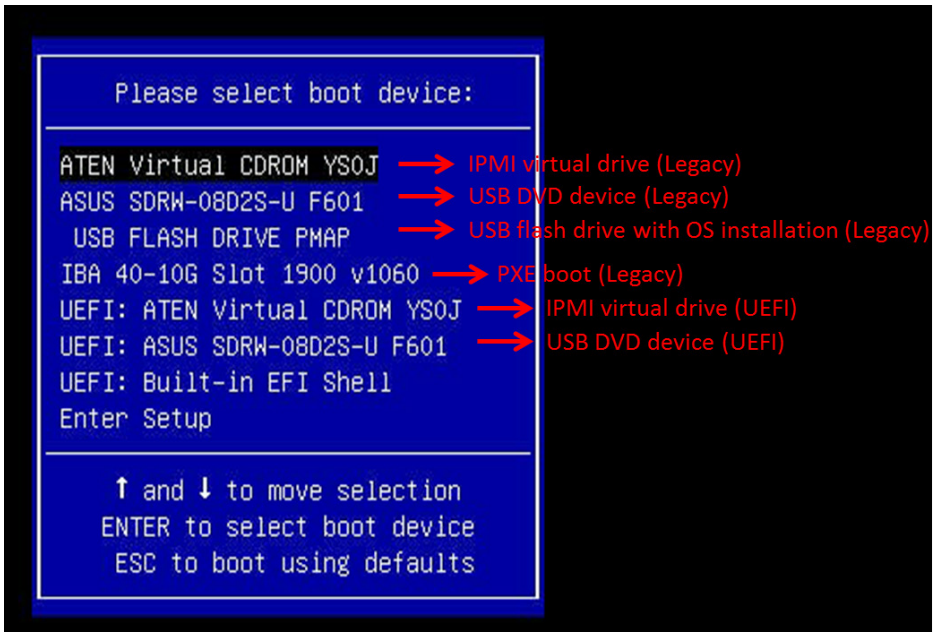


Figure A-1. Select Boot Device

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.

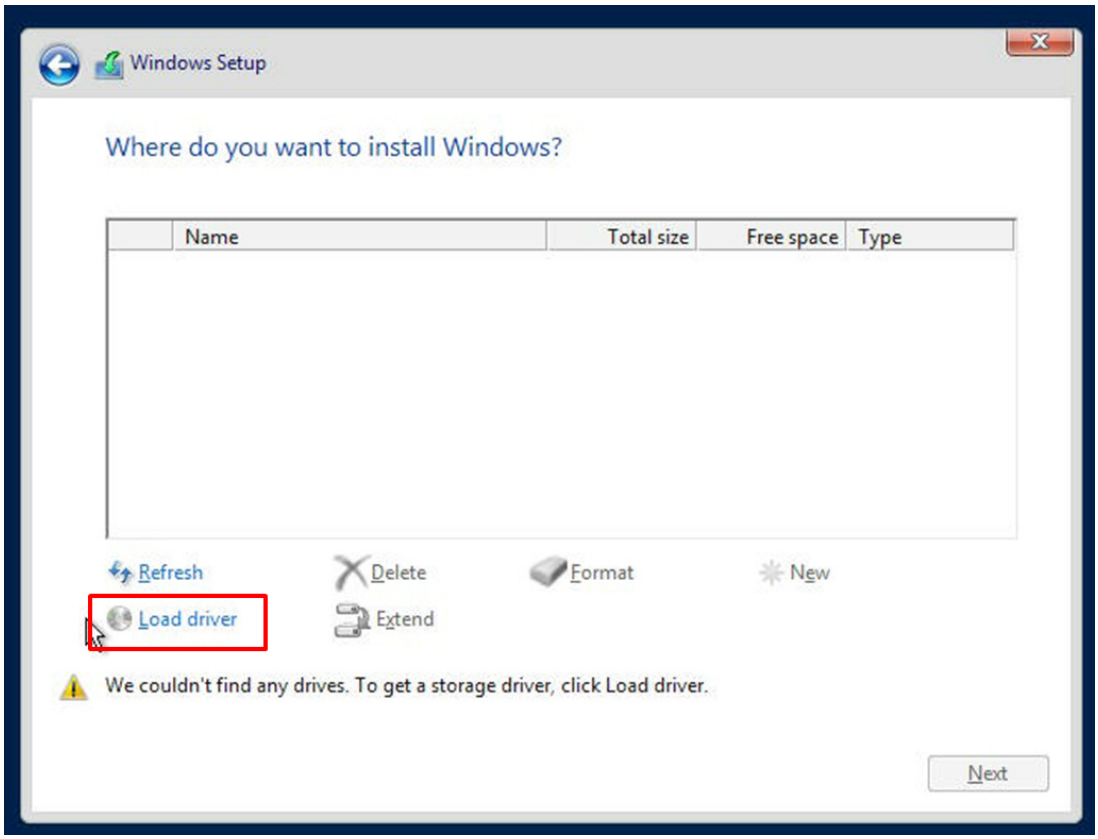


Figure A-2. Load Driver Link

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.

A.2 Driver Installation

The Supermicro website contains drivers and utilities for your system 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 drive or a DVD. (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.

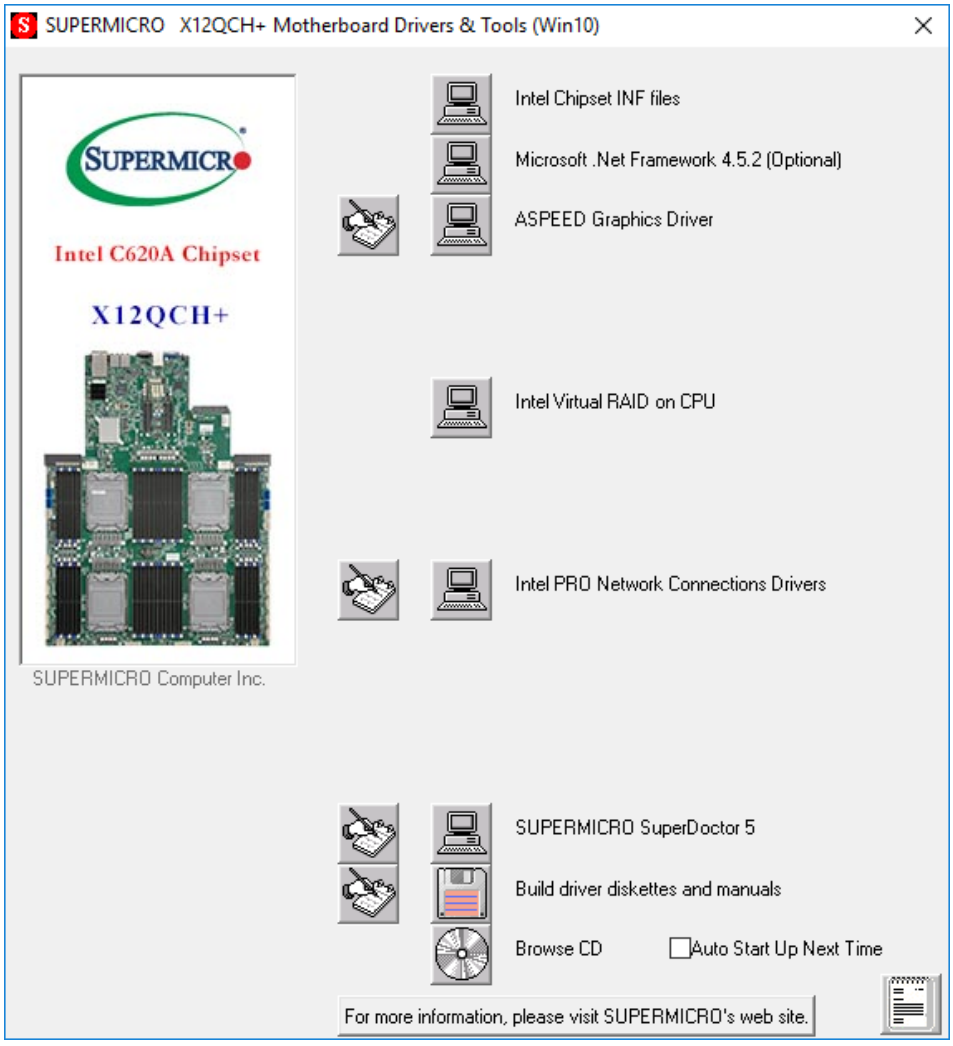


Figure A-3. Driver & Tool Installation Screen

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

A.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, FTP, and SMTP services to optimize the efficiency of your operation.

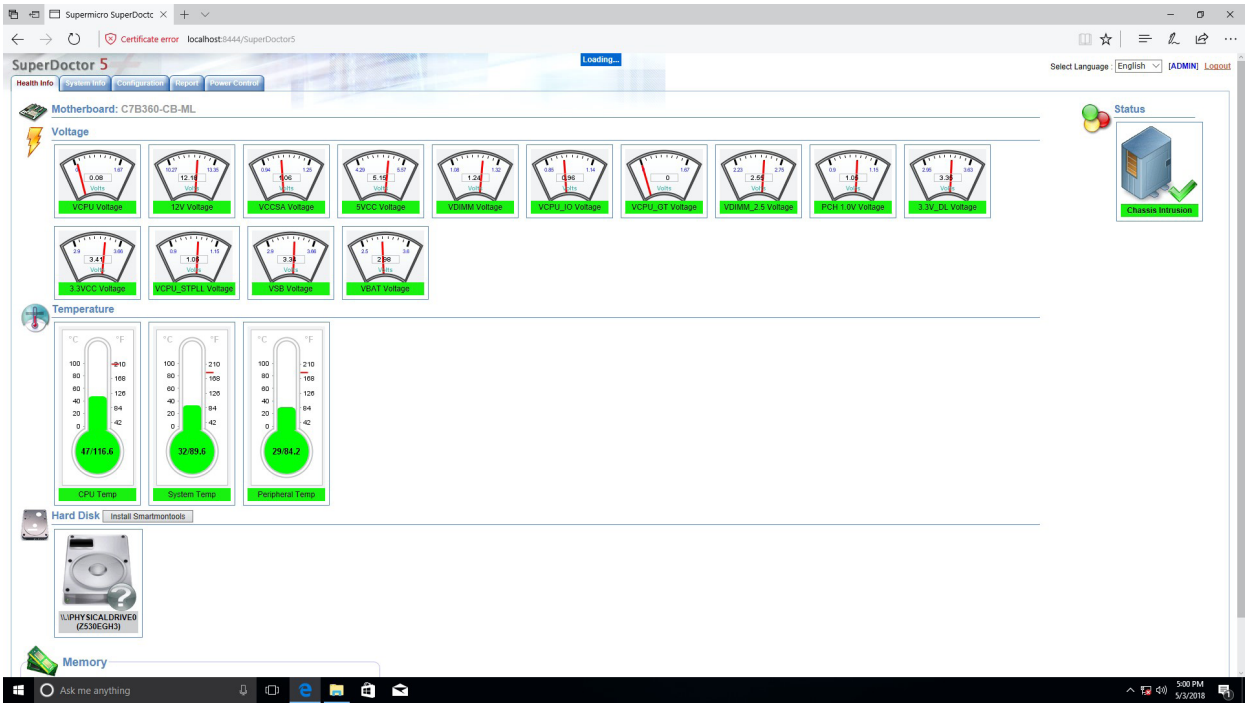


Figure A-4. SuperDoctor 5 Interface Display Screen (Health Information)

A.4 BMC

The X12QCH+ supports the Baseboard Management Controller (BMC). BMC is used to provide remote access, monitoring and management. There are several BIOS settings that are related to BMC.

For general documentation and information on BMC, please visit our website at: http://www.supermicro.com/products/nfo/BMC.cfm.

A.5 Logging into the BMC (Baseboard Management Controller)

Supermicro ships standard products with a unique password for the BMC ADMIN user. This password can be found on a label on the motherboard.

When logging in to the BMC for the first time, please use the unique password provided by Supermicro to log in. You can change the unique password to a user name and password of your choice for subsequent logins.

For more information regarding BMC passwords, please visit our website at http://www.supermicro.com/bmcpassword.

Appendix B

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

电池更换不当会有爆炸危险。请只使用同类电池或制造商推荐的功能相当的电池更换原有电池。请按制造商的说明处理废旧电池。

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 اسحبذال البطارية بطريقة غير صحيحة فعليل
اسحبذال البطارية
فقط بنفس النع أو ما يعادلها مما أوصث به الشرمة المصنعة
جخلص من البطاريات المسحعملة وفقا لحعليمات الشرمة 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 ontploffingsgevaar 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 القانين واللائح البطنية

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.