SuperBlade® Server
SBS-820H-420P

USER'S MANUAL

Revision 1.0

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Manual Revision 1.0

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Preface

About this Manual

This manual is written for professional system integrators and PC technicians. It provides information for the installation and use of the server. Installation and maintenance should be performed by experienced technicians only.

Please refer to the SBS-820H-420P system specifications page on our website for updates on supported memory, processors and operating systems (http://www.supermicro.com).

Notes

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

- Supermicro product manuals: http://www.supermicro.com/support/manuals/
- Product drivers and utilities: https://www.supermicro.com/wdl
- Product safety info: http://www.supermicro.com/about/policies/safety_information.cfm

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.

Secure Data Deletion

A secure data deletion tool designed to fully erase all data from storage devices can be found on our website: https://www.supermicro.com/about/policies/disclaimer.cfm?url=/wdl/utility/Lot9_Secure_Data_Deletion_Utility/

Warnings

Special attention should be given to the following symbols used in this manual.

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

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

Contents

Chapter 4 Power

Chapter 10 Troubleshooting and Support

Chapter 1

Introduction

1.1 Overview

This chapter provides a brief outline of the functions and features of the SuperBlade server System SBS-820H-420P.

System Overview	
Blades	Twenty SBI-420P-1T3N blade servers
Enclosure	8U SBE-820H-822
Motherboard	*(per node)* B12DPT-6
Processor	*(per node)* Dual P+ (LGA4189) sockets 3rd Gen Intel Xeon Scalable; TDP up to 220W CPU, TDP up to 270W with optional liquid cooling kit
Memory	*(per node)* Sixteen DIMM slots, 3DS ECC DDR4-3200MHz RDIMM/LRDIMM or Intel Optane PMem 200 Series* (up to 4TB for DDR4, or up to 4TB of PMem and 2TB DDR4) * Note: PMem 200 Series are supported on 3rd gen Intel Xeon Scalable Platinum, Gold and selected Silver processors.
Switch Modules	HDR 200G InfiniBand Switch External: 20x 200G HDR IB uplink Internal: 1x 200G HDR IB to each node downlink
Drive Support	*(per node)* Two hot-swap 2.5" SATA or NVMe drives, and one hot-swap 2.5" SATA drive One M.2 SSD; an optional add-on module can provide four additional M.2 SSDs Two SuperDOM (disk on modules)
System Cooling	Eight heavy duty fans with Optimal Fan Speed Control Air Shrouds Optional liquid cooling support
Power	Eight Redundant 2200W Power Supplies, 80Plus Titanium level
Form Factor	8U; (WxHxD) 14" x 17.6" x 32" in. (356 x 447 x 813 mm)

A link to the Quick Reference Guide can be found on the product page of the Supermicro website.

The following safety models associated with the SBS-820H-420P have been certified as compliant with UL and CSA; B820-22

1.2 System Features

The following views of the system display the main features. Refer to Appendix B for additional specifications.

Front View

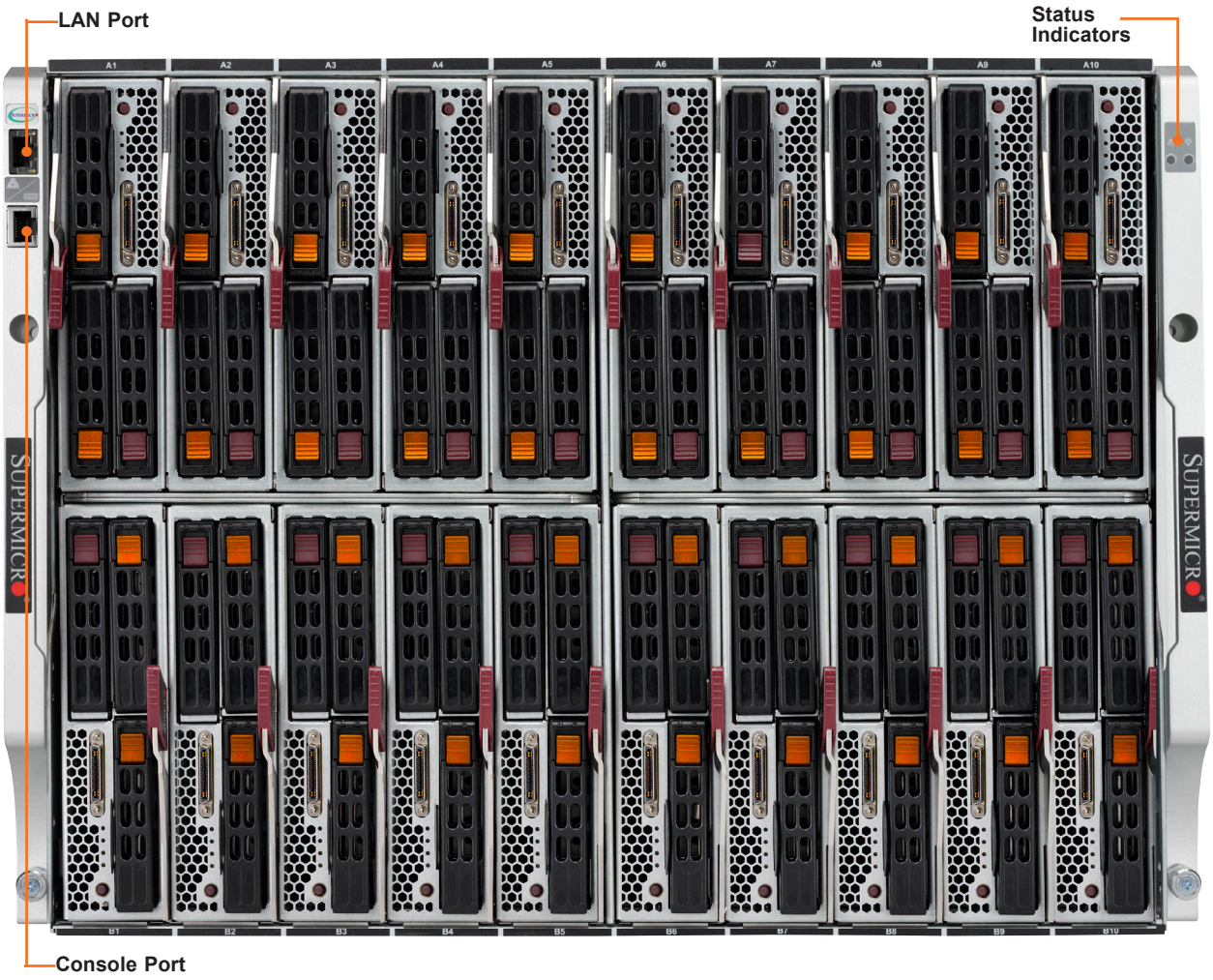


Figure 1-1. Front View

System Front Features	
Feature	**Description**
Status Indicators	Green: All blades, switch modules, CMM, power supplies, and fans are operating normally. Red: Critical warning—some components or modules are not operating normally.
LAN Port	Network port for the blade system
Console Port	Serial console port for the CMM

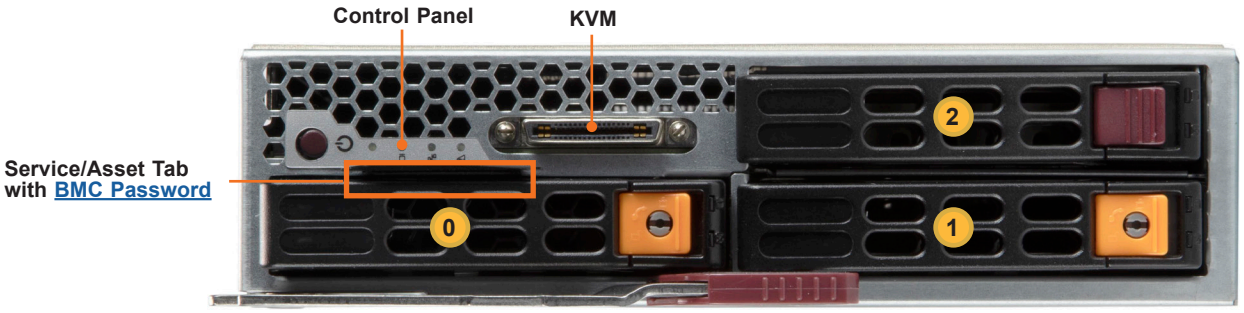


Figure 1-2. Blade Front View

Blade Front View	
Item	**Description**
0 1	Two hot-swap 2.5" SATA or NVMe
2	One hot-swap 2.5" SATA
Control Panel	Power button and status indicators
KVM	Keyboard, video, mouse connector
Service/Asset Tag	Pull-out identifier (with BMC ADMIN default password sticker)

Drive Carrier Indicators

Each drive carrier has two LED indicators: an activity indicator and a status indicator. For RAID configurations using a controller, the meaning of the status indicator is described in the table below. For OS RAID or non-RAID configurations, some LED indications are not supported, such as hot spare. For VROC configurations, refer to the VROC section in this manual.

Drive Carrier LED Indicators			
	Color	**Blinking Pattern**	**Behavior for Device**
Activity LED	Blue	Solid On	Idle SAS or NVMe drive installed
	Blue	Blinking	I/O activity
	Off		Idle SATA or no drive
Status LED	Red	Solid On	Failure of drive with RSTe support
	Red	Blinking at 1 Hz	Rebuild drive with RSTe support
	Red	Blinking at 4 Hz	Identify drive with RSTe support
	Red	Blinking with two blinks and one stop at 1 Hz	Hot spare for drive with RSTe support
	Red	On for five seconds, then off	Power on for drive with RSTe support
	Amber	Blinking	Safe to remove NVMe drive
	Green	Solid on	Ejecting an NVMe drive

Blade Control Panel

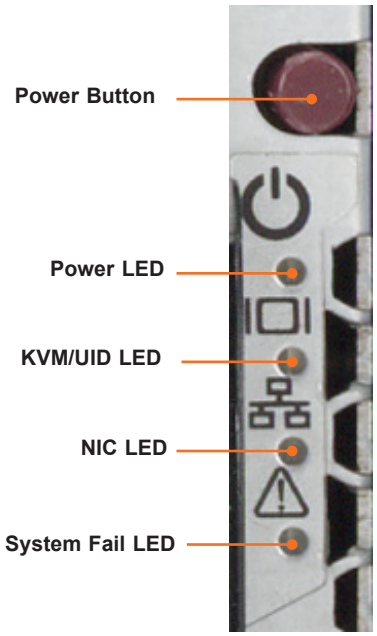


Figure 1-3. Control Panel

Control Panel Features		
Features	**Color/State**	**Description**
Power Button		Push briefly to apply or remove primary power to the server. Standby power is maintained. Push and hold to reset the BMC. See "BMC Reset" in Chapter 6.
Power LED	Green	Power on
	Amber, flashing	Before the BMC is ready, blinks until every node is ready
	Amber, steady	Power off
KVM/UID LED	Blue, steady	Indicates that KVM has been initialized
	Blue, flashing slowly	Unit Identifier indicator (The UID function is activated with a management program.) or BMC reboot (see Power Button above)
	Blue, flashing quickly	BMC returning to factory settings (see Power Button above)
NIC LED	Green, flashing	Indicates traffic (Tx and RX data) on the LAN connection to this blade module
	Orange, flashing	Indicates traffic over the network (when present in the system)
System Fail LED	Red	Indicates a fatal error. This may be a memory error, a VGA error or any other fatal error that prevents the operating system from booting.

Rear View

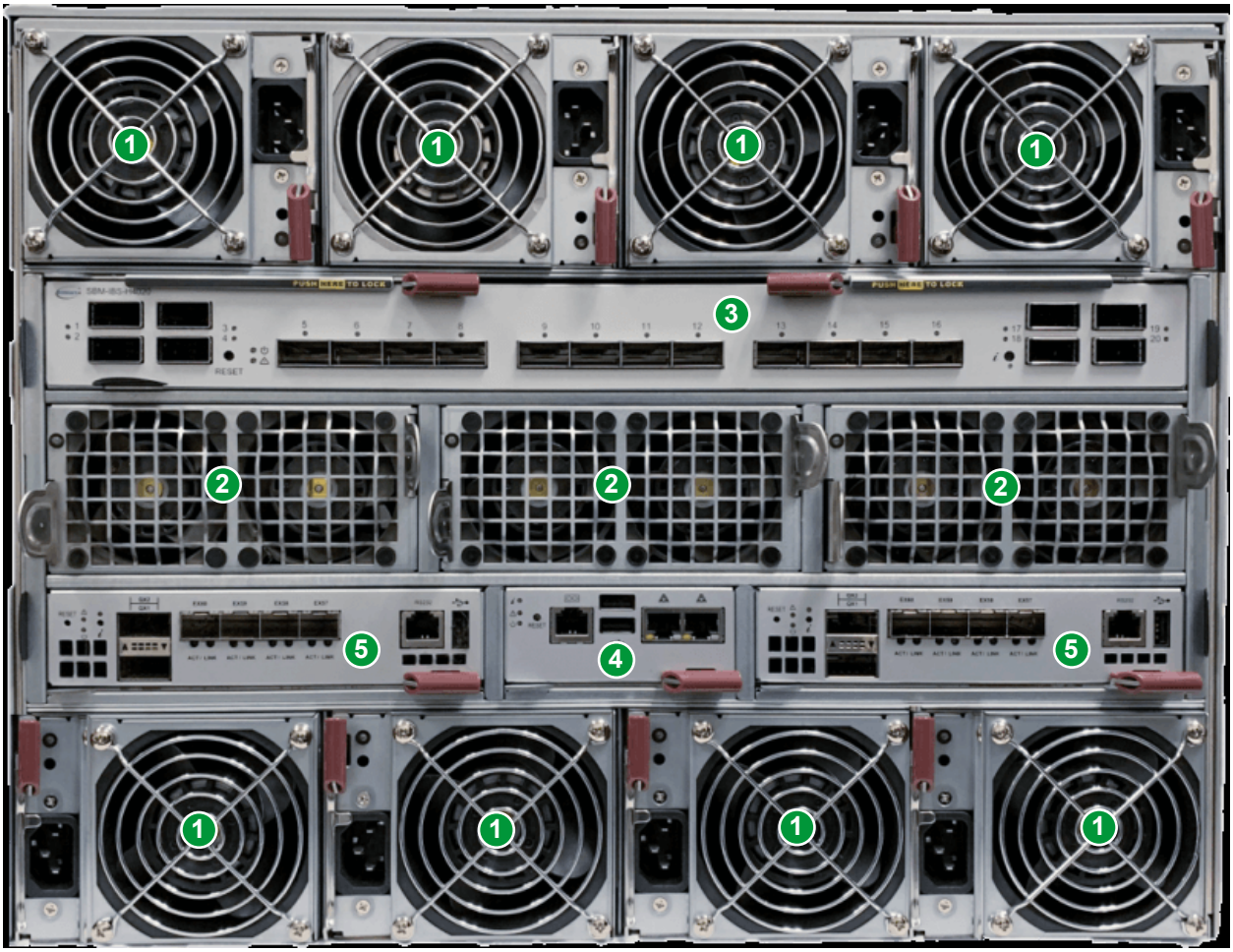


Figure 1-4. SBE-820H-822 Rear View

Rear Features	
Feature	**Description**
1	Eight power supply modules with fans (see Chapter 4)
2	Three pairs of auxiliary fans
3	200Gb InfiniBand switch (see Chapter 6)
4	Chassis Management Module (CMM) (see Chapter 5)
5	Two 25Gb Ethernet switch modules

Power Supply Indicator

LEDs on the power supplies indicate the status of the module.

Power Supply Indicator	
LED Color and State	**Power Supply Condition**
Solid Green	Indicates that the power supply is on
Blinking Green	Indicates that the power supply is plugged in and turned off by the system.
Blinking Amber	Indicates that the power supply has a warning condition and continues to operate.
Solid Amber	Indicates that the power supply is plugged in, and is in an abnormal state. The system might need service. Please contact Supermicro technical support.
Off	No AC power to modules

Top View, Blade

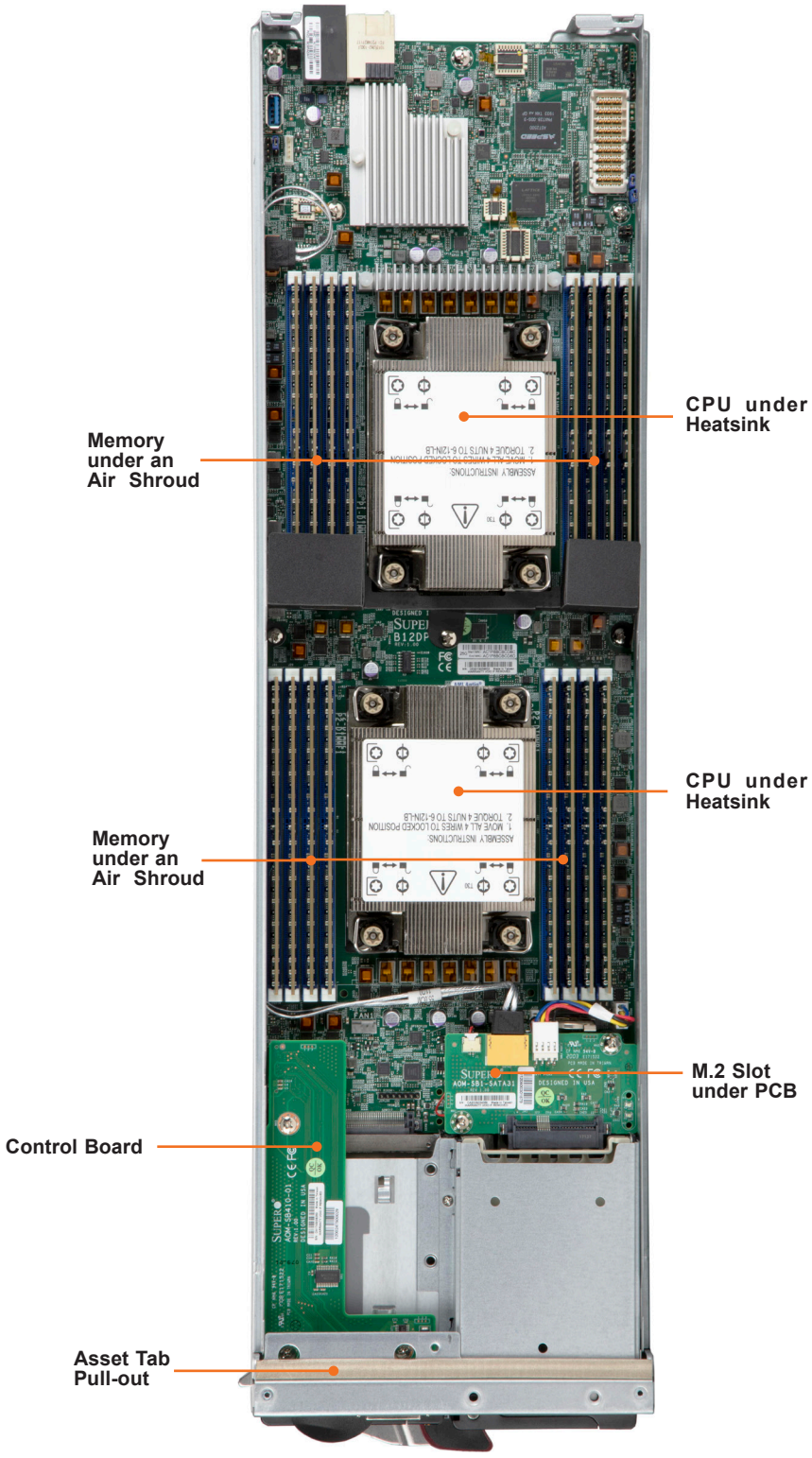


Figure 1-5. System: Top View

1.3 Blade Motherboard Layout

Below is a layout of the B12DPT-6 motherboard with jumper, connector and LED locations shown. See the table on the following page for descriptions. For detailed descriptions, pinout information and jumper settings, refer to Chapter 7 or the Motherboard Manual.

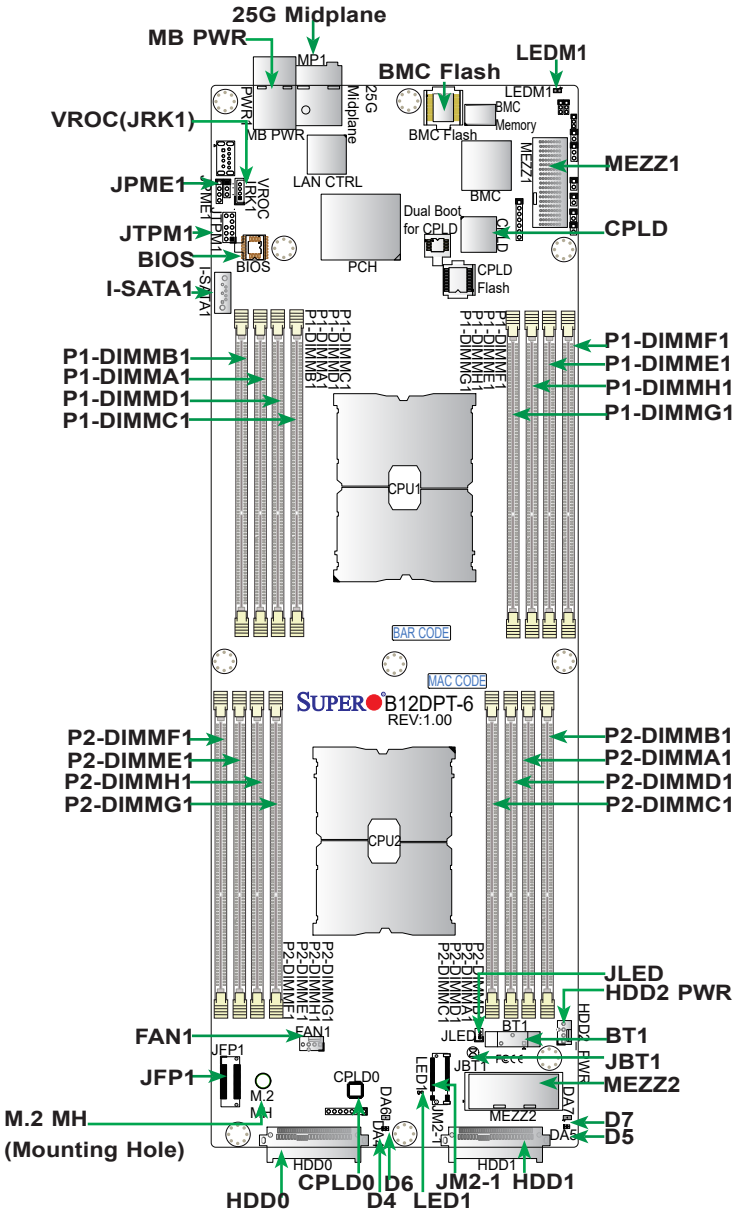


Figure 1-7. Motherboard Layout

Quick Reference

Jumper	Description	Default Setting
JBT1	CMOS Clear	Open (Normal)
JPME1	ME Manufacturing Recovery	Pins 1-2 (Normal)

Connector	Description
BT1	Onboard CMOS battery
CPLD0	Complex Programmable Logic Device (CPLD) chip
FAN1	Cooling fan header reserved for liquid cooling
HDD0/HDD1	Front accessible Hard Driver Connector #0/Hard Driver Connector #1
HDD2_PWR	Power connector for HDD 2
JBT1	Contacts for CMOS Clear
JFP1	Front Panel Control board with KVM & USB 2.0 support (via Cable CBL-0218L)
JLED	HDD2 SATA Activity LED
JM2-1 & M.2 MH	M.2 slot (PCIe 4.0 x4) and M.2 Mounting Hole (M.2 MH)
JTPM1	Trusted Platform Module/Port 80 connector
MEZZ1/MEZZ2	PCI Mezzanine Card Connector 1/Mezzanine Card Connector 2
MP1	Onboard 25G midplane
PWR1	Motherboard Power connector
I-SATA 1	Intel PCH SATA 3.0 port (with RAID 0, 1, 5, 10)
VROC (JRK1)	Intel VROC key header for NVMe RAID support

LED	Description	State: Status
DA4	HDD0 Heartbeat LED	Green: HDD0 Normal; Red: HDD0 Failure
DA5	HDD1 Heartbeat LED	Green: HDD1 Normal; Red: HDD1 Failure
DA6	HDD0 Activity LED	Blue: HDD0 Active
DA7	HDD1 Activity LED	Blue: HDD0 Active
LED1	M.2 Activity LED	Green: M.2 Normal
LEDM1	BMC Activity LED	Green: BMC Normal

Motherboard Block Diagram

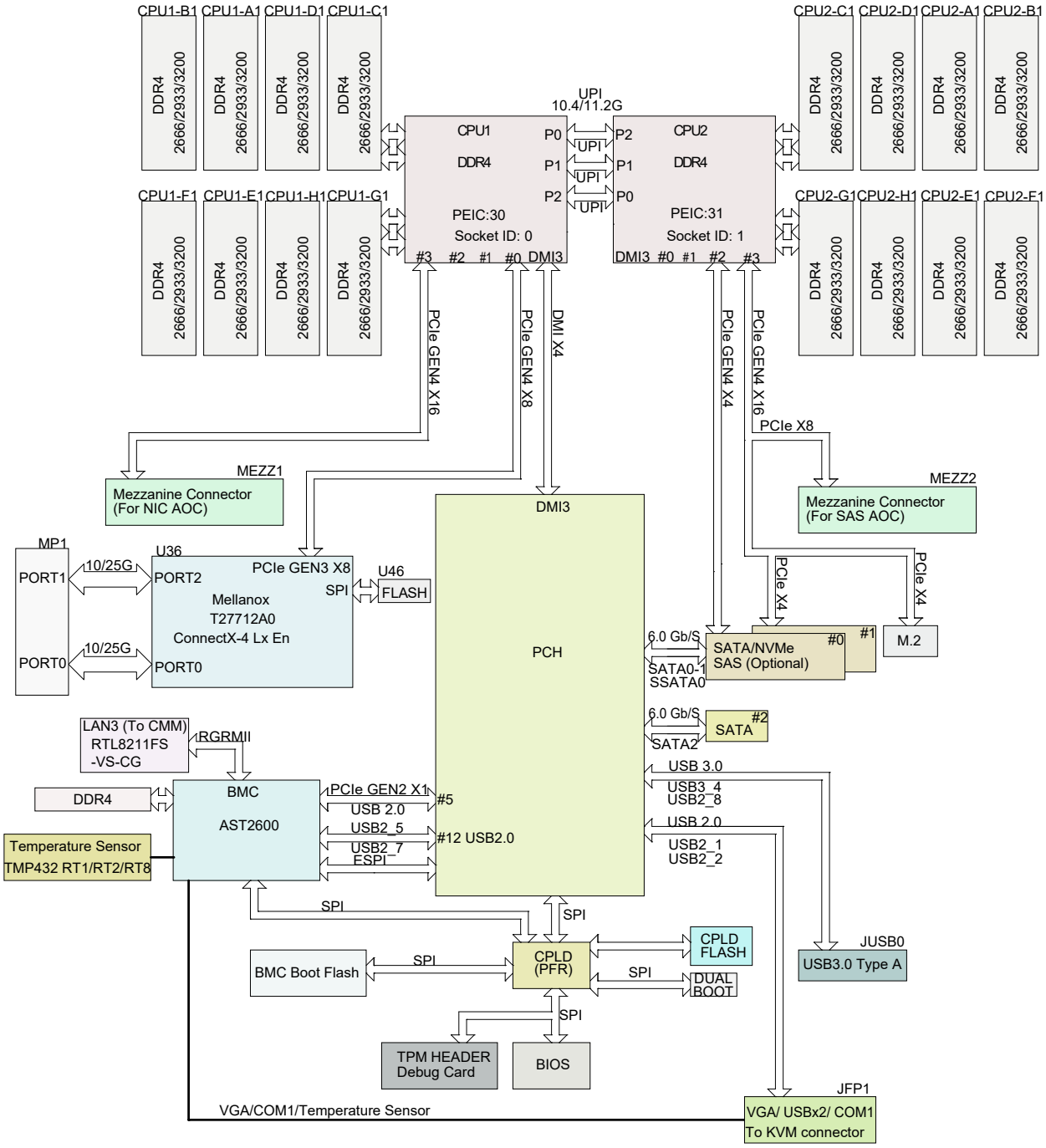


Figure 1-8. Motherboard Block Diagram

Chapter 2

Server Installation

2.1 Overview

This chapter provides advice and instructions for mounting your system in a server rack. If your system is not already fully integrated with processors, system memory etc., refer to Chapter 3 for details on installing those specific components.

Caution: Electrostatic Discharge (ESD) can damage electronic components. To prevent such damage to PCBs (printed circuit boards), it is important to use a grounded wrist strap, handle all PCBs by their edges and keep them in anti-static bags when not in use.

2.2 Unpacking the System

Inspect the box in which the system was shipped, and note if it was damaged. If any equipment appears damaged, file a claim with the carrier.

Decide on a suitable location for the rack unit that will hold the server. It should be situated in a clean, dust-free area that is well ventilated. Avoid areas where heat, electrical noise and electromagnetic fields are generated. It will also require a grounded AC power outlet nearby. Be sure to read the precautions and considerations noted in Appendix A.

2.3 Preparing for Setup

The box in which the system was shipped should include the rackmount hardware needed to install it into the rack. Please read this section in its entirety before you begin the installation.

Choosing a Setup Location

- The system should be situated in a clean, dust-free area that is well ventilated. Avoid areas where heat, electrical noise and electromagnetic fields are generated.
- Leave enough clearance in front of the rack so that you can open the front door completely (~25 inches) and approximately 30 inches of clearance in the back of the rack to allow sufficient space for airflow and access when servicing.
- This product should be installed only in a Restricted Access Location (dedicated equipment rooms, service closets, etc.).

- This product is not suitable for use with visual display workplace devices according to §2 of the German Ordinance for Work with Visual Display Units.

Rack Precautions

- Ensure that the leveling jacks on the bottom of the rack are extended to the floor so that the full weight of the rack rests on them.
- In single rack installations, stabilizers should be attached to the rack. In multiple rack installations, the racks should be coupled together.
- Always make sure the rack is stable before extending a server or other component from the rack.
- You should extend only one server or component at a time - extending two or more simultaneously may cause the rack to become unstable.

Server Precautions

- Review the electrical and general safety precautions in Appendix A.
- Determine the placement of each component in the rack *before* you install the rails.
- Install the heaviest server components at the bottom of the rack first and then work your way up.
- Use a regulating uninterruptible power supply (UPS) to protect the server from power surges and voltage spikes and to keep your system operating in case of a power failure.
- Allow any drives and power supply modules to cool before touching them.
- When not servicing, always keep the front door of the rack and all covers/panels on the servers closed to maintain proper cooling.

Rack Mounting Considerations

Ambient Operating Temperature

If installed in a closed or multi-unit rack assembly, the ambient operating temperature of the rack environment may be greater than the room's ambient temperature. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer’s maximum rated ambient temperature (TMRA).

Airflow

Equipment should be mounted into a rack so that the amount of airflow required for safe operation is not compromised.

Mechanical Loading

Equipment should be mounted into a rack so that a hazardous condition does not arise due to uneven mechanical loading.

Circuit Overloading

Consideration should be given to the connection of the equipment to the power supply circuitry and the effect that any possible overloading of circuits might have on overcurrent protection and power supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Reliable Ground

A reliable ground must be maintained at all times. To ensure this, the rack itself should be grounded. Particular attention should be given to power supply connections other than the direct connections to the branch circuit (i.e. the use of power strips, etc.).

To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.
- Slide rail mounted equipment is not to be used as a shelf or a work space.
- **Stability hazard**. The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before you slide the unit out for servicing. Failure to stabilize the rack can cause the rack to tip over.
- Do not pick up the server with the front handles. They are designed to pull the system from a rack only.

2.4 Installing the Enclosure

There are a variety of rack units on the market, which may require a slightly different assembly procedure. Also see the instructions that came with the rails. This rail set fits a rack between 26.8" and 36.4" deep.

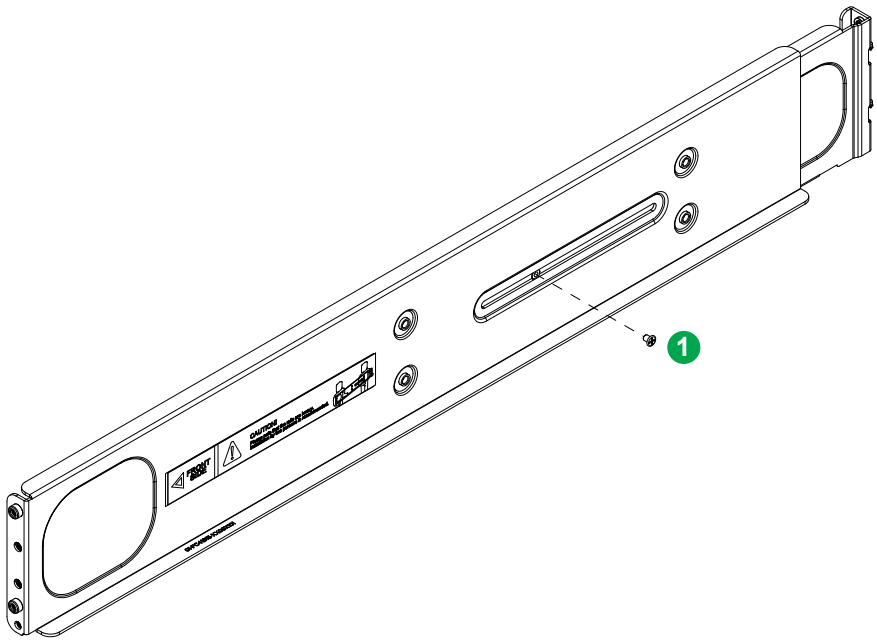


Figure 2-1. Rack Rails
(Left Rail Assembly Shown)

When installing the enclosure, remove all blades, power supplies, switches and management modules. Install these modules after the enclosure is mounted.

If desired, use the template to mark the position that the enclosure will occupy on the rack.

The chassis comes with two sets of rack rails, one set for the right side of the chassis and one for the left.

1. For each rail, sections are screwed together to keep them immobile during shipping. Release these screws just enough to allow the rails to slide apart.

2. Slide the rails apart far enough to match the depth of the rack. Note the arrow on the rail, which indicates the end that attaches to the front of the rack. Position each rail and secure the front to the front post of the rack with two flathead screws. Then secure the back of each rail to the rear of the rack with two flathead screws .

3. Lift the enclosure and slide it into the rack. Use two roundhead screws on each side of the server to lock it into place.

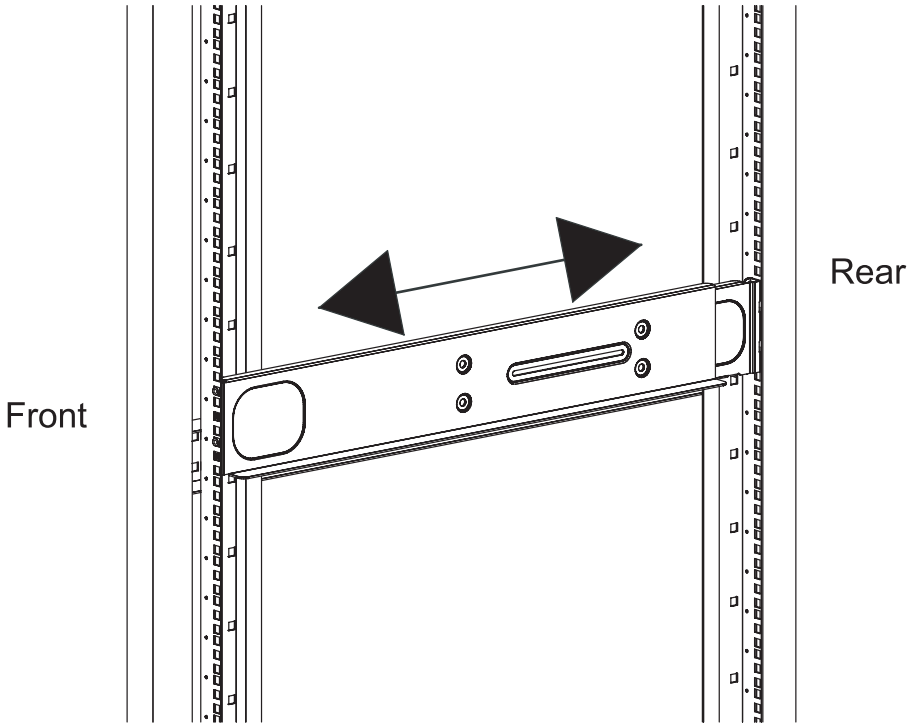


Figure 2-2. Securing the Left Rail to the Rack

Note: The figure is for illustrative purposes only. Always install enclosures at the bottom of the rack first.

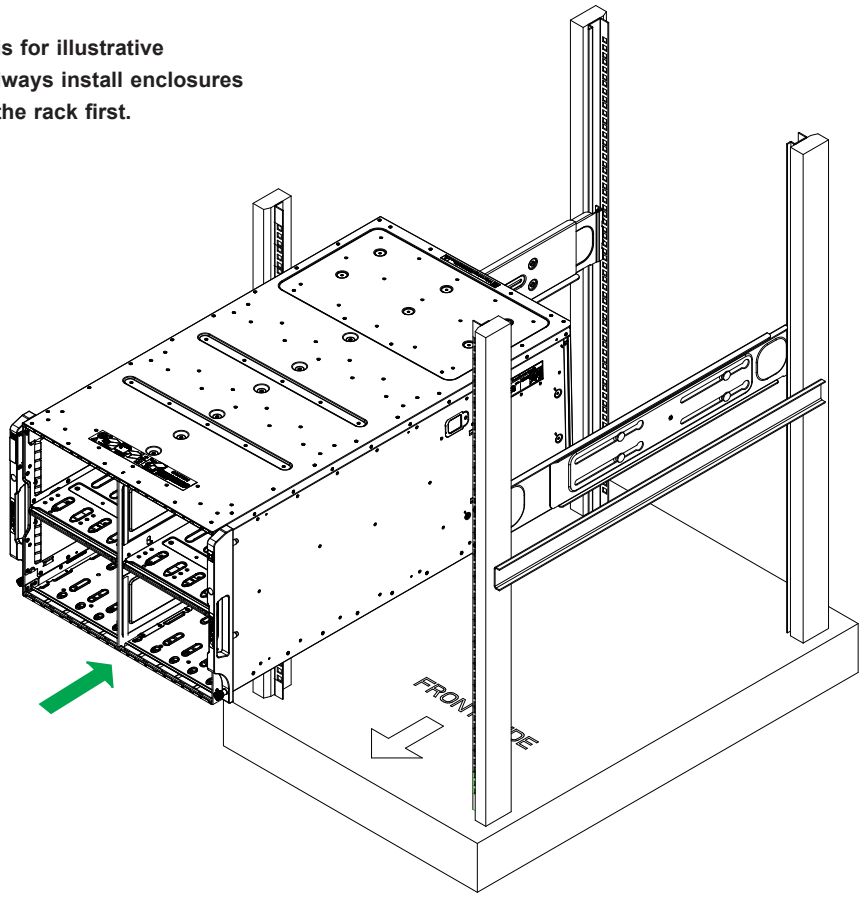


Figure 2-3. Installing the Server into the Rack

Chapter 3

Installation and Setup

This chapter provides instructions on installing and replacing main system components. To prevent compatibility issues, only use components that match the specifications or part numbers.

3.1 Unpacking the System

Inspect the box the system was shipped in and note if it was damaged in any way. If any equipment appears damaged, please file a damage claim with the carrier who delivered it.

The enclosure should be situated in a clean, dust-free area that is well ventilated. Avoid areas where heat, electrical noise and electromagnetic fields are generated. It will also require a grounded AC power outlet nearby. Be sure to read the precautions and considerations noted in Appendix B.

3.2 Removing Power from the System

Use the following procedure to ensure that power has been removed from the system. This step is necessary when removing or installing non-hot-swap components, such as the only CMM in an enclosure.

1. Use the operating systems to power down all blades.
2. Disconnect all the power cords from the power strip or outlet.
3. Disconnect all power cords from the power supply modules.

3.3 Powering Up or Down the Blade

Each blade unit may be powered on and off independently from the rest of the blades in the enclosure.

Powering Up a Blade Unit

A blade unit may be powered up in two ways:

- Press the power button on the blade unit.
- Use IPMIView or the browser based management utility to apply power using either a CMM module, or by the use of the onboard BMC chip in the blade module.

Powering Down a Blade Unit

A blade unit may be powered down in any of the following ways:

- Press the power button on the blade unit.
- Use IPMIView or the browser based management utility to power down; requires Operator or Admin privileges on the CMM.
- Use SMCIPMItool when connected to the CMM to power down; requires Operator or Admin privileges on the CMM.
- Use IPMIview or a browser connected to the onboard BMC chip to power down.
- Use SMCIPMItool to use a Command Line Interface to the onboard BMC chip; requires Operator or Admin privileges.

3.4 Installing or Removing the Blade Unit

Installing a Blade Unit into the Enclosure

1. Pull the latch lever out, and push the blade into its bay. **Caution**: Insert the blade carefully so the rear connectors are not damaged.
2. As the blade is seated in the enclosure, push the lever into its locked position.

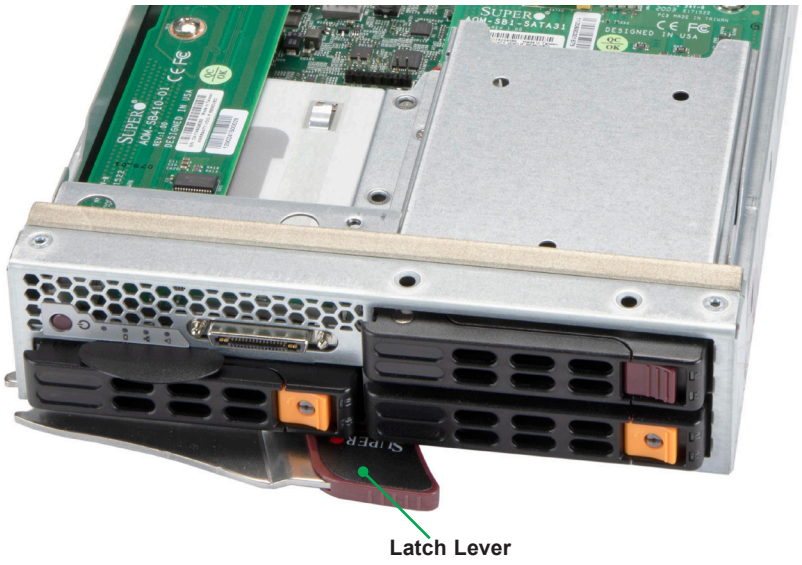


Figure 3-1. Blade Latch Lever

Removing a Blade Unit from the Enclosure

A blade can be removed from the enclosure while other blades continue to operate.

Note: When a blade is removed for a length of time, cover the slot with a dummy to ensure proper airflow in the enclosure.

Removing a Blade Unit from the Enclosure

1. Power down the blade unit.
2. Pull open the latch lever and use it to pull the blade from the enclosure.

3.5 Removing and Replacing the Blade Cover

The blade cover can be removed to access the mainboard and install processors, memory modules, the onboard battery, etc.

- To remove the cover, remove the screw as illustrated below. Slide the cover toward the rear and lift it off.
- To replace the cover, fit the six studs on the inside of the cover into the slots of the chassis, then slide the cover toward the front of the blade to lock it into place. Replace the locking screw.

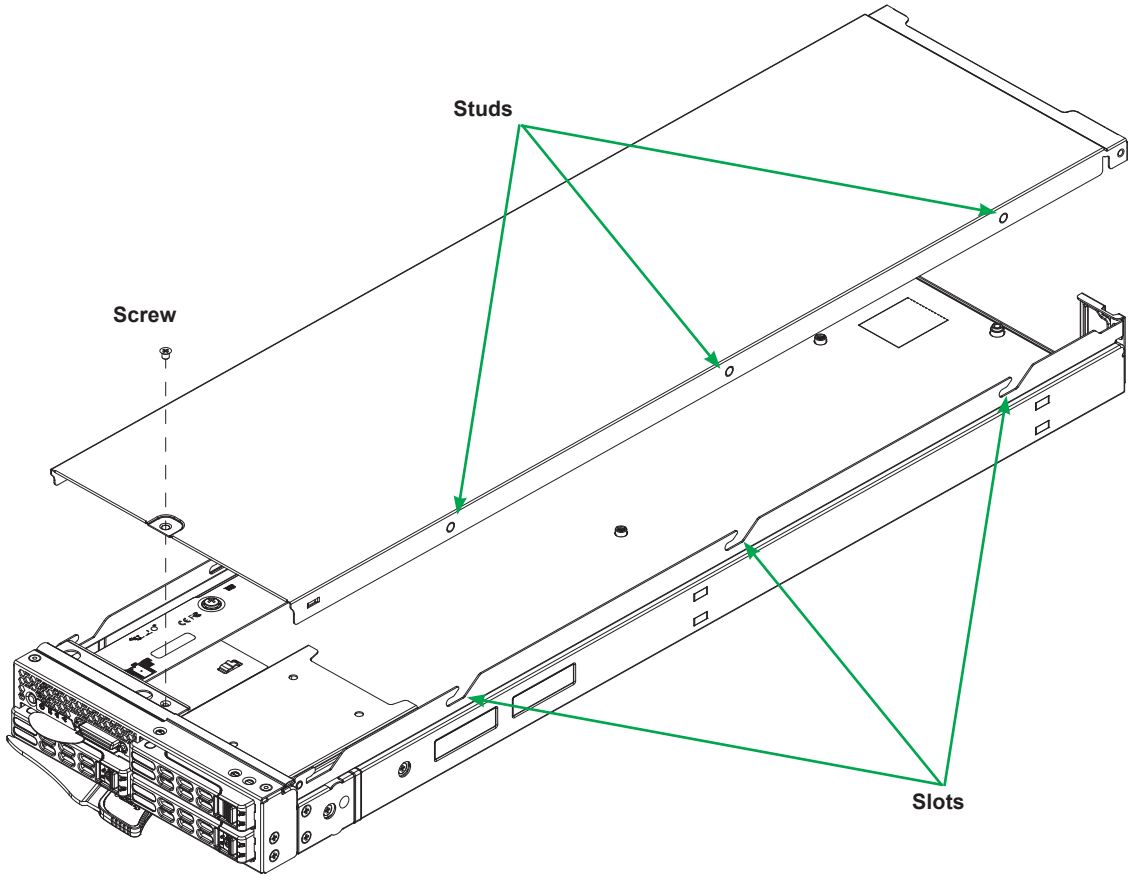


Figure 3-2. Removing the Cover

3.6 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 onto the CPU socket.

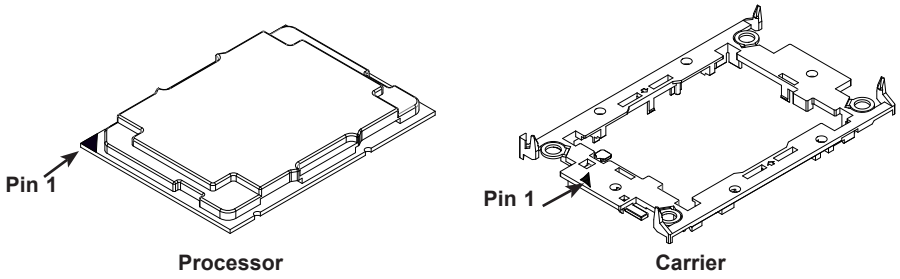
Notes:

- Use ESD protection.
- Remove the blade from the enclosure and the blade chassis cover to expose the motherboard.
- Check that the plastic protective cover is on the blade CPU socket and that none of the socket pins are bent. If they are, contact your retailer.
- When handling the processor, avoid touching or placing direct pressure on the land grid array (gold contacts).
- Improper installation or socket misalignment can cause serious damage to the processor or the socket and may require manufacturer repairs.
- Thermal grease is pre-applied on new heatsinks. No additional thermal grease is needed.
- Refer to the Supermicro website for updates on processor support.
- Graphics in this manual are for illustration only. Your components may look different.

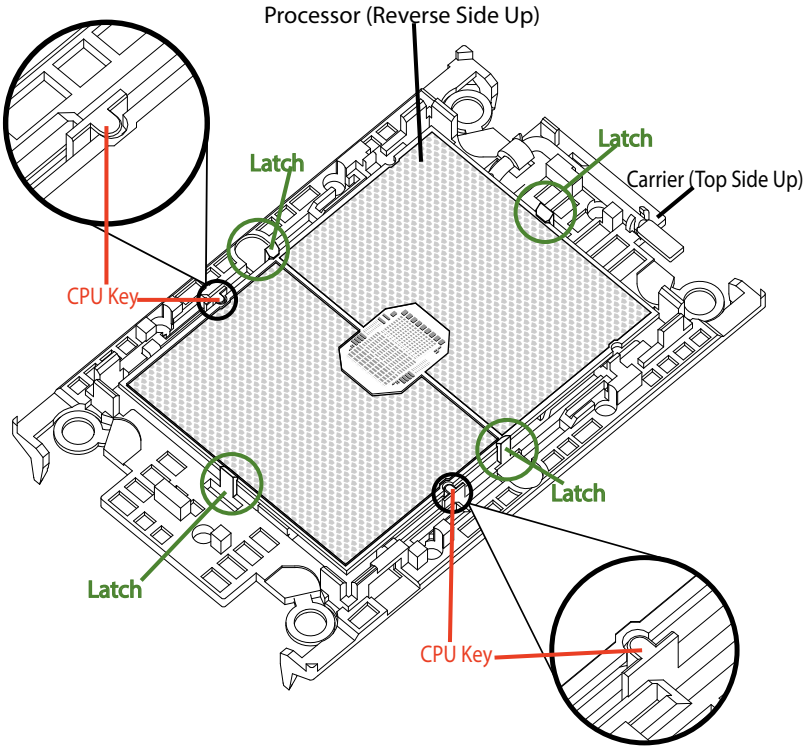
The Processor Carrier Assembly

The processor carrier assembly is comprised of the processor and the processor carrier.

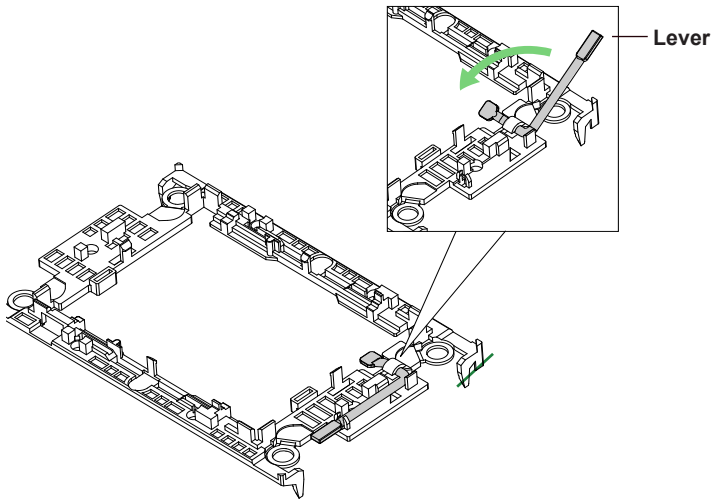
1. Hold the processor with the land grid array (LGA, gold contacts) facing down. Locate the gold triangle at the corner of the processor and the corresponding hollowed triangle on the processor carrier as shown below. These triangles indicate the location of pin 1.



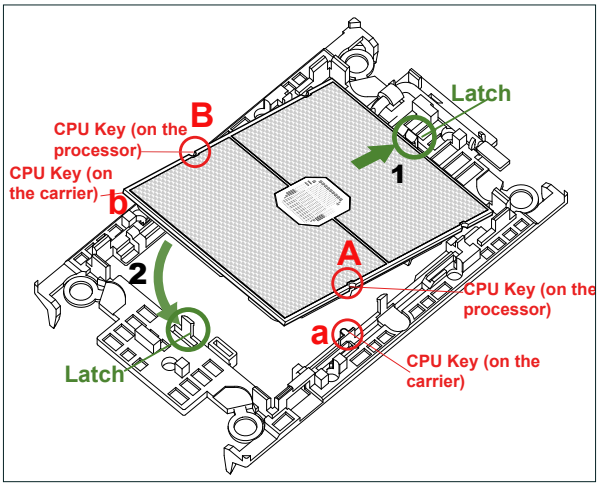
2. Turn the processor over (with the gold LGA up). Locate the CPU keys on the processor and the four latches on the carrier as shown below.



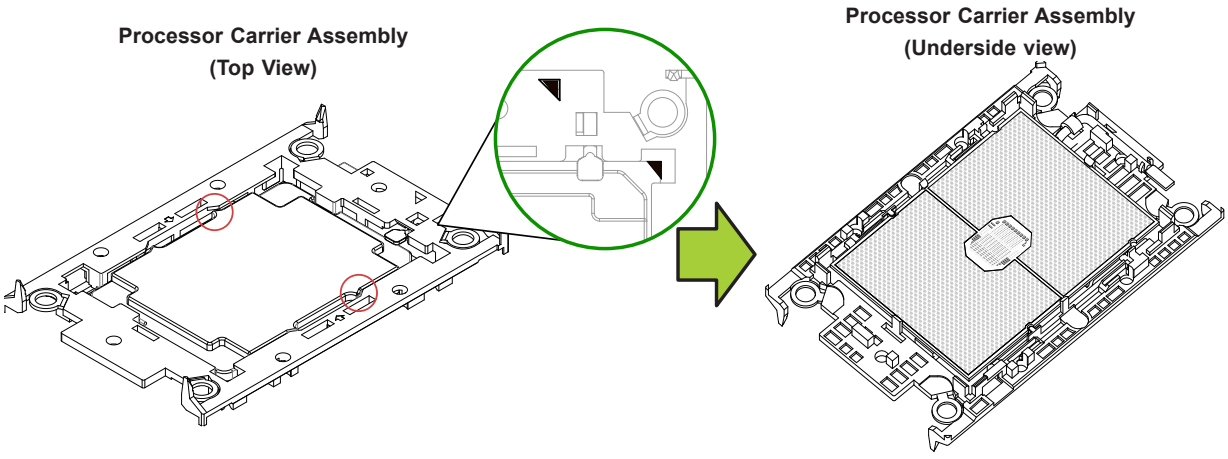
3. Locate the lever on the carrier and, if necessary, press it down as shown below.



4. Align the CPU keys on the processor (A & B) with those on the carrier (a & b) as shown below.



5. Carefully place one end of the processor under latch 1 on the carrier, and then press the other end down until it snaps into latch 2 and is properly seated on the carrier.

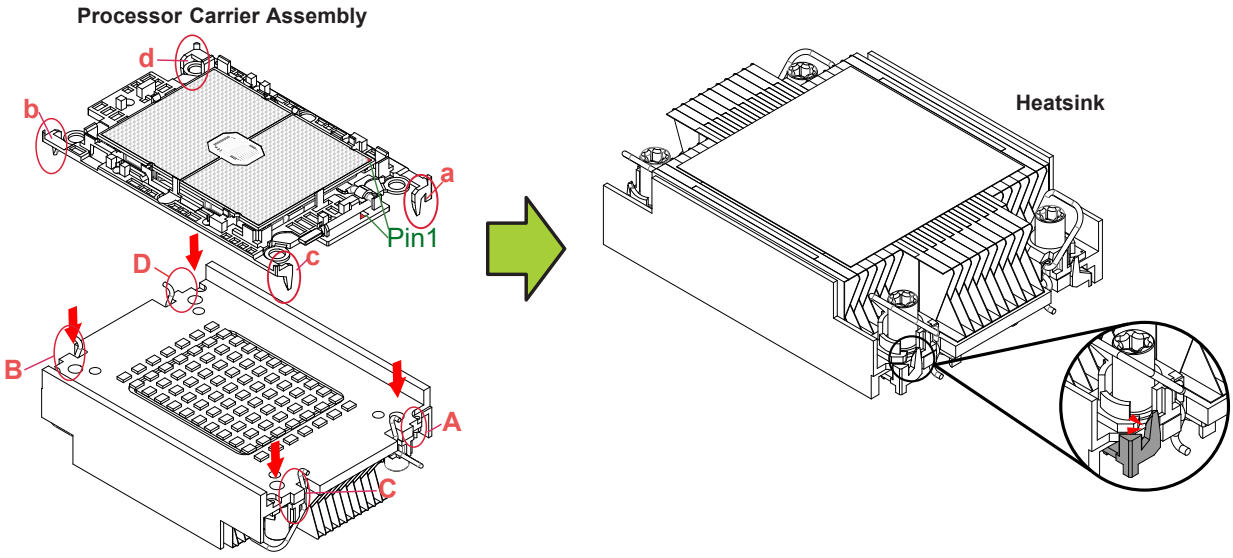


The Processor Heatsink Module (PHM)

After creating the processor carrier assembly, mount the heatsink onto the carrier assembly to form the processor heatsink module (PHM).

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

1. Turn the heatsink over with the thermal grease facing up. Note the two triangle cutouts (A, B) located at the diagonal corners of the heatsink as shown in the drawing below.
2. On the processor carrier assembly, find pin 1, as noted by the triangles. Hold the processor carrier assembly over so that the gold LGA is facing up.
3. Align clip "a" (pin 1) on the carrier assembly with the triangular cutout A on the heatsink and b, c, d on the carrier assembly with B, C, D on the heatsink.
4. Push the carrier assembly onto the heatsink, making sure that all four clips on each corner are properly secured.

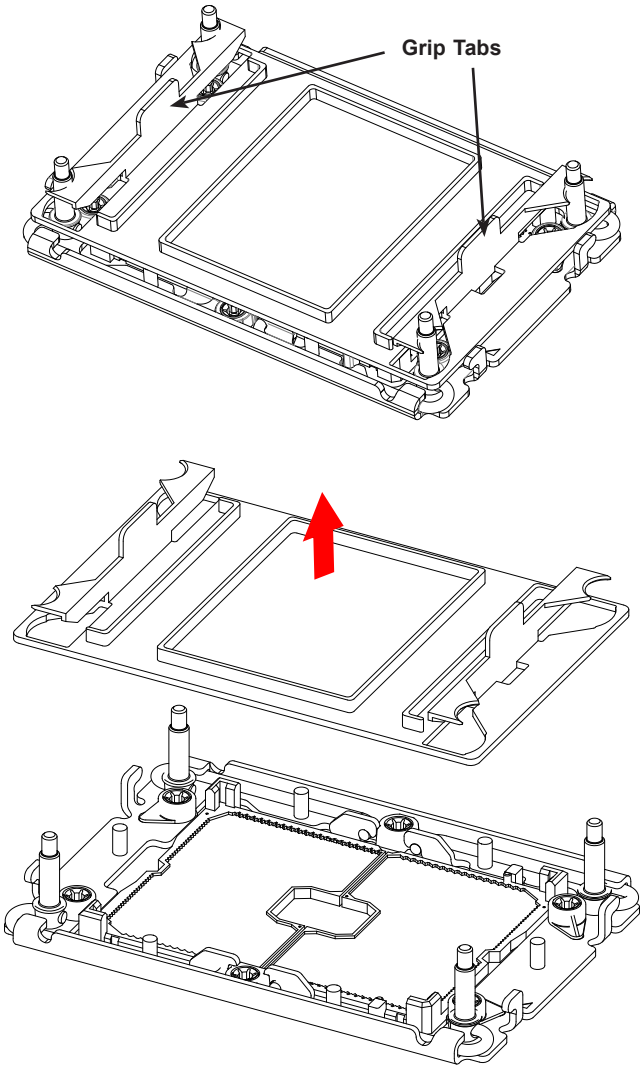


Note: These diagrams show an air cooled heatsink.

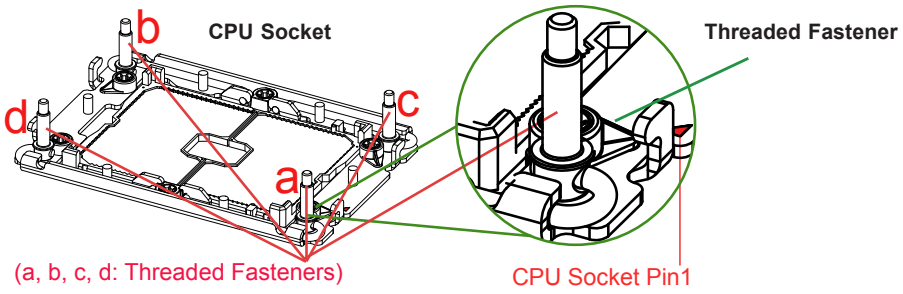
Installing the PHM into the CPU Socket

1. Remove the plastic protective cover from the CPU socket. Gently squeeze the grip tabs then pull the cover off.

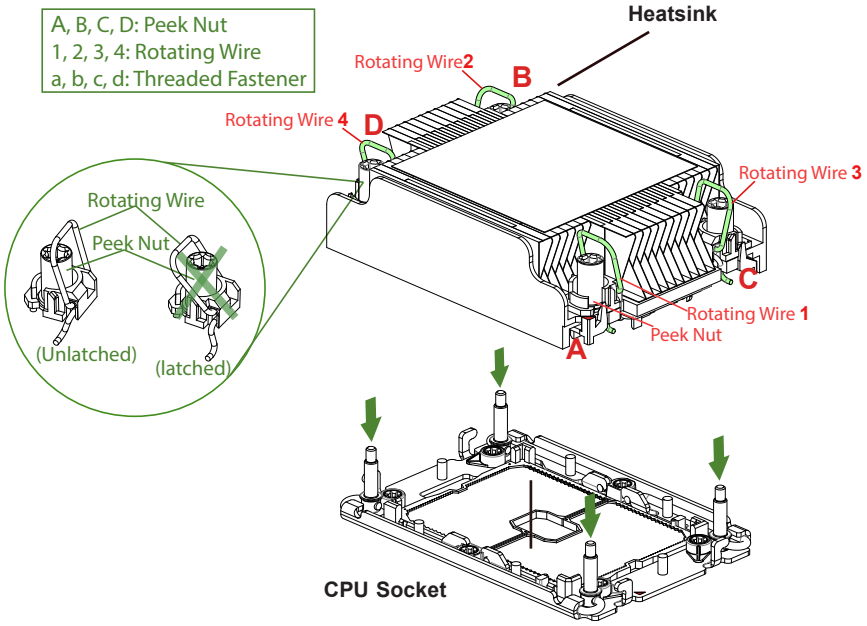
CPU Socket with Plastic Protective Cover



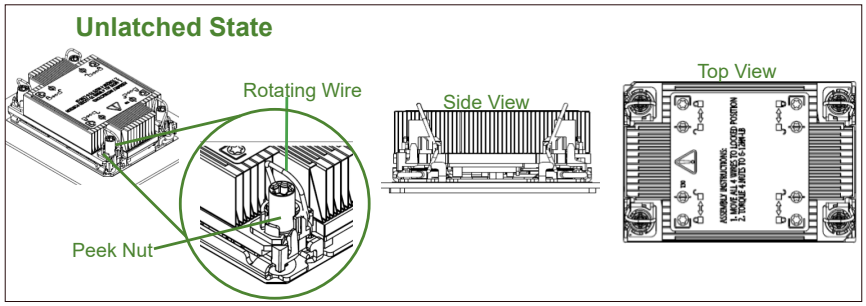
2. Locate four threaded fasteners (a, b, c, d) on the CPU socket.



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

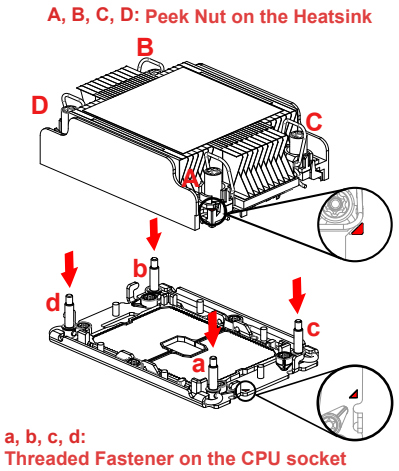


4. Check that the rotating wires (1, 2, 3, 4) are in the unlatched position as shown.

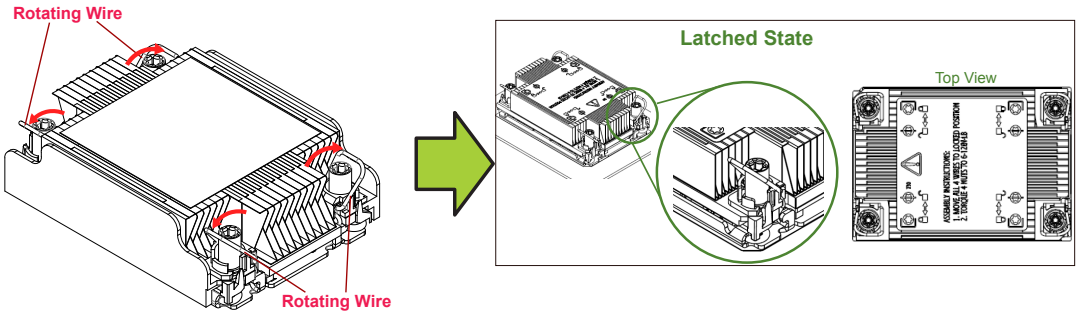


5. Align nut A (next to the triangles and pin 1) on the heatsink with threaded fastener "a" on the CPU socket. Also align nuts B, C, D on the heatsink with threaded fasteners b, c, d on the CPU socket.

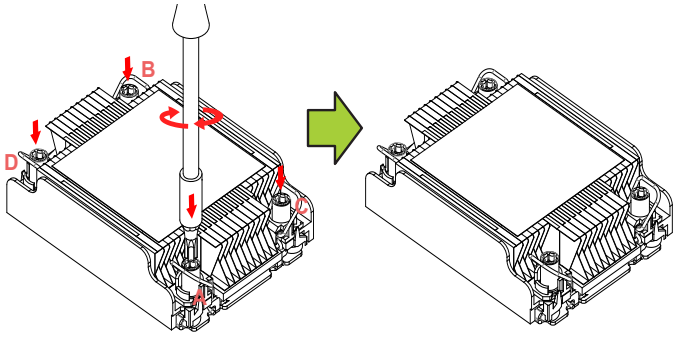
6. Gently place the heatsink on the CPU socket, making sure that each nut is properly aligned with its corresponding threaded fastener.



7. Press all four rotating wires outward to latch the PHM onto the CPU socket.



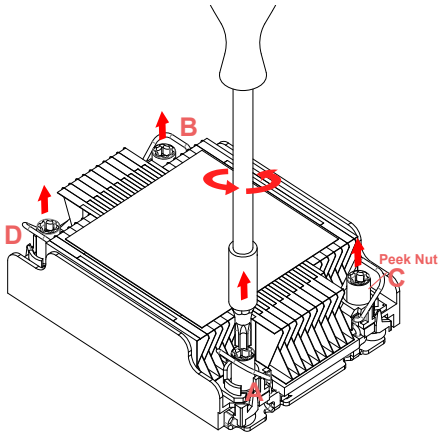
8. With a t30-bit screwdriver, tighten all PEEK nuts in the sequence of A, B, C, and D with even pressure not greater than 12 lbf-in.



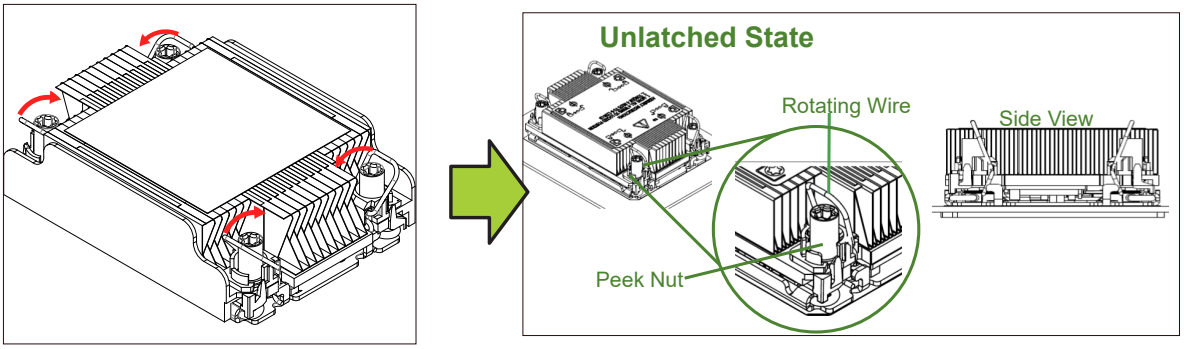
Removing the PHM from the CPU Socket

Be sure the system is shut down and all AC power cords are unplugged.

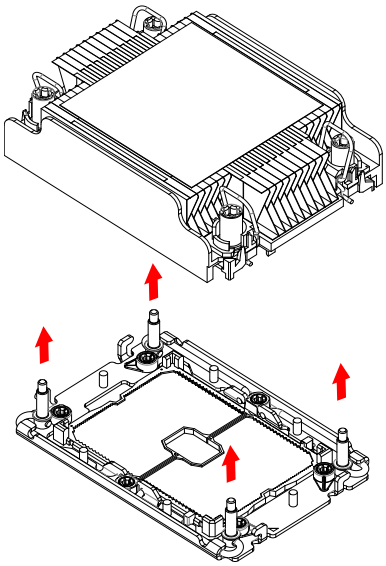
1. Use a t30-bit screwdriver to loosen the four PEEK nuts on the heatsink in the sequence of A, B, C, and D.



2. Press the four rotating wires inward to unlatch the PHM as shown below.

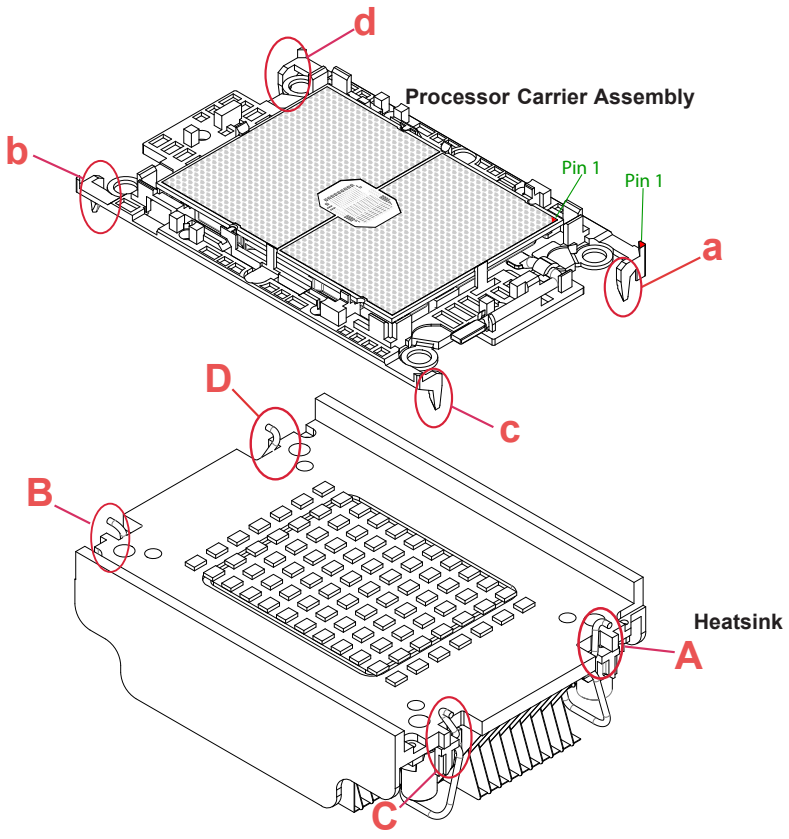


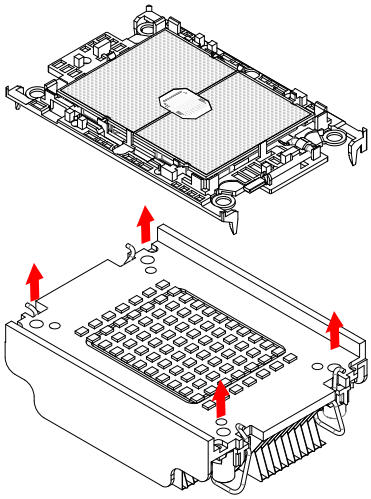
3. Gently lift the PHM upward to remove it from the CPU socket.



Removing the Processor Carrier Assembly from the PHM

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

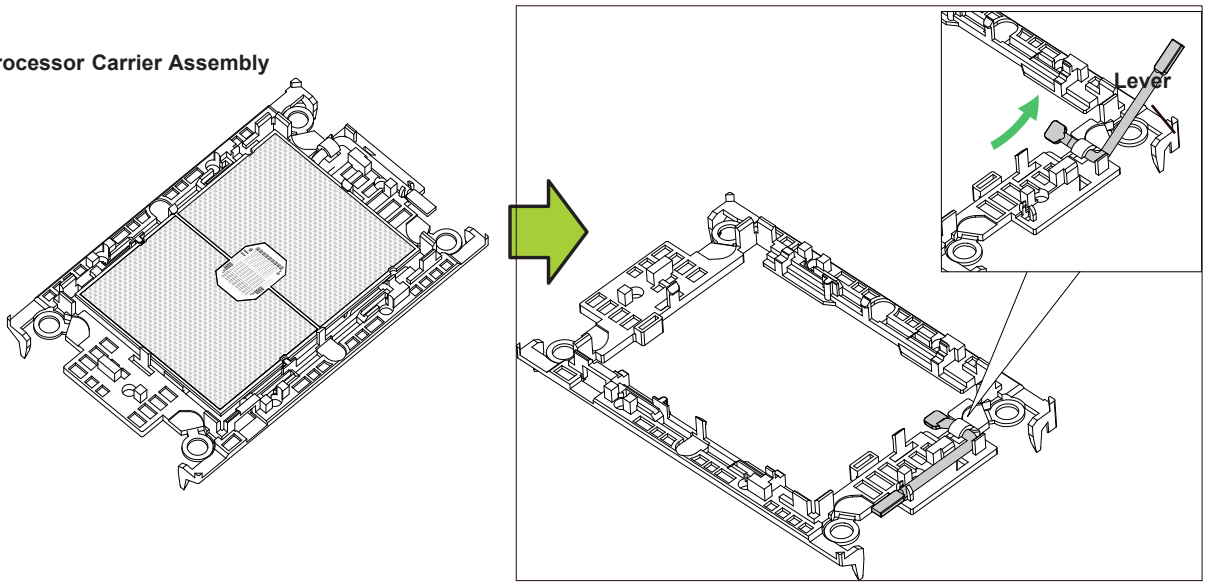




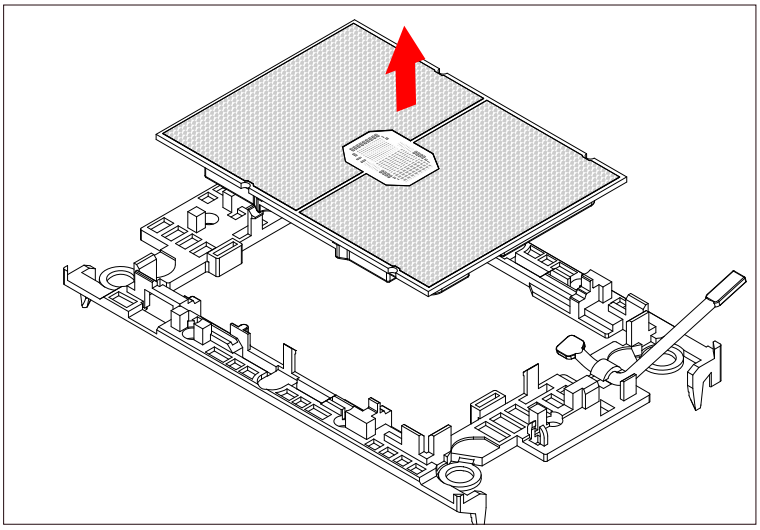
Removing the Processor from the Carrier Assembly

Unlock the lever from its locked position and push it upwards to disengage the processor from the carrier as shown below right. Carefully remove the processor from the carrier.

Processor Carrier Assembly



Note: Handle the processor with care to avoid damage.



3.7 Memory

Memory Support

The B12DPT-6 has 16 DIMM slots for up to 4TB of 3DS LRDIMM/LRDIMM/3DS RDIMM/RDIMM DDR4 (288-pin) ECC memory with speeds of 3200/2933/2666MT/s. For validated memory, use our Product Resources page.

DDR4 Memory Support for 83xx/63xx/53xx/43xx Processors				
Type	**Ranks Per DIMM and Data Width**	**DIMM Capacity (GB)**		**Speed (MT/s)**
				One Slot per Channel
		DRAM Density		**One DIMM per Channel**
		4 Gb	**8 Gb**	**1.2 Volts**
RDIMM	SRx8	8GB	16GB	3200*
	SRx4	16GB	32GB	
	DRx8	16GB	32GB	
	DRx4	32GB	64GB	
RDIMM 3DS	(4R/8R) x4	2H- 64GB 4H-128GB	2H-128GB 4H-256GB	
LRDIMM	QRx4	64GB	128GB	
LRDIMM 3DS	(4R/8R) x4	4H-128GB	2H-128GB 4H-256GB	

*Only the 83xx and 63xx series support 3200MT/s; for other processors, memory speed as supported by the CPU.

Memory Population Guidelines

- All DIMMs must be DDR4.
- Balance memory. Using unbalanced memory topology, such as populating two DIMMs in one channel while populating one DIMM in another channel, reduces performance. It is not recommended for Supermicro systems.
- In dual-CPU configurations, memory must be installed in the slots associated with the installed CPUs. Also, an odd number of total DIMMs is not recommended.
- For MM, NM/FM ratio is between 1:4 and 1:16. The capacity not used for FM can be used for AD. (NM = Near Memory; FM = Far Memory).

Guidelines Regarding Mixing DIMMs

- Populating slots with a pair of DIMM modules of the same type and capacity results in interleaved memory, which improves memory performance.
- Use memory modules of the same type and speed, as mixing is not allowed.
- x4 and x8 DIMMs can be mixed in the same channel.
- Mixing of LRDIMMs and RDIMMs is not allowed in the same channel, across different channels, and across different sockets.
- Mixing of non-3DS and 3DS LRDIMM is not allowed in the same channel, across different channels, and across different sockets.

DIMM Construction

- RDIMM (*non-3DS*) Raw Cards: A/B (2Rx4), C (1Rx4), D (1Rx8), E (2Rx8)
- 3DS RDIMM Raw Cards: A/B (4Rx4)
- LRDIMM (*non-3DS*) Raw Cards: D/E (4Rx4)
- 3DS LRDIMM Raw Cards: A/B (8Rx4)

Memory Population Sequence

Blue slots versus black slots: Install the first DIMM in the blue memory slot, which is the first of a memory channel.

The following memory population sequence table was created based on guidelines provided by Intel to support Supermicro motherboards.

Memory Population for the X12 DP Motherboard, 16 DIMM Slots	
CPUs/DIMMs	**Memory Population Sequence**
1 CPU & 1 DIMM	A1
1 CPU & 2 DIMMs	A1, E1
1 CPU & 3 DIMMs*	A1, C1, E1
1 CPU & 4 DIMMs	A1, C1, E1, G1
1 CPU & 5 DIMMs*	A1, B1, C1, E1, G1
1 CPU & 6 DIMM	A1, B1, C1, E1, F1, G1
1 CPU & 7 DIMMs*	A1, B1, C1, D1, E1, F1, G1
1 CPU & 8 DIMMs	A1, B1, C1, D1, E1, F1, G1, H1
2 CPUs & 2 DIMMs	CPU1: A1 CPU2: A1
2 CPUs & 4 DIMMs	CPU1: A1, E1 CPU2: A1, E1
2 CPUs & 6 DIMMs*	CPU1: A1, B1, E1, F1 CPU2: A1, E1
2 CPUs & 8 DIMMs	CPU1: A1, B1, E1, F1 CPU2: A1, B1, E1, F1
2 CPUs & 10 DIMMs*	CPU1: A1, B1, C1. E1, F1, G1 CPU2: A1, B1, E1, F1
2 CPUs & 12 DIMMs	CPU1: A1, B1, C1. E1, F1, G1 CPU2: A1, B1, C1. E1, F1, G1
2 CPUs & 14 DIMMs*	CPU1: A1, B1, C1. D1, E1, F1, G1, H1 CPU2: A1, B1, C1. E1, F1, G1
2 CPUs & 16 DIMMs	CPU1: A1, B1, C1. D1, E1, F1, G1, H1 CPU2: A1, B1, C1. D1, E1, F1, G1, H1

*Unbalanced, not recommended.

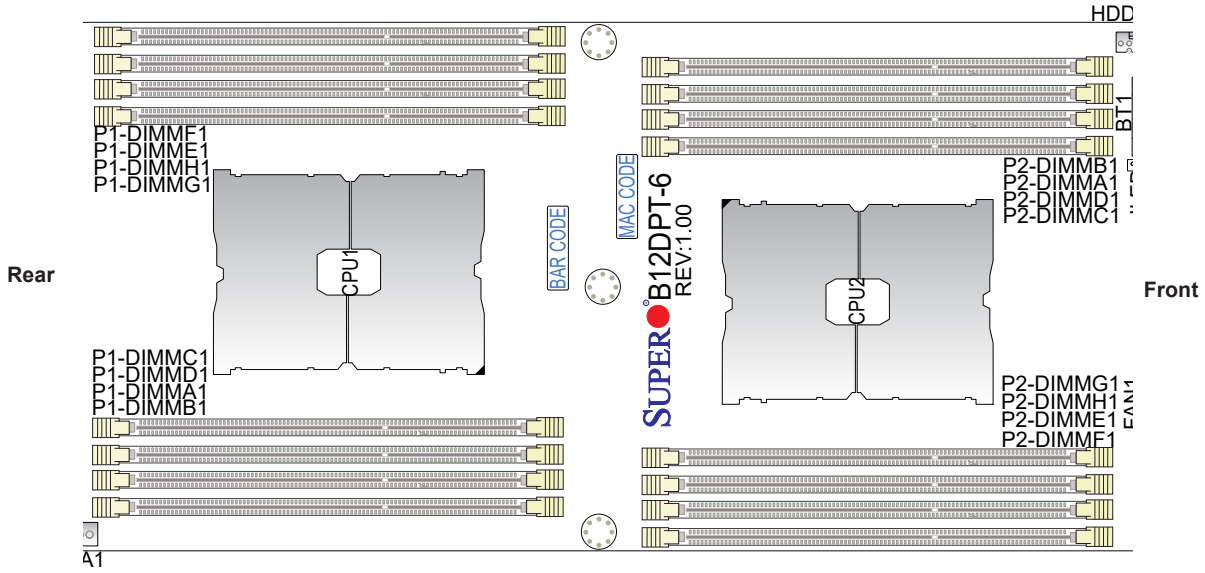


Figure 3-3. Memory Slots

Installing Memory

ESD Precautions

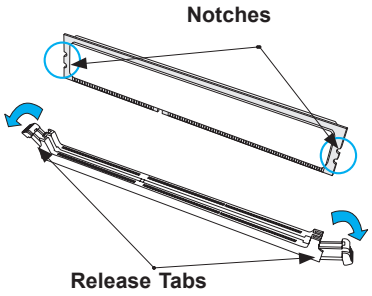
Electrostatic Discharge (ESD) can damage electronic components including memory modules. To avoid damaging DIMM modules, it is important to handle them carefully. The following measures are generally sufficient.

- Use a grounded wrist strap designed to prevent static discharge.
- Handle the memory module by its edges only.
- Put the memory modules into the antistatic bags when not in use.

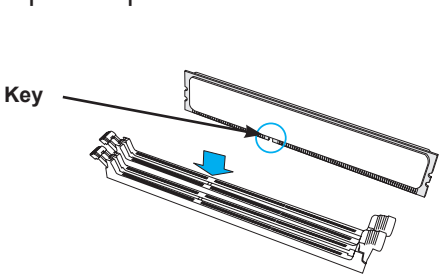
Installing Memory

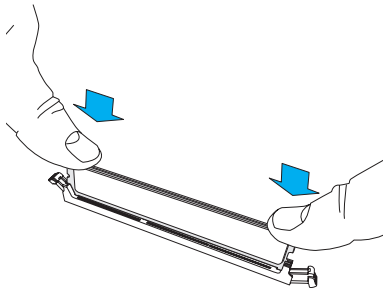
Begin by removing power from the system as described in Section 3.1. Follow the memory population sequence in the table above.

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



2. Align the key of the DIMM with the receptive point on the memory slot and with your thumbs on both ends of the module, press it straight down into the slot until the module snaps into place.





3. Press the release tabs to the locked position to secure the DIMM module into the slot.

Caution: Exercise extreme caution when installing or removing memory modules to prevent damage to the DIMMs or slots.

Removing Memory

To remove a DIMM, unlock the release tabs then pull the DIMM from the memory slot.

3.8 Motherboard Battery

The motherboard uses non-volatile memory to retain system information when system power is removed. This memory is powered by a lithium battery residing on the motherboard.

Replacing the Battery

When the blade has been removed from the enclosure.

1. Push aside the small clamp that covers the edge of the battery. When the battery is released, lift it out of the holder.
2. To insert a new battery, slide one edge under the lip of the holder with the positive (+) side facing up. Then push the other side down until the clamp snaps over it.

Note: 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.

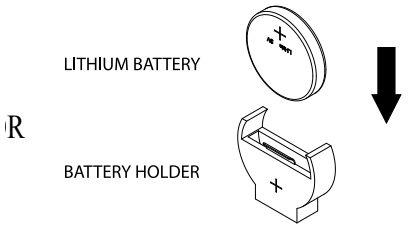


Figure 3-4. Installing the Onboard Battery

Warning: There is a danger of explosion if the onboard battery is installed upside down (which reverses its polarities). This battery must be replaced only with the same or an equivalent type recommended by the manufacturer (CR2032).

3.9 Storage Drives

The blade has three 2.5" hot-swap storage drive bays. The drives are mounted in tool-less drive carriers that simplify their removal from the chassis. These carriers also help promote proper airflow. Carriers without drives must remain in the chassis for proper airflow.

For VROC configurations, refer to the VROC section in this manual.

Note: Enterprise level storage drives are recommended for use in Supermicro systems. For information on recommended drives, visit the Supermicro website.

Installing Drives

Figure 3-5. Logical Drive Numbers

Removing a Hot-Swap Drive Carrier from the Chassis

1. Press the release button on the drive carrier, which will extend the drive carrier handle.
2. Use the drive carrier handle to pull the drive out of the chassis.

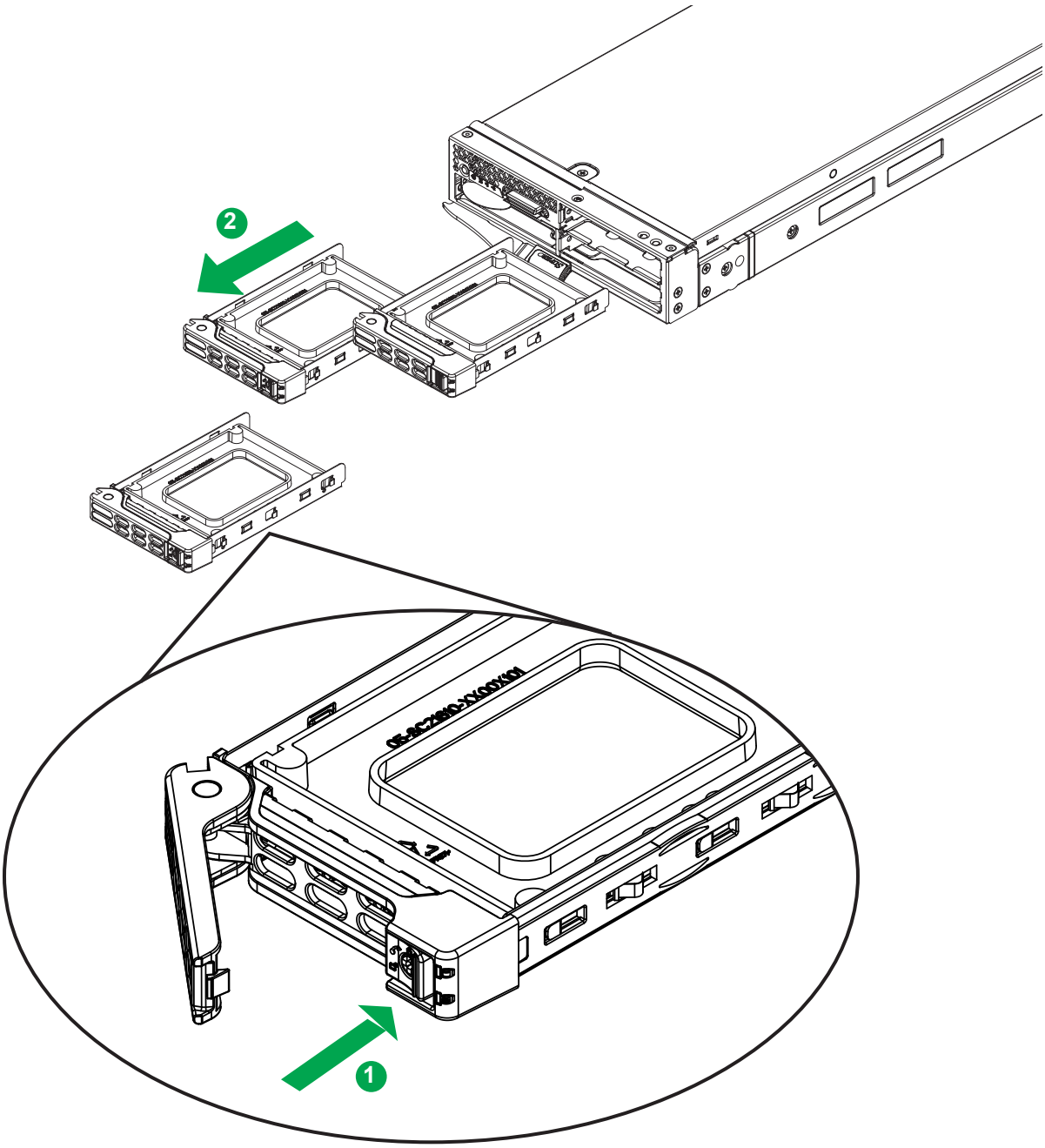


Figure 3-6. Removing a Drive Carrier

Installing a Drive

1. Remove the dummy drive, which comes pre-installed in the drive carrier. Pull out the two spring locking clasps and lift out the dummy drive.

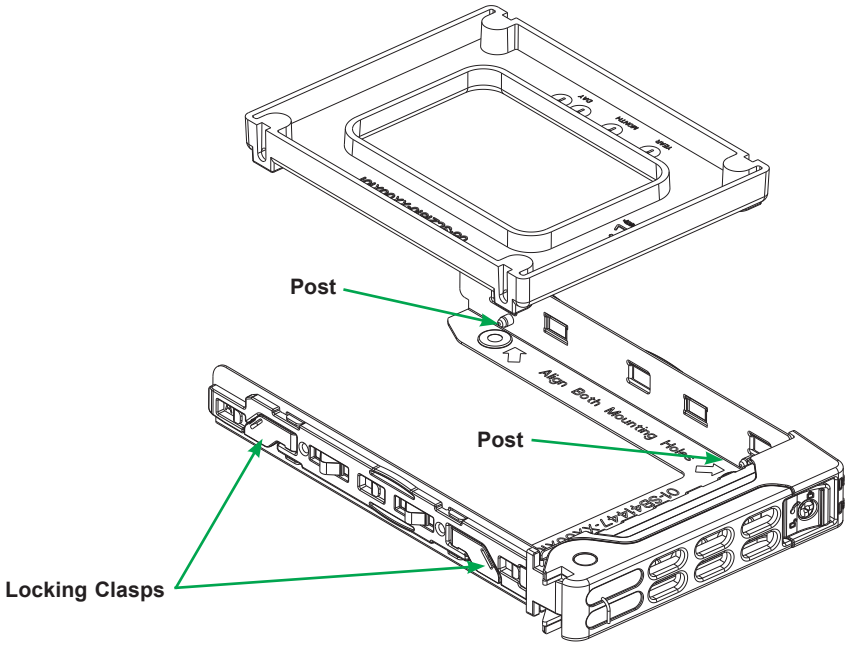


Figure 3-7. Removing the Dummy Drive from a Carrier

2. Position the drive into the carrier with the PCB side facing down and the connector end toward the rear of the carrier.
3. Tilt the drive to insert it onto the two posts on the right inside of the carrier.
4. Pull out the two spring locking clasps to allow the drive to sit fully in the carrier, then release them to secure the drive.
5. Insert the drive carrier into its bay, keeping the release button on the bottom. When the carrier reaches the rear of the bay, the release handle will retract.
6. Push the handle in until it clicks into its locked position

Hot-Swap for NVMe Drives

Supermicro servers support NVMe surprise hot-swap. For even better data security, NVMe orderly hot-swap is recommended. NVMe drives can be ejected and replaced remotely using the BMC Dashboard.

Ejecting a Drive

1. **BMC Dashboard > Server Health > NVMe SSD**
2. Select Device, Group and Slot, and click **Eject**. After ejecting, the drive Status LED indicator turns green.
3. Remove the drive.

Note that *Device* and *Group* are categorized by the CPLD design architecture.

Slot is the slot number on which the NVMe drives are mounted.

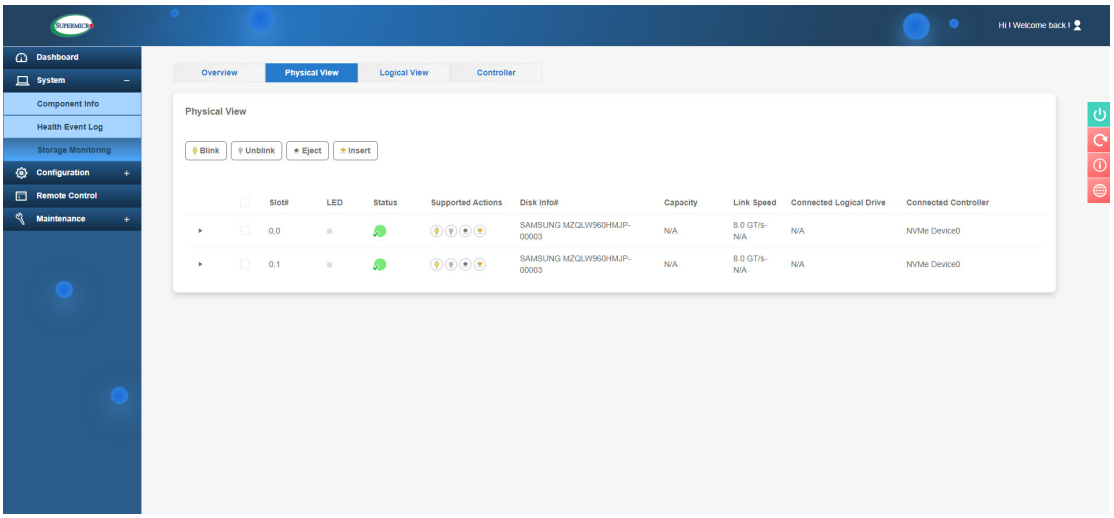


Figure 3-8. BMC Dashboard Screenshot

Replacing the Drive

1. Insert the replacement drive.
2. **BMC Dashboard > Server Health > NVMe SSD**
3. Select Device, Group and slot and click **Insert**. The drive Status LED indicator flashes red, then turns off. The Activity LED turns blue.

Checking the Temperature of an NVMe Drive

There are two ways to check using the BMC Dashboard.

Checking a Drive

- **BMC Dashboard > Server Health > NVMe SSD –** Shows the temperatures of all NVMe drives.
- **BMC Dashboard > Server Health > Sensor Reading > NVME_SSD –** Shows the single highest temperature among all the NVMe drives.

M.2 Storage

The system supports one M.2 solid state drive of form factor 2280.

- Insert the M.2 card into the M.2 slot, then secure it with the plastic pin at the other end.

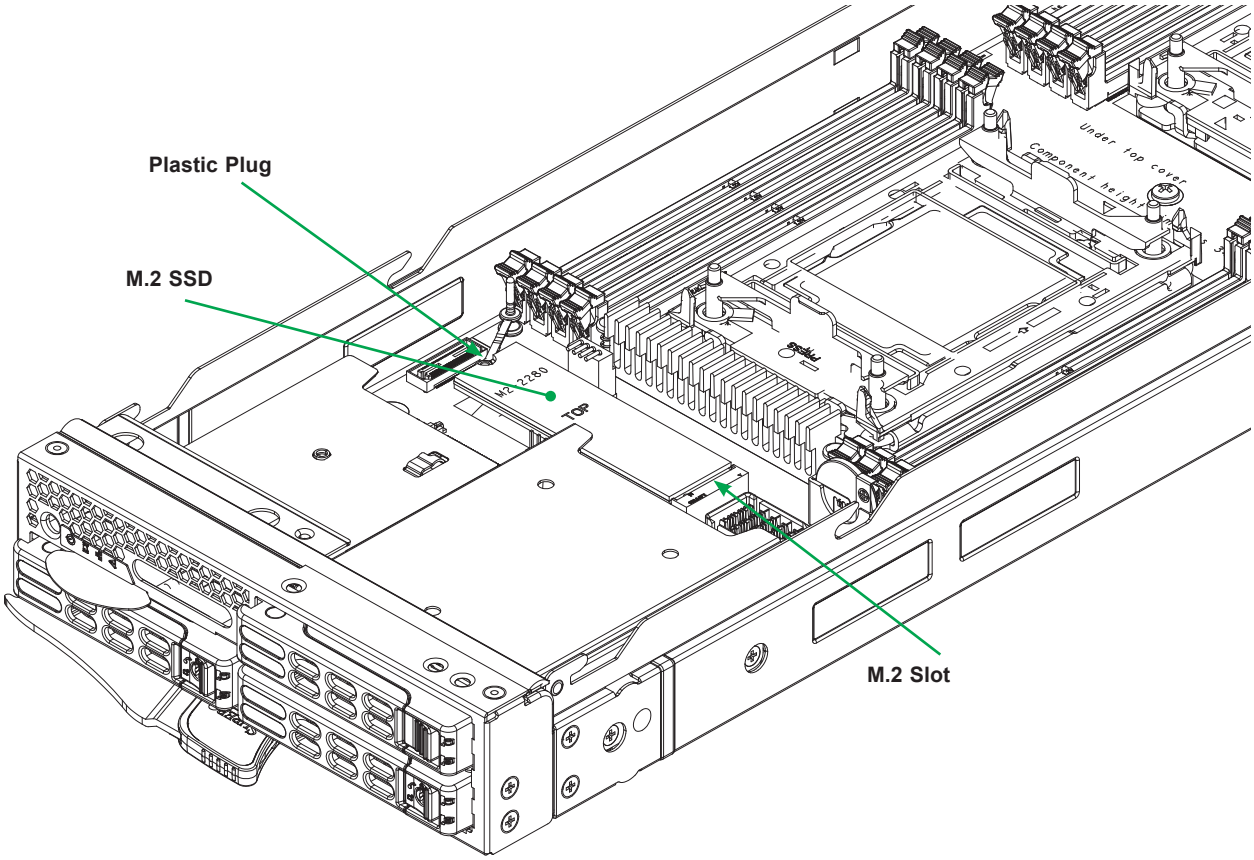


Figure 3-9. Installing M.2 SSD

3.10 Cooling

Fans, Enclosure

Power supply modules include a system fan. If a power supply fails, its fan will continue to operate to provide continuous cooling. For this reason, a failed power supply should remain installed in the enclosure until a replacement unit is ready.

Auxiliary Fans

Three optional fan modules (PWS-DF005-2F) with two fans each are available for extra cooling. They may be required for configurations such CPUs with TDP over 155W.

Air Shrouds, Blade

Air shrouds concentrate airflow to maximize fan efficiency.

Installing the Air Shrouds

- Position the air shrouds as illustrated in the figure below, sliding them over the components, and secure them with screws. The *screws are shared* with the motherboard.

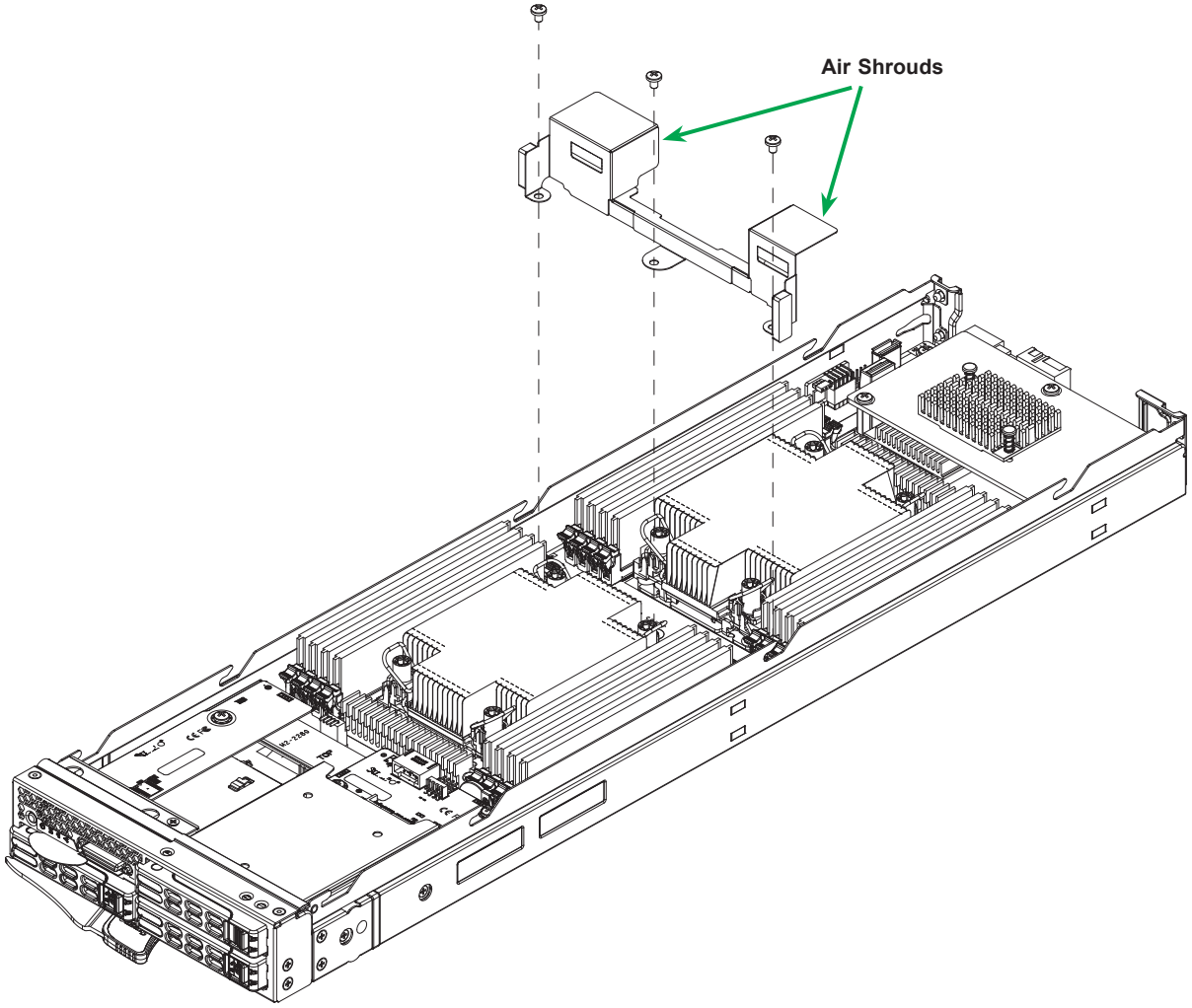


Figure 3-10. Installing the Air Shrouds

Checking the Server Air Flow

- Make sure there are no objects to obstruct airflow in and out of the server.
- Do not operate the server without drives or drive carriers in the drive bays.
- Use only recommended parts.
- Make sure no wires or foreign objects obstruct air flow through the server. Pull all excess cabling out of the airflow path or use shorter cables.

Overheating

For overheating problems, check that:

- There are no obstructions, such as poorly routed cables.
- All fans are operating normally.
- The ambient room temperature is not too warm (refer to Appendix B, Environmental Specifications).

There are several possible responses if the system overheats.

- Use the LEDs to determine the nature of the overheating condition.
- Confirm that the chassis covers are installed properly.
- Make sure all fans are present and operating normally.
- Check the routing of the cables.
- Verify that the heatsinks are installed properly.

Also, either of the blade management software utilities can increase the fan speed and maximize system cooling.

3.11 Installing Components

Install:

- Power Supply Modules
- Fans
- CMM (see also Chapter 5)
- Switches or pass-thru modules
- Blade servers

In all cases, pull out the locking lever(s), slide the component into the enclosure, then secure with the locking lever.

Note: All module bays must be populated either with a module or a dummy module cover to maintain proper airflow.

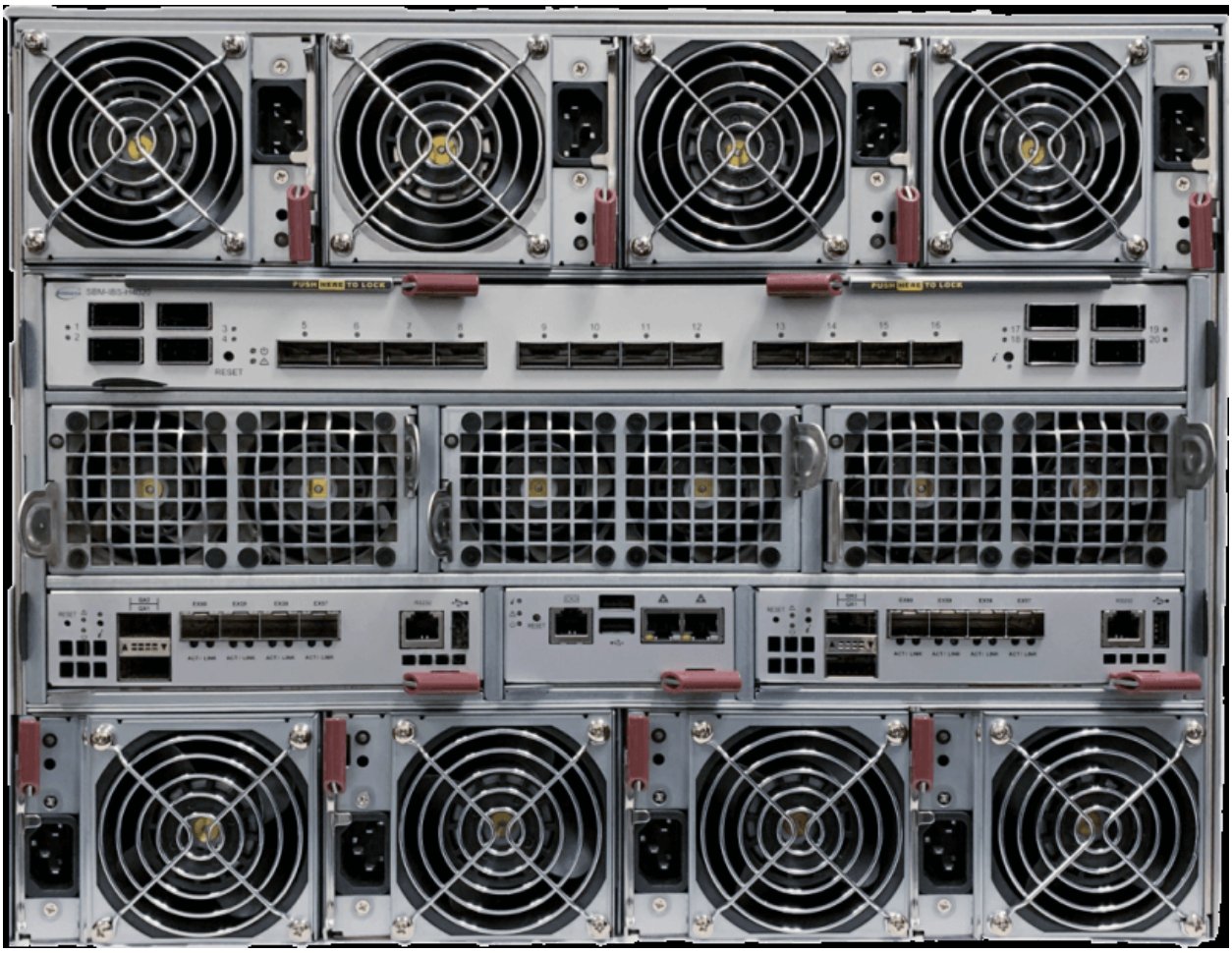


Figure 3-11. Rear Modules Installed

Chapter 4

Power

The SuperBlade enclosure integrates a power supply and a cooling fan into a single module. The fan can operate independently from the power supply, so that if the power supply fails, the fan continues to provide cooling for the system. The Chassis Management Module (CMM) monitors the status of the power supplies and the power information for the enclosure.

Figure 4-1. Example Power and Fan Module, PWS-2K21A-BR

4.1 Module Description

An LED status indicator is located near the locking lever.

Status Indictor	
Color	**Description**
Red	Power module failure
Amber	Possible module failure or the AC power cord unplugged
Green	Module operating normally

Power Cord

A plastic locking clip partially covering the socket was designed to prevent the power supply module from being removed with the power cord still connected.

Only the recommended power cord or an equivalent 14 gauge cord should be used. Typical C13/C14 cords are only 16 Gauge wiring and pose a fire hazard if substituted.

For details on the required power cord for your country, see the Supermicro website at:

www.supermicro.com/products/superblade/powersupply/powercord.cfm

4.2 Installing a Power Supply

To prevent compatibility issues, only use components that match the specifications or part numbers.

1. Insert the power module into the empty power bay. Be sure that the orientation is correct. Match the pictures of the chassis front in Chapter 1. If you inadvertently put a power supply upside down, it can be very difficult to remove.
2. Push unit all the way in until it is firmly seated.
3. Push the locking handle into the closed position until it clicks into position.
4. Move the locking clip away from the socket and reconnect the power cord.

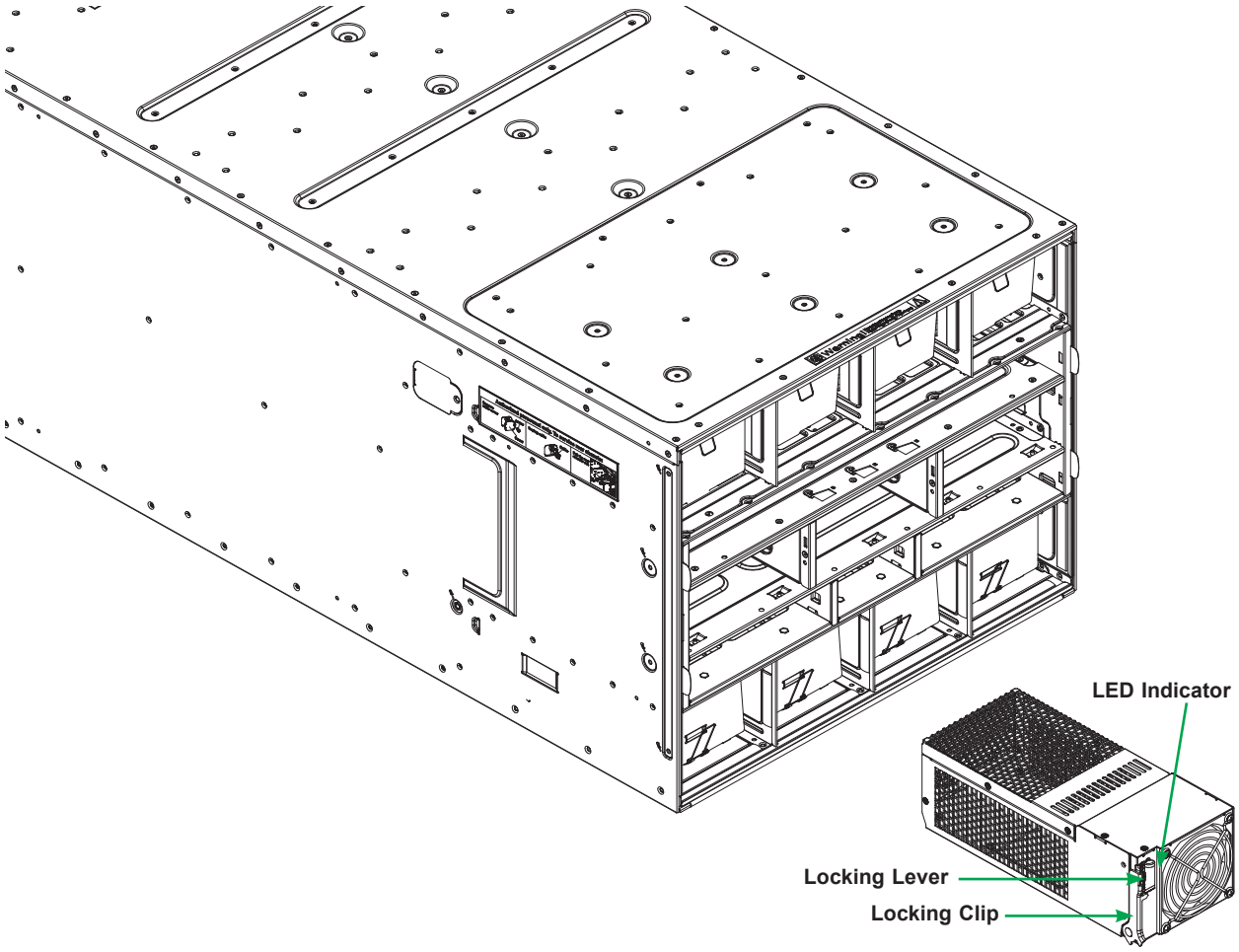


Figure 4-2. Installing a Power Supply Module

Removing a Power Supply

1. Remove the power cord from the power supply unit.
2. Release the locking clip to unlock the power supply module.
3. Pull out the locking handle and remove the unit. To release the handle, squeeze the two metal plates of the handle with your thumb and fingers, and then pull the module out.

4.3 Power Supply Failure

If a power module or a fan in a power module fails, the system management software will provide an alert. Replace the power module with another identical one. Note that if a power supply fails, its fans will continue to operate. For this reason, a failed power supply should remain installed in the enclosure until a replacement unit is ready.

Redundant Power Supplies

Each blade enclosure can hold multiple power supplies. Installing all possible power supplies may provide you with redundant power, depending upon the number of blades in the enclosure, the model and power level of the power supplies installed and the power load from modules in your system. The configuration for power redundancy is created using the IPMIView application tool for the system.

For purposes of denoting the amount of redundancy, a server system has N main power supplies to support the whole system. N+n denotes "n" the number of redundant power supplies. For example, N+1 describes a system with one power supply for redundancy.

For example, suppose a 10-blade system has four 2000 Watt power supply units (PSU), for a total power supply of 8000 Watts. The maximum power usage of each blade is 375 Watts for a total power demand of 3750 Watts to run the whole system. So in this example there are effectively two redundant power supplies (N+2) over what is needed to power the blades in the system.

- If one or two PSU fail, then 6000W or 4000W, respectively, are available. The CMM will detect the remaining power left for the whole system. And because the total blade power usage is only 3750 Watts, every blade can still work properly.
- If three PSUs fail, then the remaining 2000 Watts available cannot support the whole system. Therefore the CMM will start to shut down or throttle down the load in order to keep blades running based upon the priority settings that were made for each blade using the IPMIView application until the load is enough to power the remaining blade modules.

In the IPMIView tool you can set the priority (default CPU power usage) of each blade first before any PSU fails (0%->shut down, 50%->throttling, 100%->Running).

4.4 Power Management

The Chassis Management Module assumes the maximum power case for each blade prior to applying power. If the system power is not sufficient, the CMM will not allow that unit to power up. After a blade is powered up, the blade BIOS calculates the actual power load required by that blade based upon the installed devices and informs the CMM of its requirements. The CMM then recalculates the remaining power for additional blades.

Backup Battery Power

Backup battery power (BBP) modules, like all rechargeable batteries, eventually their capacity and performance decline as they age. Regular maintenance of charge and discharge cycles is recommended to maintain the effectiveness of the BBP batteries. At least one charge and discharge cycle for every 30 days is recommended. The BBP maintenance scheduler can be enabled and configured through the CMM.

When the BBP function is disabled through the CMM, the battery will discharge until the minimum energy state is reached. While the battery function is disabled, regular BBP maintenance cannot be performed since the battery energy remains at the lowest state and will not re-charge. As a result, the battery capacity and performance will decline at a faster pace, and/or cause the battery to no longer operate. The battery will remain the minimum charge until the BBP function is again re-enabled through CMM. The user should use the disabling BBP function with caution knowing that the possible outcome of degraded battery performance or not operational battery.

The discharge duration can be extended by adding additional BPP modules.

4.5 Power Supply Specifications

PWS-2K21A-BR	
Feature	**Description**
Maximum Output	2200W
Type	Hot-swap Redundant Module (N+1)
Dimensions (WxLxH)	106.5 x 245.3 x 84 mm
Input Rated Voltage/ Current	100-127Vac input: 100A 200-220Vac input: 150A 220-230Vac input: 165A 230-240Vac Input: 174A 200-240Vac Input: 183.3A (UL/cUL Only)
Rated Frequency	50-60HZ
Maximum Power	UL & cUL (North America): 200-220V: 2090W 220-240V: 2200W Rest of the world: 100-127V: 1200W 200-220V: 1800W 220-230V: 1980W 230-240V: 2090W
Efficiency Certification	80Plus Platinum, 96%
+12V Output	1200/1800/1980/2090/2200: 100A/150A/165A/174A/183.3A
+12Vsb DC Output	2A
Operating Conditions	Operating Temp: 0° to 50° C (up to 5000m) Non-operating Temp: -40° to 75° (up to 15200m) Humidity (Non-Condensing): 80% Operating, 95% Non-operating

Chapter 5

Chassis Management Module

The Chassis Management Module (CMM) is a "command" module that communicates with the blade units, the power supplies and the blade switches. Used in conjunction with the Web Interface or IPMI View management software, the CMM provides administrator control over individual blade units, power supplies, cooling fans and networking switches and monitors onboard temperatures, power status, voltage levels and fan speeds. It is a required module in a blade system.

5.1 Features

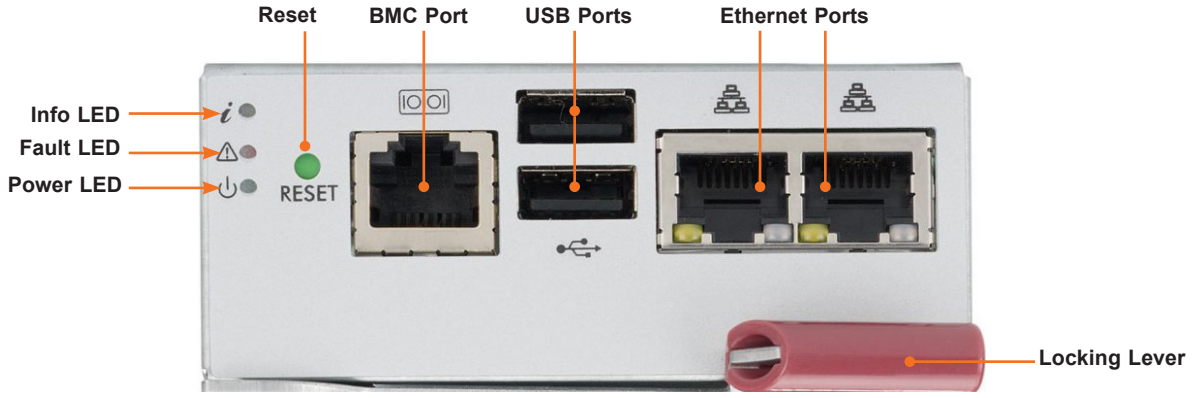


Figure 5-1. MBM-CMM-FIO Module Interface

MBM-CMM-FIO	
Feature	**Description**
Management Capabilities	Can manage up to 28 blade units, network modules and eight power supplies
Ports	Two Ethernet ports, one BMC dedicated LAN and two USB ports (for debug only)
Basic Functions Supported	Remote KVM, remote storage, Serial-over-LAN (SOL), blade monitoring and control, switch, PWS, monitor, thermal, redundancy in some enclosure models
System Management	System management interface provided via dedicated LAN, switch, PWS, monitor, thermal, and redundancy in some enclosure models
Power Consumption	Approximately 20W
Operating System	Firmware (upgradeable)

LED Status Indicators		
LED	**Color, Status**	**Description**
Power	Green	Power on
Fault	Red	Fatal error, including power supply or thermal
Information	Blue, solid	UID activated
	Blue, blinking faster than 1Hz	Firmware updating
	Blue, blinking 1Hz	Indicator for active Master CMM

Capabilities

The CMM provides a dedicated, local and remote KVM (keyboard/video/mouse) connection over an out of band TCP/IP Ethernet network during any server state (functioning, blue-screen, powered down, BIOS and so on). It also supports Virtual Media (VM) redirection for CD, floppy and USB mass storage devices and configures such information as the switch IP addresses.

Module Redundancy

A blade system must have one CMM and may have two for redundancy is offered only on a specific enclosure model, which has the hardware capability to incorporate two CMM's on one backplane. Since the CMM uses its own processor, all monitoring and control functions are carried out regardless of the operation or power status of the blade units. CMM modules can only be installed in the upper and/or lower right module bays.

Determining Master/Slave Modules Status

When a blade system has two CMM modules, they are assigned a master/slave status. This is done automatically with the default primary CMM specified for per each enclosure, while there will be no redundant in certain enclosures.

If the master CMM is powered down or removed (or is being reset by its user), the second (slave) CMM module will then immediately be assigned as the master. The redundant CMM mode is only offered on specific chassis models. The slave uses the previous master IP config in case of failover.

Note: The Slave CMM keeps the same log/status as the Master CMM and uses the previous master IP config.

5.2 Installation

Use this procedure to install the CMM module to the SuperBlade enclosure. Make sure the cover to the module has been installed before proceeding. Follow the anti-static precautions.

Installing the Module

1. Remove the dummy cover from the bay in which you want to place the module.
2. Place the module locking lever in the open position.
3. Slide the module into the module bay until it stops.
4. Push the locking lever to the closed position.

After the module has been installed and the handle locked, it will turn on and a POST test will run to verify it is working properly.

Removing the Module:

1. Pull out the release handle to the open position.
2. Pull the module out of the bay.
3. Replace immediately with another module or with a dummy module cover to maintain airflow integrity.

5.3 Configuring the CMM

To access and configure the CMM, first configure the IP settings of the CMM depending on you network environment. The below procedure for this configuration just serves as a reference for getting the CMM setup. If your system has Linux OS, please follow similar instructions to get the CMM setup.

The CMM access topology is as follows:

DHCP Access: Connect a network cable to the CMM module.

- The system should boot into the default Fail Over mode. The DHCP mode will appear on the CLI mode screen.
- If the system failover and CLI is not active, it will proceed to the default IP access.
- If the CMM cannot enter the default IP, then an RJ45/USB cable can be connected from the CMM RJ45 Ethernet LAN Port to the Desktop Host using the USB Port in Serial Port mode with a speed set at 115200. The DHCP IP can be manually set at the same subnet-mask for gateway access at 192.168.100.100.01.

Default IP Access:

The requirements are a computer with an RJ45 port and an ethernet cable.

1. Connect network cable to the network port at CMM. The default IP of the CMM is https://192.168.100.100.

2. Configure the connected computer to the same address range, such as https://192.168.100.101. The default mode is the Fail Over mode. If the DHCP fails, then the CMM will automatically default to the IP address of the CMM.

Configuring the CMM in Windows OS:

1. Go to **Start > Control Panel > Network Connections**.

2. Right-click on **LAN** to **View Properties**.

3. On the **General** tab page, choose “Internet Protocol (TCP/IP)” and click **Properties**.

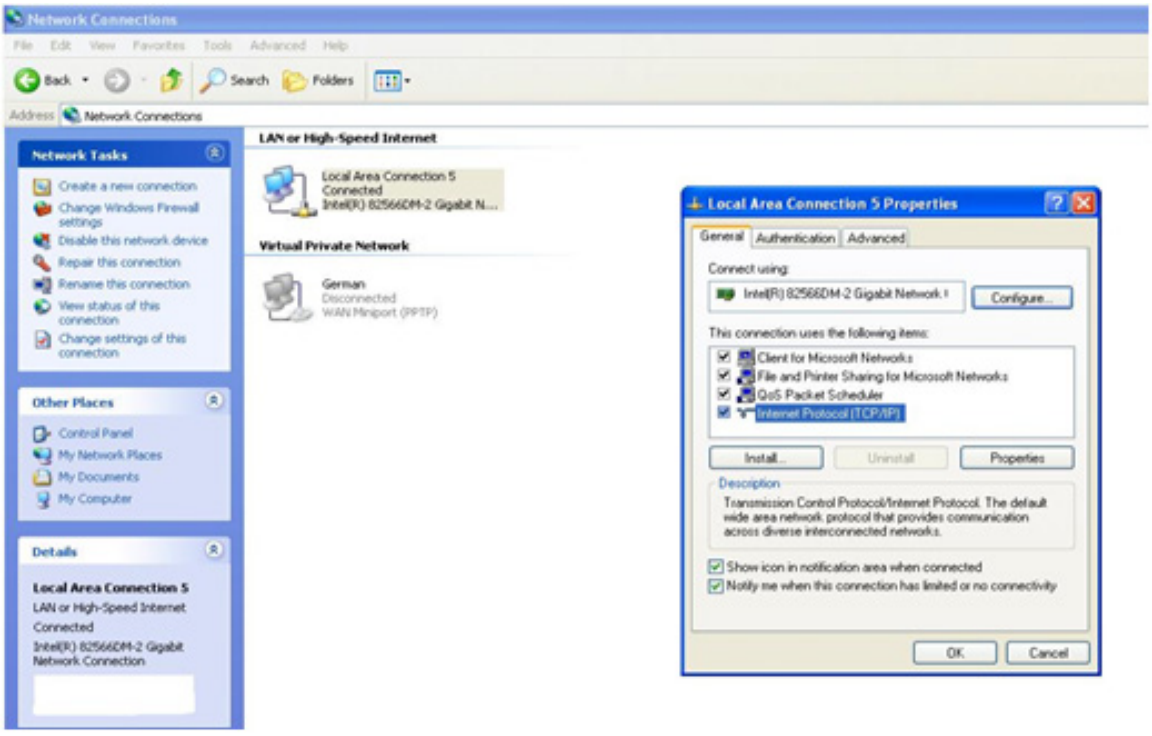


Figure 5-3. Configuring CMM, Choose Protocol

4. Manually configure the IP address of the computer system to be in the same address range as the CMM (see Figure 5-4).

Example:

IP address: https://192.168.100.101

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.100.1

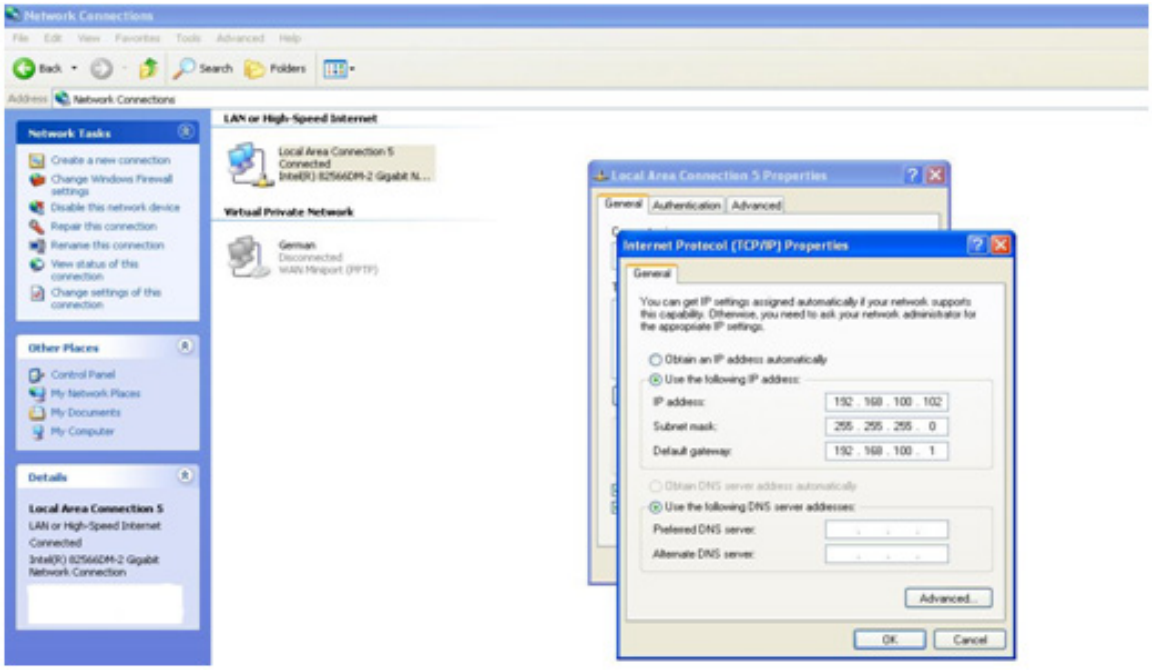


Figure 5-4. Configuring CMM, Choose Protocol

Once the IP address for the computer system is configured, the CMM can be accessed through the web browser by entering the default IP address 192.168.100.100 of the CMM into the browser's address bar.

Now, the IP address, subnet mask and default gateway of the CMM can be changed according to the network environment. Refer to the Web-based Management Utility User's Manual for more information.

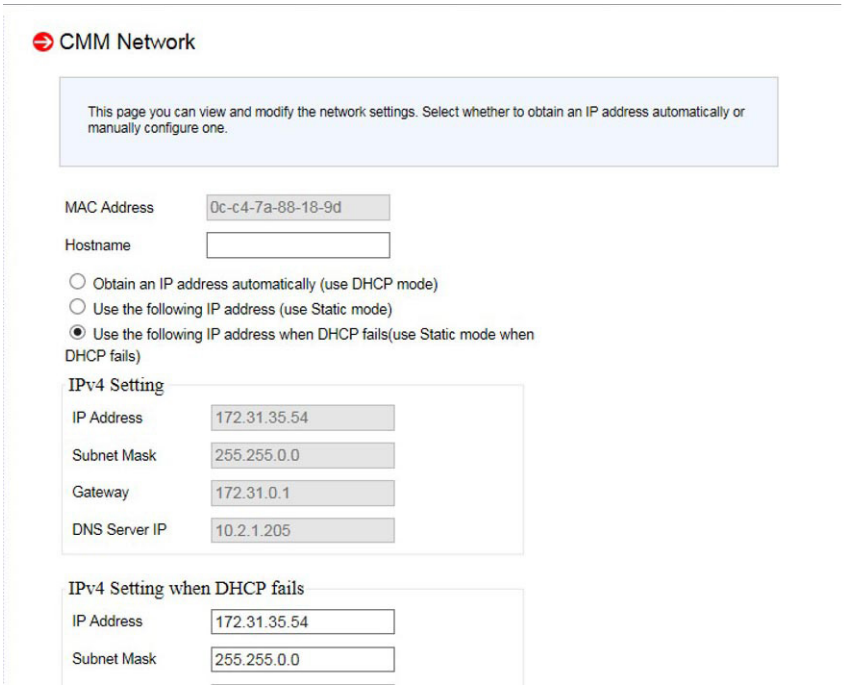


Figure 5-5. Configuring CMM, Changing Settings

Caution: Do not change any other setting, unless you are familiar with it.

Note: The above screens are examples for purposes of demonstrating this procedure. The screens you actually view may or may not appear the same as those shown above.

5.4 CMM Functions

The following sections describe local functions and remote functions of the CMM. With only minor exceptions, all of the remote functions can be performed by one of three mechanisms: web-based access to the CMM module, access to the CMM using *IPMIview*, a client tool implemented in Java, or via *IPMItool* commands (DOS commands or shell scripted commands).

When the web-based browser is used, the CMM acts as a web server, requiring a higher bandwidth connection to the CMM. If there are any bandwidth constraints, IPMI will provide a superior experience. Additionally, since graphical updates are provided by client-side Java, IPMIview can also be a superior user experience.

IPMItool, on the other hand, can provide the ability to issue similar or identical commands to many SuperBlade enclosures/CMM to manage all of them in a similar way.

Remote KVM over IP

Remote KVM over IP is independent from local KVM (although local KVM can operate in parallel with Remote KVM). Remote KVM encrypts all communication between the remote user and the CMM.

To Use: Remote KVM over IP is initiated with the management software (IPMI View or Web-based utility). Attach the LAN cable to the LAN port on the CMM module then refer to "Web-based Management Utility" on page 4-13 to login and use either utility.

Remote Storage (Virtual Media)

The Remote Storage function allows the user to connect to a remote storage device (such as a floppy, hard disk, or USB storage device) and access the device as if it were local. This can be used not only to read and write to remote storage devices but to load an operating system from a remote drive.

Serial Over LAN (SOL)

Serial Over LAN allows you to redirect the input and output of a serial port via IPMI in order to manage blade modules from a remote location.

To Use: Serial Over LAN can be activated via the Web-based Management utility. See the Web-based Management Utility User's Manual for the procedure to initiate SOL.

Monitoring Functions

Used in conjunction with IPMI or the Web-based Management utility, the CMM module can monitor and provide information on the hardware health of the blade modules and the system as a whole. In addition to the monitoring functions, you can remotely power on, power off or reboot a system.

Health information includes:

- Temperature levels
- Fan speeds
- Voltage levels
- Power status

Power Consumption Management

The CMM module firmware can also control all power on/off activity in the whole blade system. This is done by using the Power button, onboard BMC or from any other use of remote management software.

Once a blade module is installed in the enclosure the installed CMM immediately receives information on the rated Max Power Consumption value of the new blade module. The CMM then calculates whether there is enough power for this new blade module by comparing the Max Power Consumption value of the new blade module with the calculated Remaining Power value of the system.

If there is enough power, the CMM will power on the blade. However if there is not enough power in the blade system, then the new blade module is not powered on and the front panel LED on the enclosure will blink.

After the blade is powered on, the CMM then collects the actual power consumption of this individual blade and updates the calculated Remaining Power value for the system.

The CMM also reserves power for all the networking and chassis management modules installed on the system.

Caution: One CMM module must be running to control the power systems and prevent overloading.

5.5 USB Ports and Reset Button

The USB ports only used for debugging purposes and not for communication with your system.

Reset Button returns address settings to their defaults.

IP Address	Reset to https://192.168.100.100
Gateway Address	Reset to 0.0.0.0
Subnet Mask	Reset to 255.255.255.0

5.6 Firmware

The firmware for the CMM switch resides in the module. This firmware can be updated with the web-based management utility.

Within the utility, go to the **Maintenance > Update Firmware** screen. Here you can enter the name of the firmware you want to update or click **Browse** to select the firmware file. Finish by clicking the **Upload** button.

Note: This process is not reversible once the firmware is updated, so proceed with caution. It might take a few minutes to complete this procedure.

5.7 Web-based Management Utility

System management may be performed with either of three software packages: *IPMIview*, *SMCIPMItool* or a Web-based Management Utility. Any of these utilities are designed to provide an administrator with a comprehensive set of functions and monitored data to keep tabs on the system and perform management activities.

The Web-based Management Utility is a web-based interface that consolidates and simplifies system management for Supermicro SuperBlade systems. The Web-based Management Utility aggregates and displays data from the CMM module.

The Web-based Management Utility provides the following key management features:

- Enables IT administrators to view in-depth hardware configuration and status information using a single intuitive interface.
- Provides an OS-independent, remote graphical console.
- Allows remote users to map local media (floppy, removable disks and hard drives) or ISO images on a shared network drive to a blade server.

Supported Browsers

The following browsers have been tested for use with the Web-based Management Utility. It is recommended that you use the most current revision of the browser you choose. The minimum browser revisions supported by the Web-based Management Utility are shown below:

Internet Explorer 7

Firefox 2.0.0.7

Netscape 9.03b

Network Connection/Login

To log into the Web-based Management Utility:

1. Launch a web browser.

2. In the address field of the browser, enter the IP address that you assigned to the system and hit the <Enter> key.

3. When the browser makes contact with the CMM, enter your user name and password, then click **Login**. The Web-based Management Utility Home Page will then display as shown below.

Note: Supermicro ships standard products with a unique password for the BMC ADMIN user. This password can be found on a label on the motherboard. For more information, please refer to our website at https://www.supermicro.com/en/support/BMC_Unique_Password and https://www.supermicro.com/support/BMC_Unique_Password_Guide.pdf for further information.

Address Defaults

The CMM default addresses are:

IP Address – Reset to https://192.168.100.100

Gateway Address – Reset to 0.0.0.0

Subnet Mask – Reset to 255.255.255.0

The address can be changed using the Web-based Management Utility.

Home Page

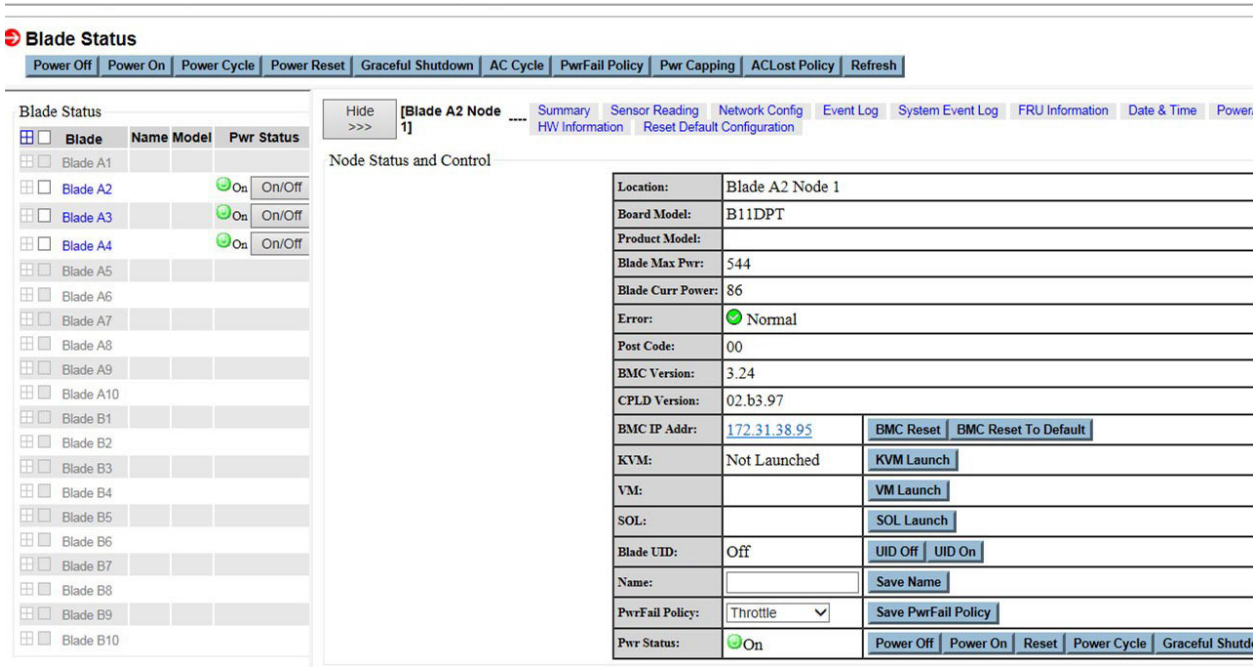


Figure 5-6. Configuring CMM, Web-based Utility

For more information on the Web-based Management Utility, and a description of its controls, see the *Web-based Management Utility User's Manual*.

Chapter 6

SuperBlade HDR 200G InfiniBand Blade Switch

6.1 Overview

The document provides the details about the SuperBlade HDR 200G InfiniBand Blade Switch model SBM-IBS-H4020.

Supermicro SBM-IBS-H4020 is an HDR 200G InfiniBand Blade Switch designed for Supermicro blade enclosures for high performance datacenter traffic applications. It provides a 1:1 non-blocking architecture and supports twenty internal HDR ports at 200G and twenty external HDR ports at 200G with ZQSFP+/QSFP56 ports.

Module Managment

The switch is unmanaged. It does not use an operating system.

6.2 Features

The switch module includes these features.

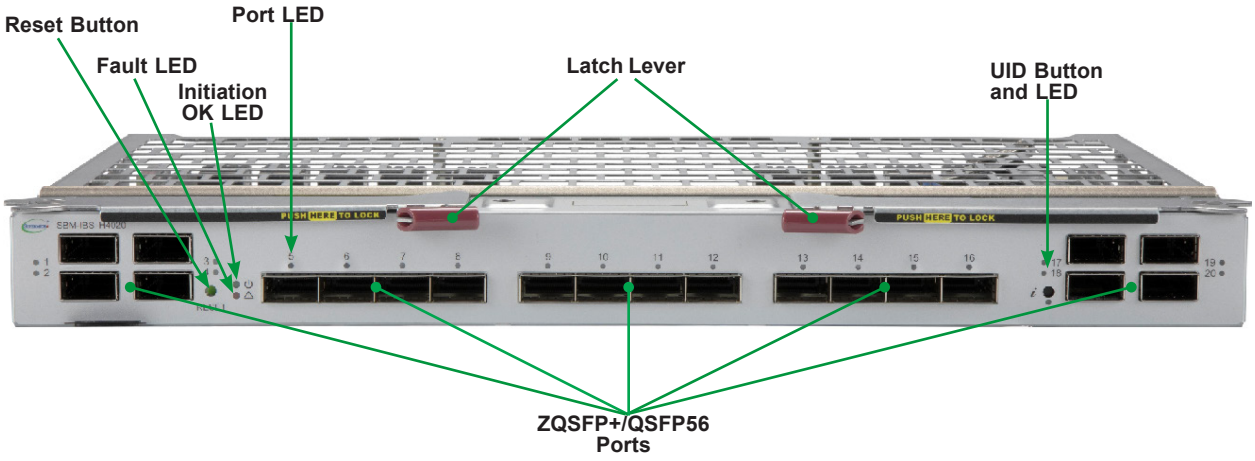


Figure 1. Front View

Front Features	
Feature	**Description**
ZQSFP+/QSFP56 Ports	Ports accept QSFP56 Direct Attach Cable (DAC) or QSFP56 transceiver modules
Port LED	Each port has a status LED that indicates a port linkup
Reset Button	Reset the switch
Fault LED	Indicates module has either failed POST or has detected an operational fault within the module
Initiation OK	Indicates module is operational and has passed the POST with no critical fault
Module Fault LED	Module has either failed POST or has detected an operational fault within the module
Latch Levers	Used to physically install or uninstall the module
UID Button and LED	Unit ID LED indicator can be activated using the button or the CMM interface

6.3 Installation

Make sure the cover to the switch module has been installed before installation.

1. Pull open the latch levers of the blade switch module.
2. Slide the switch module into the bay until the module connectors seat in the enclosure.
3. Push the latch levers closed.

The module will power on and a POST test will verify it is working properly.

Removing the Blade Switch

The switch module is hot-swappable. The blade enclosure and blades can continue to operate when it is removed.

- Pull open the latch levers and pull the module out of the enclosure.

6.4 Specifications

Hardware Specifications

- Internal Ports: Twenty HDR 200G Ports
- External Ports: Twenty HDR 200G Ports with ZQSFP+/QSFP56 connectors

Physical & Environmental Specifications

- Weight: 8.927 LB
- Dimensions: 6 &1/2” x 10 &9/16” x 1 &1/2”
- Temperature: Operating 0°C to 45°C (32°F to 113°F)
- Humidity: Operating 5% to 95% (non-condensing)

Power Specifications

- Hot-Pluggable: Yes
- Power consumption (Typical): 244 Watts

Enclosure Compatibility

- This blade switch module is compatible with the Supermicro enclosure SBE-820H with no more than one switch module per enclosure.

6.5 Port Mapping

The port mapping between the blade servers and the switch internal ports is shown in the table below.

Port Mapping	
Module	**Internal Port**
A1	P21
A2	P22
A3	P23
A4	P24
A5	P25
A6	P26
A7	P27
A8	P28
A9	P29
A10	P30
B1	P31
B2	P32
B3	P33
B4	P34
B5	P35
B6	P36
B7	P37
B8	P38
B9	P39
B10	P40

6.6 Cabling and Transceiver Compatibility

The SBM-IBS-H4020 has been qualified with the following cables for compatibility:

Passive:

- CBL-NTWK-0643—INFINIBAND, QSFP56, 200G, PASSIVE, PULL, 2M, 26AWG
- CBL-MCP7H50-H002R26—INFINIBAND, QSFP56,HDR 200G to 2x100G, 2M, 26AWG

Active:

- CBL-MFS1S00H10-MT037—INFINIBAND, QSFP56, 200G, ACTIVE OPTICAL 10M
- CBL-QSFP56AOC-20M—INFINIBAND, QSFP56, 200G, ACTIVE OPTICAL 20M

Transceiver:

- MMA1T00-HS Optical Transceiver HDR QSFP56 MPO 850nm SR4 up to 100m

Chapter 7

Motherboard Connections

This chapter describes the connections on the motherboard and provides pinout definitions. Note that depending on how the system is configured, not all connections are required. The LEDs on the motherboard are also described here. A motherboard layout indicating component locations may be found in Chapter 1. More detail can be found in the Motherboard Manual

Please review the Safety Precautions in Appendix A before installing or removing components.

7.1 Power Connections

Main Power Connector

The proprietary main power header is PWR1.

Storage Drive Power Connectors

The proprietary 4-pin connector, HDD2_PWR, is connected to the AOM-SB1-SATA31 to provide power to the HDD2.

7.2 Headers and Connectors

Fan Header

A 4-pin fan header (FAN1) is located on the motherboard. This fan header is reserved for liquid cooling.

Fan Header Pin Definitions

Pin#	Definition
1	Ground (Black)
2	+12V (Red)
3	Tachometer
4	PWM Control

TPM Header

The JTPM1 header is used to connect a Trusted Platform Module (TPM), which is available from Supermicro. A TPM 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 storage drive is not installed in the system.

Trusted Platform Module Header Pin Definitions

Pin#	Definition	Pin#	Definition
1	P3V3	2	SPI_TPM_CS_N
3	PCI-E_RESET_N#	4	SPI_PCH_MISO
5	SPI_PCH_CLK#	6	Ground
7	SPI_PCH_MOSI	8	N/A
9	JTPM1_P3V3A	10	IRQ_TPM_SPIN_N

M.2 Slot

The M2-1 connector is an M.2 slot for SSD storage. It is PCIe 4.0 x4 SSD in the 2280 form factor with support of M-Key 2280.

RAID Key Header

A VROC RAID Key header is located at JRK1. It supports VMD used in creating optional advanced NVMe RAID configurations. See the VROC section for details.

RAID Key Header Pin Definitions

Pin#	Definition
1	Ground
2	3.3V Standby
3	Ground
4	PCH_RAID_KEY

I-SATA 3.0 Port (for SBI-420P-1T3N)

The motherboard has one SATA 3.0 port (I-SATA1), which is supported by the Intel C621A PCH. Connect this port to the AOM-SB1-SATA31 add-on module.

HDD2 SATA Activity LED Connector (for SBI-420P-1T3N)

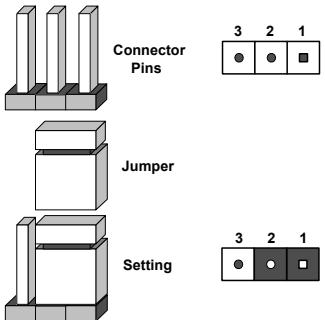
JLED is a 3-pin connector used to indicate the status of HDD2 SATA Activity. Connect JLED to the AOM-SB1-SATA31 add-on module to show HDD2 SATA activity.

7.3 Jumpers

Explanation of Jumpers

To modify the operation of the motherboard, jumpers are used to choose between optional settings. Jumpers create shorts between two pins to change the function associated with it. Pin 1 is identified with a square solder pad on the printed circuit board. See the motherboard layout page for jumper locations.

Note: On a two-pin jumper, "Closed" means the jumper is on both pins and "Open" indicates the jumper is either on only one pin or has been completely removed.



ME Recovery

JPME1 is used for ME Firmware Recovery mode, which will limit system resource for essential function use only without putting restrictions on power use. In the single operation mode, online upgrade will be available in Recovery mode.

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

CMOS Clear Contacts

JBT1 is used to clear CMOS. Instead of pins, this jumper consists of contact pads. See Chapter 10 for more information.

JBT1 contact pads

7.4 LED Indicators

BMC Heartbeat LED

LEDM1 is a BMC Heartbeat indicator. It blinks green when the BMC is working properly.

M.2 Activity LED

LED1 is an M.2 Activity indicator. When it is blinking green, M.2 is active.

Chapter 8

Blade Software

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

8.1 Installing the Operating System

An operating system (OS) must be installed on each blade module. Blades with Microsoft Windows OS and blades with Linux OS can operate within the same blade enclosure. Refer to the SuperMicro website for a list of supported operating systems.

Installing by using PXE Boot

Preboot Execution Environment (PXE) is used to boot a computer over a network. To install the OS using PXE, the following conditions must be met:

- The PXE BOOT option in BIOS must be enabled.
- A PXE server has been configured; this can be another blade in the system.
- The PXE server must be connected over a network to the blade switch to be booted.
- The blade has only non-partitioned/unformatted hard drives installed and no bootable devices attached to it.

Once these conditions are met, make sure the PXE server is running. Then turn on the blade on which you wish to install the OS. The BIOS in the blade will look at all bootable devices and finding none, will connect to the PXE server to begin the boot/install.

Installing by using Virtual Media (Drive Redirection)

You can install the OS via Virtual Media through either the IPMIview (Java-based client utility), SuperBladeTool or the Web-based Management Utility. With this method, the OS is installed from an ISO image that resides on another system.

Refer to the manuals on the SuperMicro website for further details on the Virtual Media (CD-ROM or Drive Redirection) sections of these two utility programs.

Linux Installation with Two Storage Drives—Note

When installing Linux with three storage drives you may encounter a situation where one drive is recognized as HDA and the other drive is recognized as SDA. This is normal since in this case the connection for SATA HDDs is from two different controllers.

Under Native IDE mode (which is the default), your Linux OS will see one drive as HDA and the other as SDA. If the SATA controller mode operation is changed to AMD_AHCI in the BIOS, then the HDDs will appear as SDA and SDB.

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. Boot from a bootable device with Windows OS installation. You can see a bootable device list by pressing **F11** during the system startup.

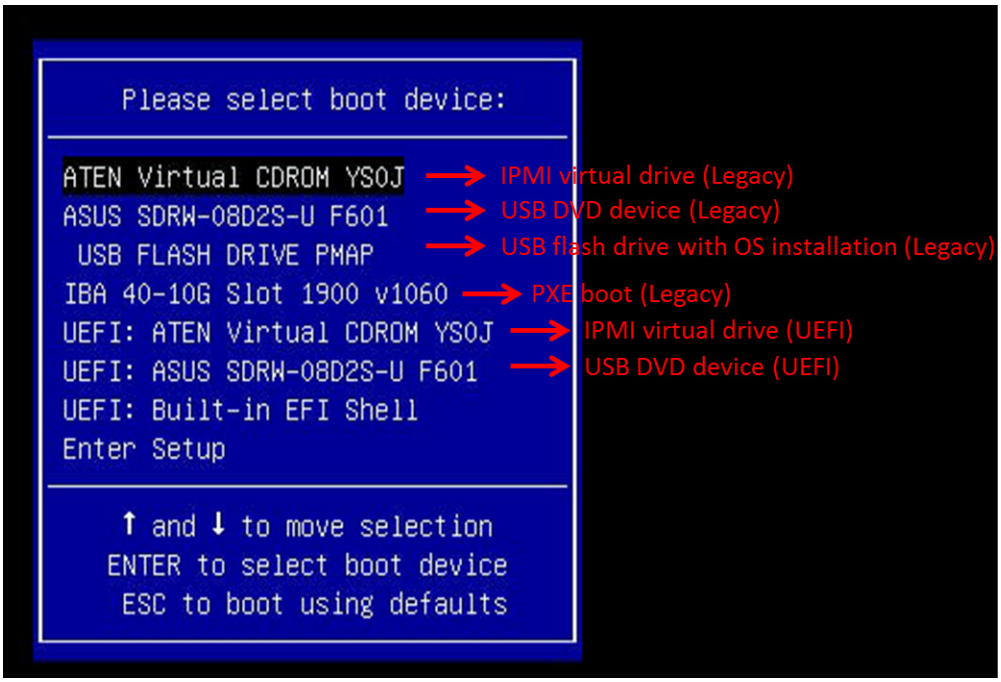


Figure 8-1. Select Boot Device

3. 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.

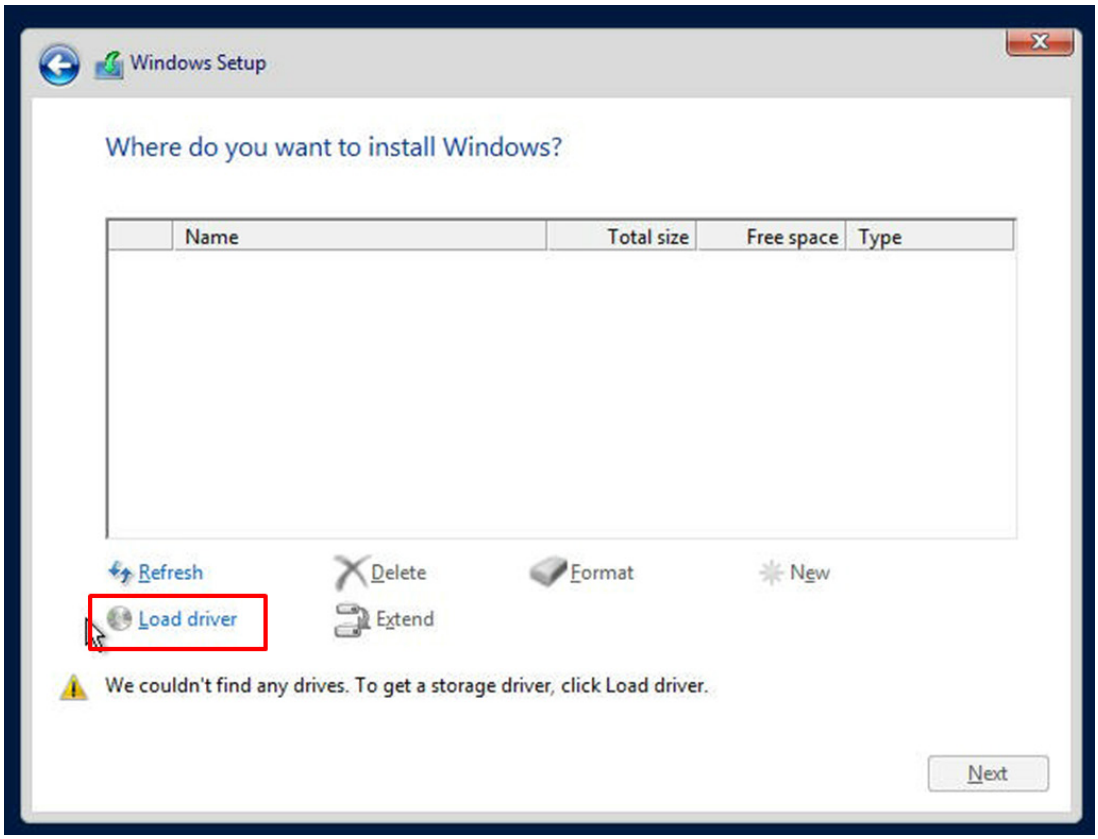


Figure 8-2. Load Driver Link

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.

4. Once all devices are specified, continue with the installation.
5. After the Windows OS installation has completed, the system will automatically reboot multiple times.

8.2 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 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.

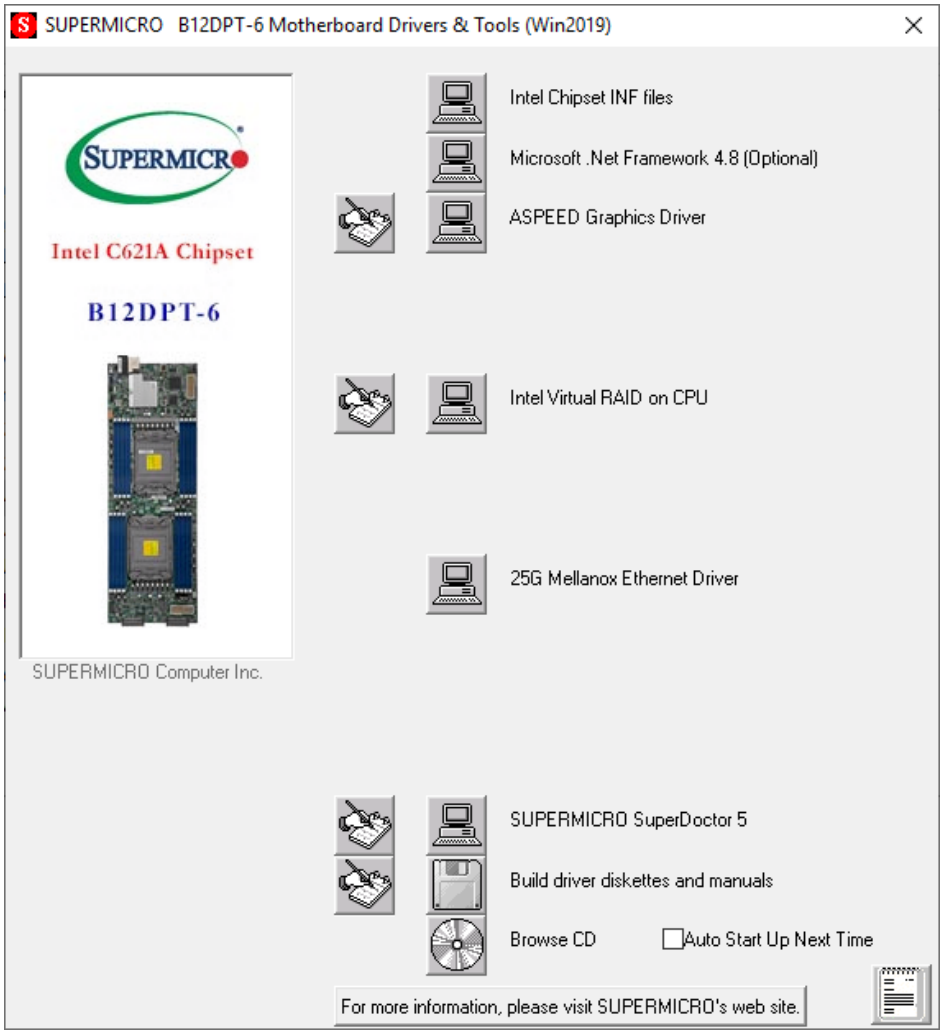


Figure 8-3. Driver & Tool Installation Screen

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 reboot 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.

8.3 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 the BMC. SuperDoctor 5 Management Server monitors HTTP, FTP, and SMTP services to optimize the efficiency of your operation.

SuperDoctor® Manual and Resources

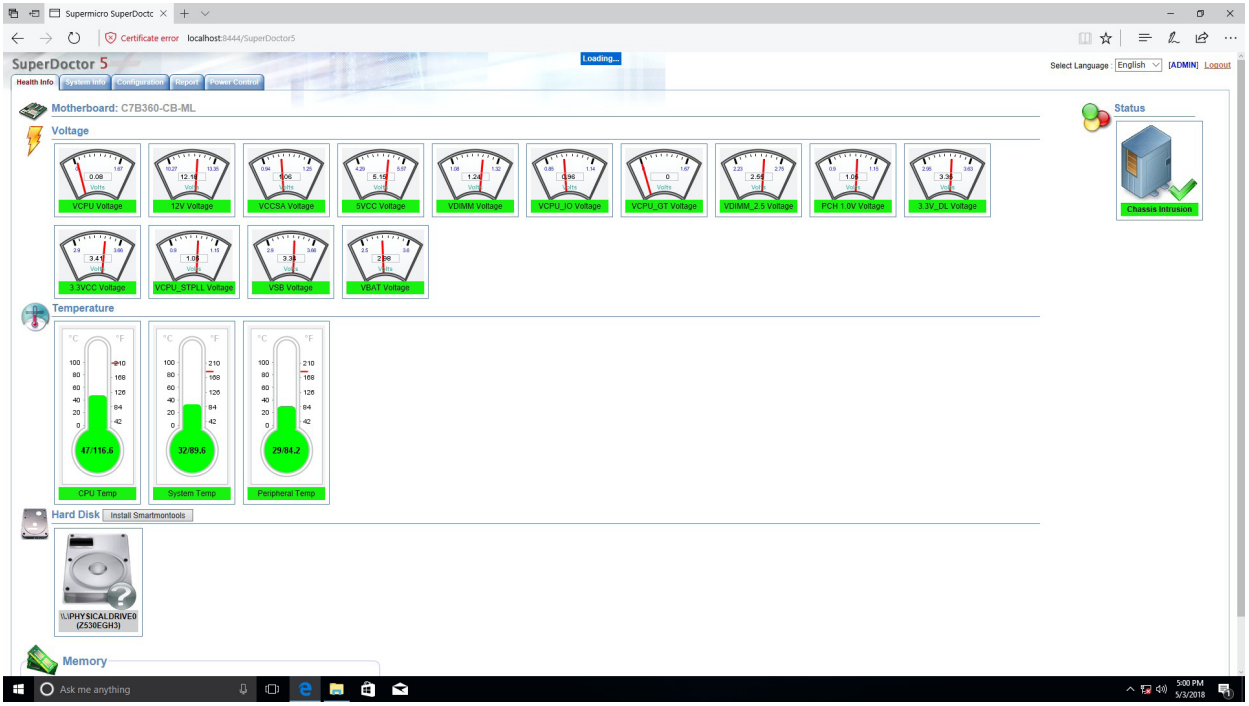


Figure 8-4. SuperDoctor 5 Interface Display Screen (Health Information)

8.4 BMC

The motherboard provides remote access, monitoring and management through the baseboard management controller (BMC) and other management controllers distributed among different system modules. There are several BIOS settings that are related to BMC. For general documentation and information on BMC, visit our website at:

www.supermicro.com/en/solutions/management-software/bmc-resources

BMC ADMIN User Password

For security, each system is assigned a unique default BMC password for the ADMIN user. This can be found on a sticker on the chassis and a sticker on the motherboard. The sticker also displays the BMC MAC address. If necessary, the password can be reset using the Supermicro IPMICFG tool.

Figure 8-5. BMC Password Label

The sticker can be found on the pull-out service tag at the front of the chassis. See Chapter 1 for the location.

Chapter 9

Optional Components

This chapter describes optional system components.

9.1 TPM Security Module

SPI capable TPM 2.0 (or 1.2) with Infineon 9670 controller, Horizontal form factor

The JTPM1 header is used to connect a Trusted Platform Module (TPM). A TPM is a security device that supports encryption and authentication in hard drives. It enables the motherboard to deny access if the TPM associated with the hard drive is not installed in the system.

Details and installation procedures are at:

https://www.supermicro.com/manuals/other/TPM.pdf.

9.2 Intel Virtual RAID on CPU (VROC)

Intel® Virtual RAID on CPU (Intel VROC) is an enterprise RAID solution for NVMe SSDs directly attached to Intel Xeon Scalable processors. Intel Volume Management Device (VMD) is an integrated controller inside the CPU PCI-E root complex.

- A single processor supports up to 12 NVMe SSDs and up to 6 RAID arrays.
- A dual processor system supports up to 24 NVMe SSDs and 12 RAID arrays.

Strip sizes are 4K, 8K, 16K, 32K, 64K, 128K.

Requirements and Restrictions

- **Intel VROC is only available when the system is configured for UEFI boot mode.**
- To enable the **mdadm** command and support for RSTe, install the patch from
  - Linux: https://downloadcenter.intel.com/download/28158/Intel-Virtual-RAID-on-CPU-Intel-VROC-and-Intel-Rapid-Storage-Technology-enterprise-Intel-RSTe-Driver-for-Linux-
  - Windows: https://downloadcenter.intel.com/download/28108/Intel-Virtual-RAID-on-CPU-Intel-VROC-and-Intel-Rapid-Storage-Technology-enterprise-Intel-RSTe-Driver-for-Windows-
- To enable Intel VROC, a hardware key must be inserted on the motherboard, and the appropriate processor's Virtual Management Devices must be enabled in the BIOS setup.
- It is possible to enable Intel VROC without a hardware key installed, but only RAID0 will be enabled.
- Intel VROC is not compatible with secure boot. This feature must be disabled.
- When creating bootable OS RAID1 devices, you must have both devices on the same CPU, and a VMD on that CPU.
- Spanning drives when creating RAID devices is not recommended to due to performance issues, even though it is supported.

Supported SSDs and Operating Sytems

To see the latest support information: https://www.intel.com/content/www/us/en/support/articles/000030310/memory-and-storage/ssd-software.html

Additional Information

Additional information is available on the product page for the Supermicro add-on card and the linked manuals.

www.supermicro.com/en/products/accessories/addon/AOC-VROCxxxMOD.php

Hardware Key

The Intel VROC hardware key is a license key that detects the Intel VROC SKU and activates the function accordingly. The key must be plugged into the Supermicro motherboard (connector JRK1). The key options are:

Intel® VROC Keys			
VROC Package	**Description**	**Part Number**	**Intel MM Number**
Standard	RAID 0, 1, 10 Supports 3rd party SSDs	AOC-VROCSTNMOD	951605
Premium	RAID 0, 1, 5, 10 Supports 3rd party SSDs	AOC-VROCPREMOD	951606
Intel SSD only	RAID 0, 1, 5, 10 Supports Intel SSDs only	AOC-VROCINTMOD	956822

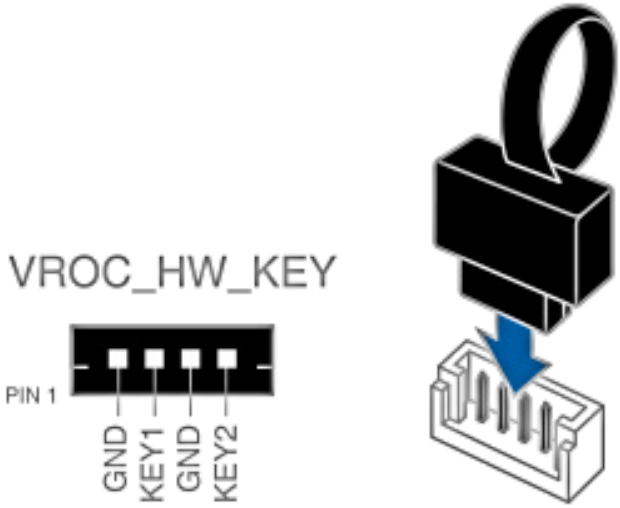


Figure 9-1. Intel VROC RAID Key and Motherboard Connector JRK1

Configuring NVMe RAID Manually

RAID for NVMe SSDs is enabled by default when Intel VROC Raid Key is populated. It may be managed manually through the UEFI BIOS.

1. Reboot the server and press [DEL] key to access the BIOS options.
2. Switch to **Advanced > Chipset Configuration > North Bridge > IIO Configuration > Intel® VMD Technology**.

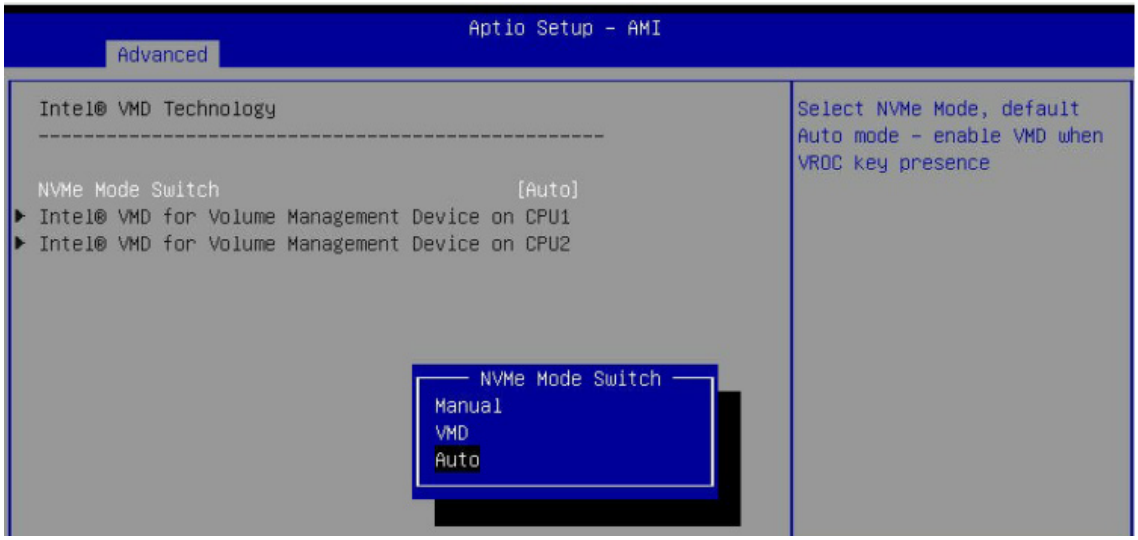


Figure 9-2. BIOS, Selecting VMD Mode

You can select a mode. The default is **Auto**. The **VMD** switch enables VMD mode for all NVMe ports despite the presence of the VROC key. The **Manual** switch allows the user to choose devices on which to enable VMD.

The onboard M.2 NVMe from PCH is located in the CPU1 section.

The screenshot below show example choices in Manual mode.

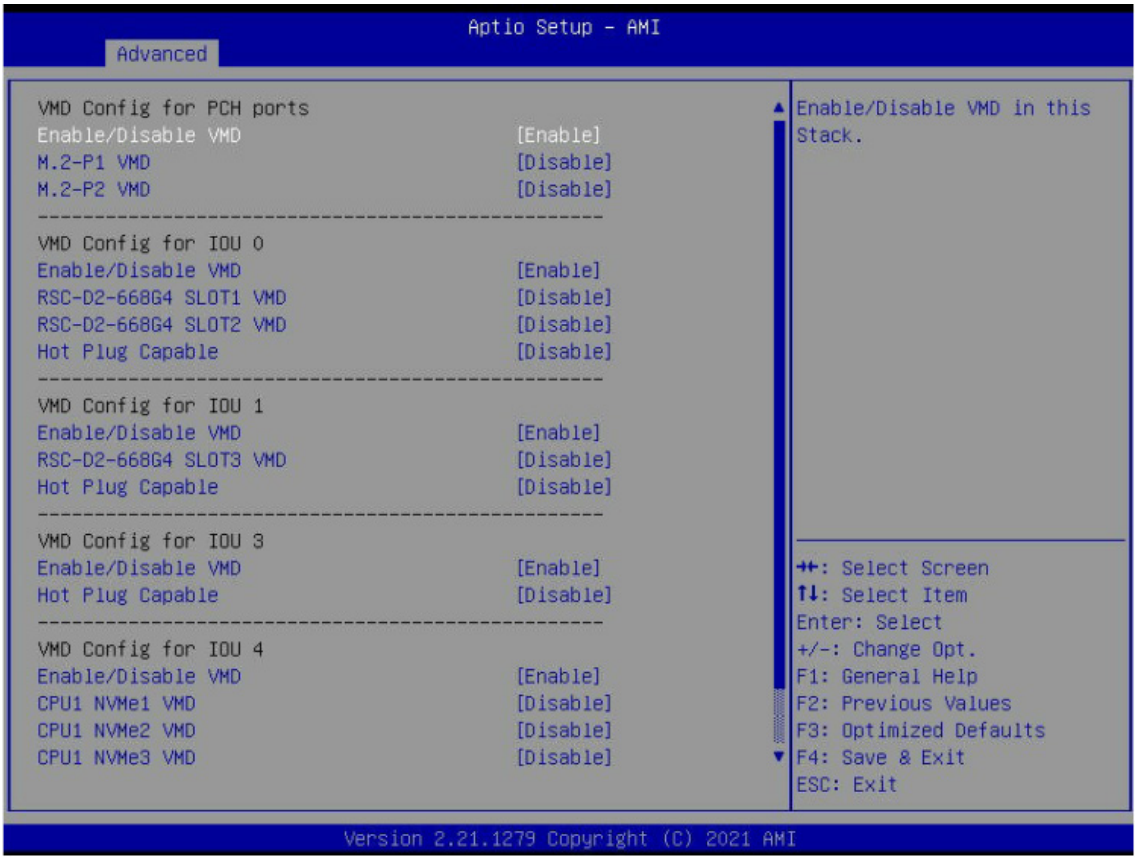


Figure 9-3. BIOS, Manual Mode (Example—your server may look different.)

3. Select the desired PStack# to Enable or Disable the corresponding Intel VMD controller

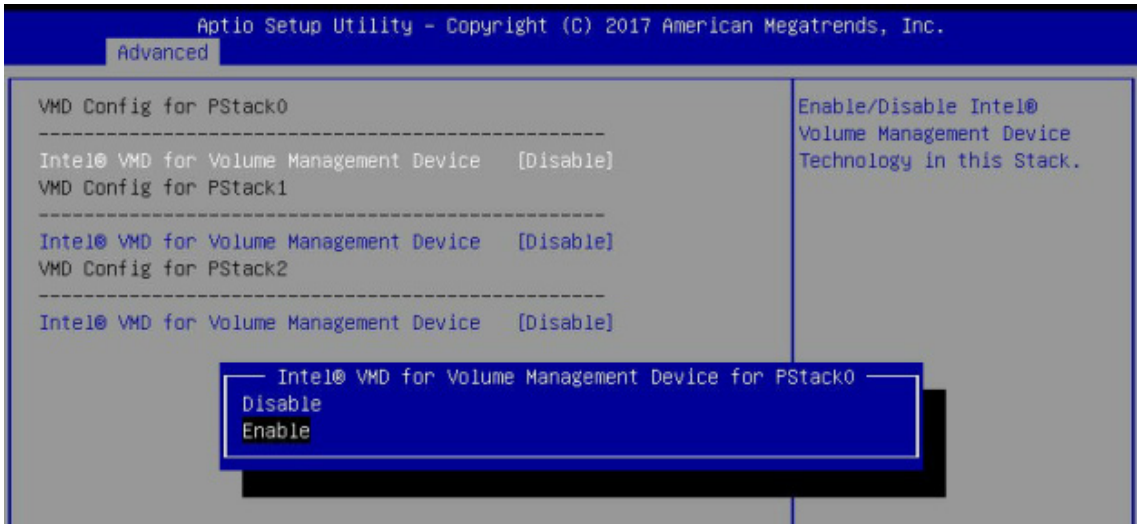


Figure 9-4. BIOS, Enabling VMD for Pstack0

4. Select the desired PCIe slot to Enable or Disable Intel VMD functionality according to the current hardware configuration being used. Hot Plug Capability can also be Enabled or Disabled.

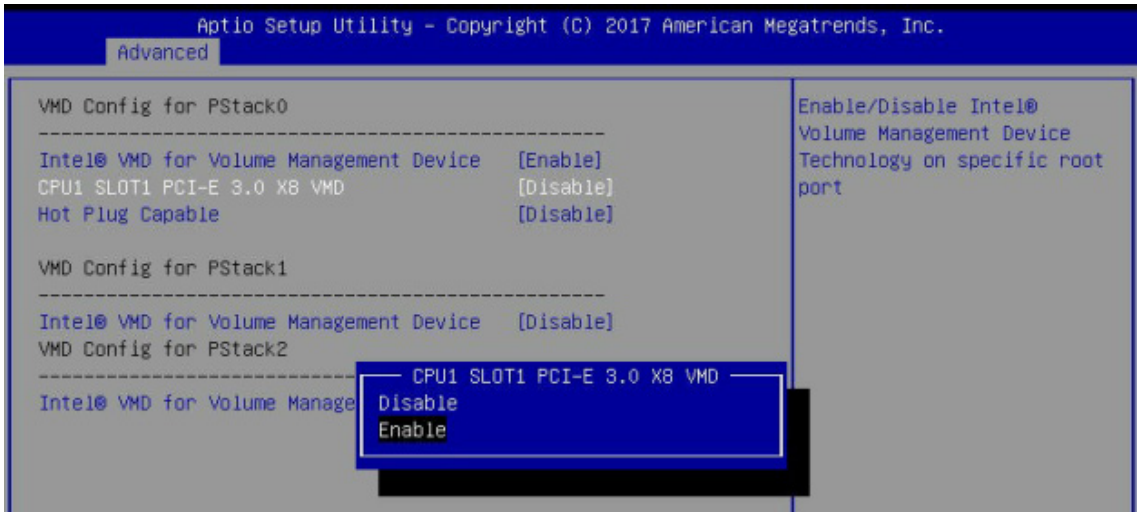


Figure 9-5. BIOS, Enabling VMD Functionality per Slot

5. Repeat steps 3 and 4 for each PStack# on each CPU to be enabled or disabled. In this example, we enabled CPU1 Slot1 (Figure 6-11) and CPU2 Slot5 (Figure 6-12) (four U.2 form factor SSDs), as well as CPU1 M.2 C-1 and CPU1 M2. C-2 (two M.2 form factor SSDs)

Figure 9-6. BIOS, Enabling CPU1 Example

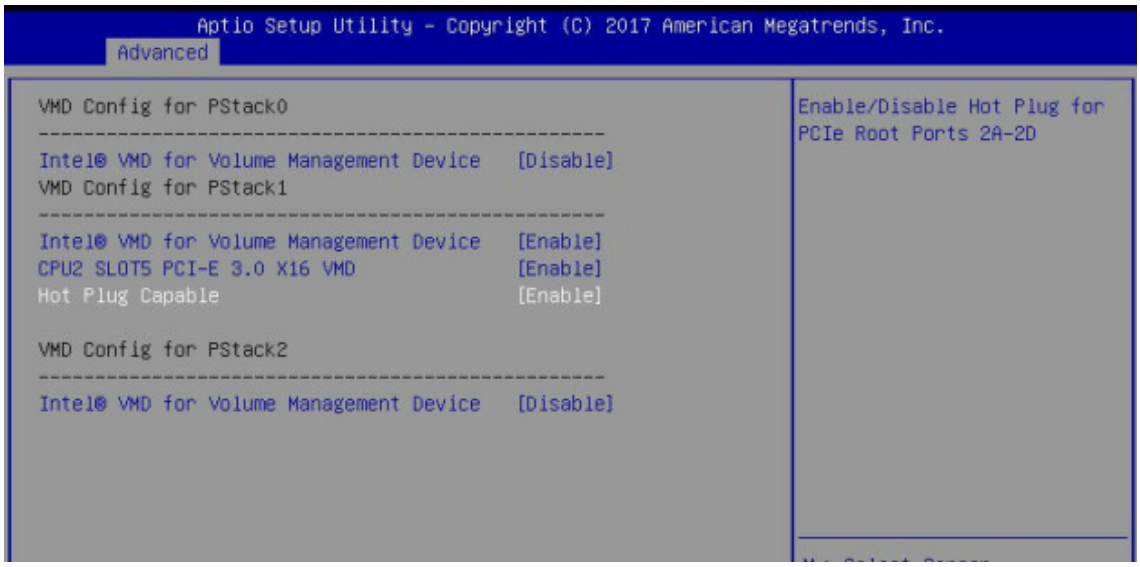


Figure 9-9. BIOS, Enabling CPU2 Example

6. Press [F4] to save the configuration and reboot the system and press [DEL] to enter BIOS.

   Note: Disabling the VMD controller without first deleting the associated existing RAID volume can lead to unexpected behavior. This action is strongly not recommended.

   Note: The effects of physically changing or swapping a CPU on the VMD controller enablement has not yet been thoroughly tested or documented.

7. Switch to **Advanced > Intel(R) Virtual RAID on CPU > All Intel VMD Controllers > Create RAID Volume**.

8. Set **Name**.

9. Set **RAID Level**.

10. If cross-controller RAID is required, select **Enable RAID spanned over VMD Controller**.

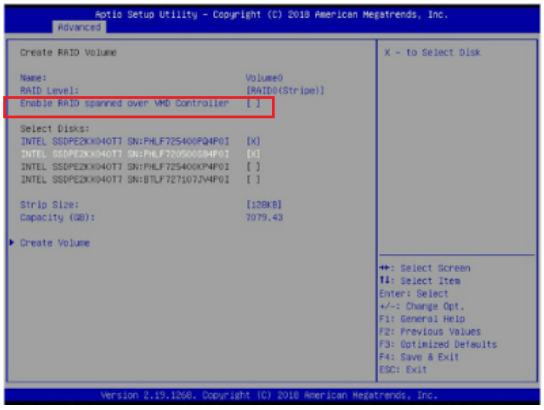


Figure 6-9-9. Created Volume *without* enabling RAID spanned over VMD controller

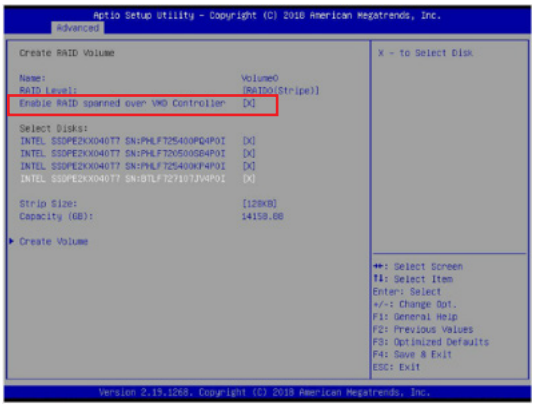


Figure 9-10. Created Volume *with* enabling RAID spanned over VMD controller

11. Select specific disks for RAID with an [X].
    - RAID0: Select at least two [2 - 24] disks
    - RAID1: Select only two disks
    - RAID5: Select at least three [3 - 24] disks
    - RAID10: Select only four disks
12. Select **Strip Size** (Default 64KB).
13. Select **Create Volume**.
14. If another RAID is needed, start again at step 9.
15. Press [F4] to save and reboot.

Status Indications

An LED indicator on the drive carrier shows the RAID status of the drive.

Drive Carrier Status LED Indicator	
Status	**State (red)**
Normal function	Off
Locating	4 Hz blink
Fault	Solid on
Rebuilding	1 Hz Blink

IBPI SFF 8489 Defined Status LED States

Hot Swap Drives

Intel VMD enables hot-plug and hot-unplug for NVMe SSDs, whether from Intel or other manufacturers. Under vSphere ESXi, several steps are necessary to avoid potential stability issues. See the information at link [1] below.

Hot-unplug

1. Prevent devices from being re-detected during rescan:

```
esxcli storage core claiming autoclaim --enabled=false
```

2. Unmount the VMFS volumes on the device. Check [2] for details.
3. Detach the device. Check [3] for details.
4. Physically remove the device.

Hot-plug

- Physically install the device.

ESXi will automatically discover NVMe SSDs, but a manual scan may be required in some cases.

Related Information Links

[1] https://kb.vmware.com/s/article/2151404

[2] https://docs.vmware.com/en/VMware-vSphere/6.5/com.vmware.vsphere.storage.doc/GUID-1B56EF97-F60E-4F21-82A7-8F2A7294604D.html

[3] https://docs.vmware.com/en/VMware-vSphere/6.5/com.vmware.vsphere.storage.doc/GUID-F2E75F67-740B-4406-9F0C-A2D99A698F2A.html

Chapter 10

Troubleshooting and Support

10.1 Information Resources

Website

A great deal of information is available on the Supermicro website, supermicro.com.

Figure 10-1. Supermicro Website

Click the menu icon, the three bars in the upper right corner, then select:

- Specifications for servers and other hardware are available by clicking the **Products** option.
- The **Support** option offers downloads (manuals, BIOS/BMC, drivers, etc.), FAQs, RMA, warranty, and other service extensions.

Direct Links for the SBS-820H-420P System

System SBS-820H-420P specifications page

Blade SBI-420P-1T3N specifications page

B12DPT-6 motherboard page for links to the Quick Reference Guide, User Manual, validated storage drives, etc.

Direct Links for General Support and Information

Frequently Asked Questions

TPM User Guide

BMC User Guide

SuperDoctor5 Large Deployment Guide

Direct Links (continued)

For validated memory, use our Product Resources page

Product Matrices page for links to tables summarizing specs for systems, motherboards, power supplies, riser cards, add-on cards, etc.

Security Center for recent security notices

Supermicro Phone and Addresses

10.2 BMC Interface

The system supports a Baseboard Management Controller (BMC) interface. It provides remote access, monitoring and management. There are several BIOS settings related to the BMC.

For general documentation and information on the BMC, please visit our website at: www.supermicro.com/manuals/other/BMC_Users_Guide_X12_H12.pdf.

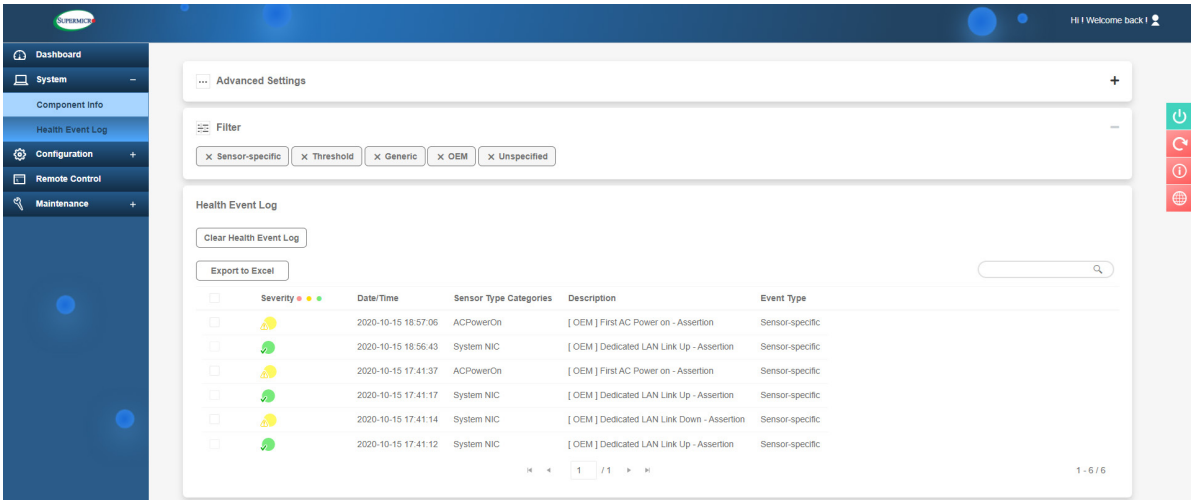


Figure 10-2. BMC Dashboard Sample

10.3 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 or Returning Merchandise for Service sections in this chapter. Power down the system before changing any non hot-swap hardware components.

No Power

1. As you try to power up the system, note any beep codes. Refer to the next section for details on beep codes.
2. Check that the power LED on the motherboard is on.

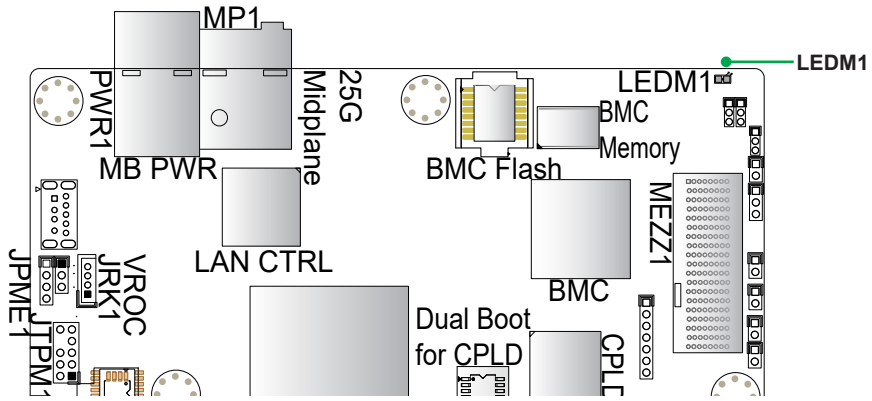


Figure 10-3. Location of the MB Power LED

3. Make sure that the power connector is connected to your power supply.
4. Make sure that no short circuits exist between the motherboard and chassis.
5. Disconnect all cables from the motherboard, including those for the keyboard and mouse.
6. Remove all add-on cards.
7. Install a CPU, a heatsink, connect the internal speaker (if applicable), and the power LED to the motherboard. Make sure that the heatsink is fully seated.
8. Use the correct type of onboard CMOS battery as recommended by the manufacturer. Check to verify that it still supplies ~3VDC. If it does not, replace it with a new one. **Warning**: To avoid possible explosion, do not install the battery upside down.
9. Verify that all jumpers are set to their default positions.
10. Check that the power supplies' input voltage operate at 100-120v or 180-240v.
11. Turn the power switch on and off to test the system

No Video

1. If the power is on but you have no video, remove all the add-on cards and cables.
2. As you try to power up the system, note any beep codes. Refer to the next section for details on beep codes.

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:

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 below.

Memory Errors

1. Make sure that the DIMM modules are properly and fully installed.
2. Confirm that you are using the correct memory. Also, it is recommended that you use the same memory type and speed for all DIMMs in the system. See Section 3.3 for memory details.
3. Check for bad DIMM modules or slots by swapping modules between slots and noting the results.
4. Check the power supply voltage 115V/230V switch.

Losing the System 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. .
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.
3. If the above steps do not fix the setup configuration problem, contact your vendor for repairs.

When the System Becomes Unstable

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: Refer to the product page on our website at http://www.supermicro.com for memory and CPU support and updates.

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 IPMI 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.

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.

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 a 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.

10.4 BIOS Error Beep (POST) Codes

During the POST (Power-On Self-Test) routines, which are performed each time the system is powered on, errors may occur.

Non-fatal errors are those which, in most cases, allow the system to continue the boot-up process. The error messages normally appear on the screen.

Fatal errors are those which will not allow the system to continue the boot-up procedure. If a fatal error occurs, you should consult with your system manufacturer for possible repairs.

These fatal errors are usually communicated through a series of audible beeps. The table below lists some common errors and their corresponding beep codes encountered by users.

BIOS Error Beep (POST) Codes		
Beep Code	**Error Message**	**Description**
1 short	Refresh	Circuits have been reset (Ready to power up)
5 short, 1 long	Memory error	No memory detected in system
5 long, 2 short	Display memory read/write error	Video adapter missing or with faulty memory
1 long continuous	System OH	System overheat condition

Additional BIOS POST Codes

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

When BIOS performs the Power On Self Test, it writes checkpoint codes to I/O port 0080h. If the computer cannot complete the boot process, a diagnostic card can be attached to the computer to read I/O port 0080h (Supermicro p/n AOC-LPC80-20).

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

10.5 Crash Dump Using the BMC Dashboard

In the event of a processor internal error (IERR) that crashes your system, you may want to provide information to support staff. You can download a crash dump of status information using the BMC Dashboard. The BMC manual is available at www.supermicro.com/manuals/other/BMC_Users_Guide_X12_H12.pdf.

Check Error Log

1. Access the BMC web interface.
2. Click the **Server Health** tab, then **Event Log** to verify an IERR error.

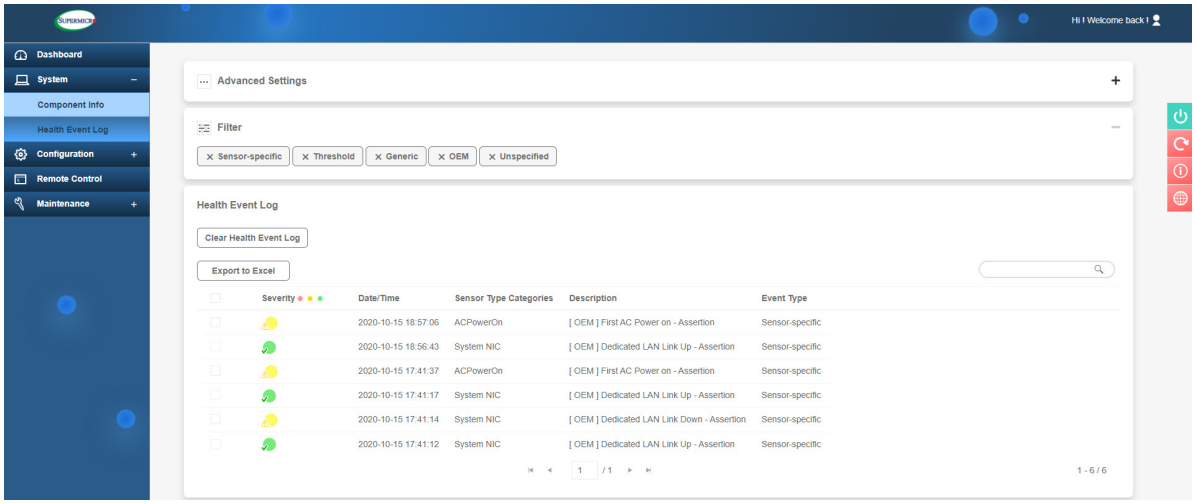


Figure 10-4. BMC Event Log

In the event of an IERR, the BMC executes a crash dump. You must download the crash dump and save it.

10.6 UEFI BIOS Recovery

Warning: Do not upgrade the BIOS unless your system has a BIOS-related issue. Flashing the wrong BIOS can cause irreparable damage to the system. In no event shall Supermicro be liable for direct, indirect, special, incidental, or consequential damages arising from a BIOS update. If you do update the BIOS, do not shut down or reset the system while the BIOS is updating to avoid possible boot failure.

Overview

The Unified Extensible Firmware Interface (UEFI) provides a software-based interface between the operating system and the platform firmware in the pre-boot environment. The UEFI specification supports an architecture-independent mechanism that will allow the UEFI OS loader stored in an add-on card to boot the system. The UEFI offers clean, hands-off management to a computer during system boot.

Recovering the UEFI BIOS Image

A UEFI BIOS flash chip consists of a recovery BIOS block and a main BIOS block (a main BIOS image). The recovery block contains critical BIOS codes, including memory detection and recovery codes for the user to flash a healthy BIOS image if the original main BIOS image is corrupted. When the system power is turned on, the recovery block codes execute first. Once this process is complete, the main BIOS code will continue with system initialization and the remaining POST (Power-On Self-Test) routines.

Note 1: Follow the BIOS recovery instructions below for BIOS recovery when the main BIOS block crashes.

Note 2: When the BIOS recovery block crashes, you will need to follow the procedures to make a Returned Merchandise Authorization (RMA) request. Also, you may use the Supermicro Update Manager (SUM) Out-of-Band (https://www.supermicro.com.tw/products/nfo/SMS_SUM.cfm) to reflash the BIOS.

Recovering the Main BIOS Block with a USB Device

This feature allows the user to recover the main BIOS image using a USB-attached device without additional utilities used. A USB flash device such as a USB Flash Drive, or a USB CD/DVD ROM/RW device can be used for this purpose. However, a USB Hard Disk drive cannot be used for BIOS recovery at this time.

The file system supported by the recovery block is FAT (including FAT12, FAT16, and FAT32) which is installed on a bootable or non-bootable USB-attached device. However, the BIOS might need several minutes to locate the SUPER.ROM file if the media size becomes too large due to the huge volumes of folders and files stored in the device.

To perform UEFI BIOS recovery using a USB-attached device, follow the instructions below.

1. Using a different machine, copy the "Super.ROM" binary image file into the Root "\" directory of a USB device or a writable CD/DVD.

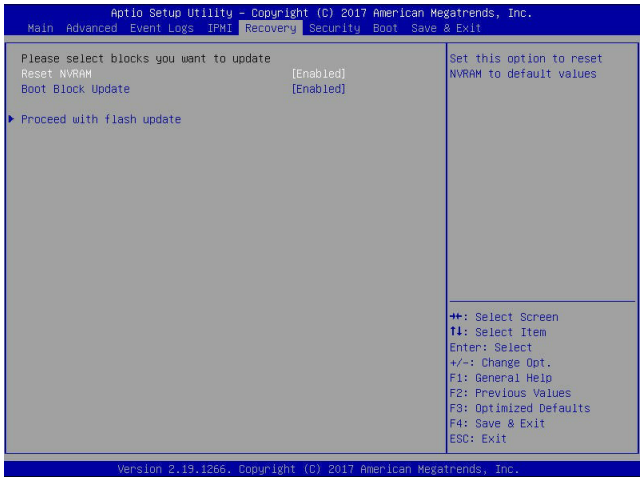
   Note 1: If you cannot locate the "Super.ROM" file in your drive disk, visit our website at www.supermicro.com to download the BIOS package. Extract the BIOS binary image into a USB flash device and rename it "Super.ROM" for the BIOS recovery use.

   Note 2: Before recovering the main BIOS image, confirm that the "Super.ROM" binary image file you download is the same version or a close version meant for your motherboard.

2. Insert the USB device that contains the new BIOS image ("Super.ROM") into your USB drive and reset the system when the following screen appears.

3. After locating the healthy BIOS binary image, the system will enter the BIOS Recovery menu as shown below.

Note: At this point, you may decide if you want to start the BIOS recovery. If you decide to proceed with BIOS recovery, follow the procedures below.

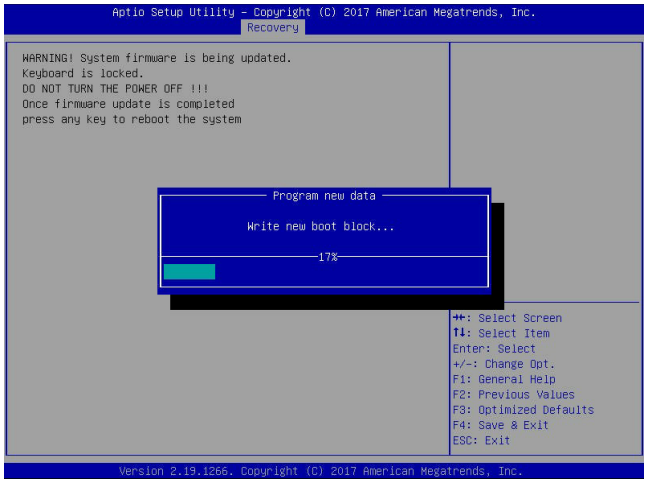


4. When the screen as shown above displays, use the arrow keys to select the item "Proceed with flash update" and press the <Enter> key. You will see the BIOS recovery progress as shown in the screen below.

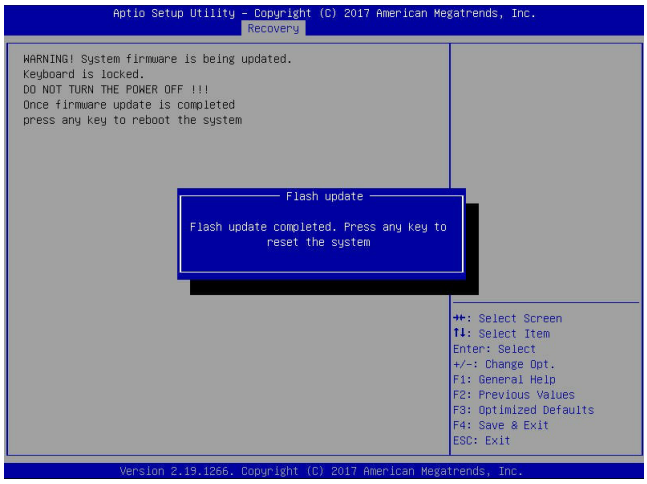
   Note: *Do not interrupt the BIOS flashing process until it has completed*.

5. After the BIOS recovery process is complete, press any key to reboot the system.

6. Using a different system, extract the BIOS package into a USB flash drive.

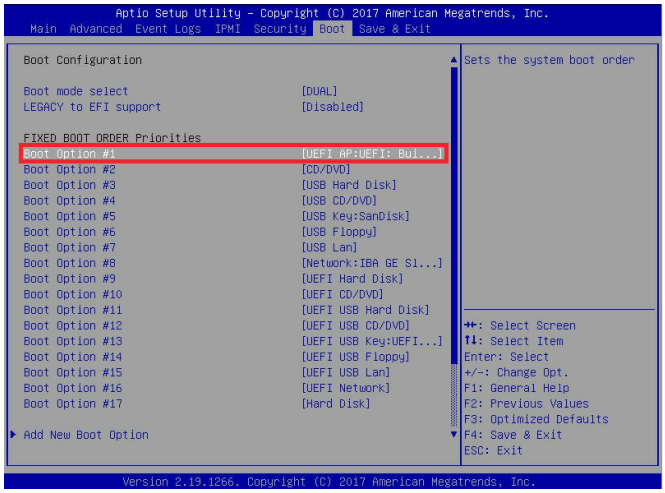


7. Press <Del> continuously during system boot to enter the BIOS Setup utility. From the top of the tool bar, select Boot to enter the submenu. From the submenu list, select Boot

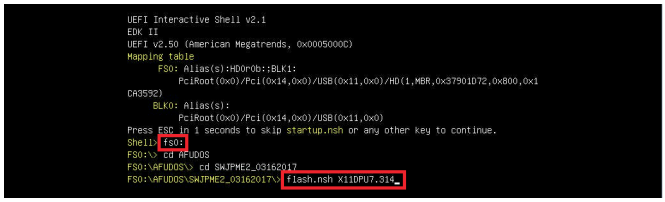


Option #1 as shown below. Then, set Boot Option #1 to [UEFI AP:UEFI: Built-in EFI Shell]. Press <F4> to save the settings and exit the BIOS Setup utility.

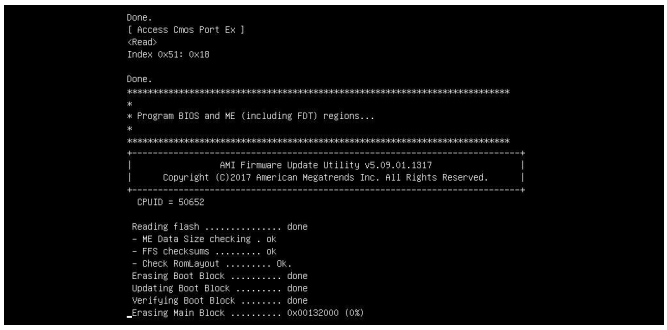
8. When the UEFI Shell prompt appears, type fs# to change the device directory path. Go to the directory that contains the BIOS package you extracted earlier from Step 6. Enter flash.nsh BIOSname.### at the prompt to start the BIOS update process.



Note: *Do not interrupt this process* until the BIOS flashing is complete.

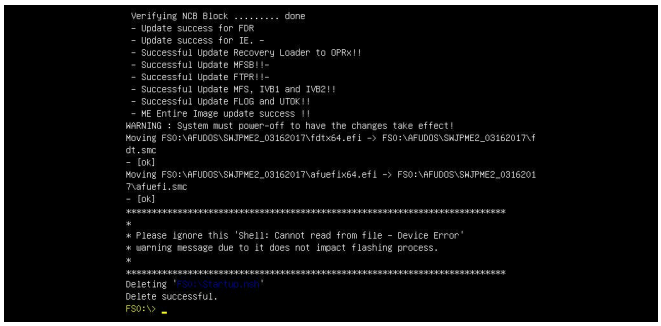


9. The screen above indicates that the BIOS update process is complete. When you see the screen above, unplug the AC power cable from the power supply, clear CMOS, and plug



the AC power cable in the power supply again to power on the system.

10. Press <Del> continuously to enter the BIOS Setup utility.



11. Press <F3> to load the default settings.

12. After loading the default settings, press <F4> to save the settings and exit the BIOS Setup utility.

10.7 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 completely.
2. Remove the onboard 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.

JBT1 contact pads

5. Replace the cover, reconnect the power cords and power on the system.

Notes: Clearing CMOS will also clear all passwords.

Do not use the PW_ON connector to clear CMOS.

10.8 BMC Reset

The BMC can be reset using the UID button.

- Reset – Press and hold the button. After six seconds, the LED blinks at 2Hz. The BMC resets and the reset duration is ~250 ms. Then the BMC starts to boot.
- Restore factory default configuration – Hold the button for twelve seconds. The LED blinks at 4Hz while defaults are configured. **Note**: All BMC settings including username and password will be removed except the FRU and network settings.

Firmware update – When the BMC firmware is being updated, the UID LED blinks at 10Hz.

BMC Reset Options		
Event	**UID LED**	**BMC Heartbeat LED**
Reset	Blue, Blinks at 2Hz	Green, solid
Restore Defaults	Blue, Blinks at 4Hz	Off
Update	Blue, Blinks at 10Hz	

10.9 Where to Get Replacement Components

If you need replacement parts for your system, to ensure the highest level of professional service and technical support, purchase exclusively from our Supermicro Authorized Distributors/System Integrators/Resellers. A list can be found at: http://www.supermicro.com. Click the "Where to Buy" tab.

10.10 Reporting an Issue

Technical Support Procedures

Before contacting Technical Support, please take the following steps. If your system was purchased through a distributor or reseller, please contact them for troubleshooting services. They have the best knowledge of your specific system configuration.

1. Please review the Troubleshooting Procedures in this manual and Frequently Asked Questions on our website before contacting Technical Support.
2. BIOS upgrades can be downloaded from our website. **Note**: Not all BIOS can be flashed depending on the modifications to the boot block code.
3. If you still cannot resolve the problem, include the following information when contacting us for technical support:
   - System, motherboard, and chassis model numbers and PCB revision number
   - BIOS release date/version (this can be seen on the initial display when your system first boots up)
   - System configuration

An example of a Technical Support form is posted on our website. Distributors: For immediate assistance, please have your account number ready when contacting our technical support department by email.

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 to the manufacturer, the RMA number should be prominently displayed on the outside of the shipping carton, and 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, RMA authorizations may be requested online (http://www.supermicro.com/support/rma/).

Whenever possible, repack the chassis in the original Supermicro carton, using the original packaging material. If these are no longer available, be sure to pack the chassis securely, using packaging material to surround the chassis so that it does not shift within the carton and become damaged during shipping.

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

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

Vendor Support Filing System

For issues related to Intel, use the Intel IPS filing system:

https://www.intel.com/content/www/us/en/design/support/ips/training/welcome.html

For issues related to Red Hat Enterprise Linux, since it is a subscription based OS, contact your account representative.

10.11 Feedback

Supermicro values your feedback as we strive to improve our customer experience in all facets of our business. To provide feedback on our manuals, please email us at techwriterteam@supermicro.com.

10.12 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:	+8810-(2) 82210-3990
Fax:	+8810-(2) 82210-3992
Email:	support@supermicro.com.tw
Website:	www.supermicro.com.tw

Appendix A

Standardized Warning Statements for AC Systems

About Standardized Warning Statements

The following statements are industry standard warnings, provided to warn the user of situations which have the potential for bodily injury. Should you have questions or experience difficulty, contact Supermicro's Technical Support department for assistance. Only certified technicians should attempt to install or configure components.

Read this appendix in its entirety before installing or configuring components in the Supermicro chassis.

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

Warning Definition

Warning! This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents.

警告の定義

この警告サインは危険を意味します。

人身事故につながる可能性がありますので、いずれの機器でも動作させる前に、

電気回路に含まれる危険性に注意して、標準的な事故防止策に精通して下さい。

此警告符号代表危险。

您正处于可能受到严重伤害的工作环境中。在您使用设备开始工作之前，必须充分意识到触电的危险，并熟练掌握防止事故发生的标准工作程序。请根据每项警告结尾的声明号码找到此设备的安全性警告说明的翻译文本。

此警告符號代表危險。

您正處於可能身體可能會受損傷的工作環境中。在您使用任何設備之前，請注意觸電的危險，並且要熟悉預防事故發生的標準工作程序。請依照每一注意事項後的號碼找到相關的翻譯說明內容。

Warnung

WICHTIGE SICHERHEITSHINWEISE

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu Verletzungen führen kann. Machen Sie sich vor der Arbeit mit Geräten mit den Gefahren elektrischer Schaltungen und den üblichen Verfahren zur Vorbeugung vor Unfällen vertraut. Suchen Sie mit der am Ende jeder Warnung angegebenen Anweisungsnummer nach der jeweiligen Übersetzung in den übersetzten Sicherheitshinweisen, die zusammen mit diesem Gerät ausgeliefert wurden.

BEWAHREN SIE DIESE HINWEISE GUT AUF.

INSTRUCCIONES IMPORTANTES DE SEGURIDAD

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Al final de cada advertencia encontrará el número que le ayudará a encontrar el texto traducido en el apartado de traducciones que acompaña a este dispositivo.

GUARDE ESTAS INSTRUCCIONES.

IMPORTANTES INFORMATIONS DE SÉCURITÉ

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers liés aux circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions des avertissements figurant dans les consignes de sécurité traduites qui accompagnent cet appareil, référez-vous au numéro de l'instruction situé à la fin de chaque avertissement.

CONSERVEZ CES INFORMATIONS.

תקנון הצהרות אזהרה

הצהרות הבאות הן אזהרות על פי תקני התעשייה, על מנת להזהיר את המשתמש מפני חבלה פיזית אפשרית. במידה ויש שאלות או היתקלות בבעיה כלשהי, יש ליצור קשר עם מחלקת תמיכה טכנית של סופרמיקרו. טכנאים מוסמכים בלבד רשאים להתקין או להגדיר את הרכיבים.

יש לקרוא את הנספח במלואו לפני התקנת או הגדרת הרכיבים במארזי סופרמיקרו.

ا كً ف حالة وٌكي أى تتسبب ف اصابة جسذ ةٌ هذا الزهز عٌ خطز !تحذ زٌ .
قبل أى تعول على أي هعذات،كي على علن بالوخاطز ال أٌجوة عي الذوائز
الكهزبائ ةٍ
وكي على درا ةٌ بالووارسات البقائ ةٍ لو عٌ وقع أي حادث
استخذم رقن الب إٍ الو صٌص ف هًا ةٌ كل تحذ زٌ للعشر تزجوتها

안전을 위한 주의사항

경고!

이 경고 기호는 위험이 있음을 알려 줍니다. 작업자의 신체에 부상을 야기 할 수 있는 상태에 있게 됩니다. 모든 장비에 대한 작업을 수행하기 전에 전기회로와 관련된 위험요소들을 확인하시고 사전에 사고를 방지할 수 있도록 표준 작업절차를 준수해 주시기 바랍니다.

해당 번역문을 찾기 위해 각 경고의 마지막 부분에 제공된 경고문 번호를 참조하십시오

BELANGRIJKE VEILIGHEIDSINSTRUCTIES

Dit waarschuwings symbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij een elektrische installatie betrokken risico's en dient u op de hoogte te zijn van de standaard procedures om ongelukken te voorkomen. Gebruik de nummers aan het eind van elke waarschuwing om deze te herleiden naar de desbetreffende locatie.

BEWAAR DEZE INSTRUCTIES

Installation Instructions

Warning! Read the installation instructions before connecting the system to the power source.

設置手順書

システムを電源に接続する前に、設置手順書をお読み下さい。

警告

将此系统连接电源前,请先阅读安装说明。

警告

將系統與電源連接前，請先閱讀安裝說明。

Warnung

Vor dem Anschließen des Systems an die Stromquelle die Installationsanweisungen lesen.

¡Advertencia!

Lea las instrucciones de instalación antes de conectar el sistema a la red de alimentación.

Attention

Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation.

יש לקרוא את הוראות התקנה לפני חיבור המערכת למקור מתח.

اقر إرشادات التركيب قبل توصيل النظام إلى مصدر للطاقة

시스템을 전원에 연결하기 전에 설치 안내를 읽어주십시오.

Waarschuwing

Raadpleeg de installatie-instructies voordat u het systeem op de voedingsbron aansluit.

Circuit Breaker

Warning! This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 250 V, 20 A.

サーキット・ブレーカー

この製品は、短絡（過電流）保護装置がある建物での設置を前提としています。

保護装置の定格が250 V、20 Aを超えないことを確認下さい。

警告

此产品的短路(过载电流)保护由建筑物的供电系统提供,确保短路保护设备的额定电流不大于250V,20A。

警告

此產品的短路(過載電流)保護由建築物的供電系統提供,確保短路保護設備的額定電流不大於250V,20A。

Warnung

Dieses Produkt ist darauf angewiesen, dass im Gebäude ein Kurzschluss- bzw. Überstromschutz installiert ist. Stellen Sie sicher, dass der Nennwert der Schutzvorrichtung nicht mehr als: 250 V, 20 A beträgt.

¡Advertencia!

Este equipo utiliza el sistema de protección contra cortocircuitos (o sobrecorrientes) del edificio. Asegúrese de que el dispositivo de protección no sea superior a: 250 V, 20 A.

Attention

Pour ce qui est de la protection contre les courts-circuits (surtension), ce produit dépend de l'installation électrique du local. Vérifiez que le courant nominal du dispositif de protection n'est pas supérieur à :250 V, 20 A.

מוצר זה מסתמך על הגנה המותקנת במבנים למניעת קצר חשמלי. יש לוודא כי
המכשיר המגן מפני הקצר החשמלי הוא לא יותר מ-250VDC, 20A

هذا المنتج يعتمد على معداث الحمايت مه الدوائرالقصيرة التي تم تثبيتها في
المبنى
تأكد من أن تقييم الجهاز الوقائي ليس أكثر من : 20A, 250V

경고!

이 제품은 전원의 단락(과전류)방지에 대해서 전적으로 건물의 관련 설비에 의존합니다.
보호장치의 정격이 반드시 250V(볼트), 20A(암페어)를 초과하지 않도록 해야 합니다.

Waarschuwing

Dit product is afhankelijk van de kortsluitbeveiliging (overspanning) van uw electrische installatie. Controleer of het beveiligde aparaat niet groter gedimensioneerd is dan 250V, 20A.

Power Disconnection Warning

Warning! The system must be disconnected from all sources of power and the power cord removed from the power supply module(s) before accessing the chassis interior to install or remove system components.

電源切断の警告

システムコンポーネントの取り付けまたは取り外しのために、シャーシー内部にアクセスするには、

システムの電源はすべてのソースから切断され、電源コードは電源モジュールから取り外す必要があります。

警告

在你打开机箱并安装或移除内部器件前,必须将系统完全断电,并移除电源线。

警告

在您打開機殼安裝或移除內部元件前，必須將系統完全斷電，並移除電源線。

Warnung

Das System muss von allen Quellen der Energie und vom Netzanschlusskabel getrennt sein, das von den Spg.Versorgungsteilmodulen entfernt wird, bevor es auf den Chassisinnenraum zurückgreift, um Systemsbestandteile anzubringen oder zu entfernen.

¡Advertencia!

El sistema debe ser disconnected de todas las fuentes de energía y del cable eléctrico quitado de los módulos de fuente de alimentación antes de tener acceso el interior del chasis para instalar o para quitar componentes de sistema.

Attention

Le système doit être débranché de toutes les sources de puissance ainsi que de son cordon d'alimentation secteur avant d'accéder à l'intérieur du chassis pour installer ou enlever des composants de systéme.

אזהרה מפני ניתוק חשמלי

!אזהרה

יש לנתק את המערכת מכל מקורות החשמל ויש להסיר את כבל החשמלי מהספק
.לפני גישה לחלק הפנימי של המארז לצורך התקנת או הסרת רכיבים

يجب فصم اننظاو من جميع مصادر انطاقت وإزانت سهك انكهرباء من وحدة امداد
انطاقت قبم
انصل إنى انمناطق انداخهيت نههيكم نتثبيج أو إزانت مكناث الجهاز

경고!

시스템에 부품들을 장착하거나 제거하기 위해서는 섀시 내부에 접근하기 전에 반드시 전원 공급장치로부터 연결되어있는 모든 전원과 전기코드를 분리해주어야 합니다.

Waarschuwing

Voordat u toegang neemt tot het binnenwerk van de behuizing voor het installeren of verwijderen van systeem onderdelen, dient u alle spanningsbronnen en alle stroomkabels aangesloten op de voeding(en) van de behuizing te verwijderen

Equipment Installation

Warning! Only trained and qualified personnel should be allowed to install, replace, or service this equipment.

機器の設置

トレーニングを受け認定された人だけがこの装置の設置、交換、またはサービスを許可されています。

警告

只有经过培训且具有资格的人员才能进行此设备的安装、更换和维修。

警告

只有經過受訓且具資格人員才可安裝、更換與維修此設備。

Warnung

Das Installieren, Ersetzen oder Bedienen dieser Ausrüstung sollte nur geschultem, qualifiziertem Personal gestattet werden.

¡Advertencia!

Solamente el personal calificado debe instalar, reemplazar o utilizar este equipo.

Attention

Il est vivement recommandé de confier l'installation, le remplacement et la maintenance de ces équipements à des personnels qualifiés et expérimentés.

אזהרה!

צוות מוסמך בלבד רשאי להתקין, להחליף את הציוד או לתת שירות עבור הציוד.

والمدربيه لتزكيب واستبدال أو خدمة هذا الجهاس يجب أن يسمح فقط للمظفيه المؤهليه

경고!

훈련을 받고 공인된 기술자만이 이 장비의 설치, 교체 또는 서비스를 수행할 수 있습니다.

Waarschuwing

Deze apparatuur mag alleen worden geïnstalleerd, vervangen of hersteld door geschoold en gekwalificeerd personeel.

Restricted Area

Warning! This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. (This warning does not apply to workstations).

アクセス制限区域

このユニットは、アクセス制限区域に設置されることを想定しています。

アクセス制限区域は、特別なツール、鍵と錠前、その他のセキュリティの手段を用いてのみ出入りが可能です。

警告

此部件应安装在限制进出的场所，限制进出的场所指只能通过使用特殊工具、锁和钥匙或其它安全手段进出的场所。

警告

此裝置僅限安裝於進出管制區域，進出管制區域係指僅能以特殊工具、鎖頭及鑰匙或其他安全方式才能進入的區域。

Warnung

Diese Einheit ist zur Installation in Bereichen mit beschränktem Zutritt vorgesehen. Der Zutritt zu derartigen Bereichen ist nur mit einem Spezialwerkzeug, Schloss und Schlüssel oder einer sonstigen Sicherheitsvorkehrung möglich.

¡Advertencia!

Esta unidad ha sido diseñada para instalación en áreas de acceso restringido. Sólo puede obtenerse acceso a una de estas áreas mediante la utilización de una herramienta especial, cerradura con llave u otro medio de seguridad.

Attention

Cet appareil doit être installée dans des zones d'accès réservés. L'accès à une zone d'accès réservé n'est possible qu'en utilisant un outil spécial, un mécanisme de verrouillage et une clé, ou tout autre moyen de sécurité.

אזור עם גישה מוגבלת

אזהרה!

יש להתקין את היחידה באזורים שיש בהם הגבלת גישה. הגישה ניתנת בעזרת
'כלי אבטחה בלבד)מפתח, מנעול וכד.)

تخصيص هذه انحذة نترك بُها ف مناطق محظورة تم .
،مَكن انصبل إن منطقت محظورة فقط من خلال استخذاو أداة خاصت
أو أ وس هُت أخري نلالأمما قفم ومفتاح

경고!

이 장치는 접근이 제한된 구역에 설치하도록 되어있습니다. 특수도구, 잠금 장치 및 키, 또는 기타 보안 수단을 통해서만 접근 제한 구역에 들어갈 수 있습니다.

Waarschuwing

Dit apparaat is bedoeld voor installatie in gebieden met een beperkte toegang. Toegang tot dergelijke gebieden kunnen alleen verkregen worden door gebruik te maken van speciaal gereedschap, slot en sleutel of andere veiligheidsmaatregelen.

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 النبع 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.

Redundant Power Supplies

Warning! This unit might have more than one power supply connection. All connections must be removed to de-energize the unit.

冗長電源装置

このユニットは複数の電源装置が接続されている場合があります。

ユニットの電源を切るためには、すべての接続を取り外さなければなりません。

警告
此部件连接的电源可能不止一个，必须将所有电源断开才能停止给该部件供电。

警告
此裝置連接的電源可能不只一個，必須切斷所有電源才能停止對該裝置的供電。

Warnung

Dieses Gerät kann mehr als eine Stromzufuhr haben. Um sicherzustellen, dass der Einheit kein trom zugeführt wird, müssen alle Verbindungen entfernt werden.

¡Advertencia!

Puede que esta unidad tenga más de una conexión para fuentes de alimentación. Para cortar por completo el suministro de energía, deben desconectarse todas las conexiones.

Attention

Cette unité peut avoir plus d'une connexion d'alimentation. Pour supprimer toute tension et tout courant électrique de l'unité, toutes les connexions d'alimentation doivent être débranchées.

אם קיים יותר מספק אחד

אזהרה!

ליחדה יש יותר מחיבור אחד של ספק. יש להסיר את כל החיבורים על מנת לרוקן את היחידה.

قد يكون لهذا الجهاز عدة اتصالات بوحدات امداد الطاقة .

يجب إزالة كافة الاتصالات لعسل الوحدة عن الكهرباء

경고!

이 장치에는 한 개 이상의 전원 공급 단자가 연결되어 있을 수 있습니다. 이 장치에 전원을 차단하기 위해서는 모든 연결 단자를 제거해야만 합니다.

Waarschuwing

Deze eenheid kan meer dan één stroomtoevoeraansluiting bevatten. Alle aansluitingen dienen verwijderd te worden om het apparaat stroomloos te maken.

Backplane Voltage

Warning! Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing.

バックプレーンの電圧

システムの稼働中は危険な電圧または電力が、バックプレーン上にかかっています。

修理する際には注意ください。

警告

当系统正在进行时，背板上有很危险的电压或能量，进行维修时务必小心。

警告

當系統正在進行時，背板上有危險的電壓或能量，進行維修時務必小心。

Warnung

Wenn das System in Betrieb ist, treten auf der Rückwandplatine gefährliche Spannungen oder Energien auf. Vorsicht bei der Wartung.

¡Advertencia!

Cuando el sistema está en funcionamiento, el voltaje del plano trasero es peligroso. Tenga cuidado cuando lo revise.

Attention

Lorsque le système est en fonctionnement, des tensions électriques circulent sur le fond de panier. Prendre des précautions lors de la maintenance.

מתח בפנל האחורי

אזהרה!

קיימת סכנת מתח בפנל האחורי בזמן תפעול המערכת. יש להיזהר במהלך העבודה.

هناك خطر مه التيار الكهزبائي أوالطاقة المجبدة على اللحة
عندما يكن النظام يعمل كه حذرا عند خدمة هذا الجهاس

경고!
시스템이 동작 중일 때 후면판 (Backplane)에는 위험한 전압이나 에너지가 발생 합니다. 서비스 작업 시 주의하십시오.

Waarschuwing
Een gevaarlijke spanning of energie is aanwezig op de backplane wanneer het systeem in gebruik is. Voorzichtigheid is geboden tijdens het onderhoud.

Comply with Local and National Electrical Codes

Warning! Installation of the equipment must comply with local and national electrical codes.

地方および国の電気規格に準拠

機器の取り付けはその地方および国の電気規格に準拠する必要があります。

警告
设备安装必须符合本地与本国电气法规。

警告
設備安裝必須符合本地與本國電氣法規。

Warnung
Die Installation der Geräte muss den Sicherheitsstandards entsprechen.

¡Advertencia!
La instalacion del equipo debe cumplir con las normas de electricidad locales y nacionales.

Attention
L'équipement doit être installé conformément aux normes électriques nationales et locales.

תיאום חוקי החשמל הארצי

אזהרה!

התקנת הציוד חייבת להיות תואמת לחוקי החשמל המקומיים והארציים.

تركيب المعدات الكهربائية يجب أن يمتثل للقاويه المحلية والبطية المتعلقة
بالكهرباء

경고!

현 지역 및 국가의 전기 규정에 따라 장비를 설치해야 합니다.

Waarschuwing

Bij installatie van de apparatuur moet worden voldaan aan de lokale en nationale elektriciteitsvoorschriften.

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.

التخلص النهائي من هذا المنتج ينبغي التعامل معه وفقا لجميع القانين واللائح البطنية عند

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.

Hot Swap Fan Warning

Warning! Hazardous moving parts. Keep away from moving fan blades. The fans might still be turning when you remove the fan assembly from the chassis. Keep fingers, screwdrivers, and other objects away from the openings in the fan assembly's housing.

ファン・ホットスワップの警告

警告!回転部品に注意。運転中は回転部(羽根)に触れないでください。シャーシから冷却ファン装置を取り外した際、ファンがまだ回転している可能性があります。ファンの開口部に、指、ドライバー、およびその他のものを近づけないで下さい。

警告!

警告！危险的可移动性零件。请务必与转动的风扇叶片保持距离。 当您从机架移除风扇装置，风扇可能仍在转动。小心不要将手指、螺丝起子和其他物品太靠近风扇

警告

危險的可移動性零件。請務必與轉動的風扇葉片保持距離。 當您從機架移除風扇裝置，風扇可能仍在轉動。小心不要將手指、螺絲起子和其他物品太靠近風扇。

Warnung

Gefährlich Bewegende Teile. Von den bewegenden Lüfterblätter fern halten. Die Lüfter drehen sich u. U. noch, wenn die Lüfterbaugruppe aus dem Chassis genommen wird. Halten Sie Finger, Schraubendreher und andere Gegenstände von den Öffnungen des Lüftergehäuses entfernt.

¡Advertencia!

Riesgo de piezas móviles. Mantener alejado de las aspas del ventilador. Los ventiladores podran dar vuelta cuando usted quite ell montaje del ventilador del chasis. Mandtenga los dedos, los destornilladores y todos los objetos lejos de las aberturas del ventilador

Attention

Pieces mobiles dangereuses. Se tenir a l'ecart des lames du ventilateur Il est possible que les ventilateurs soient toujours en rotation lorsque vous retirerez le bloc ventilateur du châssis. Prenez garde à ce que doigts, tournevis et autres objets soient éloignés du logement du bloc ventilateur.

אזהרה!

חלקים נעים מסוכנים. התרחק מלהבי המאוורר בפעולהכאשר מסירים את חלקי
המאוורר מהמארז, יתכן והמאוררים עדיין עובדים. יש להרחיק למרחק בטוח את
האצבעות וכלי עבודה שונים מהפתחים בתוך המאוורר

تحذير! أجزاء متحركة خطرة. ابتعد عن شفرات المروحة المتحركة.من الممكن أن
المراوح لا تزال تدورعند إزالة كتلة المروحة من الهيكل يجب إبقاء الأصابع
.ومفكات البراغي وغيرها من الأشياء بعيدا عن الفتحات في كتلة المروحة

경고!

움직이는 위험한 부품. 회전하는 송풍 날개에 접근하지 마세요. 섀시로부터 팬 조립품을 제거할 때 팬은 여전히 회전하고 있을 수 있습니다. 팬 조림품 외관의 열려있는 부분들로부터 손가락 및 스크류드라이버, 다른 물체들이 가까이 하지 않도록 배치해 주십시오.

Waarschuwing

Gevaarlijk bewegende onderdelen. Houd voldoende afstand tot de bewegende ventilatorbladen. Het is mogelijk dat de ventilator nog draait tijdens het verwijderen van het ventilatorsamenstel uit het chassis. Houd uw vingers, schroevendraaiers en eventuele andere voorwerpen uit de buurt van de openingen in de ventilatorbehuizing.

Power Cable and AC Adapter

Warning! When installing the product, use the provided or designated connection cables, power cables and AC adaptors. Using any other cables and adaptors could cause a malfunction or a fire. Electrical Appliance and Material Safety Law prohibits the use of UL or CSA -certified cables (that have UL/CSA shown on the cord) for any other electrical devices than products designated by Supermicro only.

電源コードとACアダプター

製品を設置する場合、提供または指定および購入された接続ケーブル、電源コードとACアダプターを 該当する地域の条例や安全基準に適合するコードサイズやプラグと共に使用下さい。他のケーブルやアダプタを使用すると故障や火災の原因になることがあります。

電気用品安全法は、ULまたはCSA認定のケーブル(UL/CSAマークがコードに表記)を Supermicroが指定する製品以外に使用することを禁止しています。

警告

安装此产品时,请使用本身提供的或指定的或采购的连接线,电源线和电源适配器，包含遵照当地法规和安全要求的合规的电源线尺寸和插头.使用其它线材或适配器可能会引起故障或火灾。除了Supermicro所指定的产品,电气用品和材料安全法律规定禁止
使用未经UL或CSA认证的线材。(线材上会显示UL/CSA符号)。

警告

安裝此產品時,請使用本身提供的或指定的或採購的連接線,電源線和電源適配器，包含遵照當地法規和安全要求的合規的電源線尺寸和插頭.使用其它線材或適配器可能會引起故障或火災。除了Supermicro所指定的產品,電氣用品和材料安全法律規定禁止
使用未經UL或CSA認證的線材。 (線材上會顯示UL/CSA符號)。

Warnung

Nutzen Sie beim Installieren des Produkts ausschließlich die von uns zur Verfügung gestellten Verbindungskabeln, Stromkabeln und/oder Adapater, die Ihre örtlichen Sicherheitsstandards einhalten. Der Gebrauch von anderen Kabeln und Adapter können Fehlfunktionen oder Feuer verursachen. Die Richtlinien untersagen das Nutzen von UL oder CAS zertifizierten Kabeln (mit UL/CSA gekennzeichnet), an Geräten oder Produkten die nicht mit Supermicro gekennzeichnet sind.

¡Advertencia!

Cuando instale el producto, utilice la conexión provista o designada o procure cables, Cables de alimentación y adaptadores de CA que cumplan con los códigos locales y los requisitos de seguridad, incluyendo el tamaño adecuado del cable y el enchufe. El uso de otros cables y adaptadores podría causar un mal funcionamiento o un incendio. La Ley de Seguridad de Aparatos Eléctricos y de Materiales prohíbe El uso de cables certificados por UL o CSA (que tienen el certificado UL / CSA en el código) para cualquier otros dispositivos eléctricos que los productos designados únicamente por Supermicro.

Attention

Lors de l'installation du produit, utilisez les cables de connection fournis ou désigné ou achetez des cables, cables de puissance et adaptateurs respectant les normes locales et les conditions de securite y compris les tailles de cables et les prises electriques appropries. L'utilisation d'autres cables et adaptateurs peut provoquer un dysfonctionnement ou un incendie. Appareils électroménagers et la Loi sur la Sécurité Matériel interdit l'utilisation de câbles certifies- UL ou CSA (qui ont UL ou CSA indiqué sur le code) pour tous les autres appareils électriques sauf les produits désignés par Supermicro seulement.

AC ימאתמו סיילמשח סילבכ

!הרהזא

ךרוצל ומאתוה וא ושכרנ רשא AC סימאתמו סיקפס ,סילבכב שמתשהל שי ,רצומה תא סיניקתמ רשאכ לכב שומיש . עקתהו לבכה לש הנוכנ הדימ ללוכ ,תוימוקמה תוחיטבה תושירדל ומאתוה רשאו ,הנקתהה למשחה יריש כמב שומישה יקוחל סאתהב .ילמשח רצק וא הלקתל סורגל לולע ,רחא גוסמ סאתמ וא לבכ לש דוק סהילע עיפומ רשאכ) CSA-ב וא UL -ב סיכמסומה סילבכב שמתשהל רוסיא סייק ,תוחיטבה יקוחו .דבלב Supermicro י"ע סאתוה רשא רצומב קר אלא ,רחא ילמשח רצומ לכ רובע UL/CSA)

عند تركيب المنتج، قم باستخدام التوصيلات المتوفرة أو المحددة أو قم بشراء الكابلات الكهربائية ومحولات التيار المتردد مع الالتزام بقوانين ومتطلبات السلامة المحلية بما في ذلك حجم الموصل والقابس السليم. استخدام أي كابلات ومحولات أخرى قد يتسبب في عطل أو حريق. يحظر قانون السلامة للأجهزة الكهربائية والمعدات استخدام الكابلات المعتمدة من قبل UL أو CSA لأي منتجات المعينة والمحددة من قبل Supermicro. والتي تحمل علامة (UL/CSA) مع أي معدات أخرى غير

전원 케이블 및 AC 어댑터

경고! 제품을 설치할 때 현지 코드 및 적절한 굵기의 코드와 플러그를 포함한 안전 요구 사항을 준수하여 제공되거나 지정된 연결 혹은 구매 케이블, 전원 케이블 및 AC 어댑터를 사용하십시오.

다른 케이블이나 어댑터를 사용하면 오작동이나 화재가 발생할 수 있습니다. 전기 용품 안전법은 UL 또는 CSA 인증 케이블 (코드에 UL / CSA가 표시된 케이블)을 Supermicro 가 지정한 제품 이외의 전기 장치에 사용하는 것을 금지합니다.

Stroomkabel en AC-Adapter

Waarschuwing! Bij het aansluiten van het Product uitsluitend gebruik maken van de geleverde Kabels of een andere geschikte aan te schaffen Aansluitmethode, deze moet altijd voldoen aan de lokale voorschriften en veiligheidsnormen, inclusief de juiste kabeldikte en stekker. Het gebruik van niet geschikte Kabels en/of Adapters kan een storing of brand veroorzaken. Wetgeving voor Elektrische apparatuur en Materiaalveiligheid verbied het gebruik van UL of CSA -gecertificeerde Kabels (met UL/CSA in de code) voor elke andere toepassing dan de door Supermicro hiervoor beoogde Producten.

Appendix B

System Specifications

Blades

SBI-420P-1T3N

Motherboard *(per node)*

B12DPT-6

Processors *(per node)*

Dual 3rd Gen Intel Xeon Scalable processors in a P+ (LGA4189)- socket with up to 38 cores and a thermal design power (TDP) of up to 220W; CPU TDP up to 270W with optional liquid cooling kit SNK-P3021A

Chipset

Intel PCH C621A (LBG-R)

BIOS

128Mb SPI Flash EEPROM with AMI BIOS

Memory *(per node)*

Sixteen DIMM slots, 3DS ECC DDR4-3200MHz RDIMM/LRDIMM or Intel Optane PMem 200 Series*
(up to 4TB for DDR4, or up to 4TB of PMem and 2TB DDR4)
* Note: PMem 200 Series are supported on 3rd gen Intel Xeon Scalable Platinum, Gold and selected Silver processors.

Storage Drives *(per node)*

Two hot-swap 2.5"SATA or NVMe, and one hot-swap 2.5" SATA
One M.2 SSD

LAN Connections *(per node)*

Two 25GbE onboard; an optional mezzanine card can provide two additional 25GbE, EDR, HDR, or OPA

Blade Chassis

MCP-680-41001-0N; (WxHxD) 1.75 x 6.5 x 23.5 in. (44.5 x 165 x 597 mm)

Address Defaults

CMM: IP Address: https://192.168.100.100, Gateway Address: 0.0.0.0, Subnet Mask: 255.255.255.0
GbE Switch: IP Address: https://192.168.100.102, Gateway Address: 192.168.100.1, Subnet Mask: 255.255.255.0

Enclosure

8U SBE-820H-822, (WxHxD) 14" x 17.6" x 32" in. (356 x 447 x 813 mm)

System Cooling

Eight 4-cm counter-rotating fans, two CPU heatsinks, two air shrouds to direct air flow

Power Supply

Model PWS-2K21A-BR, eight 2200W redundant modules, 80Plus Titanium level
AC Input
100-127 Vac, 50-60 Hz
200-240 Vac, 50-60 Hz
+12V
UL & cUL (North America):
200-220V: 2090W, 220-240V: 2200W
Rest of the world:
100-127V: 1200W, 200-220V: 1800W, 220-230V: 1980W, 230-240V: 2090W
+12 V standby: 2A

Operating Environment

Operating Temperature: 10º to 35º C (50º to 95º F)
Non-operating Temperature: -40º to 60º C (-40º to 140º F)
Operating Relative Humidity: 8% to 90% (non-condensing)
Non-operating Relative Humidity: 5% to 95% (non-condensing)

Regulatory Compliance

FCC, ICES, CE, UKCA, VCCI, RCM, NRTL, CB

Certified Safety Models

Compliant with UL and CSA: B820-22

Applied Directives, Standards

EMC/EMI: 2014/30/EU (EMC Directive)
Electromagnetic Compatibility Regulations 2016
FCC Part 15 Subpart B
ICES-003
VCCI-CISPR 32
AS/NZS CISPR 32
BS/EN55032
BS/EN55035
CISPR 32
CISPR 24/CISPR 35
BS/EN 61000-3-2
BS/EN 61000-3-3
BS/EN 61000-4-2
BS/EN 61000-4-3
BS/EN 61000-4-4
BS/EN 61000-4-5
BS/EN 61000-4-6
BS/EN 61000-4-8
BS/EN 61000-4-11

Environment:
2011/65/EU (RoHS Directive)
EC 1907/2006 (REACH)
2012/19/EU (WEEE Directive)
California Proposition 65

Product Safety: 2014/35/EU (LVD Directive)
UL/CSA 62368-1 (USA and Canada)
Electrical Equipment (Safety) Regulations 2016
IEC/BS/EN 62368-1

Perchlorate Warning

California Best Management Practices Regulations for Perchlorate Materials: This Perchlorate warning applies only to products containing CR (Manganese Dioxide) Lithium coin cells. “Perchlorate Material-special handling may apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate”

General Data Center Environmental Specifications

Particulate contamination specifications

- Air filtration: Data centers must be kept clean to Class 8 of ISO 14644-1 (ISO 2015). The air entering the data center should be filtered with a MERV 11 filter or better. The air within the data center should be continuously filtered with a MERV 8 filter or better.
- Conductive dust: Air should be free fo conductive dust, zinc whiskers, or other conductive particles.
- Corrrosive dust: Air should be free of corrosive dust.

Gaseous* contamination specifications

- Copper coupon corrosion rate: <300 Å/month per class G1 as defined by ANSI.ISA71.04-2013, reference by ASHRAE TC 9.9
- Silver coupon corrosion rate: <200 Å/month per class G1 as defined by ANSI.ISA71.04-2013, reference by ASHRAE TC 9.9
- *If testing with silver or copper coupons results in values less that 200 Å/month or 300 Å/month, respectively, then operating up to 70% relative humidity (RH) is acceptable. If the testing shows corrosion levels exceed these limits, then catalyst-type pollutants are probably present and RH should be driven to 50% or lower.