# Mona 2U servers Range
# User Manual

*Powered by AMD Processors*

## Applicable Model

| Model | Maintenance | Cooling |
|---|---|---|
| BRB-MA1-214GG-R0XX | Rear access | Air cooling |



## Environmental Protection

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- For server open-source software statements, please contact 2CRSi Customer Service.
- Some interfaces and commands for production, assembly and return-to-depot, and advanced commands for locating faults, if used improperly, may cause equipment abnormality or business interruption. This is not described herein.

Please contact 2CRSi for such information.

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| | |
|---|---|
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| Address: | 32 Rue Jacobi-Netter, 67200 Strasbourg, France |
| Email: | support@2crsi.com |

# Preface

## Abstract

This white paper describes the Mona 2U servers range AMD-based's appearance, features, performance parameters, and software and hardware compatibility, providing in-depth information.

## Intended Audience

This white paper is intended for:

- 2CRSi pre-sales engineers
- Pre-sales engineers of channel partners
- Enterprise pre-sales engineers

## Symbol Conventions

The symbols that may be found in this document are defined as follows.

| Symbol | Description |
|---|---|
| DANGER | A potential for serious injury, or even death if not properly handled |
| WARNING | A potential for minor or moderate injury if not properly handled |
| CAUTION | A potential loss of data or damage to equipment if not properly handled |
| IMPORTANT | Operations or information that requires special attention to ensure successful installation or configuration |
| NOTE | Supplementary description of document information |

## Revision History

| Version | Date | Description of Changes |
|---|---|---|
| V1 | 2023/09/14 | Initial release |
| V2 | 2023/09/15 | Technical Validation |
| V2.1 | 2024/03/08 | Technical update |

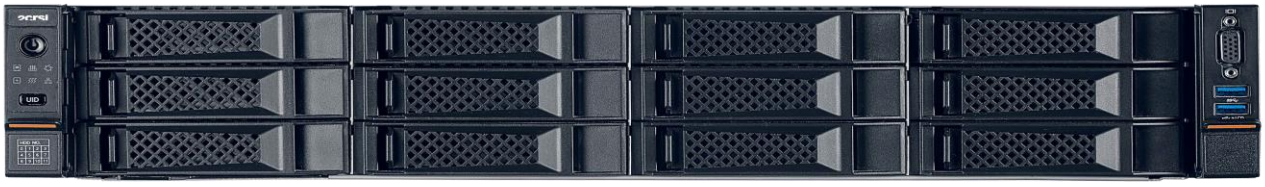
# Table of Contents

# 1. Product Overview

The 2CRSi AMD-based system is a self-developed 2U 2-socket rack server that features the 4th Gen AMD EPYC 9004 series processors. With high core counts, high memory bandwidth, ultra-high I/O throughput and other key features, it offers highly efficient compute resources and excellent performance to compute-intensive applications. It inherits high quality and reliability in various scenarios. Besides, it delivers exceptional performance, high expandability, broad ecosystem compatibility and ease of operation, management and maintenance.

Hence, it is ideal for cloud service, cloud computing, Internet data centers, and high- performance computing scenarios.

**12X 3.5-INCH DRIVE CONFIGURATION**



# 2. Features

## 2.1 Expandability and Performance

- Features the 4th Gen AMD Genoa processors, with up to 96 cores per processor, TDP up to 400 W, a max boost frequency up to 4.40 GHz, an L3 cache of up to 384 MB, and 4 xGMI links at up to 32 GT/s, delivering unrivalled processing performance.
    - Up to 2 processors, 96 cores and 192 threads per processor, maximizing concurrent execution of multi-threaded applications.
    - Increased L2 cache. Each core has a private L2 cache of 1 MB.
    - Turbo Core technology brings you an intelligent self-adaption system. It allows the CPU cores to exceed the processor TDP at peak workload and run at the max frequency.
    - Hyper-threading technology allows every processor core to run multiple threads (up to 2 threads per core) concurrently, improving the performance of multi-threaded applications.
    - AMD Virtualization (AMD-V) technology integrates hardware-level virtualization features, allowing the operating system to better leverage hardware to handle virtualized workloads.
    - Advanced Vector Extensions 512 (AVX-512), an instruction set, can significantly improve the floating-point performance for compute-intensive workloads.
- Up to 24 DDR5 DIMMs.
    - Up to 24 DDR5 ECC RDIMMs (4,800 MT/s) for superior speed, high availability, and a memory capacity up to 3,072 GB, with a theoretical memory bandwidth of 900 GB/s.
- Supports a variety of drive configurations, providing elastic and expandable storage capacities to meet different capacity and upgrade requirements.
- Supports up to 12 hot-swap all-flash NVMe solid state drives (SSDs) with significantly higher I/O performance than mixing SSDs and HDDs or using only HDDs, as SSDs provide nearly 100X input/output operations per second (IOPS) over typical HDDs.
- 12 Gb/s serial attached SCSI (SAS) is double the internal storage data transfer rate of 6 Gb/s SAS, maximizing the performance of storage I/O-intensive applications.

- Infinity Fabric technology, IOD and PCIe 5.0 controllers are integrated into processors, significantly shortening I/O latency and enhancing overall system performance.

- Up to 8 PCIe 5.0 expansion slots.

- Two OCP 3.0 slots for 1 Gb ;10 Gb ; 25 Gb ; 100 Gb ; 200 Gb OCP 3.0 cards, hot- swappable (RHEL 7.9 supports hot-swap; Windows Server 2019/2022 supports hot- swap when it starts up with the OCP 3.0 card installed; RHEL 8.x does not support hot-swap).

## 2.2 Availability and Serviceability

- Supports hot-swap SAS/SATA/NVMe drives and RAID controller cards with RAID levels 0/1/1E/10/5/50/6/60 (with SAS/SATA drives), RAID cache and data protection enabled by the super-capacitor in case of power failures. Supported RAID levels vary with RAID controller cards.

- SSDs are much more reliable than traditional HDDs, increasing system uptime.

- The UID and status LEDs for fault diagnosis on the front panel, and the BMC Web GUI indicate the status of key components and quickly lead technicians to failed (or failing) components, simplifying maintenance, speeding up troubleshooting, and enhancing system availability.

- The BMC (2CRSi BMC) management port on the rear panel enables you to directly access the BMC and supports local O&M, improving O&M efficiency.

- Provides 2 hot-swap PSUs with 1+1 redundancy and 6 hot-swap fans with N+1 redundancy, improving system availability.

- The onboard BMC monitors system parameters in real time and sends alerts in advance, so that technicians can take corresponding measures in time to ensure stable operation and minimize system downtime.

- Based on humanization design, the server allows tool-less maintenance. With enhanced and optimized structural parts, the system allows quick component installation and removal, greatly reducing the O&M time.

- 2CRSi's unique intelligent control technology combined with the cutting-edge air-cooling technology creates an optimum working environment for stable running of the server.

For documentation of the system (such as product marketing materials, user manuals, product drivers, firmware, and product certifications), visit 2CRSi website: https://2crsi.com.

## 2.3 Manageability and Security

- The BMC integrated in the server can monitor the server status and manage the server remotely.
- Network Controller Sideband Interface (NC-SI) feature allows a network port to serve as a management port and a service port. This feature can be enabled/disabled in the BMC Web GUI or BIOS. It is disabled by default.
- Industry-standard Unified Extensible Firmware Interface (UEFI) improves the efficiency of setup, configuration, and update, and simplifies error handling.
- Trusted Platform Module (TPM) 2.0 and Trusted Cryptography Module (TCM) provide advanced encryption.
- AMD Secure Processor (ASP), an integrated on-chip security processor, helps protect sensitive data and validate code before it is executed. It helps protect your system & data from unauthorized software and applications running on your device.
- AMD Secure Encrypted Virtualization (AMD SEV) protects Linux KVM virtual machines by transparently encrypting the memory of each VM with a unique key.
- Firmware update mechanism based on digital signatures prevents unauthorized firmware updates.
- UEFI Secure Boot protects the system from malicious boot loaders.
- Hierarchical password protection in BIOS ensures system boot and management security.
- BIOS Secure Flash and BIOS Lock Enable (BLE) reduces attacks from malicious software on the BIOS flash region.
- Dual-image mechanism for BMC and BIOS recovers firmware upon detection of firmware damage.
- BMC Secure Boot protects BMC from malicious tampering.
- Flexible BMC access control policies improves BMC management security.
- Chassis intrusion detection enhances physical security.

NOTE

The NC-SI port supports the following features:

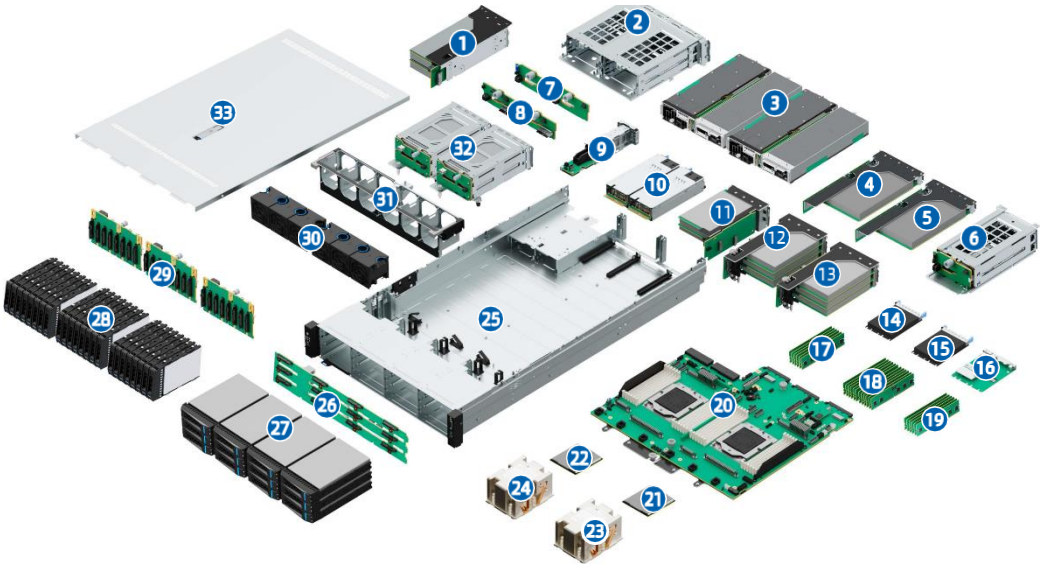
- The NC-SI port can be bonded to any network port of the OCP card or of PCIe NIC that supports NC-SI.
- Supports the enable/disable and configuration of Virtual Local Area Network ID (VLAN ID). VLAN is disabled by default and the default VLAN ID is 0.
- Supports IPv6 and IPv4 addresses. IP address, subnet mask, default gateway, and prefix length of IPv6 address can be configured.

## 2.4 Energy Efficiency

- Equipped with 80 Plus Titanium power supply units (PSUs) (1.300 W), with the efficiency up to 96% at a load of 50%.
- Supports 1+1 redundant PSUs and AC/DC power input for improved power conversion efficiency.
- Features high-efficiency single-board voltage regulator down (VRD) solutions, reducing DC-DC conversion loss.
- Delivers intelligent fan speed PID control and AMD Turbo Core technology, lowering energy consumption.
- Offers a fully optimized system cooling design with energy-efficient cooling fans, lowering energy consumption from system cooling.
- Provides power capping and power control measures.
- Supports staggered spin-up of drives, reducing power consumption during server startup.
- The power consumption of an SSD is 80% lower than that of a traditional HDD.

# 3. System Parts Breakdown

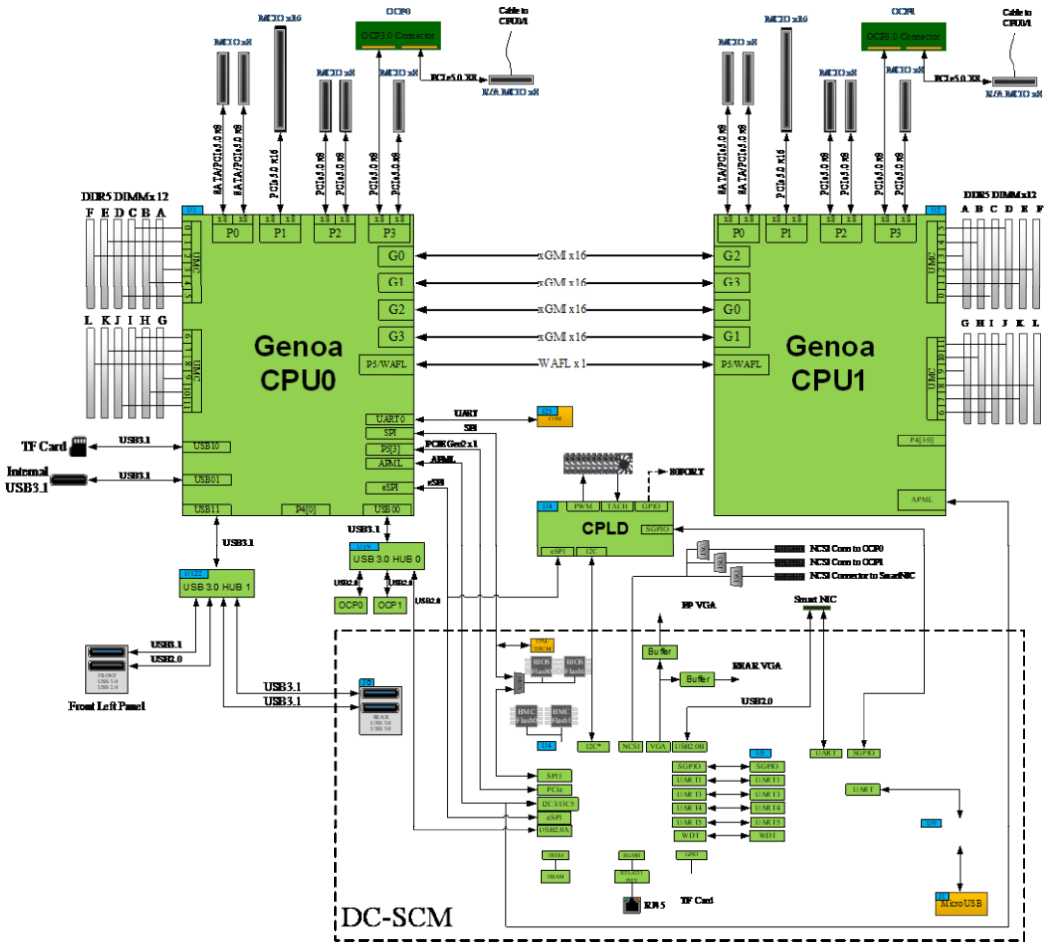
**EXPLODED DIAGRAM**



| Item | Feature | Item | Feature |
|---|---|---|---|
| 1 | PCIe Riser-Card Assembly | 2 | Rear 2.5-inch Drives |
| 3 | GPU x 4 | 4 | PCIe Riser-Card Assembly |
| 5 | PCIe Riser-Card Assembly | 6 | Rear 3.5-inch Drives |
| 7 | Rear 2.5-inch SAS/SATA Drive Backplane | 8 | Rear NVMe Drive Backplane |
| 9 | Rear M.2/E1.S Drives | 10 | PSU x 2 |
| 11 | PCIe Riser-Card Assembly | 12 | PCIe Riser-Card Assembly |
| 13 | PCIe Riser-Card Assembly | 14 | OCP 3.0 Card |
| 15 | OCP 3.0 Card | 16 | DC-SCM Board |
| 17 | DIMM x 6 | 18 | DIMM x 12 |
| 19 | DIMM x 6 | 20 | Motherboard |
| 21 | CPU | 22 | CPU |
| 23 | CPU Heatsink | 24 | CPU Heatsink |
| 25 | Chassis | 26 | Front Drive Backplane |
| 27 | Drive x 12 | 28 | Drive x 24 |
| 29 | Front Drive Backplane x 3 | 30 | Fan x 6 |
| 31 | Fan Cage | 32 | Rear 2.5-inch Drive x 2 |
| 33 | Top Cover | | |

# 4. System Logical Diagram

**LOGICAL DIAGRAM**




- 1 or 2 AMD EPYC Genoa CPUs.
- Up to 24 DIMMs.
- 4xGMI links at up to 32 Gb/s.
- 2 OCP 3.0 slots and up to 8 PCIe 5.0 slots.
- AST2600 BMC chip on DC-SCM board with a VGA port, management network port, and TF card slot, and other ports.

# 5. Hardware Description

## 5.1 Front Panel

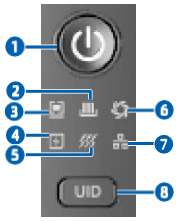
### 5.1.1 Front View

**12X 3.5-INCH DRIVE CONFIGURATION:**


| Item | Feature | Item | Feature |
|---|---|---|---|
| 1 | Serial Label Pull Tag (with an SN label) | 2 | Drive Bay × 12 |

### 5.1.2 LEDs and Buttons

**12X 3.5-INCH DRIVE CONFIGURATION:**




| Item | Feature | Item | Feature |
|---|---|---|---|
| 1 | Power Button and LED | 2 | Memory Status LED |
| 3 | System Status LED | 4 | Power Status LED |
| 5 | System Overheat LED | 6 | Fan Status LED |
| 7 | Network Status LED | 8 | UID/BMC RST Button and LED |

# LED and Button Description

### FRONT PANEL LED AND BUTTON DESCRIPTION:

| Icon | LED and Button | Status Description |
|---|---|---|
|  | Power Button and LED | Power LED:<br>• Off = No power<br>• Solid green = Power on state<br>• Solid orange = Standby state<br><br>Power button:<br>Long press 4 seconds to force a shutdown from the power-on state.<br><br>Notes:<br>• Follow the prompt under the OS to shut it down.<br>• Short press the power button to power on the system in standby state. |
| UID | UID/BMC RST Button and LED | The UID LED is used to identify the device to be operated:<br>• Off = System unit not identified.<br>• Solid blue = System unit identified.<br>• Flashing blue = System unit being operated remotely.<br><br>Notes:<br>• The UID LED turns on when activated by the UID button or via BMC remotely.<br>• Long press the UID button for over 6 seconds to reset the BMC. |
|  | Memory Status LED | • Off = Normal<br>• Flashing red (1 Hz) = A non-critical warning occurs.<br>• Solid red = A critical warning occurs. |
|  | System Status LED | • Off = Normal<br>• Flashing red (1 Hz) = A non-critical warning occurs.<br>• Solid red = A critical warning occurs. |

| | | |
|---|---|---|
|  | Power Status LED | • Off = Normal<br>• Flashing red (1 Hz) = A non-critical warning occurs.<br>• Solid red = A critical warning occurs. |
|  | System Overheat LED | • Off = Normal<br>• Flashing red (1 Hz) = A non-critical warning occurs.<br>• Solid red = A critical warning occurs. |
|  | Fan Status LED | • Off = Normal<br>• Flashing red (1 Hz) = A non-critical warning occurs.<br>• Solid red = A critical warning occurs. |
|  | Network Status LED | • Off = No network connected or network in abnormal state.<br>• Flashing green: Data is being transmitted.<br><br>Note: It only indicates the status of LOM (LAN on motherboard). |

### 5.1.3 Ports

**12X 3.5-INCH DRIVE CONFIGURATION:**


| Item | Feature | Item | Feature |
|---|---|---|---|
| 1 | VGA Port | 2 | USB 3.0 Port |
| 3 | USB 2.0/LCD Port | | |

## Port Description

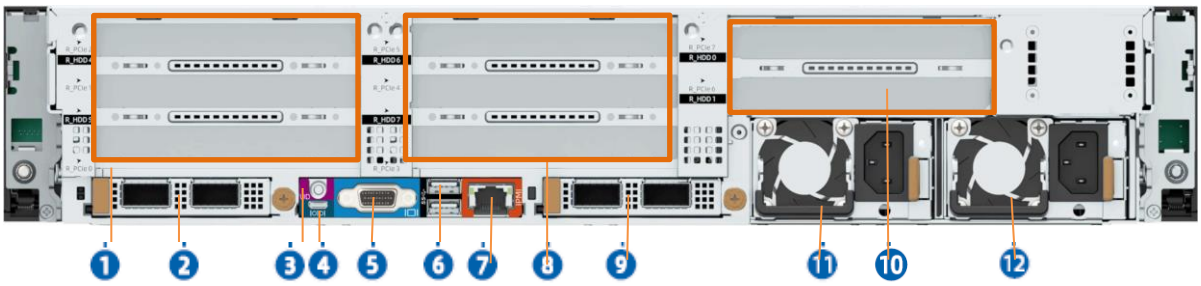
**FRONT PANEL PORT DESCRIPTION:**

| Feature | Type | Quantity | Description |
|---|---|---|---|
| VGA Port | DB15 | 1 | Enables you to connect a display terminal, for example, a monitor or KVM to the system. |
| USB 3.0 Port | USB 3.0 | 1 | Enables you to connect a USB 3.0 device to the system.<br>Note:<br>Make sure the USB device is in good condition or it may cause the server to work abnormally. |
| USB 2.0 Port | USB 2.0 | 1 | Enables you to connect a USB 2.0 device to the system.<br>Note:<br>Make sure the USB device is in good condition or it may cause the server to work abnormally. |

## 5.2 Rear Panel

### 5.2.1 Rear View

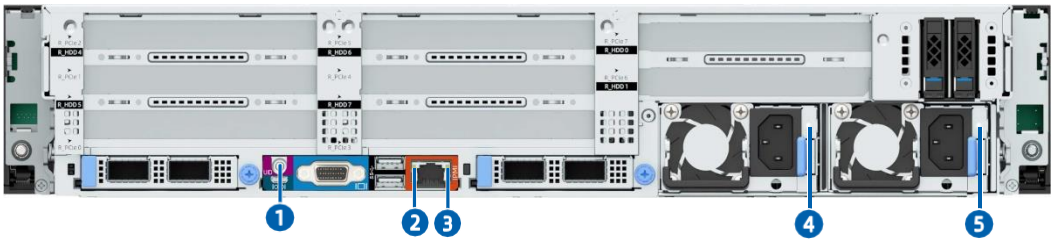
**REAR PANEL:**




| Item | Feature | Item | Feature |
|---|---|---|---|
| 1 | Left PCIe Riser Module (PCIe Slot × 3) | 9 | OCP 3.0 Card |
| 2 | OCP 3.0 Card | 10 | Right PCIe Riser Module (PCIe Slot × 2) |
| 3 | UID/BMC RST Button and LED | 11 | PSU0 |
| 4 | System/BMC Serial Port | 12 | PSU1 |
| 5 | VGA Port | | |
| 6 | USB 3.0 Port × 2 | | |
| 7 | BMC Management Network Port | | |
| 8 | Middle PCIe Riser Module (PCIe Slot × 3) | | |

### 5.2.2 LEDs and Buttons

**REAR PANEL LEDS:**




| Item | Feature | Item | Feature |
|---|---|---|---|
| 1 | UID/BMC RST Button and LED | 2 | Management Network Port Link Speed LED |
| 3 | Management Network Port Link Activity LED | 4 | PSU LED0 |
| 5 | PSU LED1 | | |

## LED and Button Description

**REAR PANEL LED DESCRIPTION:**

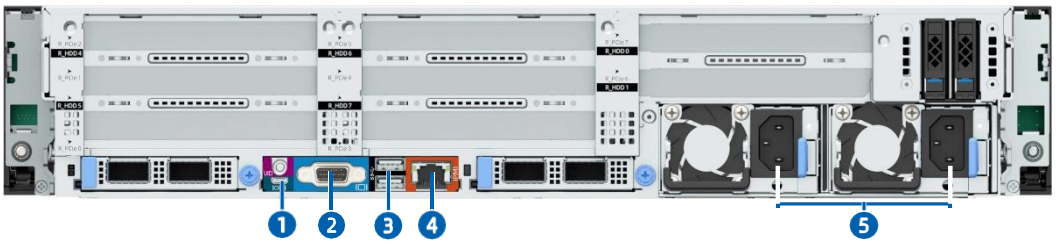
| Icon | LED | Description |
|---|---|---|
| - | UID/BMC RST Button and LED | The UID LED is used to identify the device to be operated.<br>• Off = System unit not identified.<br>• Solid blue = System unit identified.<br>• Flashing blue = System unit being operated remotely.<br>Notes:<br>The UID LED turns on when activated by the UID button or via BMC remotely.<br>Long press the UID button for over 6 seconds to reset the BMC. |

| | | |
|---|---|---|
| - | Management Network Port Link Speed LED | • Off = No network connection.<br>• Solid green = Network connected with link speed at 1,000 Mbps.<br>• Solid orange = Network connected with link speed at 100/10 Mbps. |
| - | Management Network Port Link Activity LED | • Off = No network connection.<br>• Solid green = Network connected without data being transmitted.<br>• Flashing green = Network connected with data being transmitted. |
| - | PSU LED | • Off = No power input.<br>• Flashing green (1 Hz) = PSU operating in standby state with normal AC input.<br>• Flashing green (2 Hz) = PSU firmware being updated.<br>• Flashing green (off for 1 second, on for 2 seconds): PSU in cold redundant state.<br>• Solid green = Normal input and output.<br>• Flashing orange (1 Hz) = PSU warning event where the PSU continues to operate (possible causes: PSU overtemperature, PSU output overcurrent, excessively high or low fan speed).<br>• Solid orange = Normal input but no output (possible causes of no output: PSU overtemperature protection, PSU output overcurrent or short circuit, output overvoltage, short circuit protection, device failure (not failures of all devices). |

### 5.2.3 Ports

## Port Location

**REAR PANEL PORTS:**




| Item | Feature | Item | Feature |
|---|---|---|---|
| 1 | System/BMC Serial Port | 2 | VGA Port |
| 3 | USB 3.0 Port | 4 | BMC Management Network Port |
| 5 | PSU Socket | | |

## Port Description

**REAR PANEL PORT DESCRIPTION:**

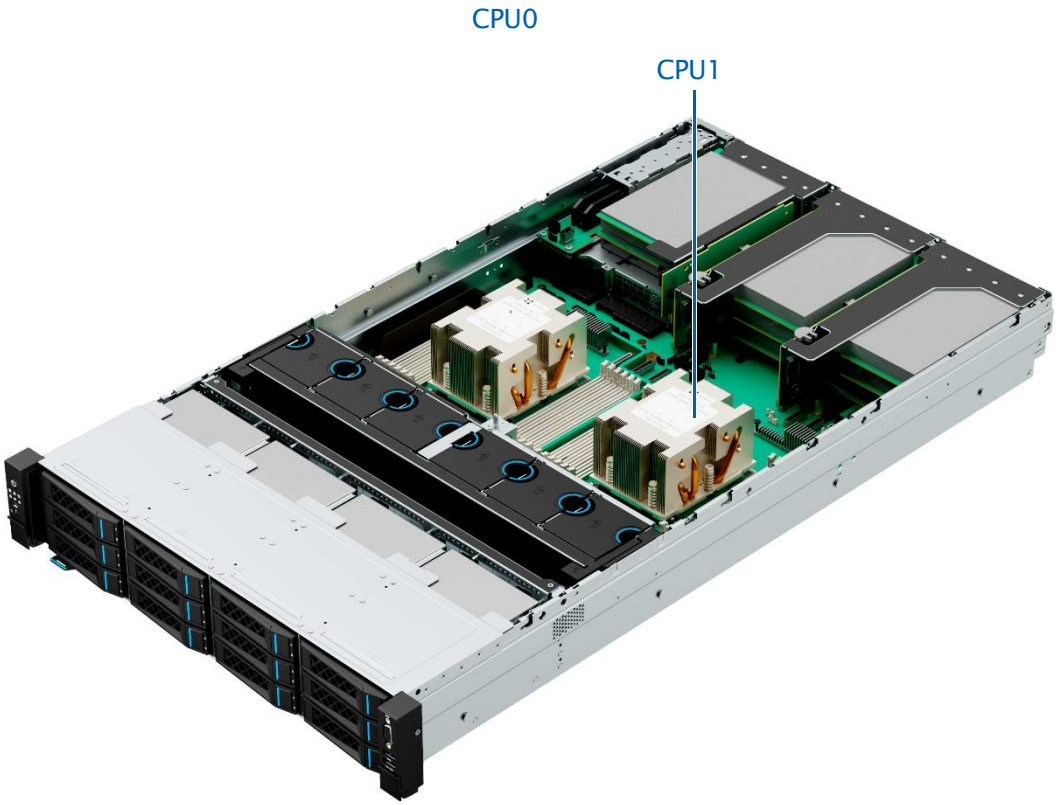
| Feature | Type | Quantity | Description |
|---|---|---|---|
| System/BMC Serial Port | Micro USB Port | 1 | Enables you to capture the system and BMC logs and debug the BMC.<br>Note:<br>The Micro USB port is a TTL level port and the baud rate is 115,200 bit/s by default. |
| USB 3.0 Port | USB 3.0 | 2 | Enables you to connect a USB 3.0 device to the system.<br>Note:<br>Make sure the USB device is in good condition or it may cause the server to work abnormally. |
| BMC Management Network Port | RJ45 | 1 | Enables you to manage the server.<br>Note:<br>The port is a Gigabit Ethernet port of 100/1,000 Mb supporting self-negotiation. |

| | | | |
|---|---|---|---|
| VGA Port | DB15 | 1 | Enables you to connect a display terminal, for example, a monitor or KVM to the system. |
| PSU Socket | - | 2 | Connected through a power cord. User can select the PSUs as needed.<br>Note:<br>Make sure that the rated power of every PSU is greater than the rated power of the server. |

## 5.3 Processors

- Supports 1 or 2 processors.
- When configuring only 1 processor, CPU0 socket should be preferred.
- Two processors used in the server must be of same model.
- For specific system processor options, consult your local 2CRSi sales representative or refer to 7.2 Hardware Compatibility.

**PROCESSOR LAYOUT**



## 5.4 Memory

### 5.4.1 DDR5 DIMM

| Item | Description | Example |
|---|---|---|
| 1 | Capacity | • 16 GB<br>• 32 GB<br>• 64 GB<br>• 128 GB<br>• 256 GB |
| 2 | Rank(s) | • 1R = Single rank<br>• 2R = Dual rank<br>• 2S2R = Two ranks of two high stacked 3DS DRAM<br>• 4DR = DDP (Dual Die Package) 4 rank<br>• 4R = Quad rank<br>• 8R = Octal rank |
| 3 | Data width of DRAM | • x4 = 4 bits<br>• x8 = 8 bits |

| | | |
|---|---|---|
| 4 | DIMM slot type | PC5 = DDR5 |
| 5 | Maximum memory speed | • 4,800 MT/s<br>• 5,600 MT/s<br>• 6,400 MT/s |
| 6 | CAS latency | B = 4800 40-39-39 |
| 7 | DIMM type | R = RDIMM |

## Memory Subsystem Architecture

The server supports 24 DIMM slots and each processor supports 12 memory channels.

**DIMM SLOT LIST:**

| CPU | Channel ID | Silk Screen |
|---|---|---|
| CPU0 | Channel A | CPU0_CAD0 |
| | Channel B | CPU0_CBD0 |
| | Channel C | CPU0_CCD0 |
| | Channel D | CPU0_CDD0 |
| | Channel E | CPU0_CED0 |
| | Channel F | CPU0_CFD0 |
| | Channel G | CPU0_CGD0 |
| | Channel H | CPU0_CHD0 |
| | Channel I | CPU0_CID0 |
| | Channel J | CPU0_CJD0 |
| | Channel K | CPU0_CKD0 |
| | Channel L | CPU0_CLD0 |
| CPU1 | Channel A | CPU1_CAD0 |
| | Channel B | CPU1_CBD0 |
| | Channel C | CPU1_CCD0 |
| | Channel D | CPU1_CDD0 |
| | Channel E | CPU1_CED0 |
| | Channel F | CPU1_CFD0 |
| | Channel G | CPU1_CGD0 |
| | Channel H | CPU1_CHD0 |
| | Channel I | CPU1_CID0 |
| | Channel J | CPU1_CJD0 |
| | Channel K | CPU1_CKD0 |
| | Channel L | CPU1_CLD0 |

## Compatibility

Refer to the following rules to select the DDR5 DIMMs.

IMPORTANT

- A server must use DDR5 DIMMs with the same part number (P/N code). All DDR5 DIMMs operate at the same speed, which is the lowest of:
    - Memory speed supported by a specific CPU.
    - Maximum operating speed of a specific memory configuration.
- Mixing DDR5 RDIMM specifications (capacity, bit width, rank, height, etc.) is not supported.
- For specific system memory options, consult your local 2CRSi sales representative or refer to 7.2 Hardware Compatibility.

- DDR5 DIMMs can be used with AMD Genoa CPUs. The maximum memory capacity supported is identical for different CPU models.
- Total memory capacity: The total memory capacity is the sum of the capacity of all DDR5 DIMMs.

IMPORTANT

The number of supported ranks per channel has the following restrictions on the number of DIMMs supported per channel: Maximum number of DIMMs supported per channel ≤ Maximum number of ranks supported per channel/Number of ranks per DIMM.

**DDR5 DIMM SPECIFICATIONS:**

| Item | Value | | | |
|---|---|---|---|---|
| Capacity per DDR5 DIMM (GB) | 16 | 32 | 64 | 128 |
| Type | RDIMM | RDIMM | RDIMM | RDIMM |
| Rated speed (MT/s) | 4,800 | 4,800 | 4,800 | 4,800 |
| Operating voltage (V) | 1.1 | 1.1 | 1.1 | 1.1 |

| | | | | | |
|---|---|---|---|---|---|
| Maximum number of DDR5 DIMMs supported in a server[a] | | 24 | 24 | 24 | 24 |
| Maximum capacity of DDR5 DIMMs supported in a server (GB)[b] | | 384 | 768 | 1,536 | 3,072 |
| Actual speed (MT/s) | 1DPC[c] | 4,800 | 4,800 | 4,800 | 4,800 |
| a: The maximum number of DDR5 DIMMs supported is based on the 2-processor configuration. If the server is 1-processor configuration, the number should be halved.<br>b: It indicates the maximum memory capacity supported when all the DIMM slots are populated with DDR5 DIMMs.<br>c: DPC (DIMM per channel) is the number of DIMMs per memory channel.<br>The information above is for reference only, consult your local 2CRSi sales representative for details. | | | | | |

## DIMM Population Rules

General population rules for DDR5 DIMMs:

- Install DIMMs only when the corresponding processor has been installed.
- Mixing RDIMMs of different specifications is not supported.
- Install dummies in empty DIMM slots.

DDR5 DIMM population rules in specific modes:

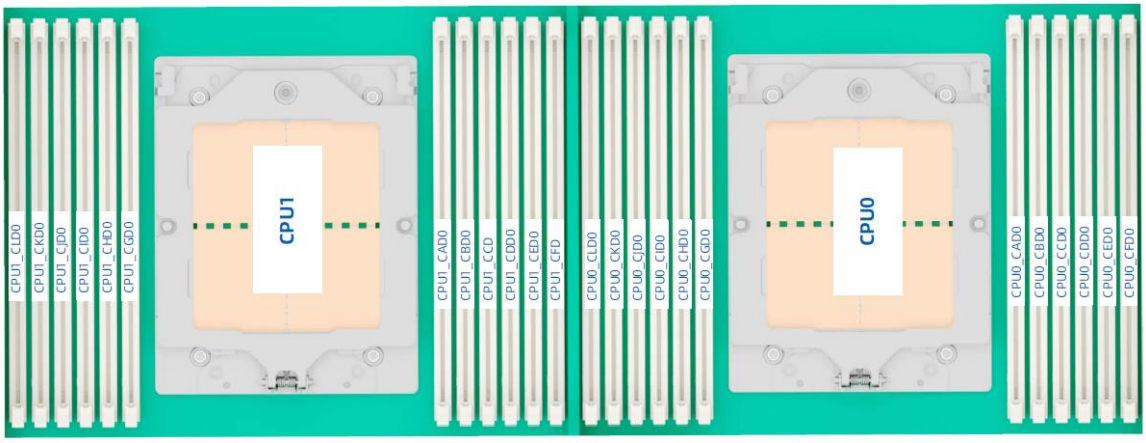
- Memory sparing
    - Follow the general population rules.
    - Each channel must have a valid online spare configuration.
    - Each channel can have a different online spare configuration.
- Memory mirroring
    - Follow the general population rules.
    - Each processor supports 12 unified memory controllers (UMC) and each UMC has one channel to be populated with DIMMs. Installed DIMMs must be of the same capacity and organization.
    - In a multi-processor configuration, each processor must have a valid memory mirroring configuration.

- Memory demand scrubbing/patrol scrubbing
    - Follow the general population rules.

## DIMM Slot Layout

Up to 24 DDR5 DIMMs can be installed in a server, and a balanced DIMM configuration is recommended for optimal memory performance. DIMM configuration must be compliant with the DIMM population rules.

**DIMM SLOT LAYOUT:**




**DDR5 DIMM POPULATION RULES (1-PROCESSOR CONFIGURATION):**

| DDR5 QTY | CPU0 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CL | CK | CJ | CI | CH | CG | CA | CB | CC | CD | CE | CF |
| | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 |
| 1 | | | | | | | V | | | | | |
| 2 | | | | | | V | V | | | | | |
| 4 | | | | V | | V | V | | V | | | |
| 6 | | | | V | V | V | V | V | V | | | |
| 8 | | V | | V | V | V | V | V | V | | V | |
| 10 | | V | V | V | V | V | V | V | V | V | V | |
| 12 | V | V | V | V | V | V | V | V | V | V | V | V |

**DDR5 DIMM POPULATION RULES (2-PROCESSOR CONFIGURATION):**

| DDR5 QTY | CPU0 | | | | | | | | | | | | CPU1 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CL | CK | CJ | CI | CH | CG | CA | CB | CC | CD | CE | CF | CL | CK | CJ | CI | CH | CG | CA | CB | CC | CD | CE | CF |
| | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 | D0 |
| 2 | | | | | | | V | | | | | | | | | | | | V | | | | | |
| 4 | | | | | | V | V | | | | | | | | | | | V | V | | | | | |
| 8 | | | | V | | V | V | | V | | | | | | | V | | V | V | | V | | | |
| 12 | | | | V | V | V | V | V | V | | | | | | | V | V | V | V | V | V | | | |
| 16 | | V | | V | V | V | V | V | V | | V | | | V | | V | V | V | V | V | V | | V | |
| 20 | | V | V | V | V | V | V | V | V | V | V | | | V | V | V | V | V | V | V | V | V | V | |
| 24 | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V |

## 5.5 Storage

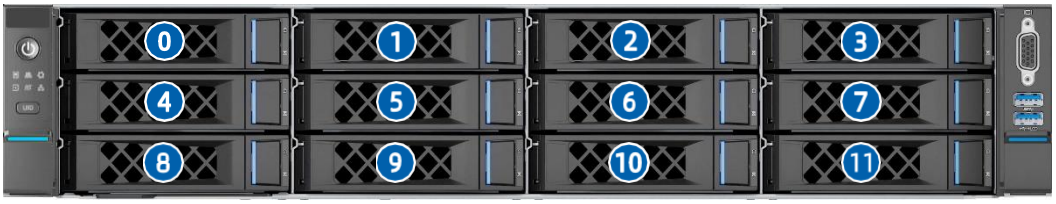
### 5.5.1 Drive Configuration

**DRIVE CONFIGURATION:**

| Configuration | Front Drive | Rear Drive | Internal Drive | Drive Management Mode |
|---|---|---|---|---|
| 12x 3.5-inch SAS/SATA/NVMe Drive Configuration | NVMe drives in drive bays 0-11 | - | - | • SAS/SATA drive: SAS/RAID controller card needed<br>• NVMe drive or internal |

### 5.5.2 Drive Numbering

**12X3.5-INCH SAS/SATA DRIVE CONFIGURATION**




| Physical Drive No. | Drive No. Identified by BMC | Drive No. Identified by RAID Controller Card |
|---|---|---|
| 0 | 0 | 0 |
| 1 | 1 | 1 |
| 2 | 2 | 2 |
| 3 | 3 | 3 |
| 4 | 4 | 4 |
| 5 | 5 | 5 |
| 6 | 6 | 6 |
| 7 | 7 | 7 |
| 8 | 8 | 8 |
| 9 | 9 | 9 |
| 10 | 10 | 10 |

| | | |
|---|---|---|
| 11 | 11 | 11 |

### 5.5.3 Drive LEDs

## SAS/SATA Drive LEDs

**SAS/SATA DRIVE LEDS:**


**SAS/SATA DRIVE LED DESCRIPTION:**

<table>
<tr><th rowspan="2">Activity LED (Green)</th><th colspan="3">Error LED (Blue/Red)</th><th rowspan="2">Status Description</th></tr>
<tr><th>Blue</th><th colspan="2">Red</th></tr>
<tr><td rowspan="2">Off</td><td rowspan="2">Off</td><td>RAID created</td><td>RAID not created</td><td rowspan="2">Drive absent</td></tr>
<tr><td>Solid on</td><td>Off</td></tr>
<tr><td>Solid on</td><td>Off</td><td colspan="2">Off</td><td>Drive present but not in use</td></tr>
<tr><td>Flashing</td><td>Off</td><td colspan="2">Off</td><td>Drive present and in use</td></tr>
<tr><td>Flashing</td><td colspan="3">Solid pink</td><td>Copyback/Rebuild in progress</td></tr>
<tr><td>Solid on</td><td>Solid on</td><td colspan="2">Off</td><td>Drive selected but not in use</td></tr>
<tr><td>Flashing</td><td>Solid on</td><td colspan="2">Off</td><td>Drive selected and in use</td></tr>
<tr><td>-</td><td>Off</td><td colspan="2">Solid on</td><td>Drive failure</td></tr>
</table>

## NVMe Drive LEDs

**NVME DRIVE LEDS:**


**NVME DRIVE LED DESCRIPTION (VMD ENABLED):**

| Activity LED (Green) | Error LED (Blue/Red) | | Status Description |
|---|---|---|---|
| | Blue | Red | |
| Off | Off | Off | Drive absent |
| Solid on | Off | Off | Drive present but not in use |
| Flashing | Off | Off | Drive present and in use |
| Flashing | Solid pink | | Copyback/Rebuild/Initializing/ Verifying in progress |
| Solid on | Solid on | Off | Drive selected but not in use |
| Flashing | Solid on | Off | Drive selected and in use |
| - | Off | Solid on | Drive failure |

### 5.5.4 RAID Controller Cards

The RAID controller card supports RAID configuration, RAID level migration, drive roaming, and other functions.

For specific RAID controller card options, consult your local 2CRSi sales representative or refer to Hardware Compatibility.

## 5.6 Network

NICs provide network expansion capabilities.

- The OCP slots support OCP 3.0 cards. Users can select the optional OCP 3.0 cards as needed.
- The PCIe slots support PCIe NICs. Users can select the cards as needed.
- For specific NIC options, consult your local 2CRSi sales representative or refer to Hardware Compatibility.

## 5.7 I/O Expansion

### 5.7.1 PCIe Expansion Cards

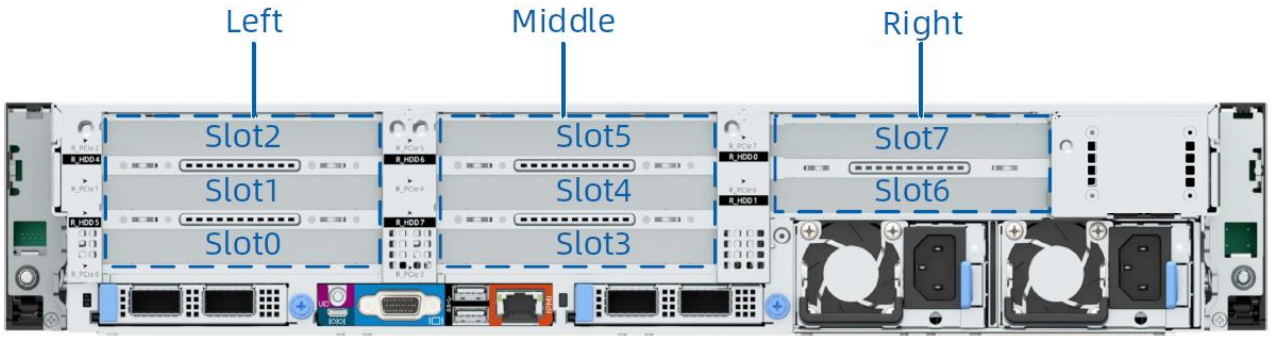
The PCIe expansion cards provide system expansion capabilities.

- The server supports 2 dedicated OCP 3.0 slots and up to 8 PCIe 5.0 slots.
- For specific PCIe expansion card options, consult your local 2CRSi sales representative or refer to Hardware Compatibility.

### 5.7.2 PCIe Slots

**PCIe Slot Layout**

**PCIE SLOTS:**

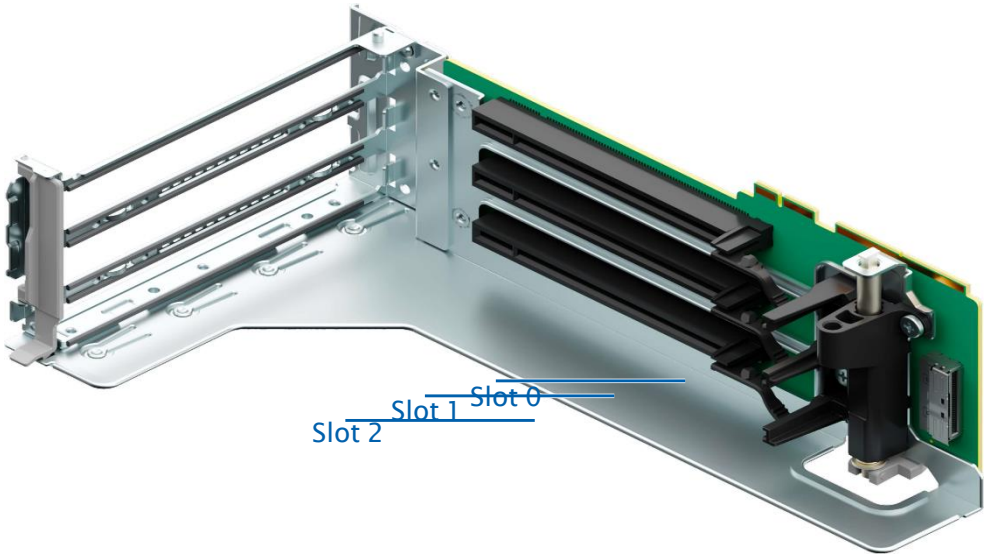



- Slot 2, slot 1 and slot 0 reside in the left PCIe riser module.
- Slot 5, slot 4 and slot 3 reside in the middle PCIe riser module.
- Slot 9 and slot 8 reside in the right PCIe riser module.

## PCIe Riser Modules

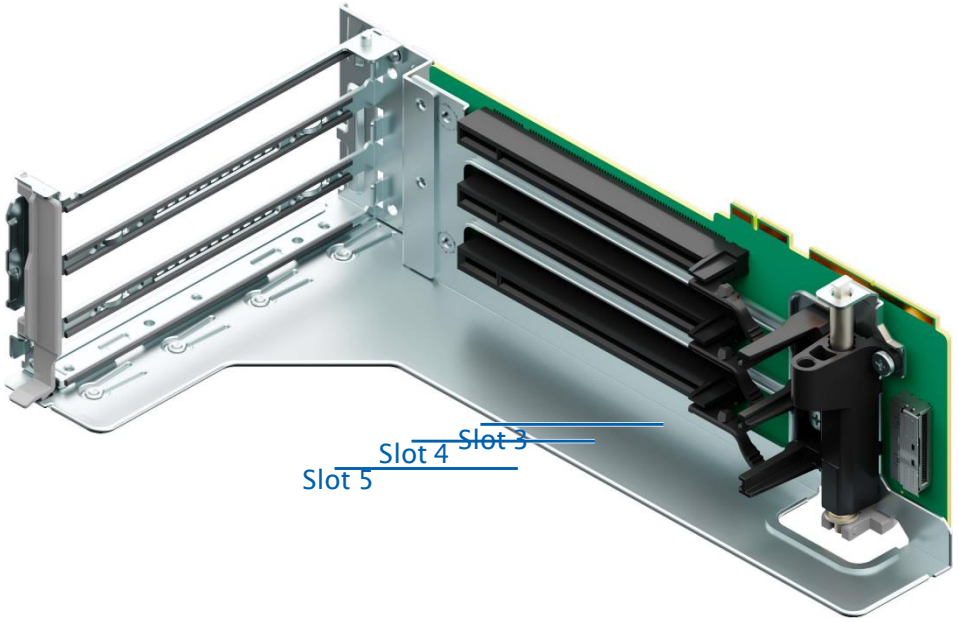
- The PCIe riser module 1 is installed as a left one.
    - Slots 2, 1, and 0 reside in this module.

**PCIE RISER MODULE 1:**



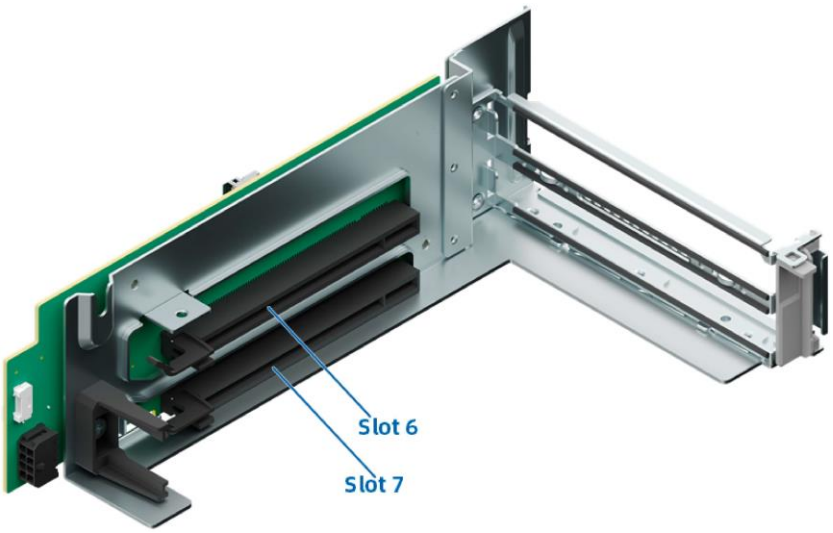

- The PCIe riser module 2 is installed as a middle one.
    - Slots 5, 4, and 3 reside in this module.

**PCIE RISER-CARD MODULE 2:**




- The PCIe riser module 3 is installed as a right one.
    - Slots 7 and 6 reside in this module.

**PCIE RISE MODULE 3:**



### 5.7.3 PCIe Slot Description

NOTE

When CPU1 is not present, the corresponding PCIe slots do not work.

## Servers Configured with Rear PCIe Riser Modules

#### PCIE SLOT DESCRIPTION (8 PCIE SLOTS)

| PCIe Slot | Owner | PCIe Standard | Connector Width | Bus Width | Port Number | Root Port (B/D/F) | Form Factor |
|---|---|---|---|---|---|---|---|
| Slot 0 | CPU1 | PCIe 4.0/ PCIe 5.0 | x16 | x8 | PE1AB | C9:02.00 | FHHL |
| Slot 1 | CPU1 | PCIe 4.0/ PCIe 5.0 | x16 | x8 | PE1CD | b0:02.00 | Full height 3/4 length |
| Slot 2 | CPU1 | PCIe 4.0/ PCIe 5.0 | x16 | x16 | PE2 | c9:04.00 | Full height 3/4 length |
| Slot 3 | CPU0 | PCIe 4.0/ PCIe 5.0 | x16 | x8 | PE1AB | e2:02.00 | FHHL |
| Slot 4 | CPU1 | PCIe 4.0/ PCIe 5.0 | x16 | x8 | PE1CD | 64:02.00 | Full height 3/4 length |
| Slot 5 | CPU0 | PCIe 4.0/ PCIe 5.0 | x16 | x16 | PE2 | e2:04.00 | Full height 3/4 length |
| Slot 6 | CPU1 | PCIe 4.0/ PCIe 5.0 | x16 | x16 | PE0 | 30:02.00 | Full height 3/4 length |
| Slot 7 | CPU0 | PCIe 4.0/ PCIe 5.0 | x16 | x16 | PE0 | 4a:02.00 | Full height 3/4 length |
| OCP 3.0 Slot | CPU1 | PCIe 5.0 | x16 | x8/x16 | PE3AB/PE3ABCD | 97:02.00 | Standard OCP 3.0 slot |
| OCP 3.0 Slot | CPU0 | PCIe 5.0 | x16 | x8/x16 | PE3AB/PE3ABCD | 97:02.00 | Standard OCP 3.0 slot |

- The B/D/F (Bus/Device/Function) numbers are the default values when all PCIe slots are fully populated with PCIe cards. The default values may vary if PCIe slots are partially populated or when PCIe cards with PCIe bridges are installed.
- Root Port (B/D/F): the B/D/F of an internal PCIe root node of the processor.
- A PCIe x16 slot is compatible with a PCIe x16, x8, x4, and x1 card. It is not upward compatible, that is, the PCIe slot width cannot be lower than that of the inserted PCIe card.
- A FHFL PCIe slot is compatible with an FHFL, FHHL, or HHHL PCIe card.
- A FHHL PCIe slot is compatible with an FHHL or HHHL PCIe card.
- Each PCIe slot provides a maximum 75 W of power.

## 5.8 PSUs

- Supports 1 or 2 PSUs.
- Supports AC or DC power input.
- The PSUs are hot-swappable.
- The server supports 2 PSUs with 1+1 redundancy.
- The server must use PSUs of the same part number (P/N code).
- The server provides short-circuit protection and provides PSUs supporting dual- live-wire input.

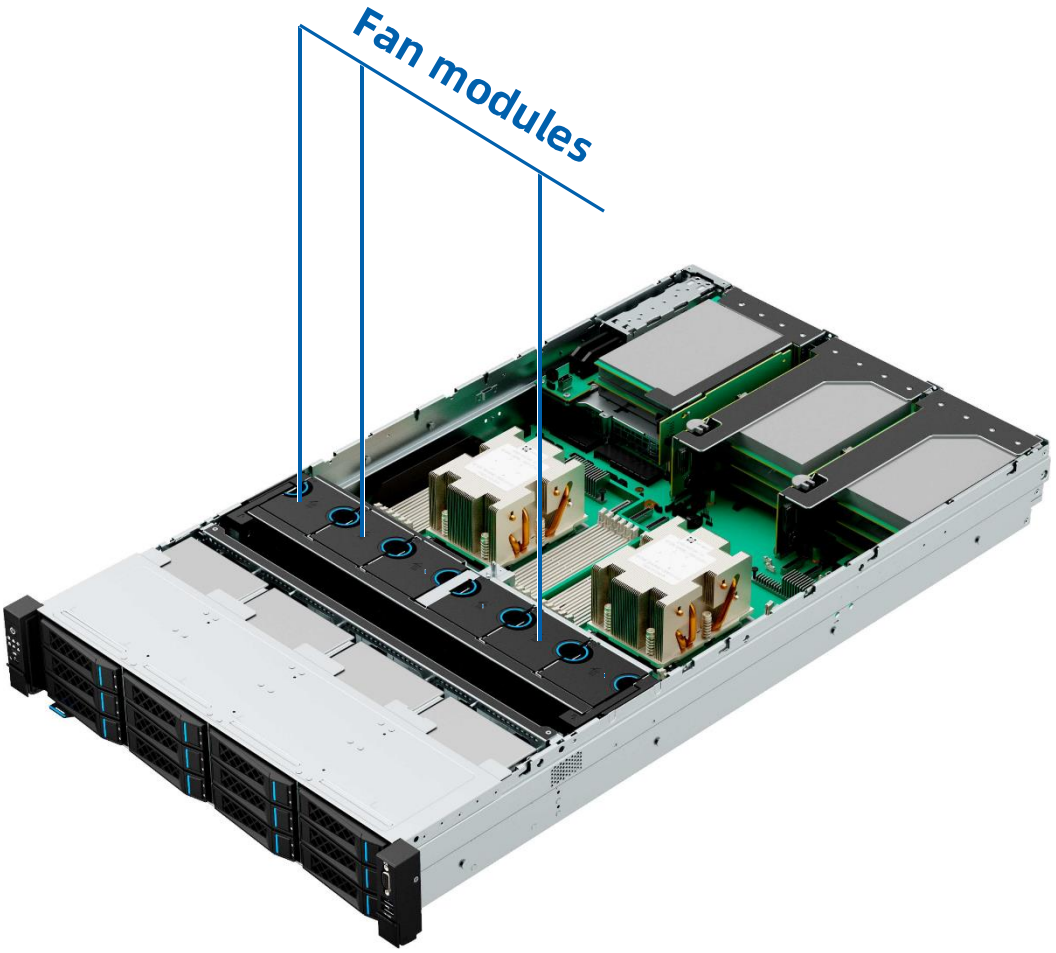
**PSU LAYOUT:**


| Item | Feature | Item | Feature |
|---|---|---|---|
| 1 | PSU0 | 2 | PSU1 |

## 5.9 Fans

- Supports 6 fans. High-performance 6056 fans and standard 6056 fans can be selected based on actual configuration.
- The fans are hot-swappable.
- Some configurations support N+1 redundancy, allowing the server to continue working normally when one fan fails.
- Supports intelligent fan speed control.
- The server must use fans of the same part number (P/N code).

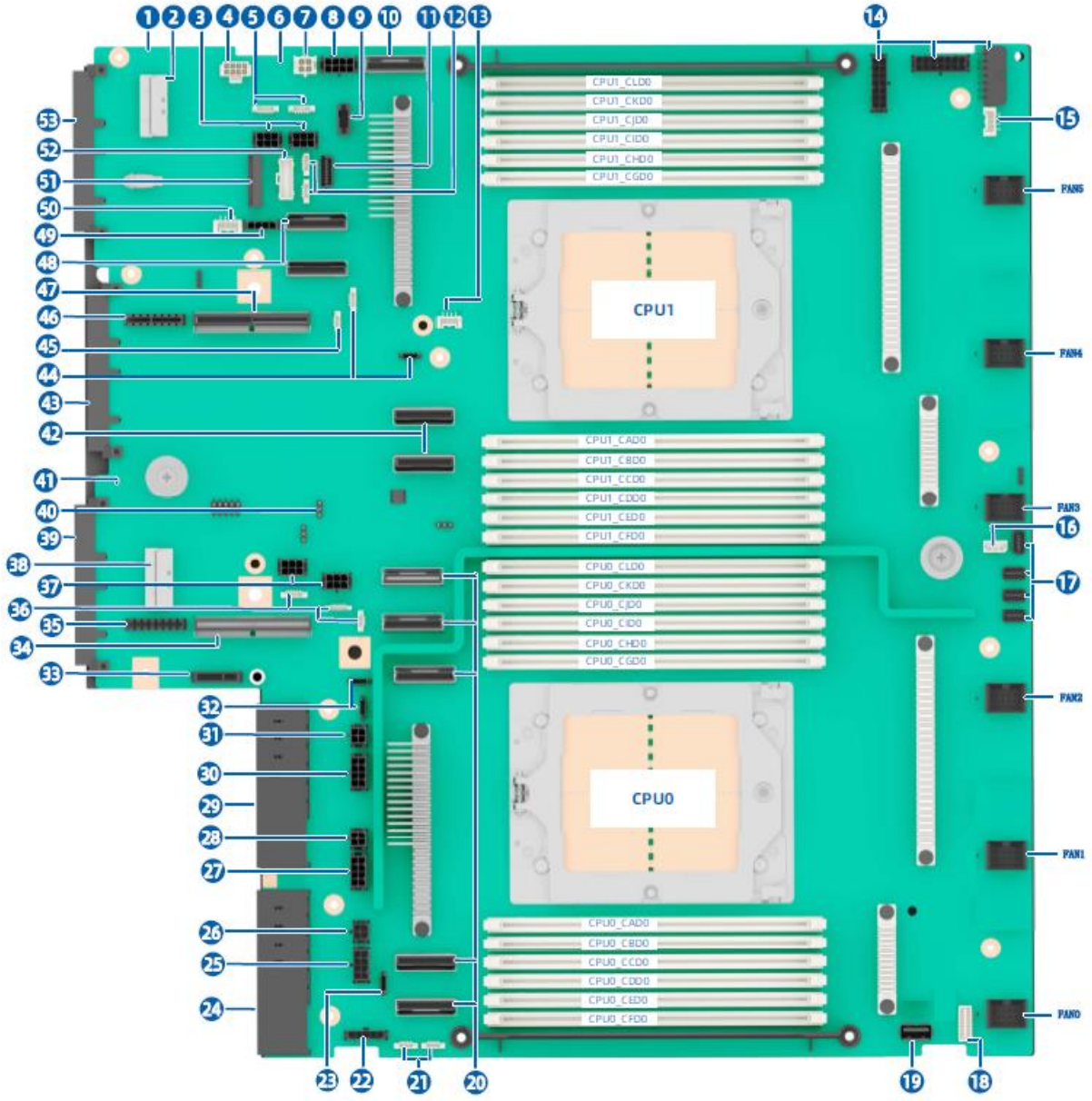
**FAN LAYOUT:**



## 5.10 Boards

### 5.10.1 Motherboard

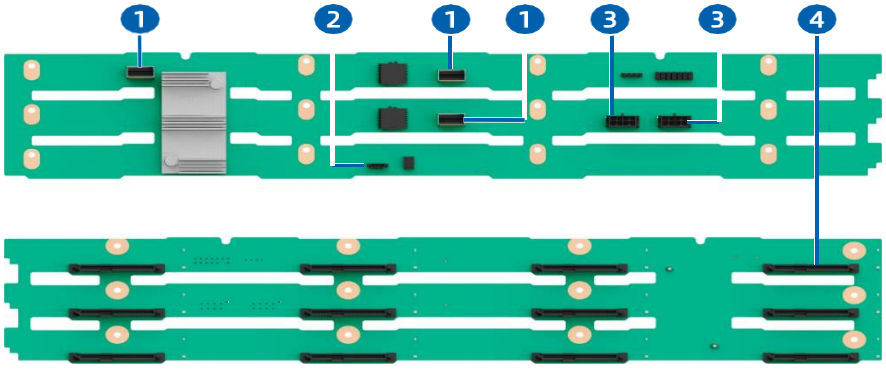
**MOTHERBOARD LAYOUT:**



| Item | Feature | Item | Feature |
|---|---|---|---|
| 1 | OCP 3.0_1 Button Connector | 28 | GPU2 Power Connector |
| 2 | OCP 3.0 MCIO Connector | 29 | PSU0 Connector |
| 3 | GPU Riser & Rear Backplane Power Connector × 2 | 30 | GPU1 Power Connector |
| 4 | Middle Backplane Power Connector | 31 | GPU1 Power Connector |
| 5 | $I^2C$ Connector × 2 | 32 | $I^2C$ Connector × 2 |
| 6 | Right Control Panel Connector | 33 | Riser Power Connector |
| 7 | GPU0 Power Connector | 34 | MCIO x16 Connector (CPU0) |
| 8 | GPU0 Power Connector | 35 | Riser Power Connector |
| 9 | VPP Connector | 36 | $I^2C$ Connector × 2 |
| 10 | MCIO x8 Connector (CPU1) | 37 | GPU Riser & Rear Backplane Power Connector × 2 |
| 11 | M.2_SB Connector | 38 | OCP 3.0 MCIO Connector |
| 12 | $I^2C$ Connector × 2 | 39 | OCP 3.0 Connector |
| 13 | Leak Detection Connector | 40 | CLR_CMOS Jumper |
| 14 | Front Backplane Power Connector × 3 | 41 | OCP 3.0_0 Button Connector |
| 15 | Sensor Connector | 42 | MCIO x8 Connector (CPU1) × 2 |
| 16 | Intrusion Switch Connector | 43 | DC-SCM Connector |
| 17 | SGPIO Connector × 4 | 44 | $I^2C$ Connector × 2 |
| 18 | Left Control Panel Connector | 45 | NIC_COM Connector |
| 19 | USB 3.0 Port | 46 | PCIE_CPU1 Power Connector |
| 20 | MCIO x8 Connector (CPU0) × 5 | 47 | MCIO x16 Connector (CPU1) |
| 21 | $I^2C$ Connector × 2 | 48 | MCIO x8 Connector (CPU1) × 2 |
| 22 | Capacitor Board Power Connector | 49 | Smart_LAN Power Connector |
| 23 | $I^2C$ Connector | 50 | Leak Detection Connector |
| 24 | PSU1 Connector | 51 | SYS_TF Connector |
| 25 | GPU3 Power Connector | 52 | GPU_Riser Power Connector |
| 26 | GPU3 Power Connector | 53 | OCP 3.0 Connector |
| 27 | GPU2 Power Connector | | |

### 5.10.2 Drive Backplane

**12X 3.5-INCH SAS/SATA DRIVE BACKPLANE:**




| Item | Feature | Item | Feature |
|---|---|---|---|
| 1 | Slimline x4 Connector | 2 | $I^2C$ Connector |
| 3 | Backplane Power Connector | 4 | Drive Connector |

# 6. Maintenance and Component Replacement

## 6.1 Installing the Server into the Rack

For detailed information on installing the server into the rack with rails supplied by us, see the rack server installation guide.

CAUTION

If you would like to use rails not provided by us, please contact us first to ensure the server can be installed into the rack safely and properly. The load-bearing capacity of rails must be higher than 100 kg (220.46 lbs). If not, you MUST use our rails as using rails not provided by us may cause such risks as installation failure. We will not assume any responsibility or liability for any damage or injury caused
by this.

WARNING

To reduce the risk of personal injury or equipment damage, DO secure the mounting ears to the mounting flanges firmly to prevent the server from moving
or sliding out from the rack.

## 6.2 Powering On/Off the Server

To power on or off the server, press the power button.

To completely shut down the server, press the power button and disconnect the power cords from the server.

DANGER

To reduce the risk of personal injury, electric shock, or equipment damage, disconnect the power cords to remove power from the server. Pressing the power button on the front panel does not shut off the system power completely.

Portions of the power supply and some internal circuitry remain active until the power is removed.

## 6.3 Preparing for Component Replacement

Read the installation instructions for all the hardware operations before removing or installing the components. All prerequisites must be completed prior to installation or maintenance.

WARNING

To reduce the risk of personal injury from hot surfaces, allow the drives and internal system components to cool before touching them.

CAUTION

To prevent damage to electrical components, properly ground the server before installation. Improper grounding may cause electrostatic discharge.

Do the following prior to installation or maintenance:

1. Power off the server.
2. Remove all cords from the server.

WARNING

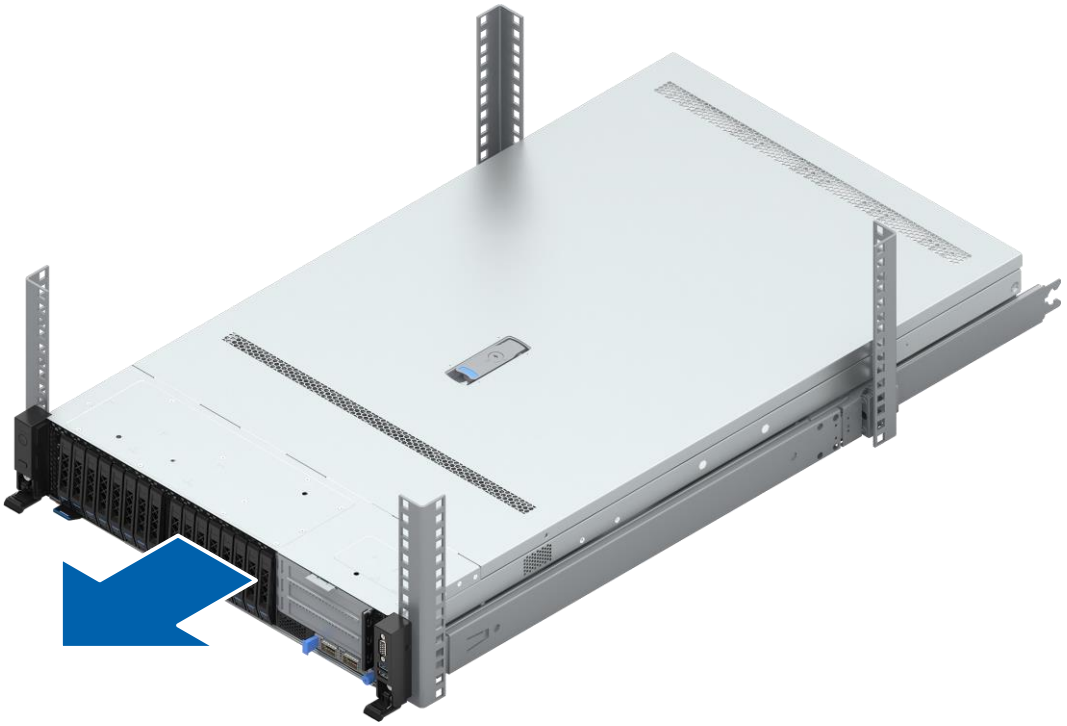
- To reduce the risk of personal injury or equipment damage, make sure that the rack is adequately stabilized before you pull the server or a component out of the rack.
- To reduce the risk of personal injury, be careful when sliding the server into the rack. The sliding rails could pinch your fingers.

3. Open the left and right ear latches, and then loosen the 2 captive screws under the ear latches.

Figure 4-1 Loosening the Captive Screw

4. Gently slide and remove the server out of the rack.

Figure 4-2 Removing the Server from the Rack



5. After installation or maintenance, slide the server all the way back into the rack to secure it in place.

## 6.4 Replacing System Components

NOTE

- When installing or removing system components, always wear anti-static gloves or an anti-static wrist strap.
- Before the installation or removal of any hardware, always ensure all data is backed up properly.
- Disconnect the server and all attached devices from the electrical outlets.
- Hot-swap components can be replaced with the server powered on.
- If more than one option is to be installed, read the installation instructions for all the hardware options and identify similar steps to streamline the

Component appearance may differ depending on actual configurations.

### 6.4.1 Replacing the Top Cover

WARNING

To reduce the risk of personal injury from hot surfaces, allow the drives and internal system components to cool before touching them.

CAUTION

- For proper cooling, do not operate the server without the top cover, air ducts, fans, dummies, or blanks installed.
- If the server supports hot-swap components, minimize the amount of time the top cover is open.

To remove the top cover:

1. Loosen the security screw on the latch counterclockwise to the unlocked position with a Phillips screwdriver.
2. Lift the latch handle until the top cover slides toward the rear of the server and the tabs on the top cover disengage from the guide slots on the chassis. Hold the top cover on both sides and remove the top cover away from the chassis.

Figure 4-3 Removing the Top Cover


To install the top cover:

1. Lift the latch handle, align the standoffs of the top cover with the J-slots on the chassis, and lower the top cover down onto the chassis.
2. Press down the latch handle until the top cover slides toward the front of the server to the closed position.
3. Tighten the security screw on the latch clockwise to the locked position with a Phillips screwdriver.

### 6.4.2 Replacing a Super-Capacitor

To remove the super-capacitor:

1. Remove the top cover.
2. Disconnect the cable of the super-capacitor.
3. Open the Velcro used to secure the super-capacitor.
4. Remove and put the super-capacitor into an anti-static bag.

Figure 4-4 Removing the Super-Capacitor

To install the super-capacitor:

1. Take a new super-capacitor out from the anti-static bag and put it into the super-capacitor holder.
2. Secure the super-capacitor firmly with the Velcro.
3. Connect the cable of the super-capacitor.
4. Install the top cover.

### 6.4.3 Replacing the Air Duct

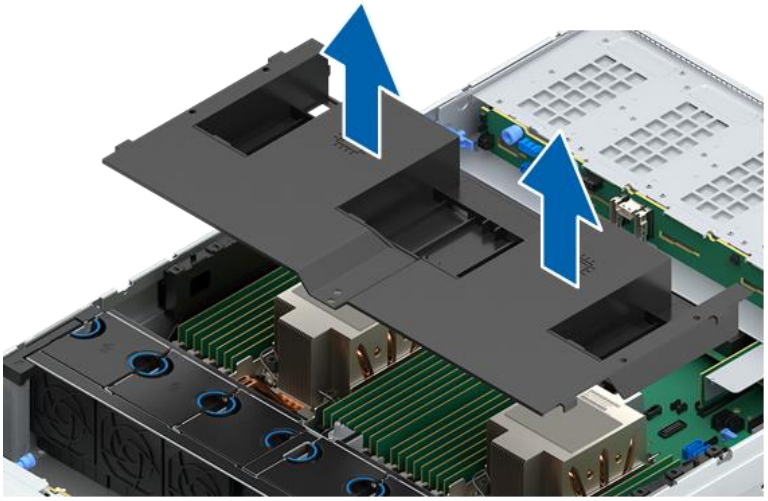
CAUTION

- For proper cooling, do not operate the server without the top cover, air ducts, fans, dummies, or blanks installed.
- If the server supports hot-swap components, minimize the amount of time the top cover is open.

To remove the air duct:

1. Remove the top cover.
2. Remove the super-capacitors on the air duct.
3. Lift the air duct to remove it.

Figure 4-5 Removing the Air Duct



To install the air duct:

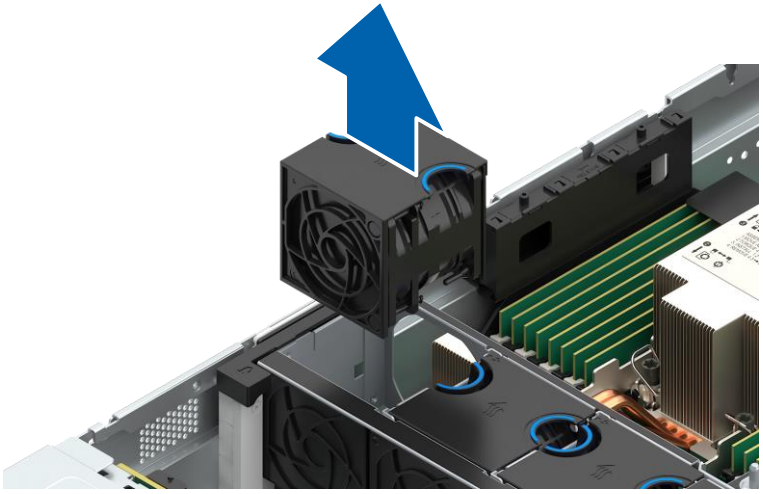
1. Lower down the air duct vertically into the chassis.
2. Install the super-capacitors.
3. Install the top cover.

### 6.4.4 Replacing a Hot-Swap Fan Module

To remove the fan module:

1. Remove the top cover.
2. Remove the fan module:
    a. Press and hold the release tab of the fan module, and then lift the fan module out of the fan bay.
    b. Put the fan module into an anti-static bag.

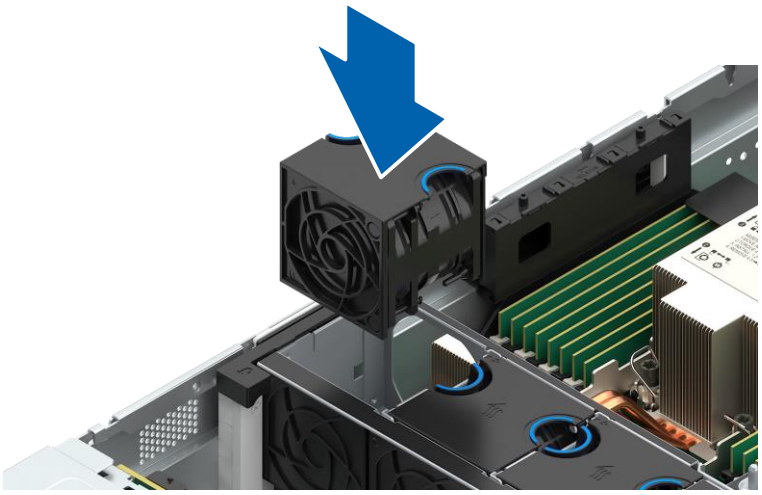
Figure 4-6 Removing the Fan Module



To install the fan module:

1. Take a new fan module out from the anti-static bag.
2. Align the connectors on the fan and the motherboard, lower down the fan module vertically into the fan bay, and secure it in place.

Figure 4-7 Installing the Fan Module



3. Install the top cover.
4. Check that the fan status LED is off when the server is powered on.

### 6.4.5 Replacing a DIMM

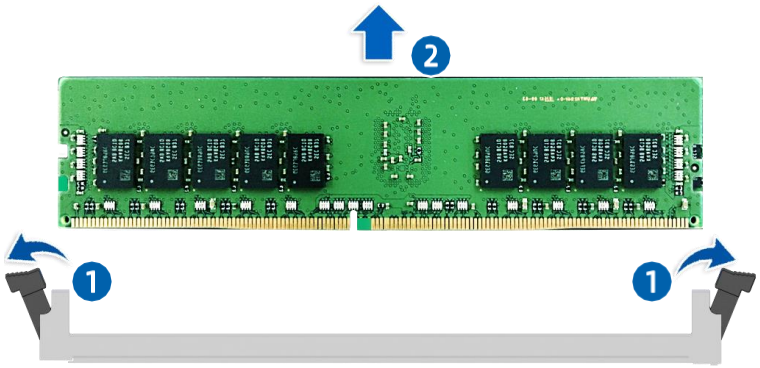
To remove the DIMM:

1. Remove the top cover.
2. Disconnect the cables of the super-capacitors (if any).
3. Remove the air duct.
4. Locate the DIMM to be replaced.
5. Remove the DIMM:
   a. Press the ejectors on both ends of the DIMM slot outward to unlock it. Gently lift and remove the DIMM from the slot.

NOTE

Make sure that the ejectors on both ends of the DIMM slot are fully opened.

Figure 4-12 Removing the DIMM

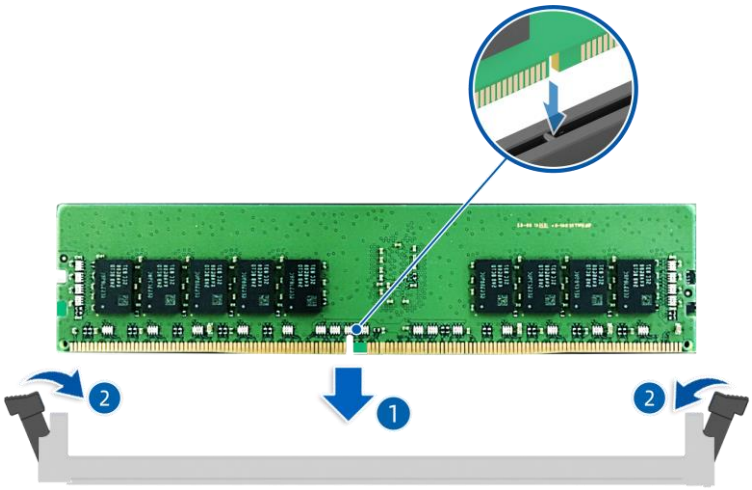



   b. Put the DIMM into a memory tray.

To install the DIMM:

1. Take a new DIMM out from the memory tray.
2. Align the alignment keys on the DIMM and DIMM slot. Insert the DIMM into the slot. Press both ends of the DIMM at the same time with your thumbs until the DIMM snaps into place.

Figure 4-13 Installing the DIMM

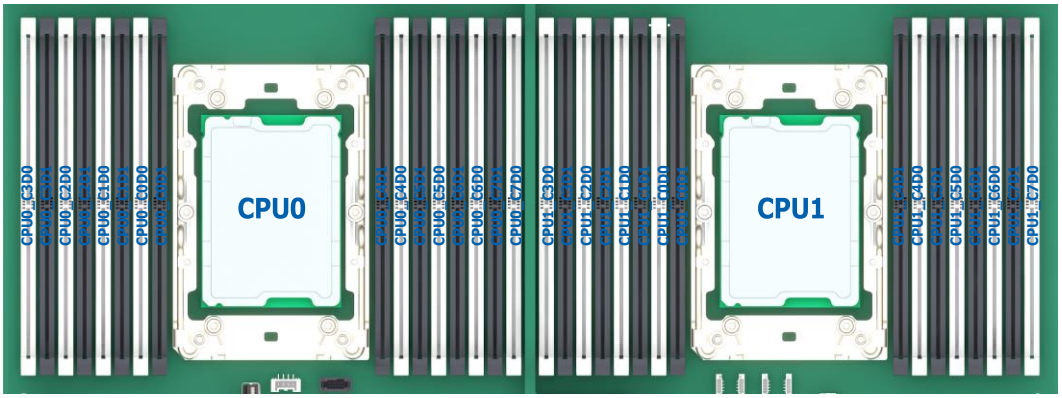



3. Install the air duct.

4. Connect the cables of the super-capacitors (if any).

5. Install the top cover.

Figure 4-14 DIMM Slot Layout




Detailed DIMM population rules are as follows:

Table 4-1 DDR5 Population Rules for Single-CPU Configuration

| DDR5 QTY | CPU0 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C3 | | C2 | | C1 | | C0 | | C4 | | C5 | | C6 | | C7 | |
| | D0 | D1 | D0 | D1 | D0 | D1 | D0 | D1 | D1 | D0 | D1 | D0 | D1 | D0 | D1 | D0 |
| 1 | | | | | | | V | | | | | | | | | |
| 2 | | | | | | | V | | | | | | | V | | |
| 4 | | | V | | | | V | | | V | | | | V | | |
| 6 | V | | V | | | | V | | | V | | V | | V | | |
| 8 | V | | V | | V | | V | | | V | | V | | V | | V |
| 12 | V | | V | V | V | | V | V | V | V | | V | V | V | | V |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | |

Table 4-2 DDR5 Population Rules for Dual-CPU Configuration

| DDR5 QTY | CPU0 | | | | | | | | | | | | | | | | CPU1 | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C3 | | C2 | | C1 | | C0 | | C4 | | C5 | | C6 | | C7 | | C3 | | C2 | | C1 | | C0 | | C4 | | C5 | | C6 | | C7 | |
| | D0 | D1 | D0 | D1 | D0 | D1 | D0 | D1 | D1 | D0 | D1 | D0 | D1 | D0 | D1 | D0 | D0 | D1 | D0 | D1 | D0 | D1 | D0 | D1 | D1 | D0 | D1 | D0 | D1 | D0 | D1 | D0 |
| 2 | | | | | | | V | | | | | | | | | | | | | | | | V | | | | | | | | |
| 4 | | | | | | | V | | | | | | | V | | | | | | | | | V | | | | | | | V | |
| 8 | | | V | | | | V | | | V | | | | V | | | | | V | | | | V | | | V | | | | V | |
| 12 | V | | V | | | | V | | | V | | V | | V | | | V | | V | | | | V | | | V | | V | | V | |
| 16 | V | | V | | V | | V | | | V | | V | | V | | V | V | | V | | V | | V | | | V | | V | | V | |
| 24 | V | | V | V | V | | V | V | V | V | | V | V | V | | V | V | | V | V | V | | V | V | V | V | | V | V | V | |
| 32 | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V |

### 6.4.6 Replacing the Processor Heatsink Module (PHM)

The server supports single- or dual-processor configuration depending on the model you purchased.

CAUTION

- To avoid damage to the processor and motherboard, do not install the processor without using the processor installation tool.
- To prevent possible server malfunction and equipment damage, processors in a multiprocessor configuration must bear the same part number.

To remove the PHM:

DANGER

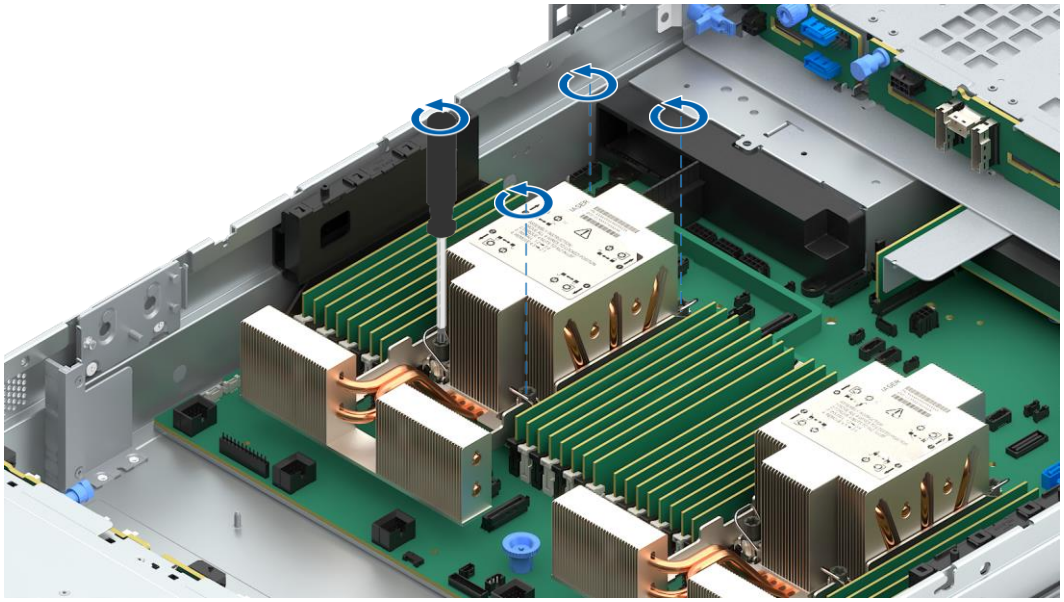
The heatsink may be hot after the system has been powered off. Allow the heatsink to cool for a few minutes before removing it.

1. Remove the top cover.
2. Disconnect the cables of the super-capacitors (if any).
3. Remove the air duct.
4. Remove the PHM:
   a. Loosen the 4 nuts securing the PHM to the CPU socket counterclockwise with a T30 Torx screwdriver in the sequence shown on the heatsink label.

b. Press the 4 lock-in wires inward to the unlocked position.

c. Gently remove the PHM from the CPU socket.

Figure 4-15 Removing the PHM



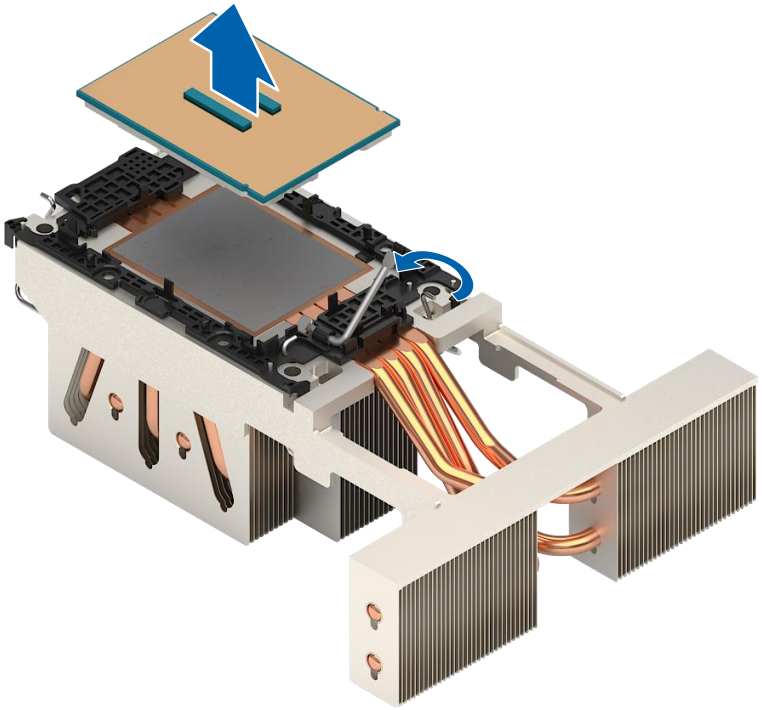
CAUTION

- Use a protective cover to protect the CPU socket to avoid damaging socket pins after removing the PHM.
- The CPU contacts are fragile and easily damaged. During removal and installation, always keep the CPU contacts side up when the dedicated processor installation/removal tool (CPU tray) is unavailable. DO NOT touch
the CPU contacts.

5. Lift the lever to release one side of the CPU off the carrier clip.

6. Open the release tabs securing the CPU to the carrier clip. Gently remove the CPU and put it into an anti-static bag.

Figure 4-16 Removing the CPU



7. Remove the CPU carrier clip:

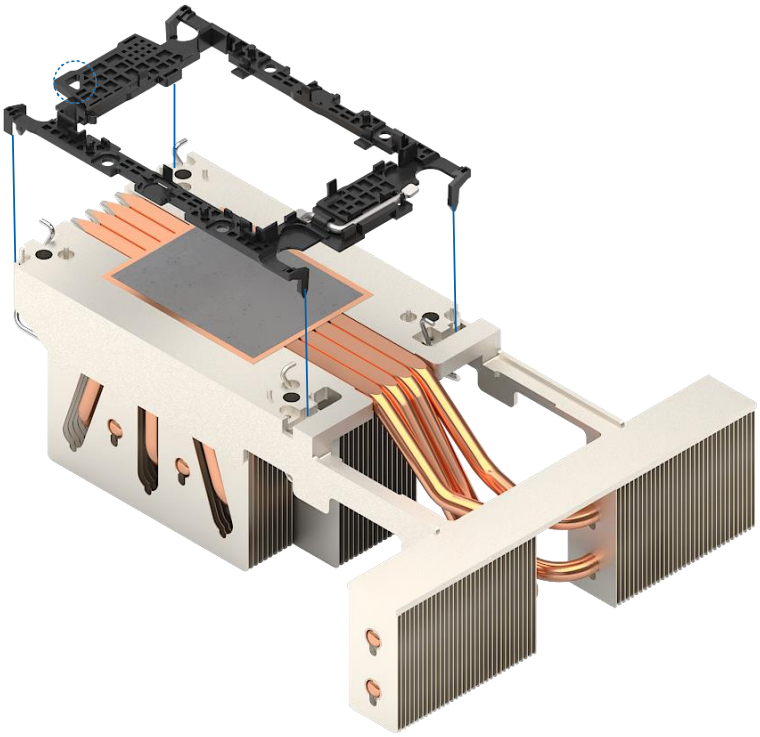
   a. Close the lever.

   b. Push to release the tab near the triangle mark.

   c. Release the other 3 tabs.

   d. Gently remove the carrier clip from the heatsink.

Figure 4-17 Removing the CPU Carrier Clip



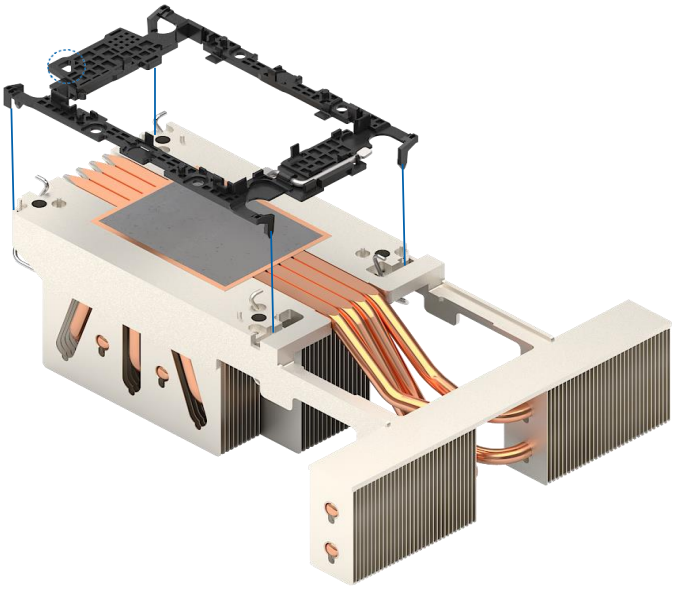
CAUTION

- Use a clean and lint-free cloth to wipe off the old thermal grease first if the heatsink is to be reused.
- Apply thermal grease evenly onto the heatsink before reusing the heatsink.

To install the PHM:

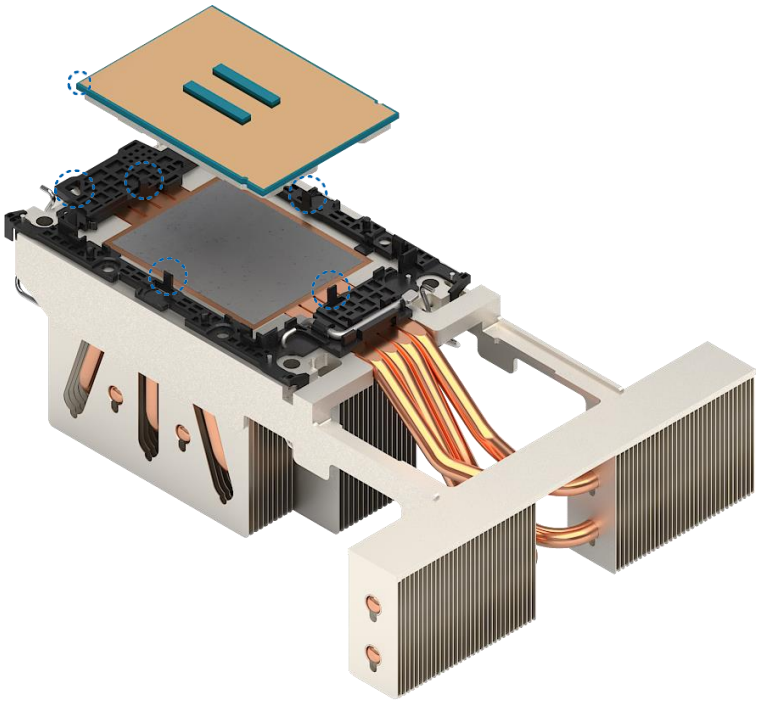
1. Install the CPU carrier clip:
   a. With the heatsink thermal grease side up, align the triangle mark on the carrier clip with that on the heatsink label.
   b. Install the carrier clip onto the heatsink until the 4 tabs of the carrier clip snap into place.

Figure 4-18 Installing the CPU Carrier Clip



2. Evenly apply the thermal grease on the heatsink surface in the size of the CPU.
3. Install the CPU:
   a. With the CPU contacts side up, align the triangle mark on the CPU with that on the carrier clip.
   b. Hold the CPU by its two edges, and install it into the carrier clip. Make sure that the CPU is secured in place by the release tabs on the four sides of the carrier clip.

Figure 4-19 Installing the CPU



4. Press down on the tabs of the protective cover (if any) to remove it from the CPU socket.
5. With the CPU contacts side down, align the triangle mark on the CPU with that on the CPU socket to attach the PHM onto the CPU socket.
6. Press the 4 lock-in wires outward to the locked position.
7. Tighten the 4 nuts securing the PHM to the CPU socket clockwise with a T30 Torx screwdriver in the sequence shown on the heatsink label.
8. Install the air duct.
9. Connect the cables of the super-capacitors (if any).
10. Install the top cover.

### 6.4.7 Replacing a PCIe Expansion Card

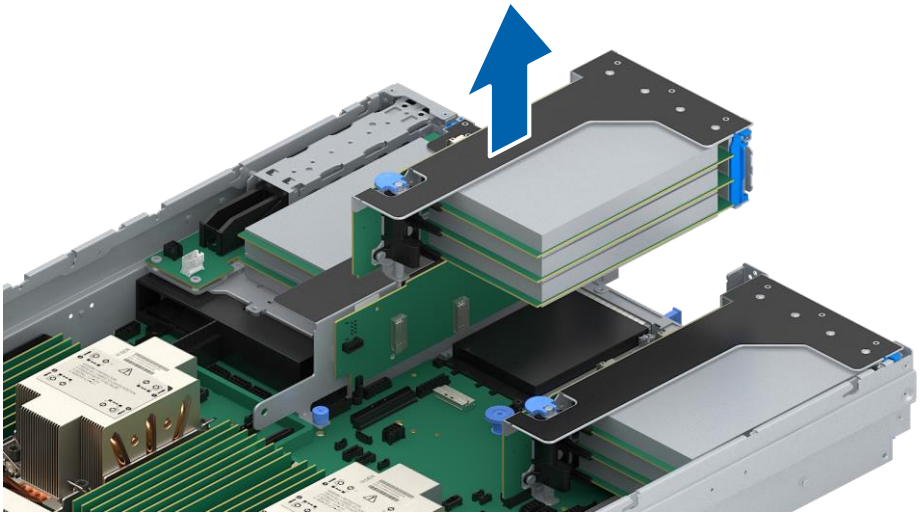
CAUTION

- To prevent damage to the server or expansion cards, power off the server and remove all power cords before removing or installing the PCIe expansion card.
- To prevent damage to the PCIe slot pins, be sure to apply even force and remove or install the PCIe expansion card vertically to the riser card.

To remove the PCIe expansion card:

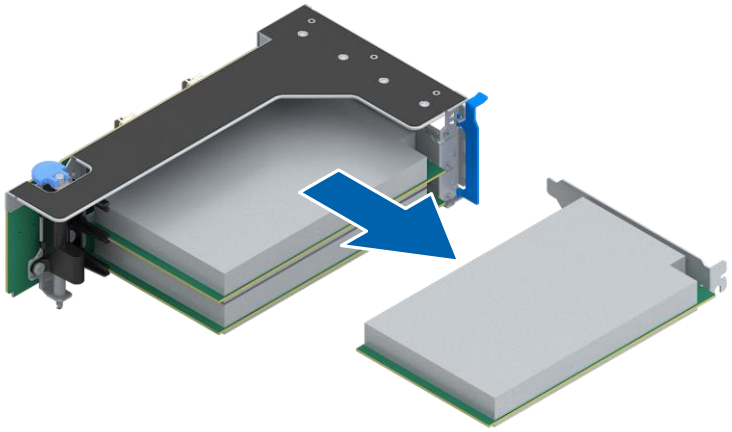
1. Remove the top cover.
2. If connected, remove the cables from the front of the riser card.
3. Lift the blue latch on the PCIe cage. Rotate the latch 180° counterclockwise to unlock it.
4. Gently lift and remove the PCIe riser-card assembly with both hands.

Figure 4-20 Removing the PCIe Riser-Card Assembly



5. Disconnect the cables from the side of the riser card. Take a record of the cables to avoid wrong cabling when installing.
6. Press down on the latch lock to open it.
7. Remove the PCIe expansion card horizontally and put it into an anti-static bag.

Figure 4-21 Removing the PCIe Expansion Card



To install the PCIe expansion card:

1. Take a new PCIe expansion card out from the anti-static bag.
2. Align and insert the PCIe expansion card into the riser card slot.
3. Close the latch lock.
4. Connect the cables to the side of the riser card. Be sure to connect the cables properly.
5. Align and insert the riser card vertically into the slot on the motherboard.
6. Press and rotate the blue latch 180° clockwise, and depress it 90° to secure the PCIe cage in place.
7. Connect the cables (if any) to the front of the riser card.
8. Install the top cover.

### 6.4.8 Replacing a Hot-Swap Drive

CAUTION

- For proper cooling, do not operate the server without the top cover, air ducts, dummies, or blanks installed.
- If the server supports hot-swap components, minimize the amount of time the top cover is open.

To remove the drive:

1. Press the release button to release the drive tray handle.

Figure 4-31 Pressing the Release Button

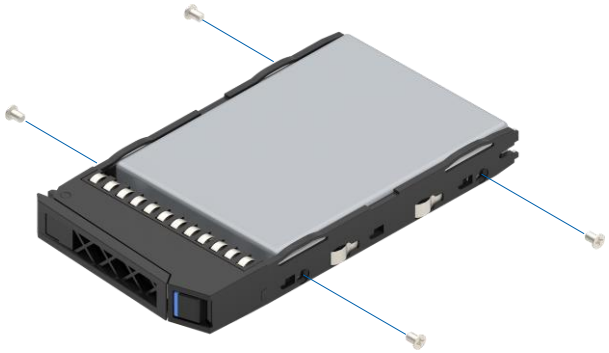
2. Hold the handle and pull the drive module out of the drive bay.

Figure 4-32 Pulling out the Drive Module

3. Remove the drive from the drive tray and put it into an antistatic bag.

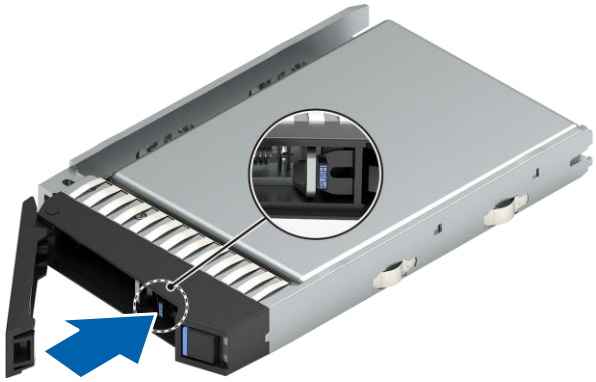
- For the drive tray with screws: Remove the 4 screws securing the drive to the drive tray counterclockwise with a Phillips screwdriver, and then remove the drive from the drive tray.

Figure 4-33 Removing the Screws



- For the tool-less drive tray: Press the PUSH button to release the drive tray latch, and then remove the drive from the drive tray.

Figure 4-34 Removing the Drive from the Tool-Less Drive Tray



To install the drive:

1. Take a new drive out from the antistatic bag.
2. Install the drive into the drive tray.

- For the drive tray with screws:

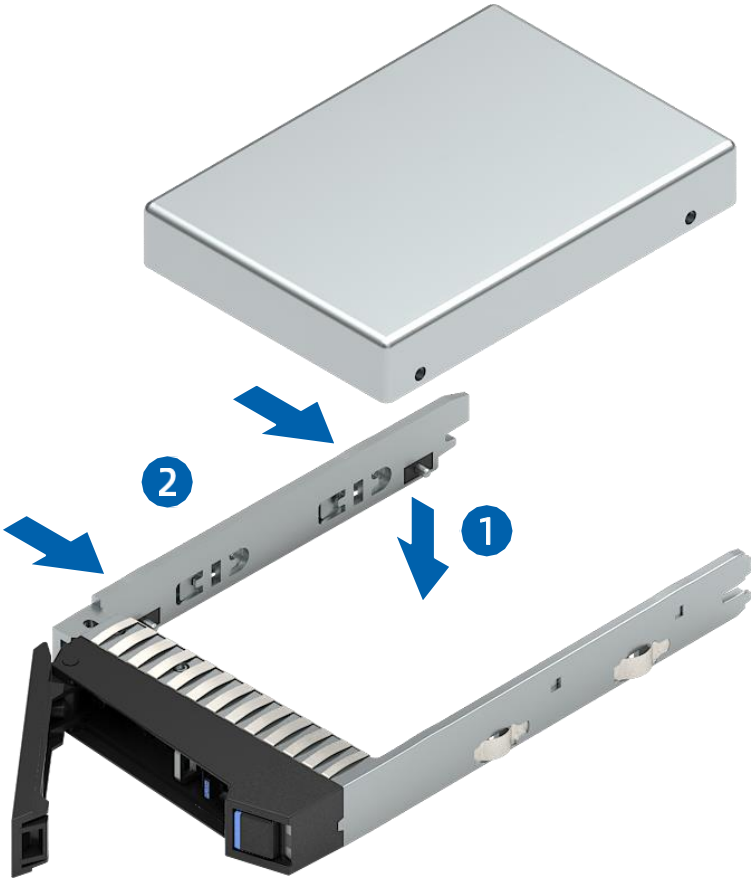
   a. Orient the drive into the drive tray with its connector toward the rear of the drive tray.

   b. Insert and tighten the 4 screws to secure the drive to the drive tray clockwise with a Phillips screwdriver.

Figure 4-38 Installing the Drive (Drive Tray with Screws)


- For the tool-less drive tray:
  a. Orient the drive into the drive tray with its connector toward the rear of the drive tray.
  b. Press the drive caddy bracket inward until the latch is locked.

Figure 4-39 Installing the Drive (Tool-Less Drive Tray)



### 6.4.9 Replacing a Hot-Swap PSU

WARNING

To reduce the risk of personal injury from hot surfaces, allow the power supply or power supply blank to cool before touching it.

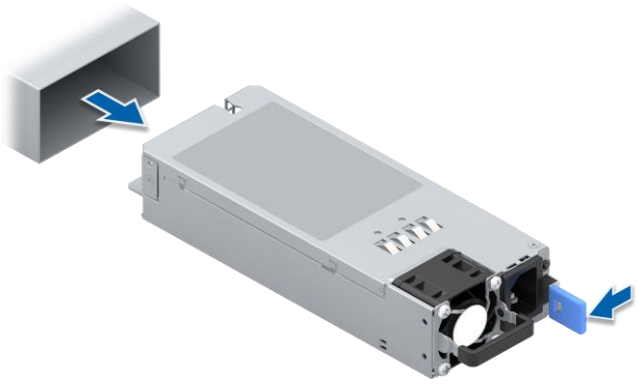
CAUTION

To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

To remove the PSU:

1. Disconnect the power cord.
2. Hold the handle and press the blue release tab to pull the PSU out of the power bay.

Figure 4-42 Removing the PSU



3. Put the PSU into an anti-static bag.

To install the PSU:

1. Take a new PSU out from the anti-static bag.
2. Make sure that the blue release tab is on the right of the PSU. Hold the handle and push the PSU into the power bay until it snaps into place.
3. Connect the power cord.
4. Check that the PSU LED is solid green when the server is powered on.

### 6.4.10 Replacing an OCP Card

CAUTION

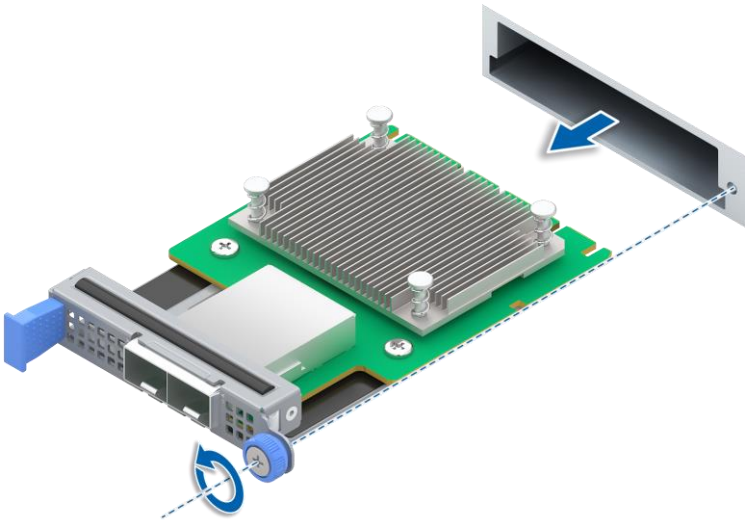
The OCP card supports hot-plug operations:

- To remove the OCP card with the server powered on, press the OCP hot-plug button, the LED turns off, and then remove the OCP card.
- To install the OCP card with the server powered on, after installing the OCP card, press the OCP hot-plug button, and the LED turns green.

To remove the OCP card:

1. Loosen the thumbscrew securing the OCP card to the chassis counterclockwise.
2. Pull out the OCP card from the chassis horizontally.

Figure 4-43 Removing the OCP Card



3. Put the OCP card into an anti-static bag.

To install the OCP card:

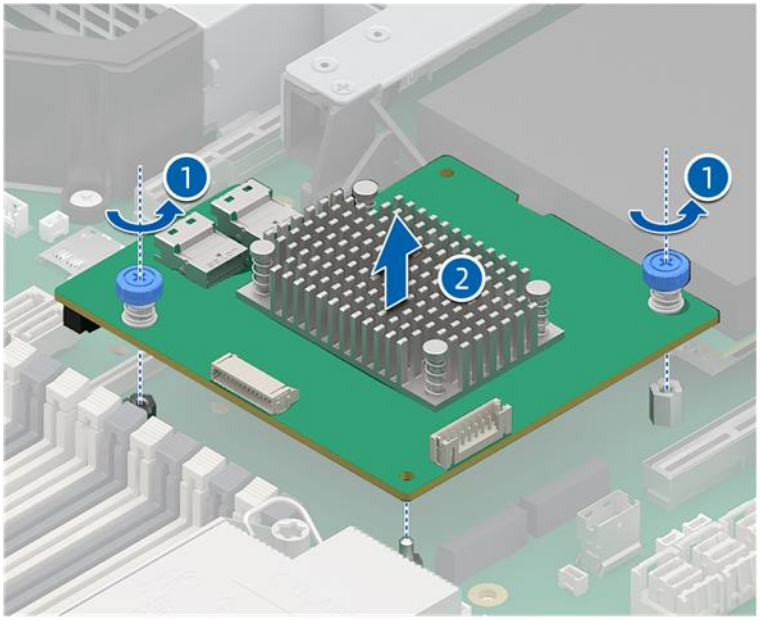
1. Take a new OCP card out from the anti-static bag.
2. Insert the OCP card horizontally into the slot until it snaps into place.
3. Tighten the thumbscrew securing the OCP card to the chassis clockwise.

### 6.4.11 Replacing the RAID Mezz Card

To remove the RAID mezz card:

1. Remove the top cover.
2. Remove the air duct.
3. Disconnect the cables from the RAID mezz card.
4. Loosen the 2 captive screws counterclockwise and vertically remove the RAID mezz card.

Figure 4-48 Removing the RAID Mezz Card




5. Put the RAID mezz card into an anti-static bag.

To install the RAID mezz card:

1. Take a new RAID mezz card out from the anti-static bag.
2. Align the connector and locating holes on the RAID mezz card with the connector and locating pins on the motherboard respectively, and install the RAID mezz card vertically onto the motherboard.
3. Tighten the 2 captive screws clockwise.
4. Connect the cables.
5. Install the air duct.

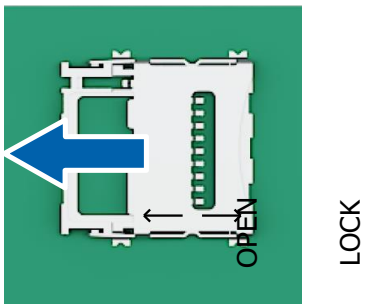
6. Install the top cover.

### 6.4.12 Replacing a TF Card

To remove the TF card:

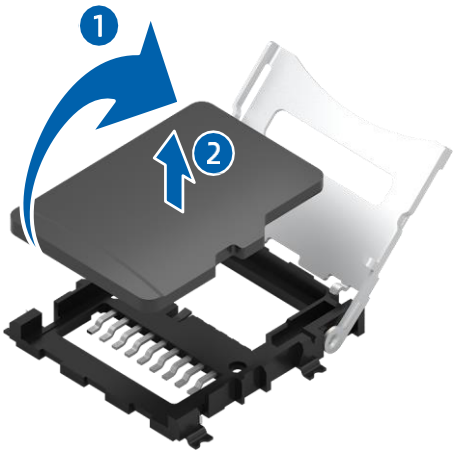
1. Remove the top cover.
2. Remove the air duct.
3. Remove the PCIe riser-card assembly.
4. Push the TF card cover in the direction of the OPEN arrow to unlock it.

Figure 4-49 Pushing the TF Card Cover




5. Open the TF card cover.
6. Remove the TF card and put it into an anti-static bag.

Figure 4-50 Removing the TF Card




To install the TF card:

1. Take a new TF card out from the anti-static bag.
2. Put the TF card into the TF card slot.

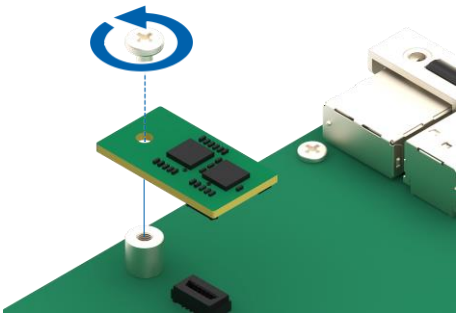
3. Close the TF card cover and push it in the direction of the LOCK arrow to lock it.
4. Install the PCIe riser-card assembly.
5. Install the air duct.
6. Install the top cover.

### 6.4.13 Replacing the TPM/TCM

To remove the TPM/TCM:

1. Remove the top cover.
2. Remove the air duct.
3. Loosen the screw counterclockwise with a Phillips screwdriver to remove it.
4. Vertically remove the TPM/TCM and put it into an anti-static bag.

Figure 4-51 Removing the TPM/TCM



To install the TPM/TCM:

1. Take a new TPM/TCM out from the anti-static bag.
2. Align the connector and screw hole on the TPM/TCM with the connector and locating post on the motherboard respectively, and install the TPM/TCM vertically onto the motherboard.
3. Insert and tighten the screw clockwise with a Phillips screwdriver.
4. Install the air duct.
5. Install the top cover.

## 6.5 Cable Routing

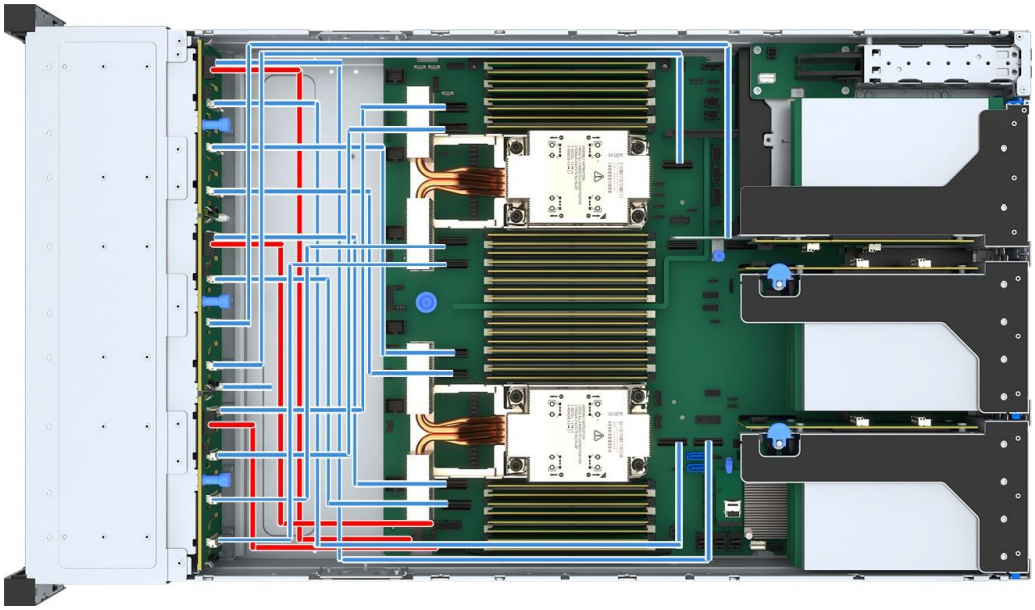
Blue lines indicate the data cable routing between the backplanes and the SAS/RAID cards/motherboard.

Red lines indicate the power cable routing between the backplanes and the motherboard.

CAUTION

Please route the cables based on the specific server configuration.

Figure 4-52 Cable Routing of 24 × 2.5-inch NVMe Drive Configuration



# 7. Replacing the CMOS Battery

DANGER

The CMOS battery contains lithium. A risk of fire and burns exists if the battery is not properly handled. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose the battery to temperatures higher than 60°C (140°F).
- Do not short-circuit external contacts, disassemble, crush, puncture, or dispose of the battery in fire or water.
- Replace batteries only with batteries designated for the product.
- To avoid damage to the components due to ESD, use anti-static gloves or wrist straps.

To remove the battery:

1. Power off the server and disconnect all the power cords to remove power completely.
2. Gently slide and remove the server out of the rack.
3. Remove the top cover.
4. Disconnect the cables of the super-capacitors (if any).
5. Remove the air duct.
6. Remove the left PCIe riser-card assembly at the rear of the server.
7. Locate the CMOS battery on the motherboard.
8. Gently push the release tab on the battery socket to release the battery.
9. Remove the battery from the battery socket.

CAUTION

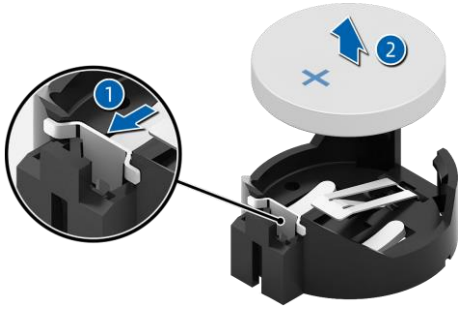
- DO NOT pry or press the battery with excessive force.
- Failing to remove the battery properly might damage the socket on the motherboard. Any damage to the socket might require replacing the motherboard.

10. Dispose of the battery as required by local ordinances or regulations.

NOTE

The figure shown below is for reference only. The location and orientation of the battery may differ depending on the models you purchased.

Figure 5-1 Removing the Battery




To install the battery:

1. Take a new battery out from the anti-static bag.
2. Place the new battery into the socket with the positive side facing up. Gently press the battery into the socket until it snaps into place.
3. Install the left PCIe riser-card assembly at the rear of the server.
4. Install the air duct.
5. Connect the cables of the super-capacitors (if any).
6. Install the top cover.
7. Reconfigure the server and reset the system date and time after powering on the server.

# 8. Troubleshooting

## 8.1 Hardware Issues

### 8.1.1 Power-On Issue

Symptom:

After pressing the power button, the power button LED is orange and does not turn green. The drive activity LEDs are off, the monitor screen is blank or shows "No input signal", and the system fans do not spin.

Solution:

1. Be sure that the power cords are plugged into functioning outlets.
2. Be sure that no loose connections exist.
3. Be sure that the power cords work.
4. Be sure that all PSUs are firmly seated.
5. Check the status of the PSU LEDs on the rear panel.
    - If the PSU LEDs are off or amber, further action is needed to determine whether the PSUs are faulty. Replace with a known working PSU. If the problem persists, contact us for assistance; if the PSU LED flashes green, then the PSU in question is faulty. Replace the faulty PSU or contact us instead.
    - If the PSU LEDs are green, contact and inform us of the detailed error information and problems.

### 8.1.2 No Display Issue

Symptom:

After pressing the power button, the power button LED is green, the system fans work properly, but the monitor screen is blank or shows "No input signal".

Solution:

1. Be sure that the monitor power cord is plugged into a working grounded outlet.
2. Be sure that no loose connections exist.

3. Power up the monitor and be sure that the monitor light is on.
4. Be sure that the monitor is cabled to the intended server.
5. Replace the monitor with a known functional monitor to be sure it is not faulty.
6. Log into the BMC Web GUI and launch the BMC remote control. (For more information on BMC Web GUI, refer to the BMC user manual.)
   - If the KVM works normally and there is display output, the server VGA port is faulty, contact us.
   - If the KVM does not work and there is no display output, review and export the system event logs related to the KVM status.
7. If the instructions above do not resolve the problem, contact and inform us of the detailed error information and problems.

### 8.1.3 Front Panel LED Illuminates Red

Symptom: The LED on the front panel illuminates red.

Solution: Identify the abnormal LED based on Front Panel Buttons and LEDs.

1. If the system status LED illuminates red, check whether the server is working properly. If it is working normally, log into the BMC Web GUI to review the BMC logs and record the detailed error information. (For more information on BMC Web GUI, refer to the BMC user manual.)
2. If the power status LED illuminates red, check the PSU LEDs on the rear panel for any abnormality (amber or off).
   - If the PSU LEDs are normal, log into the BMC Web GUI to review the BMC logs and record the detailed error information. (For more information on BMC Web GUI, refer to the BMC user manual.)
   - If the PSU LEDs are abnormal, see PSU LED Off or Amber for handling suggestions.
3. If the system overheat LED is abnormal, be sure that the server room temperature is within the normal range (see Chapter 8 for temperature specifications); be sure that the air vents and chassis interior are dust-free; be sure that the top cover and air ducts are in place; be sure that the

thermal grease between the CPU and the heatsink is not dry or caked.

4. If other LEDs are abnormal, log into the BMC Web GUI to review the BMC logs and record the detailed error information.
5. If the instructions above do not locate or resolve the problem, contact and inform us of the detailed error information and problems.

### 8.1.4 Stuck in POST Interface or Other Interfaces after Powering on

Symptom:

After pressing the power button, the server does not power up normally and is stuck in the POST interface or other interfaces.

Solution:

1. If the interface in which the server is stuck contains hardware-related error information, such as memory or RAID card errors, record the detailed error information.
2. If the server is stuck in the POST interface, record the detailed error information if any.
3. If the server is stuck in the media test failure interface, be sure that the OS has been installed successfully and the hard drive has been set as Boot Option #1.
4. If the instructions above do not resolve the problem, contact and inform us of the detailed error information and problems.

### 8.1.5 PSU LED Off or Amber

Symptom:

A certain PSU LED is off or amber when the server is working properly. Solution:

1. Be sure that there is no surface damage on the server such as burning or vulcanization.
2. Be sure that the power cord is plugged into a functioning outlet.
3. Be sure that no loose connections exist and the power cord works.
4. Disconnect the power cord of the PSU in question. Reseat the PSU and

connect the power cord.

5. If a shutdown is allowed, power off the server, remove the power, and swap the PSU in question with another PSU to test.

6. If the instructions above do not resolve the problem, contact and inform us of the detailed error information and problems.

### 8.1.6 Drive LED Abnormal

**Symptom:**

The drive LED is abnormal (activity LED off or error LED red) when the server is working properly.

**Solution:**

1. Be sure that the drive is firmly seated in place.

2. Check whether the drive has been plugged or other manual operations have occurred. If above situations have occurred, and the server is configured with RAID cards, be sure that the drive is configured properly in the RAID array.

3. Be sure that the drive can be identified in OS. Log into the RAID management interface to check whether the drive is offline.

4. If the drive is offline or if the instructions above do not resolve the problem, contact and inform us of the detailed error information and problems.

NOTE

- A hot-swap drive allows users to remove or replace the drive without shutting down or powering off the system, which improves the system disaster recovery capability, scalability and flexibility. It only means that the hot-swap drive can be plugged in and out during server operation without damaging the drive.
- Depending on the RAID level, hot-plugging out and in a drive in a RAID array may cause RAID degradation or failure. Different RAID cards have different policies. When re-inserting a drive, you may need to log into the RAID management interface for recovery.
- Do not remove the drive until the drive motor stops completely in order to

### 8.1.7 Excessive Noise from System Fans

Symptom:

The system fans make excessive noise when the server is working properly. Solution:

1. Be sure that the top cover is closed properly and the air ducts are seated in place.
2. Check the fan status LED and other status LEDs for any alarm. If the fan status LED is red, contact us for repair; if other status LEDs are red, refer to Front Panel LED Illuminates Red.
3. Check the server temperature by touching the chassis or viewing sensor temperatures in BMC Web GUI.
4. Be sure that the server room temperature is within the proper range (see Chapter 8 for temperature specifications). Adjust the air conditioner temperature if necessary.
5. Be sure that the front bezel and chassis interior are dust-free. If necessary, clean with a soft and dry cloth or a specialized brush with the server powered off. Improve the server room environment so that the server is not exposed to dirt and dust to avoid over-temperature.

6. Be sure that the server is not running with high loads. Log into the BMC Web GUI and be sure that all fans are identified and the fan mode is auto. If a fan is not identified, swap test the fan to check whether the issue is with the fan bay or the fan itself.

7. If the instructions above do not resolve the problem, contact and inform us of the detailed error information and problems.

### 8.1.8 Alarm Sound from the Server

Symptom:

An alarm goes off during server startup or operation.

Solution:

Identify the source of the alarm:

1. If the alarm sound comes from the PSU, check the PSU LEDs on the rear panel for any abnormality. If any, refer to PSU LED Off or Amber to handle this.
2. If the alarm sound comes from the chassis interior, remove the top cover to check further.
3. If the alarm sound comes from the RAID card, check the drive error LEDs or log into the RAID management interface to see whether the drives are normal. Record the error information if any.
4. If the instructions above do not resolve the problem, contact and inform us of the detailed error information and problems.

### 8.1.9 Keyboard and Mouse Not Functioning

Symptom:

The keyboard and/or mouse are not operating normally.

Solution:

1. Be sure that all cables are securely and properly connected.
2. Connect the keyboard and mouse to a notebook or another server to test.
3. Power cycle the server and retest the devices.
4. Restart the server and enter BIOS or RAID configuration interface to test whether the keyboard and mouse can work: If the two devices work properly, then the USB driver has a problem; if the problem persists, then maybe the motherboard or I/O board connectors are defective.
5. If the instructions above do not resolve the problem, contact and inform us of the detailed error information and problems.

### 8.1.10 USB Port Issue

Symptom:

Unable to use USB devices.

Solution:

1. Be sure that the OS on the server supports USB devices.
2. Be sure that the server has been installed with the correct USB driver. Reinstall the USB driver if necessary.
3. Connect the USB device to another server to test.
   - If the USB device does not work normally, replace with a known working USB device.
   - If the USB device works normally, a system fault has occurred. Contact us for repair.
4. Power cycle the server and retest the USB device.
5. If the instructions above do not resolve the problem, contact and inform us of the detailed error information and problems.

## 8.2 Software Issues

### 8.2.1 OS Installation Issues

Unable to load the RAID driver

Symptom:

Unable to load the RAID driver during OS installation. Solution:

1. Be sure that the server has been installed with the correct RAID driver.
2. Go to our official website to download the correct RAID driver. Some RAID drivers need to be loaded several times.
3. If the instructions above do not resolve the problem, contact and inform us of the detailed error information and problems.

Unable to create partitions larger than 2 TB

Symptom:

Unable to create partitions larger than 2 TB during OS installation.

Solution:

1. Click **Advanced** > **CSM Configuration** > **Boot option filter** > **UEFI only** in BIOS to set the compatibility mode to UEFI only. (For more information, refer to the BIOS user manual.) Then save and exit BIOS.
2. Press <F11> on the BIOS boot screen, and then select the needed boot option to install the OS. The server will restart automatically after OS installation.
3. Be sure that the disk format is GPT during OS installation. Then you can create partitions larger than 2 TB.
4. If the instructions above do not resolve the problem, contact and inform us of the detailed error information and problems.

Low disk space on C drive

Symptom:

After OS installation, the C drive is almost full and out of space.

Solution:

1. Turn down the virtual memory or allocate the virtual memory to other partitions by clicking **This PC** > **Properties** > **Advanced system settings** > **Advanced** > **Performance** > **Settings** > **Virtual Memory** > **Change** (demonstrated with Windows Server 2012).
2. If the instructions above do not resolve the problem, contact and inform us of the detailed error information and problems.

### 8.2.2 PXE Boot Failure

Symptom:

Fail to install an OS via PXE. Solution:

1. Be sure that the PXE server can be used to install an OS for another server.
2. Be sure that there is a network link by checking the network port LED.
3. Be sure that the NIC can be identified in BMC Web GUI, BIOS or Shell.
4. Be sure that PXE function is enabled in BIOS.
5. Be sure that the target drive and RAID array can be identified and are large enough for OS installation.
6. If the instructions above do not resolve the problem, contact and inform us of the detailed error information and problems.

### 8.2.3 Displayed Memory Capacity Abnormal

Symptom:

The memory capacity displayed in OS is inconsistent with the physical memory capacity.

Solution:

1. Be sure that all DIMMs are properly seated.
2. Be sure that the DIMMs are installed as per the DIMM population rules of the server.

3. Be sure that the identified total memory capacity in BIOS matches the physical memory capacity.
4. Be sure that the memory capacity supported by the Windows version installed on the server is equal to or larger than the total physical memory capacity. The OS may be unable to access all the installed memories. For example, Windows server 2008 x86 supports up to 4 GB memory.
5. If the instructions above do not resolve the problem, contact and inform us of the detailed error information and problems.

### 8.2.4 Network Performance Issue

Symptom:

The network connection is lost or slow.

Solution:

1. Be sure that the network cable is connected properly, the network port LED flashes normally and the network port is configured properly.
2. Reseat the network cable. If the problem persists, connect the server with a notebook via a known working network cable: If the network is normal, check the network cable or the switch port; if the network is faulty, go to our official website to download the latest NIC driver.
3. Be sure that the NIC can be identified in BMC Web GUI, BIOS or Shell and the MAC address is correct.
4. If the instructions above do not resolve the problem, contact and inform us of the detailed error information and problems.

# 9. System Specifications

## 9.1 Technical Specifications

**SYSTEM SPECIFICATIONS:**

| Item | Specification |
|---|---|
| Form Factor | 2U rack server |
| Processor | Supports 1 or 2 processors.<br>• 4th Gen AMD Genoa processors.<br>• Integrated with memory controllers, with 12 memory channels per processor.<br>• Integrated with PCIe controllers with 128 PCIe 5.0 lanes per processor.<br>• 4 xGMI links at up to 32 GT/s.<br>• Up to 96 cores per processor.<br>• Max boost frequency is 4.40 GHz.<br>• L3 cache up to 384 MB.<br>• TDP up to 400 W.<br><br>Note:<br>The information above is for reference only, consult 2CRSi Customer Service for details about component compatibility. |
| Memory | 24 DIMM slots.<br><br>• Up to 24 DDR5 DIMMs.<br>• Each processor supports 12 memory channels and each channel supports 1 DIMM slot.<br>• Up to 4,800 MT/s.<br>• RDIMMs supported.<br>• Mixing DDR5 DIMMs of different specifications (such as capacity, bit width, rank, and height) is not supported.<br>• A server must use DDR5 DIMMs with the same part number (P/N code).<br>ECC, memory mirroring, and memory rank sparing supported.<br><br>Note:<br>• The information above is for reference only, consult 2CRSi Customer Service for details about component compatibility. |

| | |
|---|---|
| Storage | Supports multiple drive configurations. For detailed information, refer to Drive Configuration.<br><br>• Supports multiple RAID controller card models, consult 2CRSi Customer Service for details.<br><br>  ◦ Supports functions such as RAID configuration, RAID level migration, and disk roaming.<br>  ◦ Supports power failure protection enabled by the super-capacitor to protect user data.<br>  ◦ A standard RAID controller card occupies 1 PCIe slot.<br><br>• 32 onboard SATA connectors (4 MCIO x8 connectors, each with 8 SATA connectors). |
| Network | Multiple types of network expansion:<br><br>• 2 optional OCP 3.0 cards (1 Gb/10 Gb/25 Gb/40 Gb/100 Gb/200 Gb).<br>• 1 Gb/10 Gb/25 Gb/40 Gb/100 Gb PCIe NICs. |
| I/O Expansion | PCIe slots:<br>• Up to 8 PCIe slots (4 PCIe x8 slots and 4 PCIe x16 slots).<br>• 2 OCP 3.0 x16 slots.<br><br>Note:<br>The information above is for reference only. For detailed information, see 5.7.2 PCIe Slot and 5.7.3 PCIe Slot Description. |
| Port | Supports multiple ports.<br>• Front panel ports:<br>• 1 USB 2.0 port<br>• 1 USB 3.0 port<br>• 1 DB15 VGA port |

| | |
|---|---|
| | • Rear panel ports:<br>  ◦ 2 USB 3.0 ports<br>  ◦ 1 DB15 VGA port<br>  ◦ 1 system/BMC serial port<br>  ◦ 1 BMC management network port<br><br>• Internal connectors:<br>  ◦ 32 SATA connectors (4 MCIO x8 connectors, each with 8 SATA connectors)<br>  ◦ 2 OCP 3.0 slots<br>  ◦ 1 USB 3.0 connector<br><br>Note:<br>The installation of OS on USB storage media is not recommended. |

| | |
|---|---|
| Fan | 6 hot-swap redundant 6056 fans with N+1 redundancy |
| PSU | Supports 550 W/800 W/1300 W/1600 W/2000 W CRPS standard PSUs with 1+1 redundancy.<br>• 110 VAC – 230 VAC: 90 V -264 V<br>• 240 VDC: 180 V – 320 V<br>• 336 VDC: 260 V – 400 V<br>• -48 VDC: -40 V to -72 V |
| System Management | • BMC<br>• NC-SIBMCNC-SI<br>• 2CRSi Physical Infrastructure Manager (ISPIM 2CRSi) |
| OS | For supported operating systems, see 7.1 Operating System. |

## 9.2 Environmental Specifications

**ENVIRONMENTAL SPECIFICATIONS:**

| Item | Parameter |
|---|---|
| Temperature[1, 2, 3] | • Operating: 10°C to 35°C (50°F to 95°F) (For some configurations, the operating temperature is 5°C to 45°C (41°F to 113°F)) |

| | |
|---|---|
| | • Storage (packed): -40°C to +70°C (-40°F to +158°F)<br>• Storage (unpacked): -40°C to +55°C (-40°F to +131°F) |
| Relative Humidity (RH, non-condensing) | • Operating: 8% to 90% RH<br>• Storage (packed): 5% to 95% RH<br>• Storage (unpacked): 5% to 95% RH |
| Operating Altitude | ≤ 3,050 m (10,007 ft)<br>• For configurations that satisfy the requirement of ASHRAE A2 level, derate the maximum allowable temperature by 1°C per 300 m (1°F per 547 ft) above 900 m (2,953 ft).<br>• For configurations that satisfy the requirement of ASHRAE A3 level, derate the maximum allowable temperature by 1°C per 175 m (1°F per 318 ft) above 900 m (2,953 ft).<br>• For configurations that satisfy the requirement of ASHRAE A4 level, derate the operating temperature by 1°C per 125 m (1°F per 228 ft) above 900 m (2,953 ft). |

Notes:
[1] GPU configuration supports the operating temperature range of 10°C to 30°C (50°F to 86rF). Some configurations with high CPU TDP support the operating temperature range of 10°C to 35°C (50°F to 95°F).

[2] Standard operating temperature:
- 10°C to 35°C (50°F to 95°F) is the standard operating temperature range at sea level. For temperatures between 10°C and 35°C (50°F and 95°F), derate the maximum allowable temperature by 1°C per 305 m (1°F per 556 ft) above sea level. The maximum temperature gradient is 20°C/h (36°F/h) and the maximum operating altitude is 3,050 m (10,007 ft), both varying with server configuration.
- Any fan failure or operations above 30°C (86°F) may lead to system performance degradation.

[3] Expanded operating temperature:
- For certain approved configurations, the temperature range at the server inlet can be expanded to 5°C to 10°C (41°F to 50°F) and 35°C to 45°C (95°F to 113°F) at sea level. At an altitude of 900 to 3,050 m (2,953 to 10,000 ft), de-rate the maximum allowable temperature by 1°C per 175 m (1°F per 319 ft).
- For certain approved configurations, the temperature range at the server inlet can be expanded to 35°C to 45°C (95°F to 113°F) at sea level. At an altitude of 900 to 3,050 m (2,953 to 10,000 ft), de-rate the maximum allowable temperature by 1°C per 125 m (1°F per 228 ft).
- Any fan failure or operations under the expanded environments may lead to system performance degradation.

[4] Product conformance to cited normative standards is based on sample testing, evaluation, or assessment. This product or family of products is eligible to bear the appropriate compliance logos and statements.

## 9.3 Physical Specifications

**PHYSICAL SPECIFICATION:**

| Item | Description |
|---|---|
| Dimensions (W × H × D) | • Chassis: 435 × 87 × 780 mm (17.13 x 3.43 x 30.71 in.)<br>• Outer packaging: 651 × 295 × 1,031 mm (25.63 × 11.61× 40.59 in.) |
| Installation Dimension Requirements | • Installation requirements for the cabinet are as follows:<br>  ○ General cabinet compliant with the International Electrotechnical Commission 297 (IEC 297) standard<br>  ○ Width: 482.6 mm (19 in.)<br>  ○ Depth: Over 1,100 mm (43.30 in.)<br>• Installation requirements for the server rails are as follows:<br>  ○ Ball-bearing rail kit: The distance between the mounting flanges at the front and rear of the cabinet is 609.6 to 914.4 mm (24 to 36 in.). |
| Weight | • Net weight:<br>  ○ 12x 3.5-inch front drive configuration: 29.2 kg (64.37 lbs)<br>  ○ Packaging material weight: 9.5 kg (20.94 lbs) |

| | |
|---|---|
| Power Consumption | Power consumption varies with configuration.<br>Consult 2CRSi Customer Service for details. |

# 10. Operating System and Hardware Compatibility

This section describes the OS and hardware compatibility of the server. For the latest compatibility configuration and the component models not listed in this document, contact your local 2CRSi sales representative.

IMPORTANT

- Using incompatible components may cause the server to work abnormally, and such failures are not covered by technical support or warranty.
- The server performance is strongly influenced by application software, middleware, and hardware. The subtle differences in them may lead to performance variation in the application and test software.
  - For requirements on the performance of specific application software, contact 2CRSi sales representatives to request for a proof of concept (POC) and confirm the detailed hardware and software configurations during the pre-sales phase.
  - For requirements on hardware performance consistency, define specific configuration requirements (for example, specific drive models, RAID controller cards, or firmware versions) during the pre-sales phase.

## 10.1 Supported Operating Systems

**SUPPORTED OPERATING SYSTEMS:**

| OS | OS Version |
|---|---|
| Windows | Windows Server 2019/2022 |
| Red Hat | Red Hat Enterprise Linux 8.6 |
| | Red Hat Enterprise Linux 9.0 |
| VMware | VMware ESXi 7.0 P06 and highter |

## 10.2 Hardware Compatibility

### 10.2.1 CPU Specifications

**CPU SPECIFICATIONS:**

| MODEL | CORES | THREADS | BASE FREQ. (GHZ) | UP TO MAX BOOST FREQ. (GHZ)a | ALL-CORE BOOST (GHZ)b | DEFAULT TDP (W) | L3 CACHE (MB) | 2P/1P |
|---|---|---|---|---|---|---|---|---|
| 9754 | 128 | 256 | 2.25 | 3.10 | 3.10 | 360 | 256 | 2P/1P |
| 9754S | | 128 | | | | | | |
| 9734 | 112 | 224 | 2.20 | 3.00 | 3.00 | 340 | 256 | 2P/1P |
| 9654 | 96 | 192 | 2.40 | 3.70 | 3.55 | 360 | 384 | 2P/1P |
| 9654P | | | | | | | | 1P |
| 9634 | 84 | 168 | 2.25 | 3.70 | 3.10 | 290 | 384 | 2P/1P |
| 9554 | 64 | 128 | 3.10 | 3.75 | 3.75 | 360 | 256 | 2P/1P |
| 9554P | | | | | | | | 1P |
| 9534 | 64 | 128 | 2.45 | 3.70 | 3.55 | 280 | 256 | 2P/1P |
| 9454 | 48 | 64 | 2.75 | 3.80 | 3.65 | 290 | 256 | 2P/1P |
| 9454P | | | | | | | | 1P |
| 9354 | 32 | 64 | 3.25 | 3.80 | 3.75 | 280 | 256 | 2P/1P |
| 9354P | | | | | | | | 1P |
| 9334 | 32 | 56 | 2.70 | 3.90 | 3.85 | 210 | 128 | 2P/1P |
| 9254 | 24 | 48 | 2.90 | 4.15 | 3.90 | 200 | 128 | 2P/1P |
| 9224 | 24 | 48 | 2.50 | 3.70 | 3.65 | 200 | 64 | 2P/1P |
| 9124 | 16 | 32 | 3.00 | 3.70 | 3.60 | 200 | 64 | 2P/1P |
| **AMD EPYC 9004 SERIES PROCESSORS WITH AMD 3D V-CACHE** | | | | | | | | |
| 9684X | 96 | 192 | 2.55 | 3.70 | 3.42 | 400 | 1152 | 2P/1P |
| 9384X | 32 | 64 | 3.10 | 3.90 | 3.50 | 320 | 768 | 2P/1P |
| 9184X | 16 | 32 | 3.55 | 4.20 | 3.85 | 320 | 768 | 2P/1P |
| **HIGH-FREQUENCY AMD EPYC 9004 SERIES PROCESSORS** | | | | | | | | |
| 9474F | 48 | 96 | 3.60 | 4.10 | 3.95 | 360 | 256 | 2P/1P |
| 9374F | 32 | 64 | 3.85 | 4.30 | 4.10 | 320 | 256 | 2P/1P |
| 9274F | 24 | 48 | 4.05 | 4.30 | 4.10 | 320 | 256 | 2P/1P |
| 9174F | 16 | 32 | 4.10 | 4.40 | 4.15 | 320 | 256 | 2P/1P |

## 10.2.2 DIMM Specifications

The server supports up to 32 DDR5 DIMMs. Each processor supports 12 memory channels with up to 2 DIMMs per channel. The supported DIMMs includes RDIMMs and CPS.

**DIMM SPECIFICATIONS**

| Type | Capacity (GB) | Frequency (MHz) | Data Width | Organization |
|---|---|---|---|---|
| RDIMM | 16 | 4,800 | x80 | 1R x8 |
| RDIMM | 32 | 4,800 | x80 | 1R x4/2R x8 |
| RDIMM | 64 | 4,800 | x80 | 2R x4 |
| CPS | 128 | 4,800 | | |

## 10.2.3 Drive Specifications

**SAS/SATA DRIVE SPECIFICATIONS**

| Type | Speed in rpm | Capacity |
|---|---|---|
| 2.5-inch SAS | 10K | 600 GB/1.2 TB/1.8 TB/2.4 TB |
| | 15K | 600 GB/900 GB |

**SSD SPECIFICATIONS**

| Type | Vendor | Model |
|---|---|---|
| 2.5" SATA SSD | | |
| 2.5" SATA SSD | SAMSUNG | SSD SATA3 PM893 3.84TB_MZ7L33T8HBLT-00A07 |
| 2.5" SATA SSD | SAMSUNG | SSD SATA3 PM893 1.92TB_MZ7L31T9HBLT-00A07 |
| 2.5" SATA SSD | SAMSUNG | SSD SATA3 PM893 960GB_MZ7L3960HCJR-00A07 |
| 2.5" SATA SSD | SAMSUNG | SSD SATA3 PM893 480GB_MZ7L3480HCHQ-00A07 |
| 2.5" SATA SSD | SAMSUNG | SSD SATA3 PM893 240GB_MZ7L3240HCHQ-00A07 |
| 2.5" SATA SSD | INTEL | SSD SATA3 S4620 3.84TB_SSDSC2KG038TZ01 99A0DC |
| 2.5" SATA SSD | INTEL | SSD SATA3 S4620 1.92TB_SSDSC2KG019TZ01 99A0DA |
| 2.5" SATA SSD | INTEL | SSD SATA3 S4620 960GB_SSDSC2KG960GZ01 99A0D9 |
| 2.5" SATA SSD | INTEL | SSD SATA3 S4620 480GB_SSDSC2KG480GZ01 99A0D8 |
| 2.5" SATA SSD | INTEL | SSD SATA3 S4520 7.68TB_SSDSC2KB076TZ01 99A0D7 |
| 2.5" SATA SSD | INTEL | SSD SATA3 S4520 3.84TB_SSDSC2KB038TZ01 99A0D6 |
| 2.5" SATA SSD | INTEL | SSD SATA3 S4520 1.92TB_SSDSC2KB019TZ01 99A0CP |
| 2.5" SATA SSD | INTEL | SSD SATA3 S4520 960GB_SSDSC2KB960GZ01 99A0AF |
| 2.5" SATA SSD | INTEL | SSD SATA3 S4520 480GB_SSDSC2KB480GZ01 99A0AD |
| 2.5" SATA SSD | INTEL | SSD SATA3 S4520 480GB_SSDSC2KB240GZ01 99A0AA |

### 10.2.4 U.2/U.3 NVMe SSD Specifications

| Type | Vendor | Model |
|---|---|---|
| 2.5" NVMe SSD | | |
| 2.5" NVMe SSD | WESTERN DIGITAL | ULTRASTAR DC SN655 TLC NVMe U.3 SFF-15mm RI-1 3.84TB - WUS5EA138ESP7E1 |
| 2.5" NVMe SSD | WESTERN DIGITAL | ULTRASTAR DC SN655 TLC NVMe U.3 SFF-15mm RI-1 7.68TB - WUS5EA176ESP7E1 |
| 2.5" NVMe SSD | WESTERN DIGITAL | ULTRASTAR DC SN655 TLC NVMe U.3 SFF-15mm RI-1 15.36TB - WUS5EA1A1ESP7E1 |
| 2.5" NVMe SSD | SAMSUNG | SSD PCIE5 PM1743 15.36TB_MZWLO15THBLA-00A07 |
| 2.5" NVMe SSD | SAMSUNG | SSD PCIE5 PM1743 7.68TB_MZWLO7T6HBLA-00A07 |
| 2.5" NVMe SSD | SAMSUNG | SSD PCIE5 PM1743 3.84TB_MZWLO3T8HCLS-00A07 |
| 2.5" NVMe SSD | SAMSUNG | SSD PCIE5 PM1743 1.92TB_MZWLO1T9HCJR-00A07 |
| 2.5" NVMe SSD | SAMSUNG | SSD PCIE4 PM9A3 7.68TB U.2_MZQL27T6HBLA-00A07 |
| 2.5" NVMe SSD | SAMSUNG | SSD PCIE4 PM9A3 3.84TB U.2_MZQL23T8HCLS-00A07 |
| 2.5" NVMe SSD | SAMSUNG | SSD PCIE4 PM9A3 1.92TB U.2_MZQL21T9HCJR-00A07 |
| 2.5" NVMe SSD | SAMSUNG | SSD PCIE4 PM9A3 960GB U.2_MZQL2960HCJR-00A07 |
| 2.5" NVMe SSD | INTEL | SSD PCIE4 D7-P5510 7.68TB_SSDPF2KX076TZ01 99A5DR |
| 2.5" NVMe SSD | INTEL | SSD PCIE4 D7-P5510 3.84TB_SSDPF2KX038TZ01 99A5DP |
| 2.5" NVMe SSD | INTEL | SSD PCIE P5620 6.4TB_SSDPF2KE064T1 99AH31 |

**3.5” HDD SPECIFICATIONS**

| Type | Vendor | Model |
|---|---|---|
| 3.5" SATA HDD | | |
| 3.5" SATA HDD | WESTERN DIGITAL | ULTRASTAR DC HC580 24TB SATA Helium_WUH722424ALE6L1 |
| 3.5" SATA HDD | WESTERN DIGITAL | ULTRASTAR DC HC570 22TB SATA Helium_WUH722222ALE6L4 |
| 3.5" SAS HDD | WESTERN DIGITAL | ULTRASTAR DC HC570 22TB SAS Helium_WUH722222AL5204 |
| 3.5" SATA HDD | WESTERN DIGITAL | ULTRASTARDCHC320 8TB SATA AIR_HUS728T8TALE6L4 |
| 3.5" SATA HDD | WESTERN DIGITAL | ULTRASTARDCHC330 10TB SATA AIR_WUS721010ALE6L4 |
| 3.5" SATA HDD | WESTERN DIGITAL | ULTRASTARDCHC520 12TB SATA Helium_HUH721212ALE600 |
| 3.5" SATA HDD | WESTERN DIGITAL | ULTRASTAR DC HC550 16TB SATA Helium_WUH721816AL5204 |
| 3.5" SATA HDD | WESTERN DIGITAL | ULTRASTAR DC HC550 18TB SATA Helium_WUH721818ALE6L4 |
| 3.5" SATA HDD | WESTERN DIGITAL | ULTRASTAR DC HC560 20TB SATA Helium_WUH722020ALE6L4 |
| 3.5" SAS HDD | WESTERN DIGITAL | ULTRASTARDCHC320 8TB SAS AIR_HUS728T8TAL5204 |

| | | |
|---|---|---|
| 3.5" SAS HDD | WESTERN DIGITAL | ULTRASTARDCHC330 10TB SAS AIR_WUS721010AL5204 |
| 3.5" SAS HDD | WESTERN DIGITAL | ULTRASTARDCHC520 12TB SAS Helium_HUH721212AL5200 |
| 3.5" SAS HDD | WESTERN DIGITAL | ULTRASTARDCHC530 14TB SAS Helium_WUH721414AL5204 |
| 3.5" SAS HDD | WESTERN DIGITAL | ULTRASTAR DC HC550 16TB SAS Helium_WUH721816AL5204 |
| 3.5" SAS HDD | WESTERN DIGITAL | ULTRASTAR DC HC550 18TB SAS Helium_WUH721818AL5204 |
| 3.5" SATA HDD | TOSHIBA | 18TB 7200RPM_MG09ACA18TE/0104 |
| 3.5" SATA HDD | TOSHIBA | 16TB 7200RPM_MG08ACA16TE/0102 |
| 3.5" SATA HDD | TOSHIBA | 14TB 7200RPM_MG07ACA14TE/0104 |
| 3.5" SATA HDD | TOSHIBA | 12TB 7200RPM_MG07ACA12TE/0104 |
| 3.5" SATA HDD | TOSHIBA | 10TB 7200RPM_MG06ACA10TE/FW:0109 |
| 3.5" SATA HDD | TOSHIBA | 8TB 7200RPM_MG08ADA800E/FW:0101 |
| 3.5" SATA HDD | TOSHIBA | 6TB 7200RPM_MG08ADA600E/FW:0101 |
| 3.5" SATA HDD | TOSHIBA | 4TB 7200RPM_MG08ADA400E/FW0101 |
| 3.5" SATA HDD | TOSHIBA | 2TB 7200RPM_MG04ACA200E/FW:FP4B |
| 3.5" SATA HDD | TOSHIBA | 1TB 7200RPM_MG04ACA100N/FW:FJ5A |
| 3.5" SATA HDD | SEAGATE | 18TB 7200RPM_SEAGATE/ST18000NM000J/SN02 |
| 3.5" SATA HDD | SEAGATE | 10TB 7200RPM_SEAGATE/ST10000NM017B/SN01 |
| 3.5" SATA HDD | SEAGATE | 8TB 7200RPM_SEAGATE/ST8000NM017B/SN01 |
| 3.5" SATA HDD | SEAGATE | 6TB 7200RPM_SEAGATE/ST6000NM019B/SN01 |
| 3.5" SATA HDD | SEAGATE | 4TB 7200RPM_SEAGATE/ST4000NM024B/SN01 |

### 10.2.5 SAS/RAID Controller Card Specifications

**SAS/RAID CONTROLLER CARD SPECIFICATIONS**

| Type | Vendor | Model |
|---|---|---|
| RAID Card | BROADCOM | RAID CARD 9560-16I 8G_BROADCOM/05-50077-00 |
| RAID Card | BROADCOM | RAID CARD 9540-8I_BROADCOM/05-50134-03 |
| RAID Card | BROADCOM | RAID CARD 9560-8I 8G_BROADCOM/05-50077-01 |
| RAID Card | BROADCOM | RAID CARD 9500-16E 8G_BROADCOM/05-50075-00 |
| RAID Card | BROADCOM | RAID CARD 9500-8E 8G_BROADCOM/05-50075-01 |
| CACHE VAULT | BROADCOM | CACHE VAULT FOR 9460-16i, 9480-8i8e, 9560-16i, 9560-8i, 9580-8i8e, SAS 9365-28i, SAS 9460-8i_BCM/05-50039-00/CVPM05 |

### 10.2.6 NIC Specifications

**NIC SPECIFICATIONS**

| Type | Vendor | Model |
|---|---|---|
| OCP3.0 NIC Cards | | |
| OCP3.0 Card | BROADCOM | LAN CARD PCIE 2T 10G N210TP_BROADCOM/BCM957416A4160C |
| OCP3.0 Card | BROADCOM | LAN CARD PCIE 2S 10G N210P_BROADCOM/BCM957412N4120C |
| OCP3.0 Card | BROADCOM | LAN CARD PCIE 2P 25G N225P_BROADCOM/BCM957414N4140C |
| OCP3.0 Card | BROADCOM | LAN CARD PCIE 4P 25G N425G_BROADCOM/BCM957504-N425G |
| OCP3.0 Card | BROADCOM | LAN CARD PCIE 2P 100G N2100G_BROADCOM/BCM957508-N2100G |
| OCP3.0 Card | NVIDIA | LAN CARD OCP3 G5 2P NDR200 MCX7_NVIDIA/MCX753436MS-HEAB |
| OCP3.0 Card | NVIDIA | LAN CARD OCP3 G4 2P 100G MCX6DX_NVIDIA/MCX623436AN-CDAB |
| OCP3.0 Card | INTEL | LAN CARD OCP3 2P 100G E810_INTEL/E810CQDA20CPV3G 983094 |
| OCP3.0 Card | INTEL | LAN CARD OCP3 2P 25G E810_INTEL/E810XXVDA2OCP3G 983263 |
| Network Card | NVIDIA | LAN CARD PCIE G5 1P NDR MCX7V_NVIDIA/MCX75310AAS-NEAT |
| Network Card | NVIDIA | LAN CARD PCIE G5 2P NDR200 MCX7_NVIDIA/MCX755106AS-HEAT |
| Network Card | MELLANOX | LAN CARD PCIE G4 1P 200G MCX6DX_MELLANOX/MCX623105AC-VDAT |
| Network Card | MELLANOX | LAN CARD PCIE 2PORT 100G_MELLANOX/MBF2H536C-CECOT |
| Network Card | MELLANOX | LAN CARD PCIE G4 2P 100G MCX6DX_MELLANOX/MCX623106AN-CDAT |
| Network Card | MELLANOX | LAN CARD PCIE G4 2P 25G MCX6LX_MELLANOX/MCX631102AN-ADAT |
| Network Card | MELLANOX | LAN CARD PCIE 2PORT 25G_MELLANOX/MBF2H532C-AECOT |
| Network Card | MELLANOX | LAN CARD PCIE 2PORT 25G MCX4_MELLANOX/MCX4121A-ACAT |
| Network Card | BROADCOM | LAN CARD PCIE 2T 10G P210TP_BROADCOM/BCM957416A4160C |
| Network Card | BROADCOM | LAN CARD PCIE 2S 10G P210P_BROADCOM/BCM957412A4120AC |
| Network Card | BROADCOM | LAN CARD PCIE 2P 25G P225P_BROADCOM/BCM957414A4142CC |
| Network Card | BROADCOM | LAN CARD PCIE 4P 25G P425G_BROADCOM/BCM957504-P425G |
| Network Card | BROADCOM | LAN CARD PCIE 2P 100G P2100G_BROADCOM/BCM957508-P2100G |

### 10.2.7 PSU Specifications

The server supports up to 2 PSUs in 1+1 redundancy (some 3-GPU or 4-GPU configurations do not support 1+1 redundancy) that follow the Intel Common Redundant Power Supply (CRPS) specification. The PSUs share a common electrical and structural design that allows for hot-swap and tool-less installation into the server with the PSUs locking automatically after being inserted into the power bay. The CRPS PSUs are 80 Plus Titanium rated with various output powers, allowing customers to choose as needed.

- The following rated 110 VAC to 230 VAC and 240 VDC PSUs in 1+1 redundancy are supported:
  - 1,300 W Titanium PSU: 1,000W (110 VAC), 1,300 W (230 VAC)
  - 2,700 W Platinum PSU: 1,200 W (110 VAC), 2,700 W (230 VAC)

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NOTE

At a rated input voltage of 110 VAC, the output power of a 1,300 W PSU will be derated to 1,000 W, and the output power of a 2,700 W PSU will be derated to 1,200 W.

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Operating voltage range:
  - 110 to 230 VAC: 90 to 264 VAC
  - 240 VDC: 180 to 320 VDC

- The following rated 336 VDC PSUs in 1+1 redundancy are supported:
  - 1,300 W PSU: 1,300 W (230 VAC) (330 VDC)
  - 2,700 W PSU: 2,700 W (230 VAC) (330 VDC)

Operating voltage range:
  - 336 VDC: 260 to 400 VDC
- The following rated -48 VDC PSUs in 1+1 redundancy are supported:
  - 1,300 W PSU: 1,300 W (-48 VDC)

Operating voltage range:
  - -48 VDC: -40 to -72 VDC

# 11. Regulatory Information

## 11.1 Safety

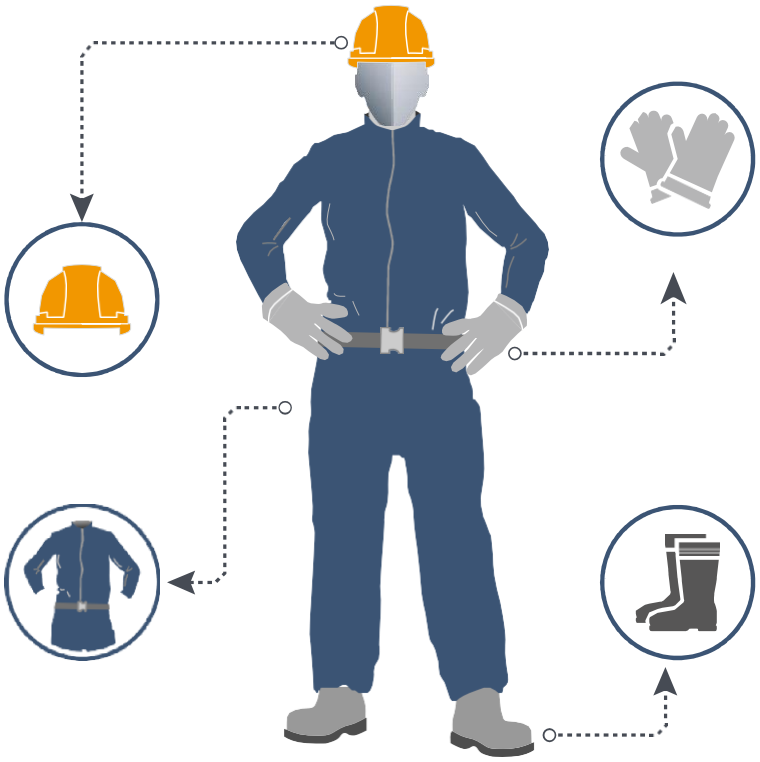
### 11.1.1 General

- Strictly comply with local laws and regulations while installing the equipment. The safety instructions in this section are only a supplement to local safety regulations.
- To ensure personal safety and to prevent damage to the equipment, all personnel must strictly observe the safety instructions in this section and on the device labels.
- People performing specialized activities, such as electricians and electric forklift operators, must possess qualifications recognized by the local government or authorities.

### 11.1.2 Personal Safety

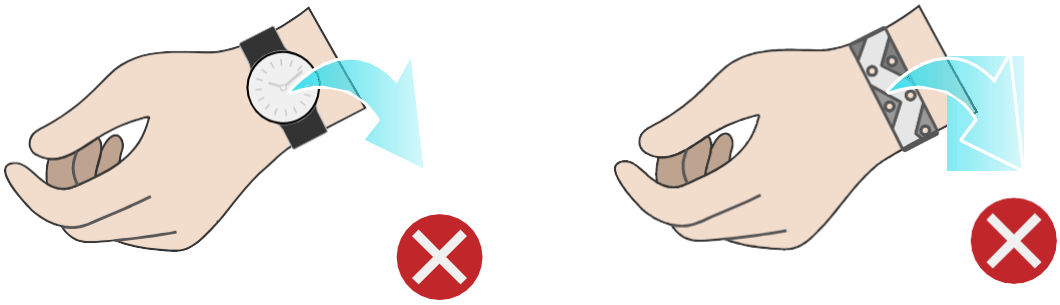
- Only personnel certified or authorized by 2CRSi are allowed to perform the installation procedures.
- Stop any operation that could cause personal injury or equipment damage. Report to the project manager and take effective protective measures.
- Working during thunderstorms, including but not limited to handling equipment, installing cabinets, and installing power cords, is forbidden.
- Do not carry the weight over the maximum load per person allowed by local laws or regulations. Arrange appropriate installation personnel and do not overburden them.
- Installation personnel must wear clean work clothes, work gloves, safety helmets and safety shoes.

**PROTECTIVE CLOTHING:**



Before touching the equipment, put on ESD clothes and ESD gloves or an ESD wrist strap, and remove any conductive objects such as wrist watches or metal jewelry, in order to avoid electric shock or burns.

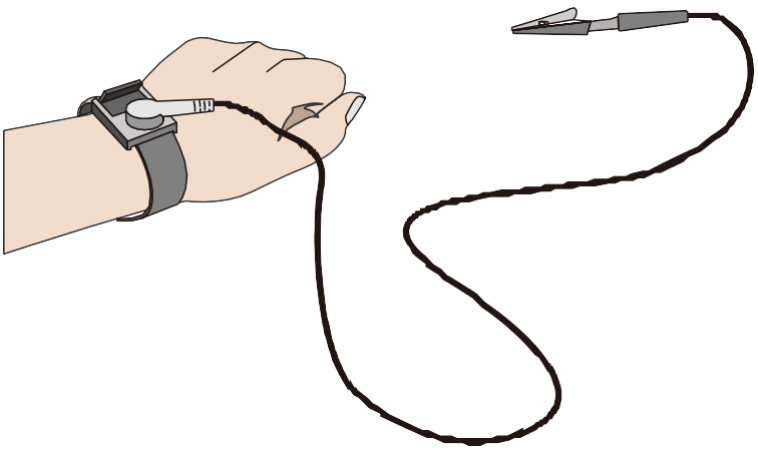
**REMOVING CONDUCTIVE OBJECTS:**



How to put on an ESD strap:

a. Put your hand through an ESD wrist strap.
b. Tighten the strap buckle to ensure a snug fit.
c. Plug the alligator clip of the ESD wrist strap into the corresponding jack on the grounded cabinet or grounded chassis.

**WEARING AN ESD WRIST STRAP**



- Use tools correctly to avoid personal injury.
- When moving or lifting equipment above shoulder height, use lifting devices and other tools as necessary to avoid personal injury or equipment damage due to equipment slippage.
- The power sources of the server carry a high voltage. Direct contact or indirect contact through damp objects with the high-voltage power source is fatal.
- To ensure personal safety, ground the server before connecting power.
- When using ladders, always have someone hold and guard the bottom of the ladders. In order to prevent injury, never use a ladder alone.
- When connecting, testing or replacing optical fiber cable, avoid looking into the optical port without eye protection in order to prevent eye damage from laser light.

### 11.1.3 Equipment Safety

- To ensure personal safety and prevent equipment damage, use only the power cords and cables that come with the server. Do not use them with any other equipment.
- Before touching the equipment, put on ESD clothing and ESD gloves to prevent static electricity from damaging the equipment.
- When moving the server, hold the bottom of the server. Do not hold the handles of any module installed in the server, such as PSUs, fan modules, drive modules, or motherboard. Handle the equipment with care at all times.
- Use tools correctly to avoid damage to the equipment.
- Connect the power cords of active and standby PSUs to different PDUs to ensure high system reliability.
- To ensure equipment safety, always ground the equipment before powering it on.

### 11.1.4 Transportation Precautions

Contact the manufacturer for precautions before transportation as improper transportation may damage the equipment. The precautions include but not limited to:

- Hire a trusted logistics company to move all equipment. The transportation process must comply

with international transportation standards for electronic equipment. Always keep the equipment being transported upright. Avoid collision, moisture, corrosion, packaging damage or contamination.

- Transport the equipment in its original packaging.
- If the original packaging is unavailable, separately package heavy and bulky components (such as chassis, blade servers and blade switches), and fragile components (such as optical modules and PCIe cards).
- Power off all equipment before shipping.

### 11.1.5 Manual Handling Weight Limits


Observe local laws or regulations regarding the manual handling weight limits per person. The limits shown on the equipment and in the document are recommendations only.

The following table lists the manual handling weight limits per person specified by some organizations.

**MANUAL HANDLING WEIGHT LIMIT PER PERSON:**

| Organization | Weight Limit (kg/lbs) |
|---|---|
| European Committee for Standardization (CEN) | 25/55.13 |
| International Organization for Standardization (ISO) | 25/55.13 |
| National Institute for Occupational Safety and Health (NIOSH) | 23/50.72 |
| Health and Safety Executive (HSE) | 25/55.13 |

# 12. Certifications

**CERTIFICATIONS**

| Country/Region | Certification | Mandatory/Voluntary |
|---|---|---|
| International Mutual Recognition | CB | Voluntary |
| EU | CE | Mandatory |
| US | FCC | Mandatory |
| | UL | Voluntary |
| | Energy Star | Voluntary |