NF5468M6

User Manual

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Environmental Protection

Please dispose of product packaging by recycling at a local recycling center for a greener planet.

Trademarks

All the trademarks or registered trademarks mentioned herein are the property of their respective holders.

Security Statement

We are intensely focused on server product safety and have placed a high priority on this. For better understanding of our server products, carefully read through the following security risk statements.

a. When servers are to be repurposed or retired, it is allowed to restore their firmware factory settings, delete information and clear logs from BIOS and BMC to protect data privacy. Meanwhile, it is suggested to wipe the drive data thoroughly and securely with third-party erasing tools.

b. The products, services or features you purchased may obtain or use some personal data (such as email address for alerts and IP address) during operation or fault locating. There should be user privacy policies in place with adequate measures implemented in accordance with the applicable laws to ensure that users' personal data are fully protected.

c. For server open source software statement, please contact us.

d. 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 us for such information.

e. We have established emergency response procedures and action plans for security vulnerabilities, so that product safety issues can be dealt in a timely manner. Please contact us for any safety problems found or necessary support on security vulnerabilities when using our products.

f. We shall remain committed to safety of our products and solutions to achieve better customer satisfaction.

Disclaimer

The purchased products, services and features shall be bound by the contract made between us and the customer. All or part of the products, services and features described herein may not be within your purchase or usage scope. Unless otherwise agreed in the contract, we make no express or implied statement or warranty on the contents herein. Images provided herein are for reference only and may contain information or features that do not apply to your purchased model. This manual is only used as a guide. We shall not be liable for any damage, including but not limited to loss of profits, loss of information, interruption of business, personal injury, or any consequential damage incurred before, during, or after the use of our products. We assume you have sufficient knowledge of servers and are well trained in protecting yourself from personal injury or product damages during operation and maintenance. The information in this manual is subject to change without notice. We shall not be liable for technical or editorial errors or omissions contained in this manual.

Support

Email	Technical Support	serversupport@aivres.com
	RMA/ARMA Support	serversupportusa@aivres.com
Web	Official Website	www.aivres.com
	Service Portal	service.aivres.com

Preface

Abstract

This manual describes NF5468M6 server's specifications, features, hardware setup, warranty information and troubleshooting, which will help users to understand how best to utilize the server and all its functionalities.

Intended Audience

This manual is intended for:

- Technical support engineers

- Product maintenance engineers

It is recommended that server installation, configuration, and maintenance is performed by experienced technicians only.

Safety Precautions

- If your purchases do not include our on-site installation service, make sure that you inspect the shipping cartons before unpacking the equipment. If a shipping carton appears severely damaged, water immersed, or the seal or pressure-sensitive adhesive tape (PSA) is broken, report this based on your purchase channel. If you purchased from a third-party supplier, contact your supplier directly; if you purchased through our direct sales stores, contact us for technical support.

- For your safety, please do not disassemble the server's components, extend configuration or connect other peripherals arbitrarily. You can contact us for our support and guidance.

- Before disassembling the server's components, please be sure to disconnect all the cables connected to the server.

- Please install the product-compatible operating system and use the

driver that comes with the server or provided by us. You can go to our official site and then find the correct driver of your product based on the prompt. An incompatible operating system or a driver not provided by us may cause compatibility issues and affect the normal use of the product. We will not assume any responsibility or liability for this.

- BIOS and BMC setup is a significant factor in correctly configuring your server. If there are no special requirements, it is suggested to use the Default Values and not alter the parameter settings arbitrarily. After the first login, please change the BMC user password in time.

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 manual information

Revision History

Version	Date	Description of Changes
V1.0	2021/03/31	Initial release

Version	Date	Description of Changes
V1.1	2021/06/23	Added table names for some tables
V1.2	2021/12/20	Update the figure and table in 4.4.7 DIMM Replacement
V1.3	2023/03/22	Added the operation place not suitable for the product in 1.1 Warnings

Table of Contents

1 Safety Instructions

1.1 Warnings

Please be advised to follow the instructions below for safety. Failure to do so could result in potential dangers that may cause property loss, personal injury or death.

- The power supplies in the system may produce high voltages and energy hazards that may cause personal injury. For your safety, please do not attempt to remove the access panel to dissemble or replace any component on your own. Unless informed by us, only service technicians trained by us are authorized to do so.

- Please connect the equipment to an appropriate power supply. Use only the external power supplies indicated on the rated input label to power the system. To protect your equipment from damages caused by a momentary spike or plunge of the voltage, please use voltage stabilizing equipment or uninterruptible power supplies.

- If you must use an extension cable, please use a three-core cable with properly grounded plugs. Check ratings of the extension cable to ensure that the total rating of all equipment plugged into the extension cable does not exceed 80 percent of the rated current limit for the extension cable.

- Please be sure to use the power supply components that come with the server, such as power cords, power socket (if provided with the server) etc. For your safety and safety of the equipment, please do not replace power cords or plugs randomly.

- To prevent electric shocks caused by leakage in the system, please make sure that the power cables of the system and peripherals are correctly connected to the earthed/grounded outlet. Please connect the three-core power plug to the three-core AC power outlet that is well earthed and within reach. Be sure to use the earthing/grounding pin of power cord and do not use the patch plug or the earthing/grounding pin unplugged

with cables. In the case that the earthing/grounding conductors are not installed and it is uncertain whether there is appropriate earthing/grounding protection, please do not use or attempt to operate the equipment. You can contact and consult an electrician.

- Please do not push any objects into the openings of the system. Doing so may cause short circuit of internal components and then lead to fire or electric shock.

- Please keep the system far away from the heatsink and heat sources, and be sure not to block the air vents.

- Please be sure not to scatter food or spill liquid into the system or onto other components. Do not use the product in high humid or dusty environments.

- Using an incompatible battery may cause explosion. When battery replacement is required, please consult the manufacturer first, and choose batteries of the same or equivalent type suggested by them. Do not disassemble, crush, puncture the batteries or short circuit the external connection point, and do not expose them in the environment over 60℃. Never throw batteries into fire or water. Please do not attempt to open or repair the batteries. Dispose of used batteries properly. Do not put waste batteries, circuit boards or other components that may contain batteries with other wastes. For battery recycling, please contact the local recycling center.

- For independent cabinets, please install front and side stabilizers before installing the equipment into the cabinet. For cabinets connected with other cabinets, please install front stabilizers first. Failure to install the corresponding stabilizers before installing the equipment into the cabinet may cause the cabinet to tip over, possibly leading to personal injury. Hence, please do make sure to install stabilizers before installing the equipment into the cabinet. After installing the equipment and other components into the cabinet, only one component can be pulled out from the cabinet through its sliding part at one time. Pulling out several

components at the same time may cause the cabinet to turn over, resulting in serious personal injury.

- Please do not move the cabinet on your own. Considering the height and weight of the cabinet, the moving of the cabinet should be completed by at least two people. Moving it without adequate, trained personnel could result in severe injury or death.

- It is prohibited to directly short-circuit the copper busbar. Please do not touch the copper busbar when the cabinet is powered on.

- The product cannot be used in places where children may appear.

1.2 Cautions

The following considerations may help avoid problems that could damage the components or cause data loss, etc.

- In the event of the following, please unplug the power plug from the outlet and contact us:

  - The power cables, extension cables or power plugs are damaged.

  - The products get wet.

  - The products have fallen or have been damaged.

  - Other objects have fallen into the products.

  - The products do not or cannot function normally even when you operate according to the instructions.

- If the system gets wet or damp, please follow steps below:

  a. Power off the equipment, disconnect them with the outlet, wait for 10 to 20 seconds, and then open the access panel.

  b. Move the equipment to a well-ventilated place to dry the system for at least 24 hours and make sure that the system is fully dried.

c. Close the access panel, reconnect the system to the power outlet, and then power on.

d. In case of operation failure or other abnormal situations, please contact us for technical support.

- Avoid cabling system cables and power cords in high foot traffic locations. Please do not place objects on the cables.

- Before removing the access panel or accessing the internal components, please let the equipment cool down first. To avoid damaging the motherboard, please power off the system and wait for 5 seconds, and then remove components from the motherboard or disconnect the peripherals from the system.

- If there are modem, telecom or LAN options installed in the equipment, please pay attention to the followings:

  - In case of lightning, please do not connect or use the modem. Otherwise, there's risk of lightning stroke.

  - Never connect or use the modem in a damp environment.

  - Never insert the modem or telephone cables into the socket of network interface controller (NIC).

  - Before unpacking the product package, accessing or installing internal components, or touching uninsulated cables or jacks of the modem, please disconnect the modem cables.

- In order to avoid damages of electronic components in the equipment caused by electrostatic discharge, please pay attention to the followings:

  a. Please remove any static electricity on your body before dismounting or accessing any electronic component in the equipment, to prevent the static electricity from conducting itself to the sensitive components. You may remove the static electricity on your body by touching the metal earthing objects (such as the unpainted metal surface on the rack).

  b. Please do not take static sensitive components that are not ready to be installed or used out of the anti-static packages.

c. During operation, please touch the earthing conductor or the unpainted metal surface on the cabinet regularly to remove any static electricity from your body that may damage the internal components.

- When dismounting internal components upon receiving proper authorization from us, please pay attention to the followings:

  a. Power off the system and disconnect the cables, including all connections of the system. When disconnecting the cables, please hold the connector of the cables to slowly pull them out. Never pull the cables.

  b. Only after the products completely cool down can you dismount the access panel or access the internal components.

  c. Please remove any static electricity on your body by touching metal earthing objects before dismounting or accessing any electronic component in the equipment.

  d. When dismounting, avoid making large movement to prevent damage to the components or scratching arms.

  e. Handle components and plug-in cards with care. Please do not touch the components or connectors on the plug-in cards. When handling the plug-in cards or components, firmly grab the edges of the plug-in cards or those of components, or their metal retaining brackets.

- During cabinet installation and application, please pay attention to the followings:

  a. After the cabinet has been installed, please ensure that the stabilizer feet have been fixed into the cabinet and supported to ground, and the full weight of the cabinet is on the ground.

  b. Always load from the bottom up, and load the heaviest items first.

  c. When pulling out components from the rack, apply slight force to keep the rack balanced.

d. Please be careful when pressing down the release latch to slide the server in or out as the rail may hurt your fingers.

e. Do not overload the AC power branch circuits in the cabinet. The total load of the cabinet should not exceed 80% of the ratings of the branch circuits.

f. Ensure that components in the cabinet are well vented.

g. When repairing components in the cabinet, never step on any other component.

2 Product Specifications

2.1 Introduction

The NF5468M6 is a general-purpose 2-socket AI server built with Intel Whitley processors and engineered for such application scenarios as AI training, reasoning, video encoding and decoding. It is fully optimized for PCIe GPU cards of NVIDIA Ampere architecture and supports 4-, 8- and 16-GPU configuration with Balance, Common, Cascade GPU topology. What's more, it is engineered with standard PCIe slots for NVIDIA GPUs and heterogeneous acceleration products from us, Intel, Cambricon, AMD and Graphcore.

● Key features:

- Two Intel Whitley (ICX) processors with TDP up to 270 W

- 3 channels UPI for 11.2 GT/s

- Up to 32 DDR4 RDIMMs with 16 Barlow Pass DIMMs, memory mirroring and memory hot spare supported

- Up to 24 × 2.5" drive or 12 × 3.5" drive at the front (Up to 8 NVMe SSDs)

- Up to 2 M.2 SATA SSDs

- OCP NIC 3.0 with operational modes of single-host and multi-host

- 16 onboard Slimline x8 connectors

- Up to 12 onboard SATA drives directly attached from PCH

- Two internal PCIe x8 RAID card slots

- P configuration: Up to 8 standard dual-width PCIe slots and 4 standard single-width PCIe slots for 4 FHHL/HHHL NICs and 8 FHFL dual-width acceleration cards (TDP ≤ 350 W) of Balance, Common and Cascade topologies. The GPU topologies can be switched by just one-click.

- T configuration: Up to 4 standard dual-width PCIe slots and 4 standard single-width PCIe slots for 4 FHFL dual-width acceleration cards (TDP ≤ 350 W) and 4 FHHL/HHHL NICs.

- V configuration: Up to 20 standard single-width PCIe slots for 16 FHFL single-width acceleration cards (TDP ≤ 150W) and 4 FHHL/HHHL NICs.

- Motherboard integrated with AST2500 BMC chip with KVM functionality as standard

- Intel remote BMC debug

- Modular design of drives, PCIe expansion cards, PSUs and fans, enabling free-tool maintenance

- Hot-swap and redundant CRPS of 80 Plus Platinum or higher rank with PMBus and NM 4.0 functionality

- Fans (single rotor) are N+1 redundant

2.1.1 24 × 2.5" Configuration (-P/-T/-V configurations included)

Up to 24 front 2.5-inch drives (Up to 8 NVMe SSDs), as shown in the figure below.

Figure 2-1 NF5468M6 Appearance (24 × 2.5" Configuration)

Includes -P/-T/-V configurations with 4, 8 and 16 GPU cards respectively. The three different GPU cards share the rear panel, as

shown in the figure below.

Figure 2-2 Rear Panel (24 × 2.5" Configuration)
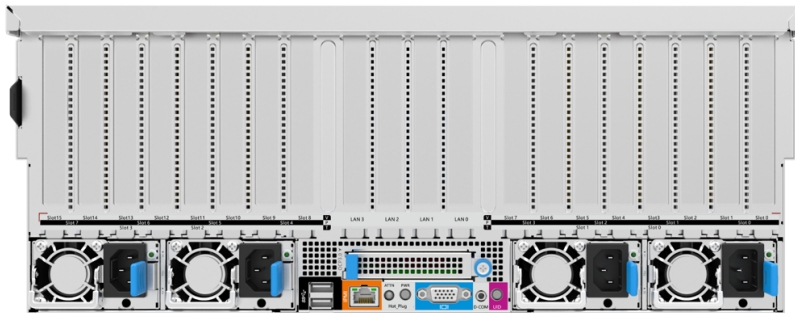
2.1.2 12 × 3.5" Configuration (-P/-T/-V configurations included)

Up to 12 front 3.5-inch drives (Up to 8 NVMe SSDs), as shown in the figure below.

Figure 2-3 NF5468M6 Appearance (12 × 3.5" Configuration)

Includes -P/-T/-V configurations with 4, 8 and 16 GPU cards respectively. The three different GPU cards share the rear panel, as shown in the figure below.

Figure 2-4 Rear Panel (12 × 3.5" Configuration)
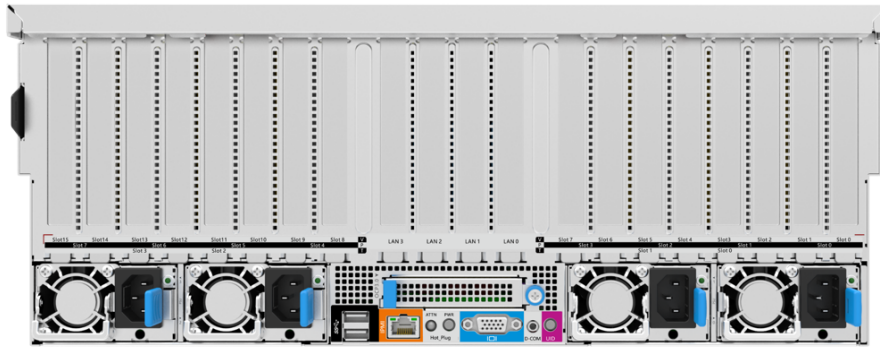
2.2 Features and Specifications

Table 2-1   Features and Specifications

Launch Time	2021/5	
GPU	GPU Expansion	8 NVIDIA® Telsa® PCIe A100 8 NVIDIA® Telsa® PCIe A30 8 NVIDIA® Telsa® PCIe V100S 8 NVIDIA® Quadro® A40 16 NVIDIA® Telsa® A10 16 NVIDIA® Telsa® T4 Other 8 FHFL dual-width or 16 FHFL single-width AI acceleration cards
Processor	Processor Type	Intel® Whitley (ICX) processors (Up to 2 CPUs with TDP up to 270 W)
	Socket	Two
Chipset	Chipset Type	C621
Memory	Memory Type	DDR4 RDIMMs, LRDIMMs, 3DS-RDIMMs, 3DS-LRDIMMs and Barlow Pass DIMMs
	Memory Slot Qty	32
	Total Memory Capacity	Up to 4.0 TB
I/O Connector	USB Port	• 2 front USB 3.0 ports

		• 2 rear USB 3.0 ports
	Video	• 1 front VGA port • 1 rear VGA port
	Serial Connector	• 1 front serial connector (RJ45) • 1 rear BMC serial connector (headphone port-hole)
	UID LED	2 UID LEDs & buttons (1 front and 1 rear)
Display Controller	Controller Type	Integrated in the Aspeed AST2500 chip, up to 1280 × 1024 resolution
SAS Backplane	SAS 3.0 Backplane	Hot-Swap SATA drives
NIC	NIC Controller	One OCP NIC 3.0 with operational modes of single-host and multi-host
Management Chip	Management Chip	Integrated with 1 independent 1000 Mbps network port, dedicated for IPMI remote management
Expansion Slot	PCIe Expansion Slot	2 internal PCIe slots for RAID cards; 4 standard PCIe x16 slots for NICs/IB cards
Drive	Drive Type	3.5" SATA drives and 2.5" SAS/SATA/NVMe drives (Actual configuration may vary depending on the model you purchased)
External Storage Drive	Optical Drive	External USB optical drives
	T-flash Card	T-flash card
Power	Specification	• 1600 W/2000 W/2200 W/3000 W CRPS power supplies • 2+2 redundancy • 4 power modules • PMBus power supply and Node Manager 4.0 function

	Power Input	Please refer to the power input on the nameplate label of the chassis.
Physical	Outer Packaging Dimensions	D × W × H: 1200 × 800 × 473 mm (Pallet shipping)
	Chassis Dimensions	D × W × H: 830 × 483 × 175.5 mm
	Product Weight	• 12 × 3.5" Configuration (NF5468M6-P) Net weight: 52 kg Gross weight: 84 kg (Packages +Rails + Accessory Box + Pallet included) • 24 × 2.5" Configuration (NF5468M6-P) Net weight: 48 kg Gross weight: 80 kg (Packages +Rails + Accessory Box + Pallet included) • 12 × 3.5" Configuration (NF5468M6-T/V) Net weight: 47 kg Gross weight: 79 kg (Packages +Rails + Accessory Box + Pallet included) • 24 × 2.5" Configuration (NF5468M6-T/V) Net weight: 43 kg Gross weight: 75 kg (Packages +Rails + Accessory Box + Pallet included)

2.3 PSU Efficiency

Table 2-2 Platinium PSU Efficiency

Platinium PSUs				
Rated Power	@20% Load	@50% Load	@100% Load	PF@50% Load
1600 W	90%	94%	91%	0.98
2000 W	90%	94%	91%	0.98
2200 W	90%	94%	91%	0.98
3000 W	90%	94%	91%	0.98

3 Product Overview

3.1 Front View

3.1.1 Front Panel

Figure 3-1 Front View

- 24 × 2.5-inch Drive System
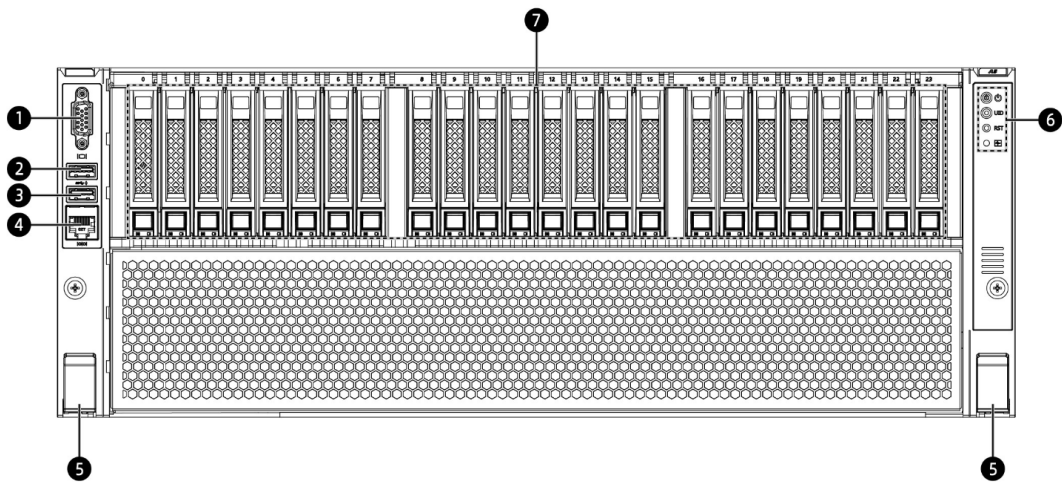
- 12 × 3.5-inch Drive System
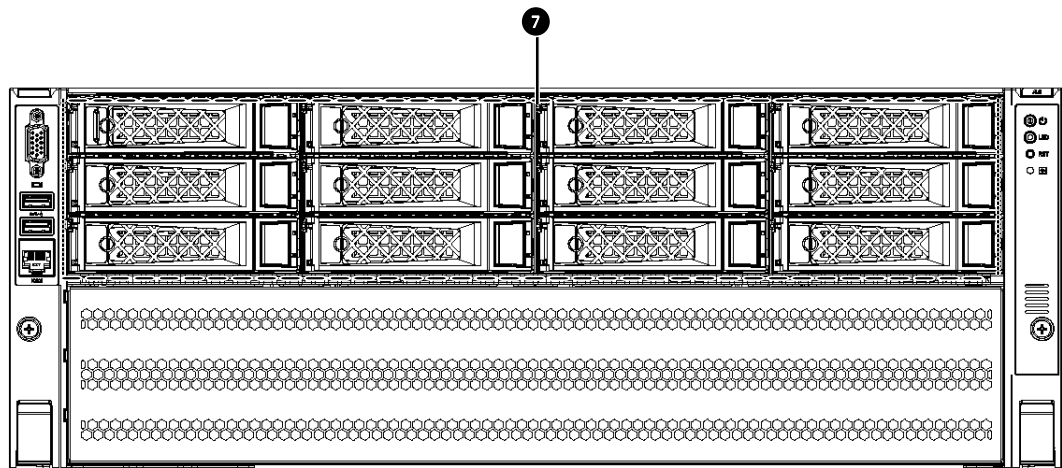
#	Item
1	VGA Port
2	USB 3.0 Port
3	USB 3.0 Port

#	Item
4	System Serial Port
5	Quick Release Lever
6	System Button + LED
7	Drive Bays

Figure 3-2 Drive Bay Sequence

- 24 × 2.5" Drive Bay
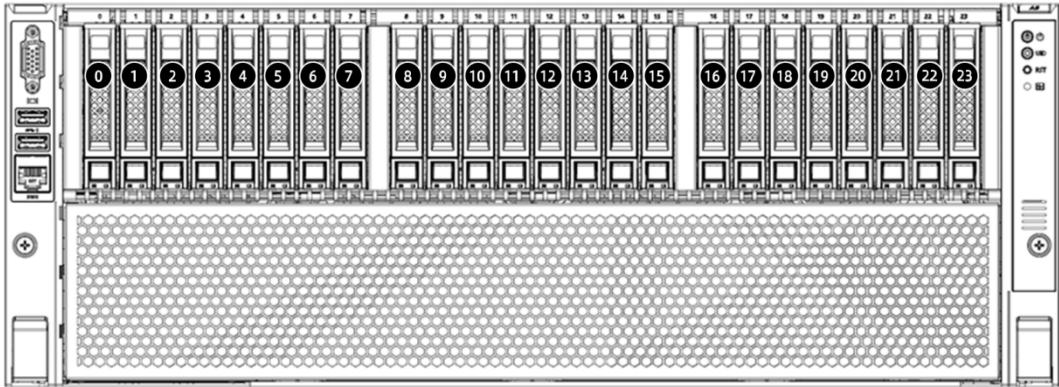
- 12 × 3.5" Drive Bay
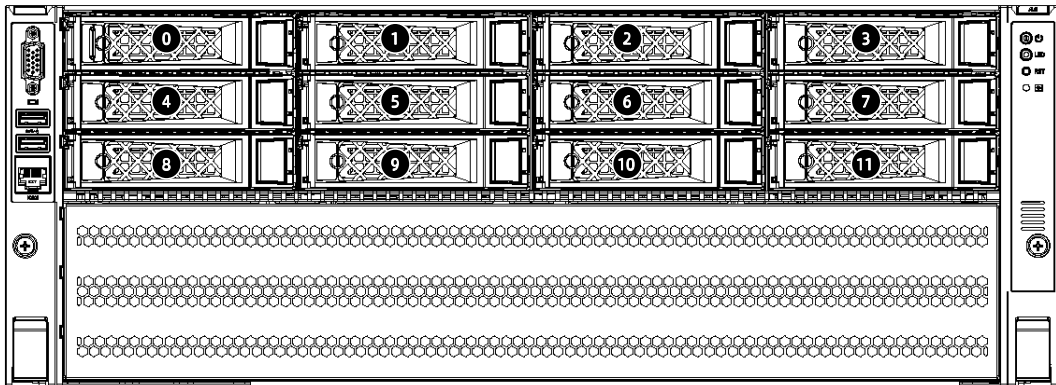
3.1.2 Front Panel Buttons and LEDs

Figure 3-3 Front Panel Buttons and LEDs
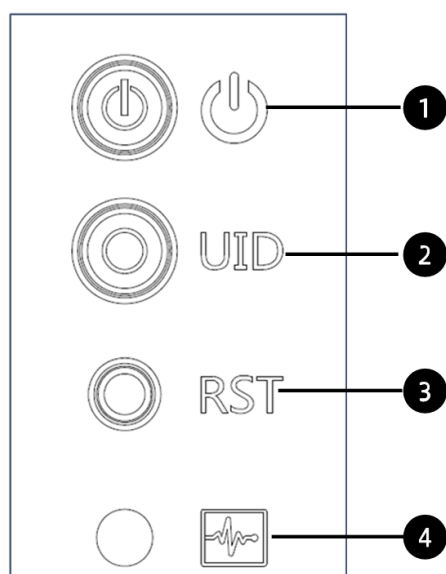
#	Item	Description
1	Power Button	• Solid green = Power on state • Solid orange = Standby state • Long press 4s to force a shutdown
2	UID Button	• Solid blue = Normal • Long press to reset BMC
3	System Reset Button	• Press to reset the system
4	System Status LED	• Off = Normal • Red = System error

3.1.3 Drive Tray LEDs

Figure 3-4 Drive Tray LEDs
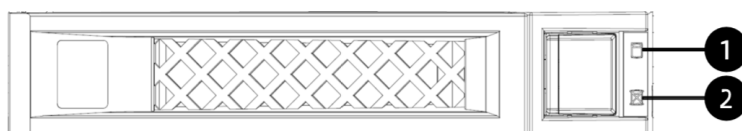
#	Item	Description
1	Activity LED	• Solid green = Normal

#	Item	Description
		• Flashing green = Read/write activities
2	Error LED	• Solid red = Drive error or failed • Solid blue = Drive is being located • Solid pink = RAID rebuilding

3.2 Rear Panel

Figure 3-5 Rear Panel
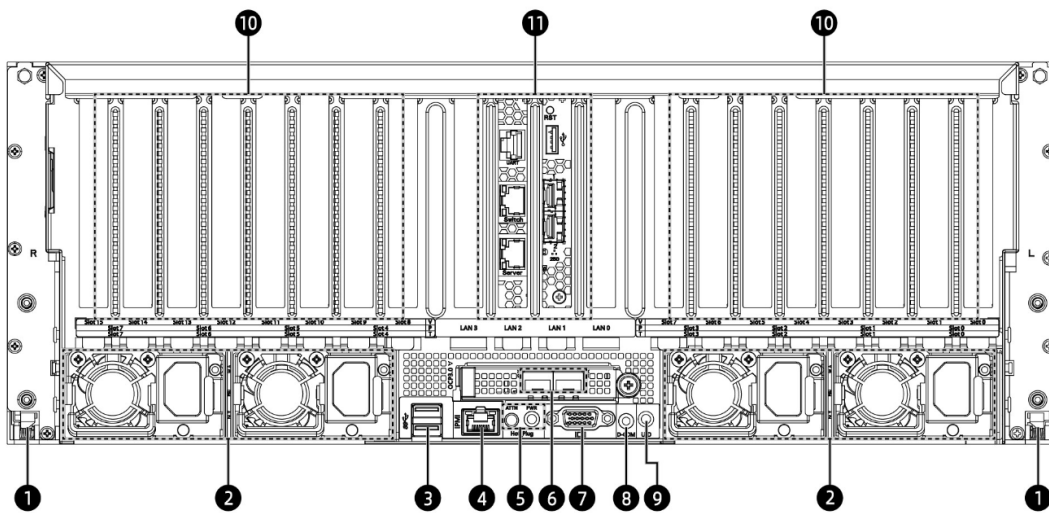
#	Item
1	Quick Release Lever
2	PSU × 4
3	USB 3.0 Port × 2
4	RJ45 Port
5	Hot-Swap Button & LED
6	OCP NIC 3.0

#	Item
7	VGA Port
8	COM Port
9	UID Button
10	GPU Card Slot
11	Add-in Card Slot

3.3 Motherboard View

Figure 3-6 Motherboard View
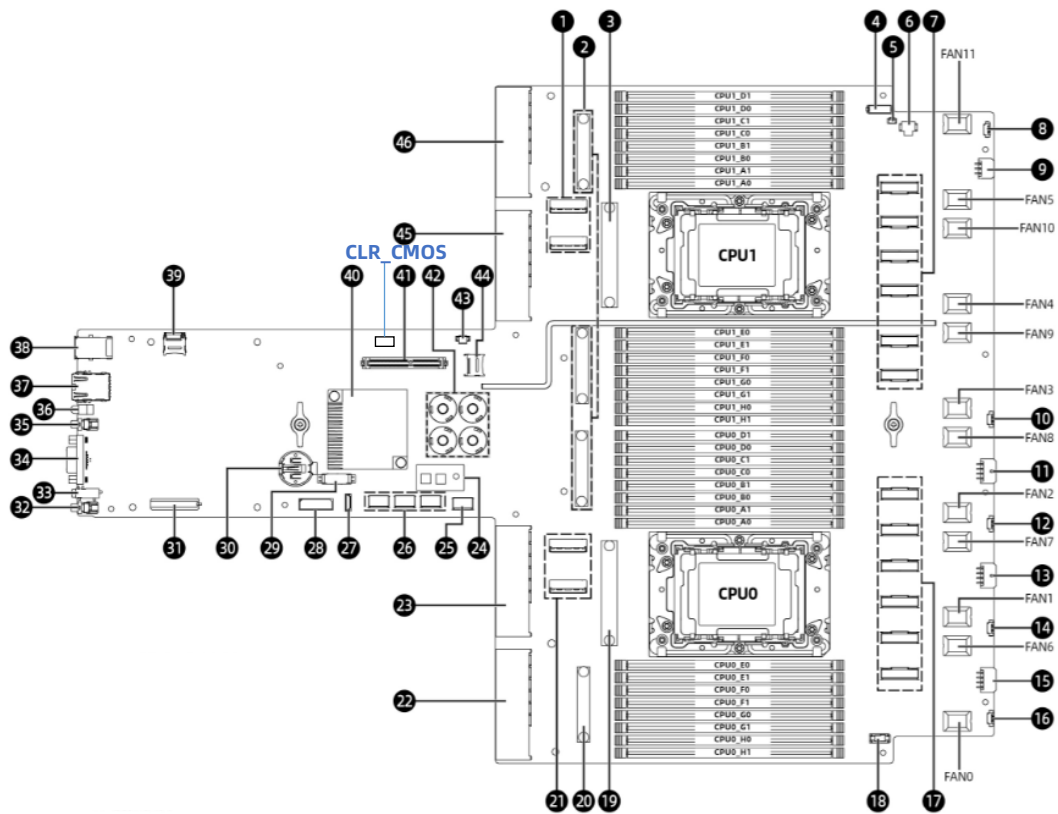
#	Item	#	Item
1	Slimline Connector	24	Trusted Platform Module Connector

#	Item	#	Item
2	Memory VR Heatsink	25	Left Control Panel Connector
3	CPU1 VR Heatsink	26	Drive SATA/sSATA Connector
4	Right Control Panel Connector	27	RAID Key Connector
5	Intrusion Switch Connector	28	XDP Debug Connector
6	MOC Card Power Connector	29	NCSI Connector
7	Slimline Connector	30	Battery Holder
8	Chassis Temperature Connector	31	OCP Riser Connector
9	RAID Card Power Connector	32	UID Button
10	Backplane I2C Connector	33	COM Port
11	Backplane Power Connector	34	VGA Port
12	Backplane I2C Connector	35	Hot-Plug Button
13	Backplane Power Connector	36	Hot-Plug Attention LED
14	Backplane I2C Connector	37	BMC Management Network Port
15	Backplane Power Connector	38	USB 3.0 Port
16	Backplane I2C Connector	39	BMC TF Connector
17	Slimline Connector	40	PCH Heatsink
18	VPP Connector	41	M.2 Riser Connector
19	CPU0 VR Heatsink	42	Radsok & Busbar
20	Memory VR Heatsink	43	100 MHz Clock Connector
21	Slimline Connector	44	CPU TF Connector
22	PSU0 Connector	45	PSU2 Connector

#	Item	#	Item
23	PSU1 Connector	46	PSU3 connector

3.4 GPU Card Layout

3.4.1 P Configuration

Figure 3-7 GPU Card Layout
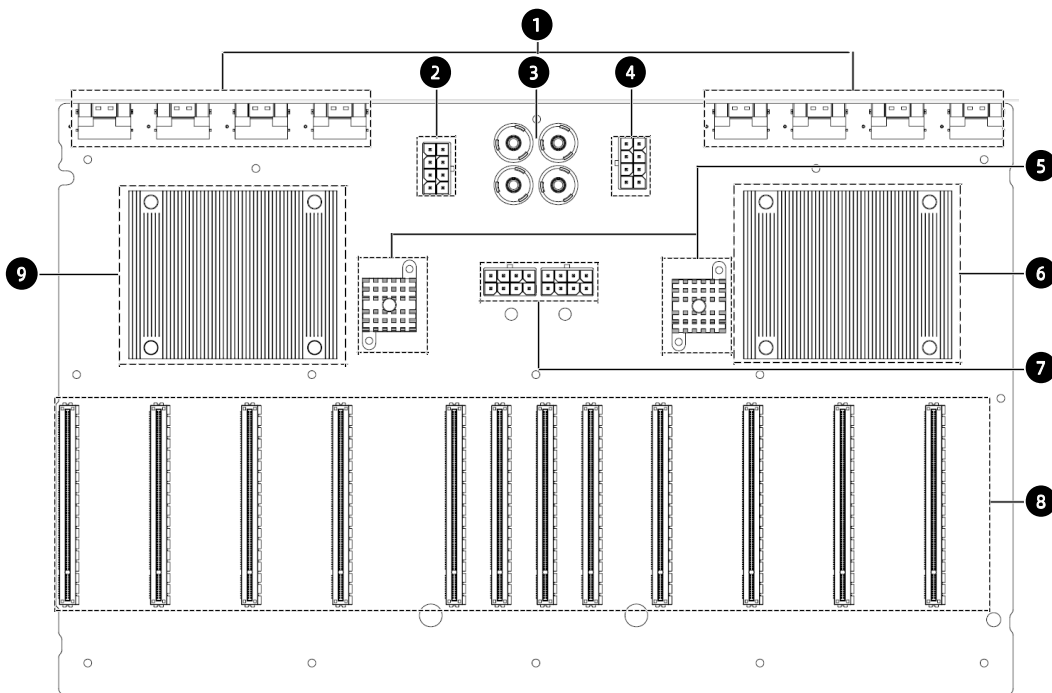
#	Item	#	Item
1	Slimline Connector	6	Switch Heatsink
2	GPU Card Power Connector	7	GPU Card Power Connector
3	Radsok & Busbar	8	GPU Card Slot
4	GPU Card Power Connector	9	Switch Heatsink
5	Retimer Heatsink		

3.4.2 V Configuration

Figure 3-8 GPU Board Layout
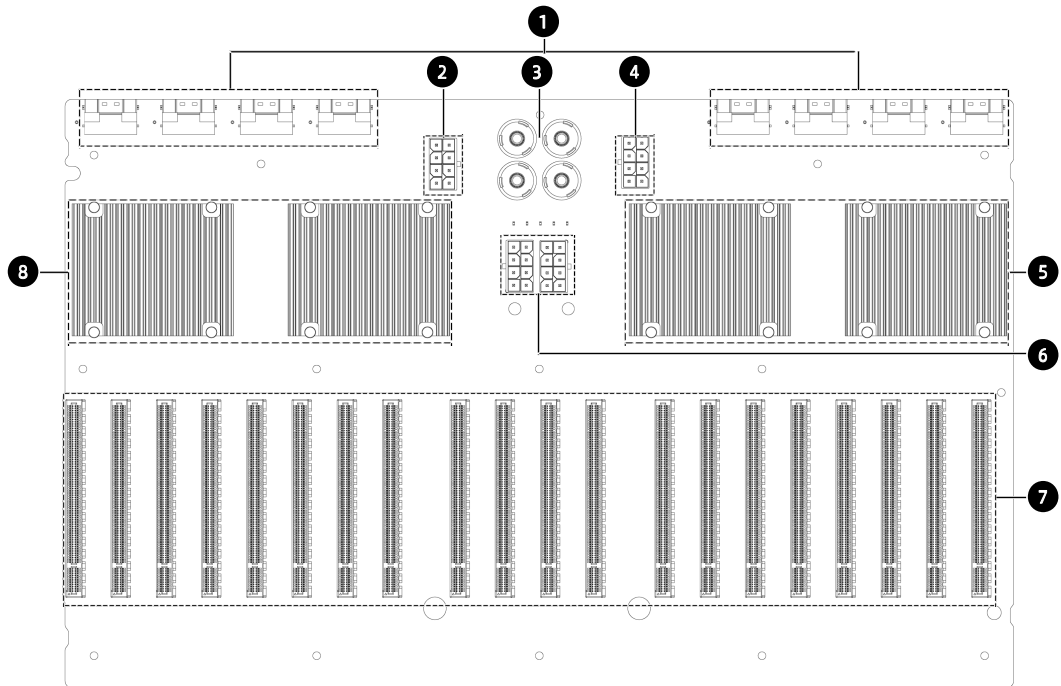
#	Item	#	Item
1	Slimline Connector	5	Switch Heatsink
2	GPU Card Power Connector	6	GPU Card Power Connector
3	Radsok & Busbar	7	PCIe Card Slot
4	GPU Card Power Connector	8	Switch Heatsink

3.4.3 T Configuration

Figure 3-9 GPU Card Layout
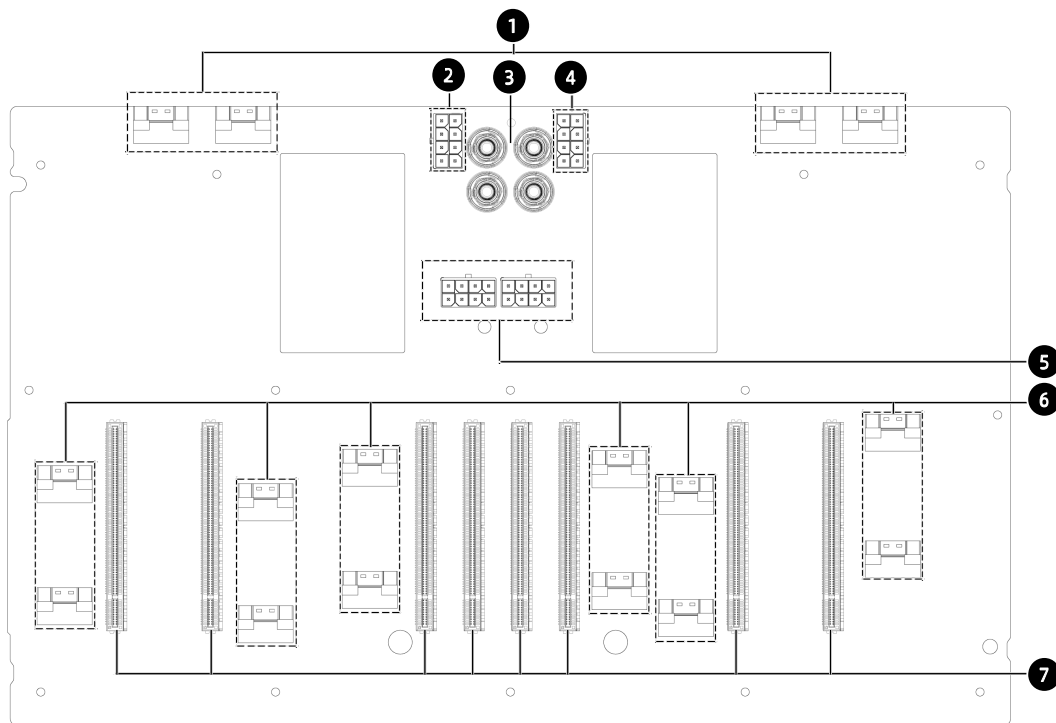
#	Item	#	Item
1	Slimline Connector	5	GPU Card Power Connector
2	GPU Card Power Connector	6	Slimline Connector
3	Radsok & Busbar	7	GPU Card Slot
4	GPU Card Power Connector		

3.5 Motherboard Jumper Introduction

⚠️ CAUTION

It is required to shut down the system and disconnect the power supply during CMOS clearing.

See Motherboard View for the jumper location.

Table 3-1 CMOS Jumper Cap

Item	Description	Function
J73（CLR_CMOS）	CMOS clear jumper	Short-circuit pins 1-2 to restore to normal status; short-circuit pins 2-3 to clear the CMOS setting.

To reset/clear the CMOS setting via a jumper:

1. Power down the server and unplug the power cable from the electrical outlet.

2. Wait for 5 seconds.

3. Remove the access panel.

4. Locate the CMOS clear jumper on the motherboard.

5. Move the jumper cap from the default pins 1-2 to pins 2-3.

6. Plug in the power cable and power on the server, and then wait for 10 seconds for the CMOS to clear.

7. Power down the server, unplug the power cable, and then wait for 5 seconds again.

8. Move the jumper cap back to the default pins 1-2.

9. Install the access panel.

10. Reconnect the power cable and power on the server.

3.6 Layout

Figure 3-10 Layout
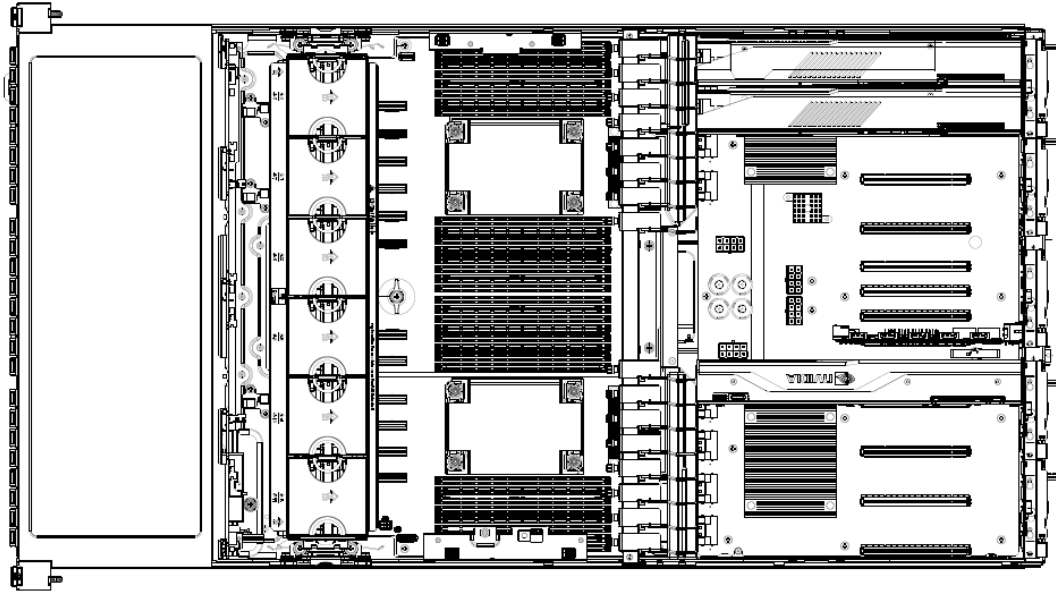
4 Getting Started

4.1 Installing 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

We recommend using rails supplied by us as 3U and 4U servers are very heavy. If you would like to use rails not provided by us, please contact us first to ensure the server can be installed to the rack safely and properly. The loading-bearing capacity of self-prepared rails must be higher than 150 kg. If not, you MUST use our rails as using these 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.

⚠️ DANGER

To reduce the risk of personal injury or damage to the equipment, DO secure the mounting ears to the posts firmly to avoid server from moving or sliding out from the cabinet.

4.2 Power On/Off

To power on and off the server, press the Power button.

To completely shut down the server, press the **Power** button and disconnect the power cable from the server.

⚠️ DANGER

To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to disconnect power from

the server. The front panel Power Button does not completely shut off system power. Some power supplies and internal circuitry remain active until AC power is removed.

4.3 Pre-Disassembly Instructions

Read the installation instructions for all the hardware operations before disassembling or re-assembling the components. All prerequisites must be completed prior to starting installation or maintenance.

⚠️ WARNING

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

⚠️ CAUTION

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

Do the following prior to starting installation or maintenance:

1 Power down the server

2 Remove all cables from the system

3 Remove the server out of the rack:

⚠️ WARNING

1. To reduce the risk of personal injury or equipment damage, be sure that the rack is adequately stabilized before you extend a

component from the rack.

2. To reduce the risk of personal injury, be careful when sliding the server into the rack. The sliding rails could pinch your fingers.

a. Open both handles on the front panel of the server, and then loosen the two captive screws securing the server in place.

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

Figure 4-1 Removing the Server out of the Rack
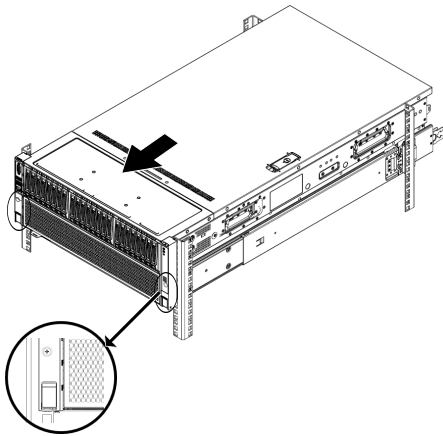
c. After performing installation or maintenance, slide the server all the way back into the rack and tighten the two captive screws securing the server in place.

Figure 4-2 Sliding the Server into the Rack
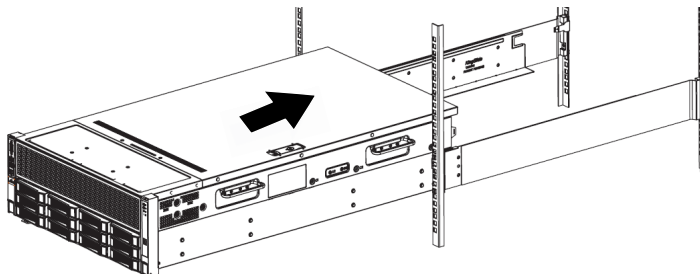
For more information on how to install the server into the rack, refer to the rack server installation guide.

4.4 Disassembly/Reassembly Process

NOTE

1. During installation or removal of any hardware, always ensure all data is backed up properly.

2. Disconnect the server and all attached devices from their electrical outlets.

3. There is no need to remove power from the server when replacing hot-swap components.

4. 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 installation process.

Item appearance may be different on actual models.

4.4.1 Access Panel Replacement

WARNING

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

CAUTION

For proper cooling, do not operate the server without the access panel, air duct, or fan installed. If the server supports hot-swap components, minimize the amount of time the access panel is open.

To remove the access panel:

1. Loosen the screw on the hood latch anticlockwise to the unlocked position with a Phillips screwdriver

2. Lift up the hood latch handle to the unlocked position until the access panel slides back and the tabs on the access panel disengage from the guide slots on the chassis. Hold the access panel on both sides and remove it.

Figure 4-3 Removing the Access Panel
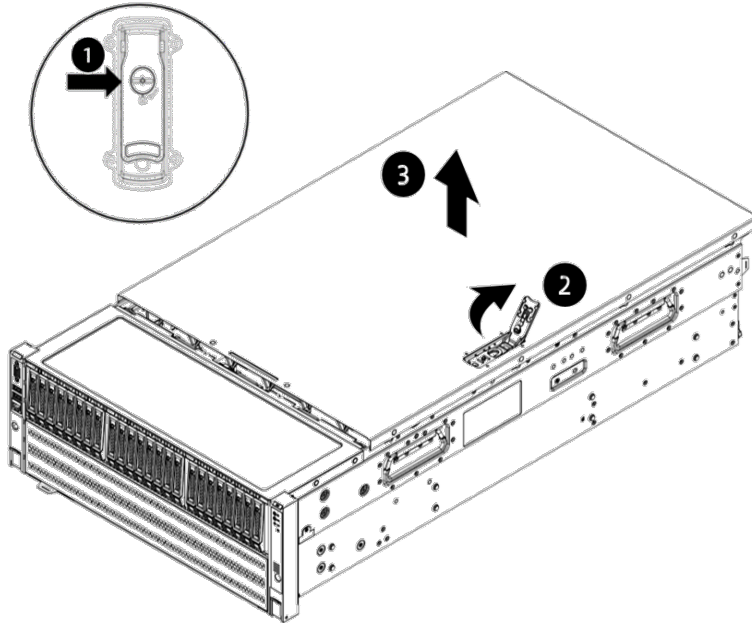
To install the access panel:

1. Align the standoffs on the access panel with the J-slots on the server and lower down the access panel with the hood latch open.

2. Press down the hood latch until it locks into place. Make sure the access panel snaps into place.

3. Tighten the screw on the hood latch clockwise to the locked position with a Phillips screwdriver.

4.4.2 Air Duct Replacement

⚠️ CAUTION

For proper cooling, do not operate the server without the access panel, air duct, or fan installed. If the server supports hot-swap components, minimize the amount of time the access panel is

To remove the air duct:

1. Remove the access panel (Refer to [Access Panel Replacement](#)).

2. Lift up the air duct with both hands to remove it

Figure 4-4 Removing the Air Duct
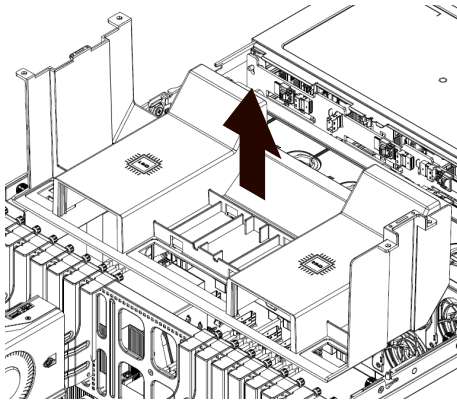
To install the air duct:

1. Lower down the air duct into the chassis until it snaps into place.

2. Install the access panel.

4.4.3 Hot-Swap Storage Drive Module Replacement

⚠️ CAUTION

For proper cooling, do not operate the server without the access panel, air ducts, expansion slot covers, or blanks installed. If the server supports hot-swap components, minimize the amount of time the access panel is open.

To remove the drive:

1. Press the release latch to release the lever. The lever will pop up automatically.

Figure 4-5 Pressing the Release Latch
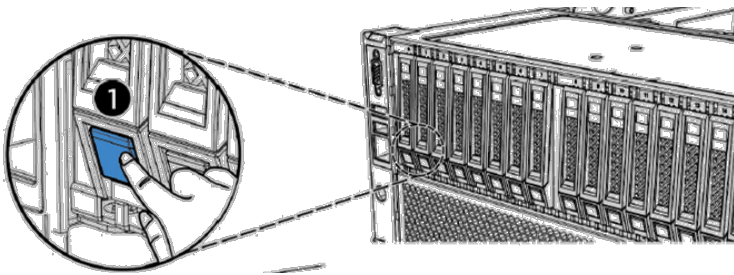
2. Hold the lever and pull the drive module out of the drive bay

Figure 4-6 Pulling Out the Drive Module
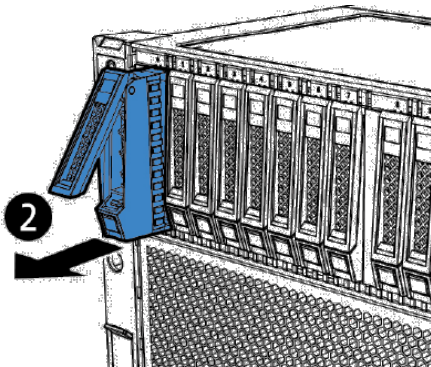
3. Remove the four screws securing the drive to the drive tray with a Phillips screwdriver

Figure 4-7 Removing the Screws on the Drive
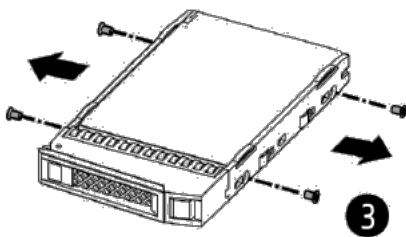
4. Remove the drive from the drive tray and put it into an antistatic bag

Figure 4-8 Removing the Drive
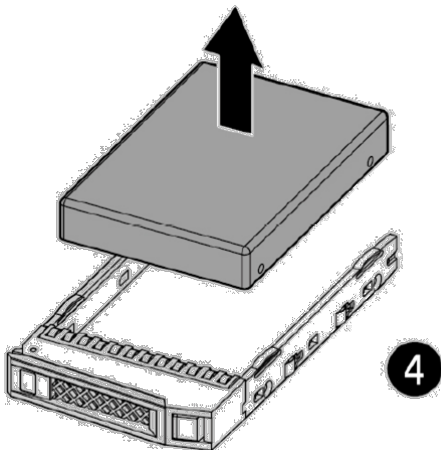
To install the drive:

1. Orient the drive into the drive tray. Make sure the drive connector is towards the rear of the drive tray.

2. Tighten the four screws securing the drive to the drive tray clockwise with a Phillips screwdriver.

3. Open the release lever, and insert the drive module into the drive bay.

4. Close the release lever to lock the drive module in place

5. Verify that the activity status LED on the drive tray is green after powering on the server.

4.4.4 Hot-Swap Fan Module Replacement

NOTE

To maintain proper cooling while the system is active, replace one fan module at a time and install the new fan module as soon as possible.

To remove the fan module:

1. Remove the access panel (Refer to Access Panel Replacement).

2. To remove the fan module:

a. Hold and press the fan module release tabs towards each other, and then lift up the fan module out of the fan bay.

b. Put the fan module into an antistatic bag

Figure 4-9 Removing the Fan Module
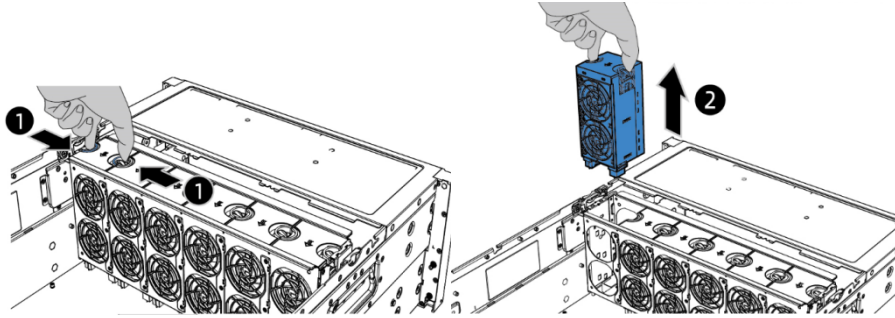
To install the fan module:

1. Take the new fan module out from the antistatic bag

2. Align the fan power connector with the power connector on the motherboard and install the fan module vertically into the fan cage.

3. Install the access panel

4. Verify that the fan status LED is off.

Figure 4-10 Installing the Fan Module
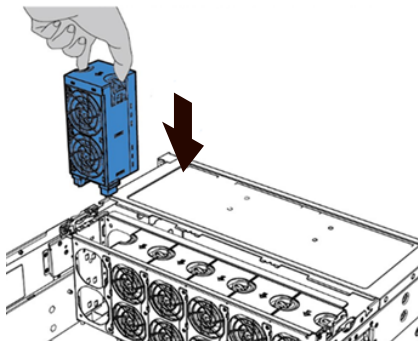
4.4.5 Hot-Swap PSU Replacement

⚠️ WARNING

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

⚠️ 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. Grasp the handle and press on the blue lever to release the PSU. Pull the PSU out of the power supply bay.

2. Put it in an antistatic bag.

Figure 4-11 Removing the PSU
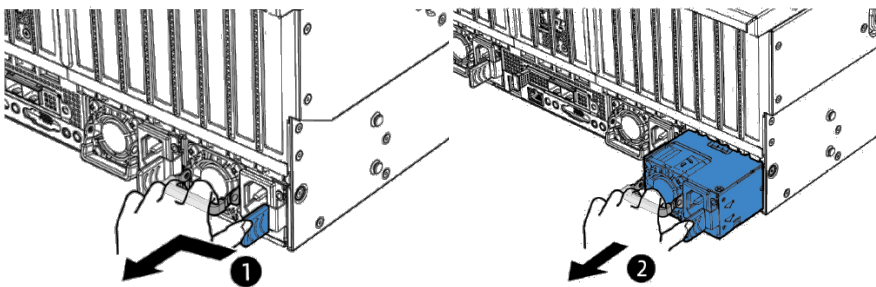
To install the PSU:

1. Take the new PSU out from the antistatic bag

2. Grasp the handle and push the PSU into the bay until it snaps into place. Make sure the blue release tab is on the right of the PSU

3. Verify that the PSU LED is green

Figure 4-12 Installing the PSU
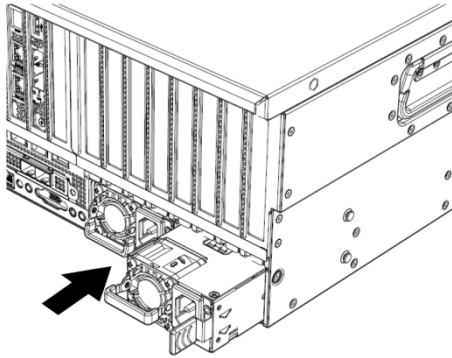
4.4.6 PCIe Expansion Card/GPU Replacement

⚠️ CAUTION

To prevent damage to the server or expansion card/GPU, power down the server and remove all power cables before removing or installing the PCIe expansion card/GPU.

To remove the PCIe expansion card/GPU:

1. Remove the access panel (Refer to [Access Panel Replacement](#)).

2. Lift up the latch of the PCIe Riser card/GPU to open

Figure 4-13 Lifting up the Latch to Open
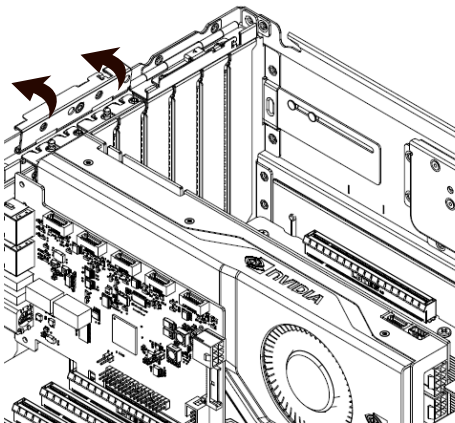
3. Lift up and remove the PCIe card/GPU as indicated by the arrow

4. Put the PCIe Riser card/GPU into an antistatic bag

Figure 4-14 Removing PCIe Card/GPU
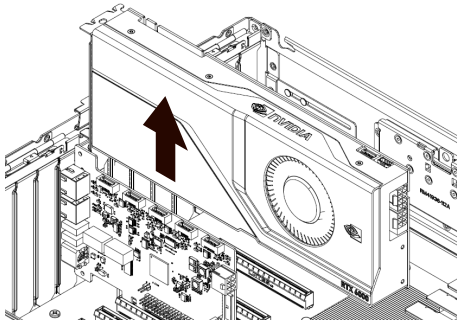
To install the PCIe Riser card/GPU:

1. Take the new Riser card/GPU out from the antistatic bag

2. Install the PCIe Riser card/GPU

3. Close the latch of the PCIe Riser card/GPU

4. Install the access panel

4.4.7　DIMM Replacement

⚠️ WARNING

1. Always wear antistatic wrist strap or gloves when removing or installing DIMM modules.

2. Attempting to mix the DIMMs of different frequencies may cause system stability or performance degradation.

To remove the DIMM module:

1. Remove the access panel (Refer to [Access Panel Replacement](#)).

2. Remove the crossbar (if available)

3. Remove the super-capacitors (if available)

4. Remove the air duct

5. Locate the DIMM slot. Determine which DIMM you want to replace.

6. To remove the DIMM:

   a. Push the release tabs outwards on both ends of the DIMM slot to unlock it. Gently lift and remove the DIMM from the slot.

   b. Put it into the memory box

⊟ NOTE

Make sure the release tabs on both ends of the DIMM slot are fully opened.

To install the DIMM:

1. Take the new DIMM out from the memory box

2. Align the bottom notch with the receptive point on the slot. Use two thumbs together to press both ends of the module straight down into the slot until the module snaps into place

Figure 4-15 Installing the DIMM
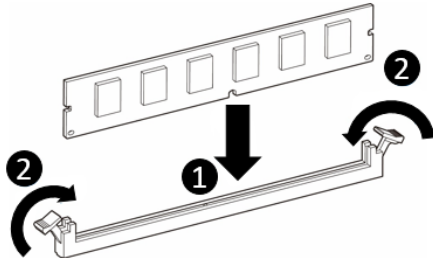
3. Install the air duct

4. Install the super-capacitors (if available)

5. Install the crossbar (if available)

6. Install the access panel

⊟ NOTE

Make sure that retaining tabs engage with the notches on the DIMM. If the retaining tabs are not in the fully-closed position, the DIMM has not been correctly installed. Press the DIMM firmly into the slot again until the retaining tabs are fully seated.

Figure 4-16 DIMM Slot Layout

Figure 4-16 DIMM Slot Layout

Only DIMMs of the same type could be used in the same machine. Detailed DIMM population rules are as follows:

Table 4-1 DIMM Population Rules

DIMM QTY	CPU1 C5 D0	C5 D1	C4 D0	C4 D1	C7 D0	C7 D1	C6 D0	C6 D1	C2 D1	C2 D0	C3 D1	C3 D0	C0 D1	C0 D0	C1 D1	C1 D0	CPU0 C5 D0	C5 D1	C4 D0	C4 D1	C7 D0	C7 D1	C6 D0	C6 D1	C2 D1	C2 D0	C3 D1	C3 D0	C0 D1	C0 D0	C1 D1	C1 D0
1																														●		
2														●																●		
4			●											●					●											●		
8			●				●					●		●					●				●					●		●		
12	●		●				●					●		●		●	●		●				●					●		●		●
16	●		●		●		●			●		●		●		●	●		●		●		●			●		●		●		●
24	●		●	●	●	●	●	●	●	●		●		●		●	●		●	●	●	●	●	●	●	●		●		●		●
32	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

4.4.8 Processor and Heatsink Module (PHM) Replacement

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

CAUTION

1. To avoid damage to the processor and system board, only authorized personnel should attempt to replace or install the processor in this server.

2. To help avoid damage to the processor and motherboard, do not install the processor without using the processor installation tool.

3. To prevent possible server malfunction and damage to the equipment, multiprocessor configurations must contain

processors with the same part number.

4. To install a faster processor, update the system ROM before installing.

To remove the PHM:

WARNING

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

1. Remove the air duct (Refer to [Air Duct Replacement](#))

2. To remove the PHM:

    a. Loosen the four screws securing the PHM to the CPU socket anticlockwise in the sequence as shown on the heatsink label with a T30 Torx screwdriver, as indicated by ① in Figure 4-17

    b. Press the lock-in wires inward with both hands to unlocked positions.

    c. Remove the PHM from the CPU socket, as indicated by ③ in Figure 4-17

Figure 4-17 Removing PHM

CAUTION
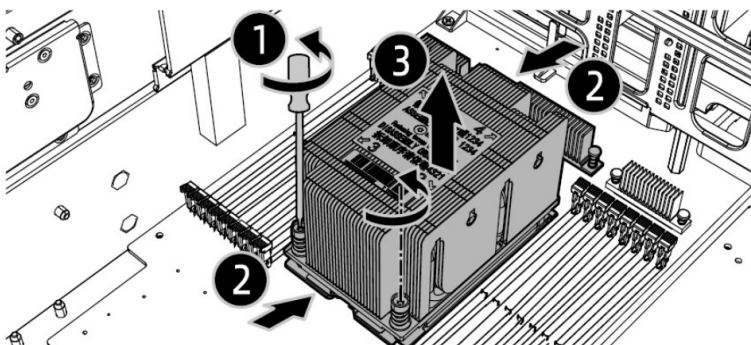
1. Use a protective cover to protect the CPU socket to avoid damaging socket pins after the PHM has been removed.

2. The gold pins on the CPU are fragile and can be easily damaged if touched. During removal and installation, always keep the gold pins facing up and DO NOT touch the gold pins when processor dedicated insertion/removal tool (CPU tray) is unavailable.

3. To remove the CPU: Lift the lever to remove the CPU from the Carrier Clip

Figure 4-18 Removing the CPU
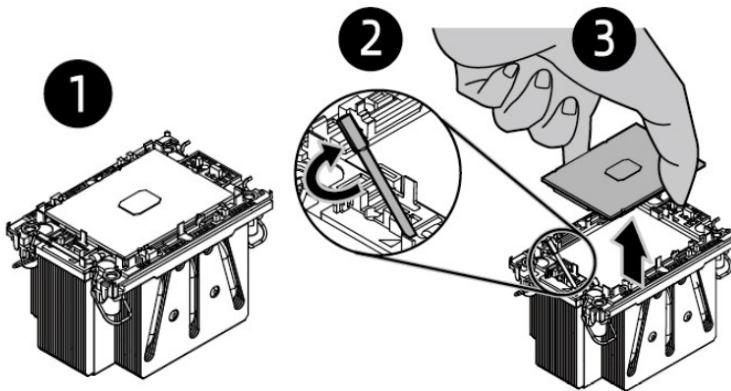
4. To remove the CPU clip:

   a. There are four retaining tabs on the four corners of Carrier Clip. Pry the one closest to the triangle mark as indicated by ① in 4-19

   b. Release the retaining tabs on the other three corners, as indicated in ② in Figure 4-19

   c. Remove the Carrier Clip from the heatsink as indicated by ③ in Figure 4-19

Figure 4-19 Removing Carrier Clip
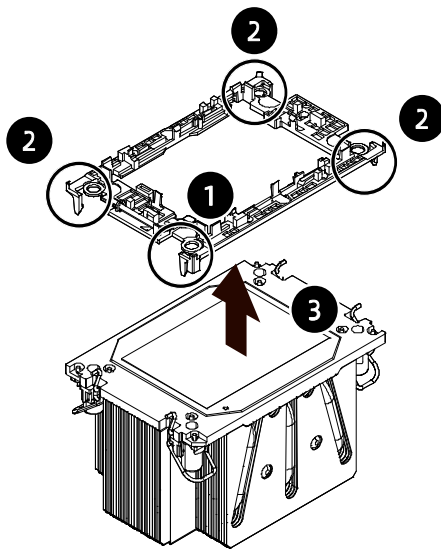
5. Put the CPU or Carrier Clip into an antistatic bag and put the heatsink into an antistatic box

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⚠️ CAUTION

1. Use a clean and lint-free cloth to wipe off the old thermal grease first if the heatsink is to be reused before putting the heatsink into an antistatic box

2. Once removed, it is not recommended to reuse CPU and Carrier Clip.

To install the PHM:

⚠️ CAUTION

1. The gold pins on the CPU are fragile and can be easily damaged if touched. During removal and installation, always keep the gold pins facing up and DO NOT touch the gold pins when processor dedicated insertion/removal tool (CPU tray) is unavailable.

2. Do not allow the thermal grease on the CPU or the heat sink to

---

	contact any objects to avoid damaging the thermal grease.

1. Install the Carrier Clip:

   a. With the heatsink thermal grease side up, align the triangle mark on the Carrier Clip with that on the heatsink label, as indicated by ① in Figure 4-20

   b. Install the Carrier Clip onto the heatsink until the four retaining tabs of the Carrier Clip snap into place, as indicated by ② in Figure 4-20

Figure 4-20 Assembling the Carrier Clip to the Heatsink
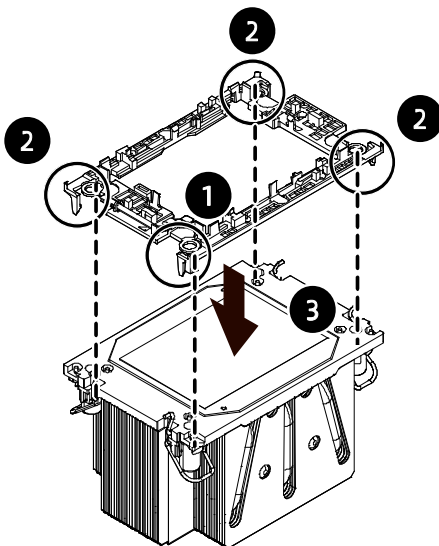
2. Install the CPU:

   a. With the gold pins up, align the triangle mark on the CPU with that on the Carrier Clip, as indicated by ① in Figure 4-21;

   b. Grasp the CPU by its short edges and install it into the Carrier Clip until the notches of the CPU snaps in place, as indicated by ② in Figure 4-21.

Figure 4-21 Installing CPU
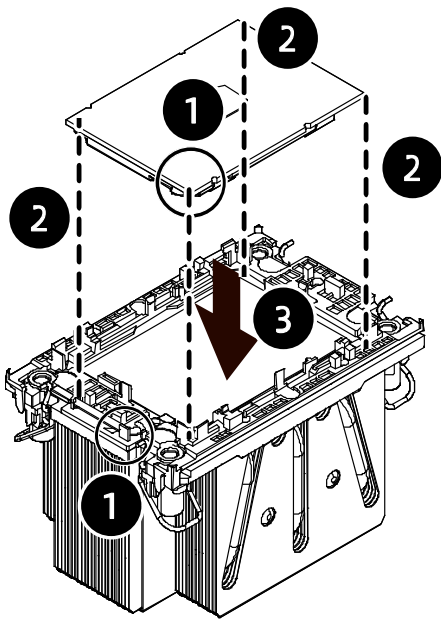
⚠ CAUTION

1. It is required to coat thermal grease evenly onto the contact position between CPU heatsink and CPU. Use a clean and lint-free cloth to wipe off the old thermal grease first if the heatsink is to be reused. Then coat the thermal grease onto the heatsink.

2. When assembling Carrier Clip to the heatsink or CPU to the Carrier Clip, make sure that the Carrier Clip or CPU is installed correctly.

3. Grasp the protective cover by its short edges to remove it from the CPU socket.

4. With the gold pins down, align the triangle mark on the CPU with that on the heatsink to attach the PHM onto the CPU socket.

5. Press the lock-in wires to locked positions

6. Tighten the four screws securing the PHM to the CPU socket clockwise in the sequence as shown on the heatsink label with a T30 Torx screwdriver.

4.5 Firmware Update and Configuration

For update and configuration of firmware, refer to:

- BIOS update manual

- BMC configuration manual

- BMC update manual

4.6 Cabling

Blue indicates the data cable routing between the backplane and SAS/RAID card;

Red indicates the cable routing between the backplane power connector and the motherboard power connector for powering the drives.

⚠️ CAUTION

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

Figure 4-22 Cabling of 24 × 2.5" Configuration
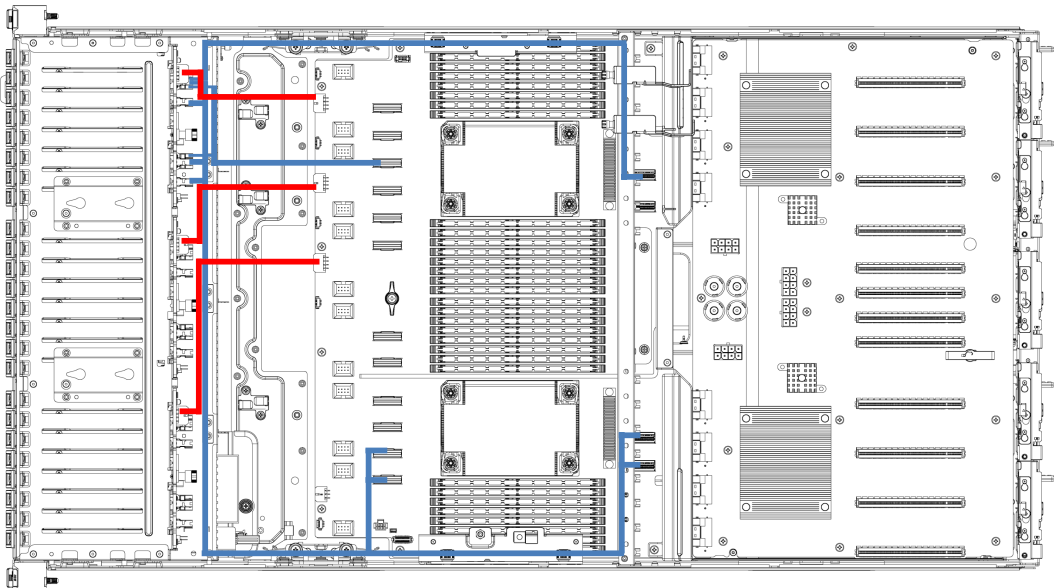
No.	Cable Name	Connection A to B
1	MB to HDBP0 Power Cable	J112-J11
2	MB to HDBP0 NVMe Cable	J13-J100
3	MB to HDBP0 NVMe Cable	J14-J101
4	MB to HDBP0 NVMe Cable	J15-J102
5	MB to HDBP0 NVMe Cable	J16-J103
6	MB to HDBP0 NVMe Cable	J7-J100
7	MB to HDBP0 NVMe Cable	J13-J101
8	MB to HDBP0 NVMe Cable	J14-J102
9	MB to HDBP0 NVMe Cable	J16-J103
10	MB to HDBP0 MiniSAS HD SATA Cable	J67-J12
11	MB to HDBP0 MiniSAS HD SATA Cable	J65-J14
12	MB to HDBP1 Power Cable	J116-J11
13	MB to HDBP1 MiniSAS HD SATA Cable	J65-J14
14	MB to HDBP2 Power Cable	J117-J11
15	MB to HDBP2 MiniSAS HD SATA Cable	J66-J12
16	MiniSAS to Slimline x4	J3-J12&J3-J14
17	MiniSAS to Slimline x4	J3-J12&J3-J14
18	MiniSAS to Slimline x4	J3-J12&J3-J14
19	MiniSAS to Slimline x4	J3-J12&J3-J14

Figure 4-23 Cabling of 12 × 3.5" Configuration
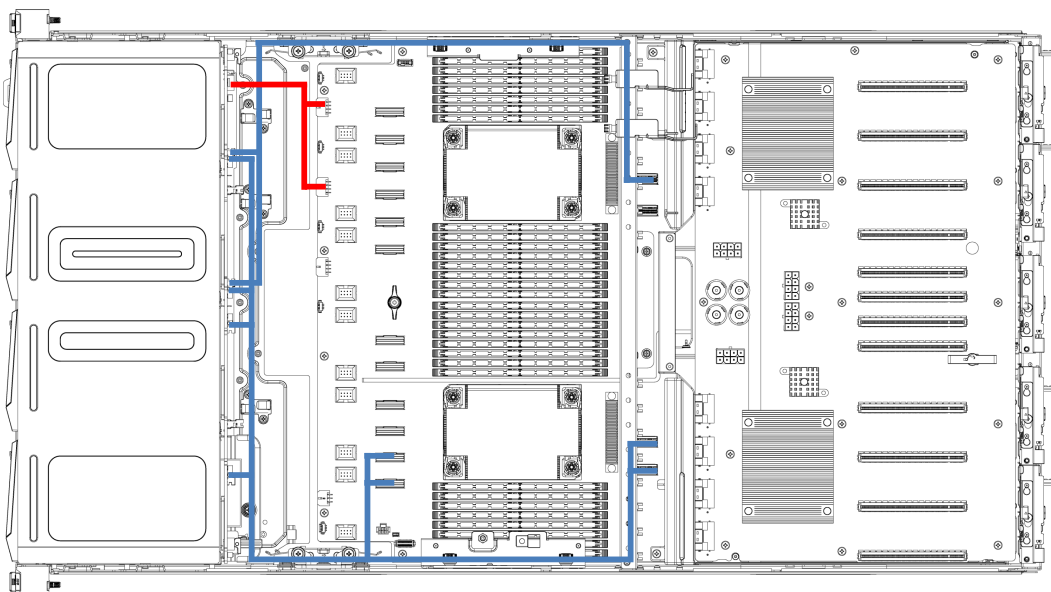
No.	Cable Name	Connection A to B
1	1*MB Slimline x8 to 2*HDBP NVMe Slimline x4	J13 – J2/J3
2	1*MB Slimline x8 to 2*HDBP NVMe Slimline x4	J14 – J4/J5
3	1*MB Slimline x8 to 2*HDBP NVMe Slimline x4	J15 – J31/J32
4	1*MB Slimline x8 to 2*HDBP NVMe Slimline x4	J16 – J29/J30
5	1*MB Slimline x8 to 2*HDBP NVMe Slimline x4	J7 – J2/J3
6	1*MB Slimline x8 to 2*HDBP NVMe Slimline x4	J13 – J4/J5
7	1*MB Slimline x8 to 2*HDBP NVMe Slimline x4	J14 – J31/J32
8	1*MB Slimline x8 to 2*HDBP NVMe Slimline x4	J16 – J29/J30
9	12 × 3.5 HDBP Power Cable	J112 – J7
10	12 × 3.5 HDBP Power Cable	J116 – J10
11	12 × 3.5 HDBP SATA Cable	J67-J6&J37
12	12 × 3.5 HDBP SATA Cable	J65-J22&J35
13	12 × 3.5 HDBP SATA Cable	J66-J8&J36

5 Battery Replacement

⚠️ WARNING

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

- DO NOT recharge the battery.

- DO NOT expose the battery to temperatures higher than 60°C (140°F).

- Do not disassemble, crush, puncture, short external contacts, or dispose of the battery in fire or water.

- Replace only with the spare designated for this product.

- After replacing the battery, you must reconfigure the server and reset the system date and time.

To remove the battery:

1. Power down the server.

2. Gently slide and remove the server out of the rack, and remove the access panel.

3. Remove all the GPUs and plug-ins.

4. Disconnect the Slimline cable and clock cable connected between GPU board and the motherboard.

5. Rotate the handle of the GPU board to unlocked position, and then remove the GPU board.

6. Remove the battery.

Figure 5-1 Removing the Battery
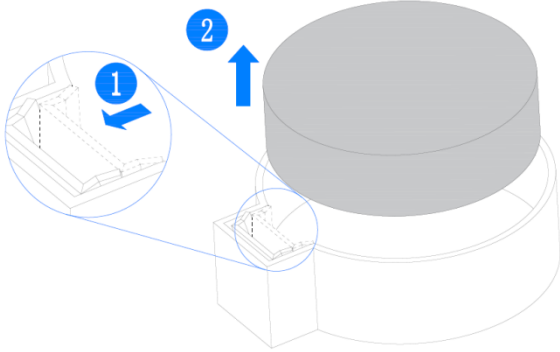
6 Electrostatic Discharge

6.1 Preventing Electrostatic Discharge

To prevent damage to the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage:

- Avoid hand contact by transporting and storing products in static-safe containers.

- Keep electrostatic-sensitive parts in their containers before they arrive at static-free workstations.

- Place parts on a grounded surface before taking them out from their packages.

- Avoid touching pins, leads, or circuitry.

- Always be properly grounded when touching a static-sensitive component or assembly.

6.2 Grounding Methods to Prevent Electrostatic Discharge

Several methods are used for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ±10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.

- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.

- Use conductive field service tools.

- Use a portable field service kit with a folding static-dissipating work mat.

- If you do not have any of the suggested equipment for proper grounding, have an authorized reseller install the part.

- For more information on static electricity or assistance with product installation, contact us.

7 Troubleshooting

7.1 Hardware Problems

- **Power-On Failure**

  Symptoms:

  After pressing the power button, the power LED on the power button is orange and the drive activity status LED is off. Meanwhile, there is no output on the monitor, and server fans do not rotate.

  Solutions:

  Check the status of the PSU LEDs on the rear panel.

  1) The PSU LEDs are off or amber

  a. If the PSU LEDs are off or amber, it indicates abnormal power supply. Check if the outlet can function, if the power cords are plugged properly and if the power cables of the faulty PSU can work;

  b. If all yes: the PSU LEDs are still off or amber, maybe the PSUs are faulty. Please replace the faulty PSUs with PSUs of the same server model and of the same specifications to test whether the PSUs have failed; the PSU LEDs turn green, but the power LED on the power button is still orange, please contact and inform us of the detailed error information and problems.

  2) All the PSU LEDs are green

  a. If all the PSU LEDs are green, disconnect the power cables, remove and re-insert all the PSUs. Connect the power cables and power on again to test if the problem can be solved;

  b. If re-inserting the PSUs won't work, please replace the PSUs with PSUs of the same server model and of the same specifications to test whether the PSUs have failed;

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

- **No Display**

  Symptoms:

  After pressing the power button, the power LED on the power button changes from orange to green, the system fans work normally, but there's no output on the monitor.

  Solutions:

  1) Check whether the monitor is powered up normally;

  2) If yes, but there is still no output on the monitor, check whether the monitor is connected properly to the server's VGA port;

  3) If yes, but there is still no output on the monitor, please replace with another monitor;

  4) If the problem still persists, maybe the VGA port is abnormal. Please log into the BMC Web interface. Launch the BMC remote KVM (For detailed reference document, please see [Firmware Update and Configuration](#)) to see if KVM can be displayed normally: If yes, maybe the VGA port on the motherboard is abnormal, please contact us; if no, please record the detailed warning information;

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

- **Abnormal LED on the Front Panel**

  Symptoms:

  The status LED on front panel illuminates red.

Solutions:

Identify the abnormal LED based on <u>Front Panel Buttons and LEDs</u>

1) If the system status LED illuminates red, check whether the server is under normal operation: If yes, log into the BMC Web interface to view the BMC logs (For detailed reference document, please see <u>Firmware Update and Configuration</u>) to check whether there are warnings. If yes, please record the detailed warning information;

2) If the power status LED is abnormal, please check if the PSU LEDs on the rear panel are abnormal (amber or off): If the PSU LEDs are normal, please log into the BMC Web interface to check the BMC logs (For detailed reference document, please see <u>Firmware Update and Configuration</u>) to see if there are warnings. If yes, please record the detailed warning information; if all the PSU LEDs are abnormal, please refer to <u>All the PSU LEDs are green</u>; if one PSU LED is abnormal, please refer to <u>PSU LED Off or Illuminates Amber</u>;

3) If other status LEDs are abnormal, log into the BMC Web interface to check the BMC logs to see if there are warnings; if yes, please record the detailed warning information;

4) If the instructions above do not locate or resolve the problem, please contact and inform us of the detailed error information and problems.

- **Stuck in POST Interface or Other Interface**

   Symptoms:

   After pressing the power button, the server gets stuck in the POST

   interface or other interface and cannot enter the OS.

   Solutions:

1) If the server gets stuck in the media test failure interface, please confirm if OS is installed successfully and OS boot order is set to first;

2) If the stuck interface includes directional error information of hardware, such as self-test errors of memory and RAID, record the detailed errors;

3) If the stuck interface is the POST interface and there are errors reported in the interface, please record the detailed errors;

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

- **PSU LED Off or Illuminates Amber**

Symptoms:

A certain PSU LED on the rear panel is off or illuminates amber when

the server is under normal operation.

Solutions:

1) Check if there is normal external power supply. Inspect the server for any abnormal appearance such as burning or vulcanization;

2) Check whether the power cord is plugged in firmly. Re-connect the power cable again.

3) If the fault still exists, remove the power and insert the PSU again.

4) Shut down the server (if shutdown is allowed), switch the positions of the PSUs and cross-check whether the PSU is faulty.

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

- **Abnormal Drive Status LED**

Symptoms:

The drive activity status LED is off or the drive fault LED illuminates red when the server is under normal operation.

Solutions:

1) Check if the drives are installed properly;

2) Check whether the drivers are removed and inserted or if there are other manual operations. If yes, restore the array through RAID configuration to ensure the drives are configured properly;

3) If no, run command under the OS to see if all the drives are identified. If the server is configured with an RAID card, you can also choose to log into the RAID management interface to check whether there is a drive failure;

4) If there is a drive failure or the instructions above do not resolve the problem, please contact and inform us of the detailed error information and problems.

📖NOTE

Hot-swap storage 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 storage drive can be plugged in and out online without damage.

Depending on the RAID level, hot-swapping a storage drive in the RAID may cause RAID degradation or failure. When installing a new drive, different RAID cards have different policies. You may need to log into the RAID management interface for recovery.

Remove the drive until the drive motor stops completely in order to prevent damage to the motor.

- **Loud System Fan Noise**

  Symptoms:

  System fans make excessive noise when the server is under normal operation.

  Solutions:

  1) Check the fan status LED or other status LEDs on the front panel for any warnings. Meanwhile, ensure that the access panel is closed properly and the air duct has not been moved;

  2) Check the server temperature by hand or the sensor temperature in the BMC Web interface for over-temperature;

  3) If the temperature of the chassis is too high, check the temperature of the server room. If it is too high, adjust the air conditioner to cool the room;

  4) If the temperature of the server room isn't high, check whether the front bezel or chassis interior is jammed with dust. If yes, clean with a soft and dry cloth, or a specialized brush. The environment of the server room needs to be improved to avoid over-temperature running of the server caused by too much dust;

  5) Check if the server is operating under heavy load. Log into the BMC Web interface to see if all the fans are identified and if the fan mode is automatic;

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

- **Alarm Sound from the Server**

Symptoms:

There is an alarm sound during server startup or operation.

Solutions:

Find the source of the alarm sound:

1) If the alarm sound comes from the PSUs, check the status of the PSU LEDs on the rear panel. If the PSU LEDs are abnormal, refer to [PSU LED Off or Illuminates Amber](#) to handle it.

2) If the alarm sound comes from the chassis interior, remove the access panel to find the specific source;

3) If the alarm sound comes from the RAID card, check the drive fault LED for any warning or log into the RAID management interface for any drive warning and record the detailed warning information if any.

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

- **Keyboard and Mouse Failure**

  Symptoms:

  Neither keyboard nor mouse can function.

  Solutions:

  1) Make sure the keyboard and mouse have been connected properly and firmly.

  2) Connect the keyboard and mouse to a laptop or a server to test if they can function or not;

  3) Power cycle the server and retest;

  4) Restart the server and enter BIOS or RAID management interface to test if the keyboard and mouse can function: If the keyboard

and mouse can function in non-OS environment, maybe there is something wrong with the USB driver of the OS; if the keyboard and mouse cannot function in non-OS environment, then maybe the connector on the motherboard is faulty. Please contact and inform us of the detailed error information and problems.

- **USB Port Problem**

Symptoms:

Unable to use devices with a USB port.

Solutions:

1) Make sure the OS of the server supports USB devices;

2) Make sure the server has been installed with the correct USB driver, and try installing the USB driver again;

3) Connect the USB device to another server to test if the device can function;

4) If the USB device cannot function, please replace with a known working USB device;

5) Power cycle the server and retest;

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

7.2 Software Problems

- **OS Installation Problems**

Symptoms:

Unable to load the RAID driver or create partitions larger than 2 T during OS installation; C disk usage is too high after OS installation, etc.

Solutions:

1) If it fails to load the driver during OS installation, check the RAID driver version. Go to official website to download the correct RAID driver. Some RAID drivers need to be loaded several times.

2) If it fails to create partitions larger than 2 T during OS installation, select **Advanced>CSM Configuration>Boot option filter>UEFI only** (For detailed reference document, please see [Firmware Update and Configuration](#)) in BIOS, save and exit BIOS interface. Choose UEFI to boot the OS. The server will restart automatically. It needs to enter the CMD command line to change the drive format to GPT, and then partitions larger than 2 T can be created;

3) If the C disk usage is too high after installing the Windows OS, turn down the virtual memory or allocate the virtual memory to other partitions;

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

- **PXE Boot Failure**

Symptoms:

Unable to install OS via PXE.

Solutions:

1) Check if the PXE server can be used to install OS for another server;

2) Check whether there is network link via the network port LED to check if there is a fault in external network;

3) Check whether the NIC can be identified under BMC Web, BIOS or Shell;

4) Check if PXE Function is enabled and if the boot sequence is set to first in BIOS;

5) Check if the target drive for the OS or RAID array can be identified and if there is enough space;

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

- **Abnormal Memory Capacity**

  Symptoms:

  The memory capacity displayed in the OS and the physical memory capacity are inconsistent.

  Solutions:

  1) Check the OS version. The supported memory capacity varies with the version of Windows OS. Enter BIOS Setup to view the memory capacity. If the memory is identified completely, the OS may be unable to access all the installed memories. For example, Windows server 2008 x86 supports up to 4 G memory;

  2) If the memory is not identified completely in BIOS Setup, confirm that the corresponding slots have been populated with memories of correct type;

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

- **Abnormal Network**

  Symptoms:

  The network is disconnected, or the rate is lower than the actual rate of the network port under the server OS.

  Solutions:

1) Check whether the network cable is connected properly and whether the network port LED flashes normally to ensure that the network is configured correctly;

2) Unplug and plug the network cable back to see if the problem can be solved. If not, connect the server with a laptop 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 official Website to download the latest NIC driver;

3) Check whether the NIC can be identified under BMC Web, BIOS or Shell and whether the MAC address is correct;

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

8 Environmental Requirements

8.1 Ambient Temperature

Table 8-1 Ambient Temperature

Parameter	Condition	Requirement
Temperature	Operating continuously	10 to 35℃ (50℉ to 95℉)
	Transportation (Storage)	-40℃ to 70℃ (-40℉ to 158℉)
	Maximum temperature gradient (Operation and storage)	20℃/h (36℉/h)
Humidity	Operations	Relative humidity is 10% to 90% with the maximum dew point at 32℃ (89.6℉)
	Transportation (Storage)	When the maximum dew point is 39℃ (102.2℉), relative humidity is 10% to 93%, and the air must be non-condensing all the time

8.2 Vibration and Shock Resistance

Table 8-2 Vibration and Shock Resistance

Parameter	Condition	Requirement
Vibration	Operating	5 - 500 Hz: 0.21 Grms (X, Y and Z axis and every direction for 15 min)
	Transportation (Storage)	1 - 200 Hz: 0.54 Grms (Z axis for 4 hours)
Shock	Operating	Half sine wave shock lasting for 11 ms with an acceleration of 2g (100 shocks in every direction of the six negative and

Para meter	Condition	Requirement
		positive directions of X, Y and Z respectively with an interval of 3s)
	Transportatio n (Storage)	Half sine wave shock lasting for 6 ms with an acceleration of 40g (1000 shocks in every direction of the three X, Y and Z axis)

8.3 Altitude and Air Pressure

Table 8-3 Altitude and Air Pressure

Para meter	Condition	Requirement
Altitu de	Operating	0 to 3,048 m (0 to 10,000 feet)
	Transportation (Storage)	0 to 12,192 m (0 to 40,000 feet)

8.4 Alternating Temperature and Humidity

Table 8-4 Alternating Temperature and Humidity

Para meter	Condition	Requirement
Humi dity	Operating	Relative humidity is 10% to 90% with the maximum dew point at 38℃ (100.4°F)
	Transportation (Storage)	When the maximum dew point is 39℃ (102.2°F), relative humidity is 10% to 95%, and the air must be non-condensing all the time

8.5 Extended Operation Temperature

⚠️ CAUTION

1. The system performance will be impacted when the temperature is not within the specification range;

2. Ignore alarm sound of ambient temperature when the temperature is not within the specification range.

Table 8-5 Extended Operation Temperature

Temperature Specification (Numbers are for instance only)	Description
10℃ - 35℃ (5% - 85%RH)[1]	Continuous running is possible
10℃ - 35℃ (5% - 90%RH)[2]	Running time ≤1% per year

8.6 Extended Operation Temperature Limits

- Do not perform a startup below 10°C

- The altitude cannot be higher than 3,000m

- CPU with power higher than 280W is not supported

- Redundant power supplies are not supported

- Only specified PCIe cards are supported

- PCIe SSDs are not supported

- NVDIMMs are not supported

- Internal drives are not supported

- Rear drives are not supported

- GPU configurations are not supported

8.7 Thermal Restrictions

- CPU with power higher than 280 W is not supported

- Memories with power higher than 12 W are not supported

- Do not perform a startup when the temperature is higher than 35℃

8.8 Operational Requirement

This section specifies the requirements of temperature, humidity, organisms, chemical materials and mechanically active materials in the server room when the server is operating.

1. Temperature and humidity

The temperature, dew point and relative humidity in the server room should meet the requirements for operating the server. For specified requirements, see the detailed description in the product documentations.

2. Organisms

Plants and animals are not allowed in the server room. Take strict precautions against damage by rats and ants.

To meet these requirements, take the following measures in the server room:

- Ensure safety if there are humidification devices in the server room.

- All the structures and construction gaps of doors, windows, walls, ground (floors) must be sealed.

- If there are water supply and drainage pipes in the server room, anti-leakage and anti-condensation measures should be taken.

- If there is water equipment in the main server room, measures to prevent water overflow and leakage should be taken.

- Block cable holes and antenna holes.

- Clean and sterilize the server room periodically.

3. Corrosive Airborne Contaminants

Generally, a small amount of common corrosive gas pollutants exist

in indoor and outdoor atmospheric environments. Chemical reactions may occur due to long-term contact between these mixed corrosive gas pollutants or pollutants of one single corrosive gas and other environmental factors (such as temperature or relative humidity), which may pose a risk of IT equipment failure from corrosion and damage circuit boards of IT equipment and system component units with weak oxidation resistance. This article specifies the limitation on corrosive airborne contaminants with an aim to avoid such risks.

The concentration level of corrosive airborne contaminants in a data center shall meet the requirements listed in the white paper entitled Gaseous and Particulate Contamination Guidelines for Data Centers published in 2011 by American Society of Heating Refrigerating and Air-conditioning Engineers (ASHRAE) Technical Committee (TC) 9.9. According to the Guidelines, corrosive airborne contaminants in a data center shall meet the following requirements:

- Copper coupon corrosion rate less than 300 Å/month per ANSI/ISA-71.04-2013 severity level G1

- Silver corrosion rate less than 200 Å/month per ANSI/ISA-71.04-2013 severity level G1

- According to ANSI/ISA-71.04-2013 Environmental Conditions for Process Measurement and Control Systems: Airborne Contaminants, the gaseous corrosivity levels are G1 (mild), G2 (moderate), G3 (harsh), and GX (severe), as described in the table below.

Table 8-6 Gaseous Corrosivity Levels per ANSI/ISA-71.04-2013

Severity Level	Copper Reactivity Level	Silver Reactivity Level	Description
G1 (mild)	< 300 Å/month	< 200 Å/month	An environment sufficiently well-controlled such that corrosion is not a factor

Severity Level	Copper Reactivity Level	Silver Reactivity Level	Description
			in determining equipment reliability.
G2 (moderate)	< 1000 Å/month	< 1000 Å/month	An environment in which the effects of corrosion are measurable and may be a factor in determining equipment reliability.
G3 (harsh)	< 2000 Å/month	< 2000 Å/month	An environment in which there is high probability that corrosive attack will occur.
GX (severe)	≥ 2000 Å/month	≥ 2000 Å/month	An environment in which only specially designed and packaged equipment would be expected to survive.

See the table below for the requirements on the copper and silver corrosion rates.

Table 8-7 Concentration Limitation on Corrosive Airborne Contaminants in a Data Center

Group	Gas	Unit	Concentration
Group A	H_2S	ppb[a]	<3
	SO_2	ppb	<10
	Cl_2	ppb	<1
	NO_2	ppb	<50
Group B	HF	ppb	<1
	NH_3	ppb	<500
	O_3	ppb	<2

Group	Gas	Unit	Concentration
a: Part per billion (ppb) is the number of units of mass of a contaminant per 1000 million units of total mass.			

Group A and group B are common gas groups in a data center. Group A's or group B's concentration limitation values correspond to copper and silver reactivity level G1.

Corrosion is not determined by a single factor, but by comprehensive environmental factors such as temperature, relative humidity and corrosive airborne contaminants. Any change of the environmental factors may affect the gaseous corrosivity level. Therefore, the concentration limitation values specified in the previous table are for reference only. If the actual mixed gas concentration is not listed in the table, refer to chemically active substance level in IEC-60721-3-3 or GB/T 4798.3-2007 to choose the concentration range.

4. Mechanically Active Materials

The server room should be free from explosive, conductive, magnetism-permeable, and corrosive dust. The table below lists the requirements for concentration of the mechanically active materials in the server room

Table 8-8 Requirements for Concentration of Mechanically Active Materials

Mechanically Active Materials	Unit	Concentration
Sand	mg/m^3	≤30
Suspending dust	mg/m^3	≤0.2
Dust deposit	mg/(m^{2}h)	≤1.5

To meet these requirements, take the following measures in the server room:

• Use dustproof materials on the ground, wall, and ceiling of the server room.

- Adopt few or no windows design in the server room, and use dustproof materials for outer windows.

- Clean the server room, especially the air filters periodically.

- Wear shoe covers and ESD clothing before entering the server room.

8.9 EMC Requirements

1. As per GB/T 17626.3(IEC 61000-4-3)& GB/T 17626.6(IEC 61000-4-6)& GB/T 17626.8(IEC 61000-4-8), the recommended electromagnetic environment is as follows:

Table 8-9 Electromagnetic Parameters

Electromagnetic Phenomenon		Specifications
Power frequency magnetic field	Frequency (Hz)	50
	A/m (rms)	≤ 1
RF electromagnetic field amplitude modulation	Frequency (MHz)	80 - 1000
	V/m (rms, unmodulated)	≤ 3
	%AM (1 kHz)	80
RF continuous wave conduction	Frequency (MHz)	0.15 - 80
	V (rms, unmodulated)	≤ 3
	%AM (1 kHz)	80

Meanwhile, we recommend you to take the following measures to suppress interfering signals:

- Take effective measures against power grid interference to the power supply system.

- Keep away from electrical equipment such as medical magnetic resonance device, helium arc welder, radio frequency electric heater, etc.

- Try to avoid the impact of nearby areas with high power emissions (broadcast, radar, mobile communication

transmitters), electrified railways, industrial radiation, substations, and high-voltage transmission lines.

- The interference effect of other equipment in the server room must comply with relevant standards and regulations.

- Take measures to shield and isolate natural noise such as atmospheric noise and solar radio noise when necessary.

To avoid damage to the system, take ESD protection measures (Refer to Chapter 10 Electrostatic Discharge for electrostatic protection methods.)

2. As per the requirements of Appendix F.5 of IEC6268, the server is pasted with safety protection logos. The logos and interpretations are as follows:

1) Fan blade safety protection:

Figure 8-1 Fan blade safety protection
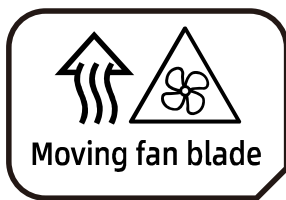
Caution: Keep body parts away from fan blades

2) Multi-power safety protection:

Figure 8-2 Multi-power safety protection
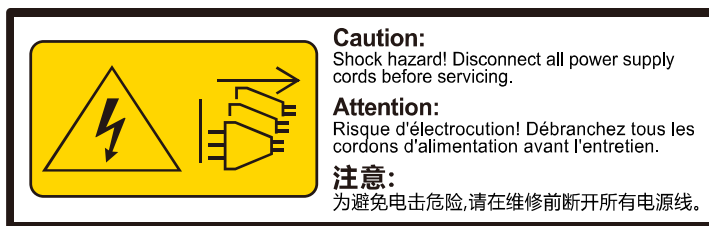
Caution: Shock Hazard! Disconnect all power supply cords before servicing

8.10 Power Supply Requirements

This section introduces power supply requirements for operating the server.

8.10.1 AC Power Supply Requirement

An AC power supply that consists of mains supply, uninterruptible power supply (UPS), and self-supplied electric generator set can be used as an integrated power supply. The AC power supply must feature simple connection line, safe operation, flexible scheduling, and easy maintenance in addition to meeting the requirements of site load. Low voltage power supply should adopt three-phase five-wire mode or monophase three-wire mode.

AC power supply system should work under nominal voltage and rated frequency.

Table 8-10 Nominal Voltage

Nominal Voltage	Rated Frequency
110 V	60 Hz
220 V	50 Hz

A UPS is typically used as an AC potential power of network products. A UPS should be in the same phase as the mains supply. The time used for switching between the UPS and the mains supply should be less than 8 ms. Otherwise, the server will reboot or reset.

8.10.2 DC Power Supply Requirement

DC power supply system should work under nominal voltage of 270 V.

When determining the AC distribution capacity in the server room, consider the working current and fault current. An independent device must have an independent AC distribution protection apparatus. The maximum capacity of the current over the configuration protection switch should be greater than the maximum capacity of the current over the protection switch of each device. When designing the capacity of an AC power supply system, consider the maximum load of the system in dynamic mode and static mode and reserve a certain margin. The cabling on the power distribution panel must be figured out based on the maximum power supply load. This helps you determine the type and size of the conducting wire.

Voltages of an AC-powered server and power equipment should meet the following requirements:

- For an AC-powered server, the voltage fluctuates from -10% of the rated voltage to 5% of the rated voltage.

- For AC-powered power equipment and important buildings, the voltage fluctuates from -15% of the rated voltage to 10% of the rated voltage.

- The AC frequency fluctuates from -4% to 4%. The sinusoidal distortion rate of the voltage waveform is smaller than or equal to 5%.

The server room should be equipped with a self-supplied electric generator set. The electric generator set should perform automatic power-on/off, automatic recruitment, remote communication, remote control, and remote detection, and provide standard interfaces that comply with communication protocols.

The power cord used for AC/DC power distribution should meet the following requirements:

- The conductor in the neutral wire must have the same cross-sectional area as the conductor in the live wire.

- The power feeder should be selected based on the long-term load. If the cross-sectional area exceeds 95 mm^2, a hard bus cable should be used. If there is a great difference between the short-term load and the long-term load, cables can be routed by stage.

- AC/DC conducting wires should be flame-retardant and be routed according to the Code for fire protection design of tall buildings (GB50045).

8.10.3 Recommendations on the AC Power Supply

Recommendations on the AC power supply are as follows:

- Use a voltage stabilizer or voltage-regulator to respond to unstable voltages. Use a voltage-regulator in the following situations:

- The server is directly powered by the mains supply, and the power supply voltage exceeds the rated voltage by -10% to +5% or the voltage range allowed for the server.

- The server is not directly powered by the mains supply, and the mains voltage exceeds the rated voltage by -15% to +10% or the AC input voltage range allowed for the DC power equipment.

  • To prevent interruption or surge of AC power supply, use the UPS or inverter.

  • The data center should be equipped with self-supplied generator set in case of mains failure to ensure proper function of important load and important power load. All electrical equipment such as IT equipment and refrigeration equipment shall be considered. Check the start-up shock to ensure that the generator can start reliably. The generator performance should meet the requirements of Code for Design of Data Centers (GB50174).

  • Connect two storage battery strings in parallel. A second UPS is needed as redundant backup.

8.10.4 HVDC Power Supply

The high-voltage direct current (HVDC) system can eliminate the problems existing in conventional AC and low-voltage DC power supplies. At present, 240 V HVDC standards and 336 V HVDC standards are the mainstream HVDC standards used in China.

⚠ CAUTION

336V HVDC is not supported.

8.10.5 HVDC Power Supply Requirements

  • The requirements for HVDC power supply are as follows:

- Operating range: -5℃ - 45℃

- Transportation and storage: -40℃ - 85℃

  • Relative Humidity:

− Operating range: ≤ 90% RH (40 ± 2℃)

− Storage and transportation range: ≤ 95% RH (40 ± 2℃)

- Vibration performance: ability to withstand sinusoidal frequencies between 10 Hz to 55 Hz and amplitude of 0.35 mm.

- Battery capacity configuration: Ensure continuous operation of servers at full loads when the power supplies are unavailable. The battery backup time should be 15 minutes when a diesel generator is available as backup power source.

- Determination of cell voltage and pack number: Depending on the system capacity and backup time, the cell voltage can be selected from 2 V, 6 V or 12 V.

- The insulation monitoring device acts properly if a ground fault occurs or the insulation resistance is 28 kΩ lower than the set value. The HVDC system is protected against overcurrent and short circuits and can be manually or automatically restored after overcurrent or short circuits are rectified.

- Over- and under-voltage protection for AC power supplies: The power supply system can monitor the input voltage changes. When detecting that the AC input voltage is higher or lower than the specified threshold, which may pose safety risk on the operation of the power supply system, the system automatically shuts down. The system automatically restores when the input voltage is normal.

- The site is free from explosive materials, conductive media and hazardous gases that erode metals and affect insulation, and mold.

- Protection against high temperature: When the temperature in the power supply system reaches the specified threshold, the power supply system automatically reduces the power or shuts down the power amplifier. When the temperature falls below the threshold, the power supply system restores the normal power output.

- The system provides alarm records and query, and the alarm display can be updated on a real-time basis. The alarm information is protected against loss when the system is out of power.

8.10.6 HVDC Power Supply Suggestions

- Terminal equipment can be connected to power sockets or wiring terminals. Wiring terminals are recommended.

- Do not use a shunt circuit breaker to connect to or control multiple PSUs through a multi-purpose power socket.

- Choose DC circuit breakers based on the rated current of the equipment. The 10 A or 16 A DC breakers are recommended.

- Recommended standards for equipment power wiring: Connect the DC output positive pole to terminal N of the equipment power cord. Connect the DC output negative pole to terminal L of the equipment power cord. DC system is strictly forbidden to be grounded.

- The upstream input terminal of the power supply system is equipped with a surge protection device to protect the system against a minimal voltage surge of 10/700 us, 5 kV and a minimal current surge of 8/20 us, 20 kA.

- All cables in the power distribution frame (PDF) comply with YD/T 1173 specifications, and the diameters of all power cords meet the requirements for wire ampacity.

8.10.7 DC Power Supply

The DC power supply should be stable and reliable. The power equipment should be deployed near the server. The standard DC voltage is 240 VDC with a fluctuation range of server power between 190 V to 300 V.

9 Limited Warranty

This limited warranty applies only to the original purchasers of our products who are direct customers or distributors of us ("Customer").

We warrant all our hardware products, if properly used and installed, to be free from defects in material and workmanship within the warranty period. The term "Hardware Product" is limited to the hardware components and required firmware. The term "Hardware Product" DOES NOT include software applications or programs, and DOES NOT include products or peripherals that are not supplied by us. We may, at our discretion, repair or replace the defective parts. Repair or replacement parts may be new, used, or equivalent to new in performance and reliability. Repair or replacement parts are warranted to be free of defects in material or workmanship for ninety (90) calendar days or for the remainder of the warranty period of the product, whichever is longer.

Service offerings may vary by geographic region. Please contact your representative to identify service levels and needs for your region.

9.1 Warranty Service

Our warranty service includes 24 × 7 remote technical support, RMA (Return Material Authorization) Service, ARMA (Advanced Return Material Authorization) Service, 9 × 5 × NBD (Next Business Day) Onsite Service and 24 × 7 × 4 Onsite Service.

9.1.1 Remote Technical Support

The 24 × 7 remote technical support can be obtained through hotline, e-mail, and Service Portal[1]. Through hotline and e-mail support, our engineers help customers diagnose the causes of malfunctions and provide solutions. Service Portal[1] provides access to firmware, customized update files, and related manuals for Hardware Products. Customer may also access the Service Portal[1] to submit an RMA request or an ARMA request for parts replacement or repair.

Information needed when requesting support:

- Contact name, phone number, e-mail address

- System serial number, part number, model and location (address) of the product needing service

- Detailed description of problem, logs (SELs and blackbox logs, and any other related logs from OS), screenshot of issue, pictures of damaged/faulty parts, etc.

Table 9-1 Support Contact Information

Type	Description	Support Window
Email	• Technical Support: serversupport@aivres.com • RMA/ARMA Support: serversupportusa@aivres.com	24 × 7 × 365
Web	Service Portal: service.aivres.com	24 × 7 × 365

9.1.2 RMA Service

Standard Replacement: When a hardware failure occurs, Customer may submit an RMA request to us via e-mail or Service Portal*[1]. We will review and approve the RMA submission at its own discretion, and provide an RMA number and return information that Customer may use to return the defective part(s) for the RMA service. We will ship out replacement part(s) within one (1) business day after receiving the defective part(s) and cover one-way shipment.

📋NOTE

• Customer should return the defective parts in proper packaging to our designated service center at their own expense.
• After our further diagnosing and testing, if the defective parts conform to our repair policy, we will ship out the repair or replacement parts at our own expense; otherwise, we will return the defective parts at Customer's expense.
• If Customer needs to designate a logistics company , allocation of the shipping cost to us/Customer will be redefined.

9.1.3 ARMA Service

Advanced Replacement: If a problem with our hardware products cannot be resolved via hotline or e-mail support and replacement part(s) are required, we will ship out replacement part(s) in advance within one (1) business day. Customer should return defective part(s) within five (5) business days after receiving the replacement(s). We will cover one-way shipment.

📋NOTE

- Customer should return the defective parts in proper packaging to our designated service center.
- We will ship out the replacement parts at our own expense after completing remote diagnosis.
- If Customer needs to designate a logistics company, allocation of the shipping cost to us/Customer will be redefined.

9.1.4 9 × 5 × NBD Onsite Service

When we ultimately determine that an onsite service call is required to repair or replace a defect, the call will be scheduled in accordance with the Response Time Commitment. The response time is measured from the time when the remote troubleshooting is completed and logged to the arrival of a service engineer and parts to Customer location for repair.

📋NOTE

9 × 5 × NBD: Our service engineer typically arrives at the customer's data center on the next business day. Service engineers are available on local business day from 9:00 am to 6:00 pm local time. Calls received/dispatches after 5:00 pm local time will require an additional day for the service engineer to arrive.

9.1.5 24 × 7 × 4 Onsite Service

When we ultimately determine that an onsite service call is required to repair or replace a defect, the call will be scheduled in accordance with the Response Time Commitment. The response time is measured from the time when the remote troubleshooting is completed and logged to the arrival of a service engineer and parts to Customer location for repair.

📋NOTE

24 × 7 × 4: Our service engineer typically arrives at the customer site within 4 hours. Service engineers are available at anytime, including weekends and local national holidays.

9.2 Our Service SLA

We offer a variety of Service Level Agreements (SLA)*2 to meet customer requirements.

- RMA Service

- ARMA Service

- 9 × 5 × NBD Onsite Service

- 24 × 7 × 4 Onsite Service

9.3 Warranty Exclusions

We do not guarantee that there will be no interruptions or mistakes during the use of the products. We will not undertake any responsibility for the losses arising from any operation not conducted according to instructions intended for Hardware Products.

The Limited Warranty does do not apply to

- expendable or consumable parts, such as, but not limited to, batteries or protective coatings that are designed to diminish over time, unless failure has occurred during DOA period due to a defect in material or workmanship;

- any cosmetic damage, such as, but not limited to, scratches, dents, broken plastics, metal corrosion, or mechanical damage, unless failure has occurred during DOA period due to a defect in material or workmanship;

- damage or defects caused by accident, misuse, abuse, contamination, improper or inadequate maintenance or calibration or other external causes;

- damage or defects caused by operation beyond the parameters as stipulated in the user documentation;

- damage or defects by software, interfacing, parts or supplies not provided by us;

- damage or defects by improper storage, usage, or maintenance;

- damage or defects by virus infection;

- loss or damage in transit which is not arranged by us;

- Hardware Products that have been modified or serviced by non-authorized personnel;

- any damage to or loss of any personal data, programs, or removable storage media;

- the restoration or reinstallation of any data or programs except the software installed by us when the product is manufactured;

- any engineering sample, evaluation unit, or non-mass production product that is not covered under warranty service;

- any solid-state drive (SSD) which has reached its write endurance limit.

In no event will we be liable for any direct loss of use, interruption of business, lost profits, lost data, or indirect, special, incidental or consequential damages of any kind regardless of the form of action, whether in contract, tort (including negligence), strict liability or otherwise, even if we have been advised of the possibility of such damage, and whether or not any remedy provided should fail of its essential purpose.

*1 Service Portal availability is subject to customer type and customer location. Please contact your representative to learn more.

*2 Not all SLA offerings are available at all customer locations. Some SLA offerings may be limited to geolocation and/or customer type. Please contact your representative to learn more.

Appendix

A.1 Drive Neodymium Content Reference Table

Table A.1-2 Seagate Drive Neodymium Content Reference

Product Series Name	Neodymium Content Range		
	< 5 g	5 g - 25 g	> 25 g
Cimarron (2T/4T)	√		
Cimarron (6T/8T)		√	
Evans		√	
Kestrel	√		
MakaraBP		√	
MakaraPLUS		√	
Mobula		√	
MobulaBP		√	
Skybolt	√		
Tatsu		√	

Table A.1-2 WD Drive Neodymium Content Reference

Product Series Name	Neodymium Content Range		
	< 5 g	5 g - 25 g	> 25 g
Rainier	√		
Libra He10		√	
Leo A		√	
Vela-A		√	
Vela-AP		√	
Hs14		√	
Leo-B		√	

Table A.1-3 Toshiba Drive Neodymium Content Reference

Product Series Name	Neodymium Content Range		
	< 5 g	5 g - 25 g	> 25 g
AL14SE-Lite	√		
AL15SE	√		
AL14SX	√		
MG04 Tomcat-R SAS		√	
MG04 Tomcat-R SATA		√	
MG04 Tomcat SATA		√	
MG06 SAS		√	
MG06 SATA		√	
MG07 SAS		√	
MG07 SATA		√	

A.2 Acronyms and Abbreviations

A

AC	Alternating Current
ACPI	Advanced Configuration and Power Management Interface
AES	Advanced Encryption Standard New Instruction Set
AI	Artificial Intelligence
AOC	Active Optical Cables
API	Application Program Interface
ARP	Address Resolution Protocol

B

BIOS	Basic Input Output System
BMC	Baseboard Management Controller

C

CE	Conformite Europeenne
CLI	Command-Line Interface
CMOS	Complementary Metal-Oxide-Semiconductor Transistor
CPLD	Complex Programming Logic Device
CPU	Central Processing Unit
CRPS	Common Redundant Power Supplies
CRU	Customer-Replaceable Unit
CSA	Canadian Standards Association
CSM	Compatibility Support Module

D

DC	Direct Current
DDR4	Double Date Rate 4
DHCP	Dynamic Host Configuration Protocol
DIMM	Dual-Inline-Memory-Modules

DNS	Domain Name System
DVD	Digital Video Disc

F

FMA	Failure Mode Analysis
FRU	Field-Replaceable Unit
FTP	File Transfer Protocol
FW	Firmware

G

GPU	Graphics Processing Unit
GUI	Graphical User Interface

H

HBA	Host Bus Adapter
HCA	Host Channel Adapter
HDD	Hard Disk Drive
HTML	Hyper Text Markup Language
HWRAID	Hardware Redundant Arrays of Independent Drives

I

I/O	Input/Output
IEC	International Electrotechnical Commission
IOPS	Input/Output Operations Per Second
IP	Internet Protocol
IPMB	Intelligent Platform Management Bus
IPMI	Intelligent Platform Management Interface
iSCSI	Internet Small Computer System Interface

J

JTAG	Joint Test Action Group

K

KVM	Keyboard Video Mouse

L

LAN	Local Area Network
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LRDIMM	Load Reduced Dual In-Lane Memory Module

M

MLAN	Music Local Area Network

N

NCSI	National Communication System Instructions
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NIC	Network Interface Controller
NM	Node Manager
NPU	Network Processing Unit
NTP	Network Time Protocol
NVDIMM	Non-Volatile Dual In-Line Memory Module
NVMe	Non-Volatile Memory Express

O

OCP	Open Compute Project
OS	Operating System

P

PCH	Platform Controller Hub
PCI	Peripheral Component Interconnect

PCIe	Peripheral Component Interconnect express
PDU	Power Distribution Unit
PFR	Platform Firmware Resilience
PHM	Processor Heatsink Module
PHY	Physical
PMBus	Power Management Bus
POST	Power On Self Test
PSU	Power Supply Unit
PXE	Pre-boot Execution Environment

R

RAM	Random-Access Memory
RAID	Redundant Arrays of Independent Drives
RDIMM	Registered Dual In-line Memory Module
RH	Relative Humidity
ROM	Read-Only Memory
RTA	Real Time Clock

S

SAS	Serial Attached Small Computer System Interface

SATA	Serial Advanced Technology Attachment
SFP	Small Form-factor Pluggable
SIC	Smart Interface Card
SKU	Stock Keeping Unit
SMTP	Simple Mail Transfer Protocol
SNMP	Simple Network Management Protocol
SOL	Serial Over LAN
SSD	Solid State Disk
SSH	Secure Shell
SWRAID	Software Redundant Arrays of Independent Drives

T

TCG	Trusted Computing Group
TCM	Trusted Cryptography Module
TCO	Total Cost of Ownership
TDP	Thermal Design Power
TPCM	Trusted Platform Control Module
TPM	Trusted Platform Module

U

UEFI	Unified Extensible Firmware Interface
UID	User Identification
UPI	Ultra Path Interconnect
UPS	Uninterruptible Power Supply
USB	Universal Serial Bus

V

VGA	Video Graphics Array
VLAN	Virtual Local Area Network

X

XDP	eXtend Debug Port