White Paper for KR6880V2 Series Servers

Powered by Intel Processors

For KR6880-X2-A0-R0-00

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Applicable Model

Model	Maintenance	Cooling
KR6880-X2-A0-R0-00	Rear access	Air cooling

Technical Support

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Preface

Abstract

This document describes the KR6880V2 Intel-based server's appearance, features, performance parameters, and software and hardware compatibility, providing in-depth information of this server.

Intended Audience

This document is intended for pre-sales engineers.

Symbol Conventions

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

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

Revision History

Version	Date	Description of Changes
V1.0	2025/04/23	Initial release

Table of Contents

1 Product Overview

The KR6880V2 Intel-based system is designed for customers' key business applications. Featuring excellent computing performance and comprehensive reliability design, it is ideal for application scenarios such as large core transaction databases, SAP HANA, enterprise ERP, and virtual integration of critical applications.

The KR6880V2 Intel-based system is a high-end 8-socket server developed by us based on the 4th Gen Xeon Scalable processors of the Intel Eagle Stream platform. With up to 8 Intel Xeon Scalable processors in a 6U space, it reaches the highest computing density in the industry. Additionally, the server supports 128 DDR5 DIMM slots (for DDR5 RDIMMs/3DS RDIMMs, up to 4,800 MT/s at 1 DPC), providing powerful physical resources for critical applications.

Figure 1-1 Appearance (24 × 2.5-Inch Drive Configuration)

Figure 1-2 Appearance (24 × 2.5-Inch Drive Configuration with an Optional Security Panel)

2 Features

2.1 Scalability and Performance

Technical Feature	Description
4th Gen Intel Xeon Scalable Processors (Sapphire Rapids)	Features processors with up to 60 cores, a max. base frequency of 3.7 GHz, a max. Turbo frequency of 4.2 GHz, up to 112.5 MB L3 cache, and 4 UPI 2.0 links per CPU at up to 16 GT/s, delivering enhanced processing performance. • Supports up to 8 processors with up to 480 cores and 960 threads, maximizing the concurrent execution of multi-threaded applications. • With the processor cache hierarchy optimization, a larger L2 cache of private 1 MB per core is provided, so that memory data can be put and processed directly in L2 cache, improving the memory access performance and reducing the demand on L3 cache capacity, and a single processor can share up to 112.5 MB of L3 cache. • Supports Intel Turbo Boost Technology 2.0 and automatically scales CPU speeds up to the max. Turbo frequency at peak workloads, allowing processor cores to exceed the thermal design power (TDP) for a limited time. • Supports Intel Hyper-Threading Technology, allowing up to 2 threads to run on each core to improve the performance of multi-threaded applications. • Supports Intel Virtualization Technology that provides hardware assistance to the virtualization software, allowing the operating system to better use hardware to handle virtualized workloads. • Supports Intel Advanced Vector Extensions 512 (Intel AVX-512), significantly accelerating the workloads that are strongly floating point compute intensive. • Supports Intel DL Boost (VNNI/INT8) instructions, improving the performance for deep learning applications.
Multiple DIMM Types	Supports up to 128 DDR5 ECC DIMMs (4,800 MT/s, RDIMMs and 3DS RDIMMs), delivering superior speed, high availability, and a memory capacity of up to 32 TB.

Technical Feature	Description
Flexible Drive Configurations	Provides elastic and expandable storage solutions to meet different capacity and upgrade requirements.
Support for All-SSD Configuration	Brings higher I/O performance over all-HDD configuration or HDD-SSD mixing configuration.
24 Gbps Serial Attached SCSI (SAS 4.0)	Doubles the internal storage data transfer rate of 12 Gbps SAS (SAS 3.0) solution, maximizing the performance of storage I/O-intensive applications.
Intel Integrated I/O Technology	The processors integrate the PCIe 5.0 controller to significantly reduce I/O latency and enhance overall system performance.
New CXL Technology	Built on PCIe 5.0, this technology enables resource sharing among different PCIe devices.
PCIe 5.0 Expansion	Supports up to 16 PCIe 5.0 expansion slots (8 FHFL PCIe x16 + 8 FHHL PCIe x16).
OCP I/O Expansion	Supports 4 OCP 3.0 slots that can flexibly support 1/10/25/40/100/200/400 Gb OCP 3.0 cards. (Only single-host OCP 3.0 cards are hot-pluggable.)

2.2 Availability and Serviceability

Technical Feature	Description
Hot-Swap SAS/SATA/NVMe Drives	Supports hot-swap drives; RAID cards support RAID 0/1/1E/10/5/50/6/60 with RAID cache; supports data protection enabled by the super-capacitor in case of power failures.
Reliability	• SSDs are much more reliable than traditional HDDs, increasing system uptime. • The system MTBF is up to 180,000 hours. • Supports SSD/DIMM fault early warning. • Supports dual BIOS/BMC flash, avoiding power-on failure due to firmware corruption. • Provides 4 hot-swap PSUs with 2+2/3+1 redundancy and 8 hot-swap fan modules with N+1 redundancy, improving system reliability; supports dynamic power capping, maximizing power supply security of the system.
Availability	• The LEDs on the front and rear panels, the LCD module, and the BMC Web GUI indicate the status of key components and quickly lead technicians to failed (or

Technical Feature	Description
	failing) components, simplifying maintenance, speeding up troubleshooting, and enhancing system availability. • The BMC management network port on the rear panel enables remote BMC O&M, improving O&M efficiency.
Maintenance Efficiency	• The BMC monitors system parameters in real time and sends alerts in advance, enabling technicians to take appropriate measures in time to ensure stable system operation and minimize system downtime. • Provides offline light path diagnostics for DIMMs, quickly marking the position of each faulty DIMM on the motherboard by the onboard LED, which helps service technicians quickly locate the DIMM to be serviced, and improves maintenance efficiency. • The system load LED displays the system load state and startup process, enabling customers to know the real-time system status. (Amber green = CPU load ranges from 0% to 30%; Blue = CPU load ranges from 31% to 80%; Yellow = CPU load ranges from 81% to 100%) • Provides an optional LCD management module, enabling timely identification of system status and error information.

2.3 Manageability and Security

Technical Feature	Description
Remote Management	The BMC monitors system operating status and enables remote management.
NC-SI Feature	Allows a network port to serve as a management port and a service port. The NC-SI feature is disabled by default and can be enabled/disabled through the BIOS or BMC. Notes: The service port with NC-SI enabled supports: • Being bonded to any network port of the OCP card or of the PCIe NIC that supports NC-SI. • Enablement/Disablement and configuration of Virtual Local Area Network (VLAN), which is disabled by default. • Both IPv6 and IPv4 addresses, of which the IP address, subnet mask, and default gateway can be configured, as well as the prefix length of IPv6 address.

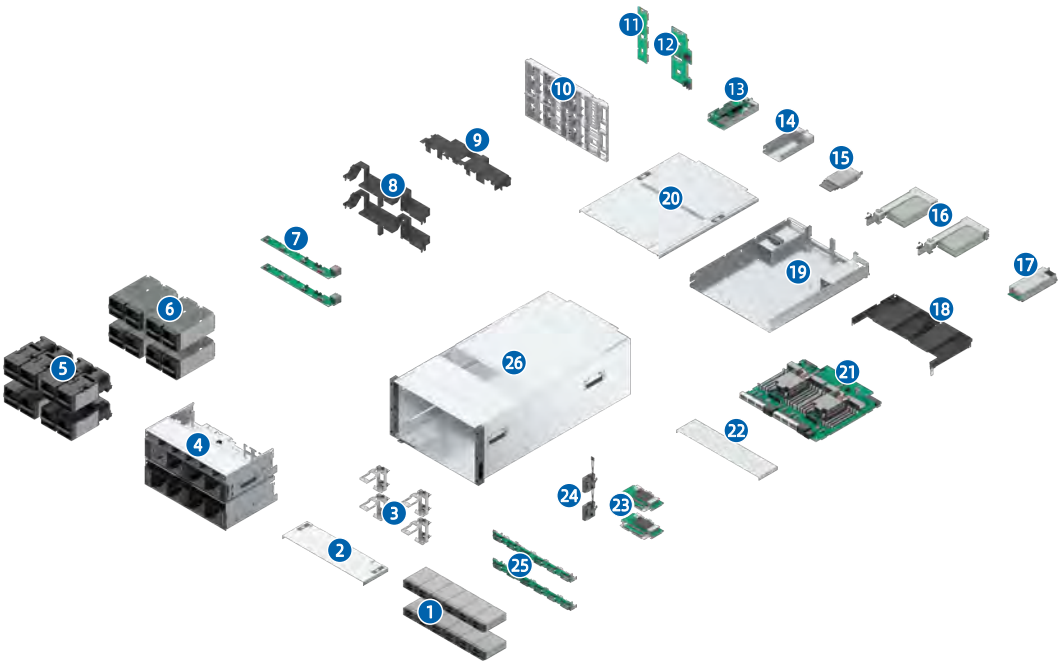
Technical Feature	Description
Intel PFR	Intel Platform Firmware Resilience (PFR) protects firmware from malicious tampering and restores detected corrupted firmware automatically.
Unified Extensible Firmware Interface (UEFI)	The industry-standard UEFI improves the efficiency of setup, configuration and update, and simplifies the error handling process.
TPM & TCM	Trusted Platform Module (TPM) 2.0 and Trusted Cryptography Module (TCM) provide advanced encryption.
Intel Trusted Execution Technology	Intel Trusted Execution Technology provides enhanced security through hardware-based resistance to malicious software attacks.
Firmware Update Mechanism	The firmware update mechanism based on digital signatures prevents unauthorized firmware updates.
UEFI Secure Boot	Protects the system from malicious bootloaders.
Hierarchical Password Protection in BIOS	Ensures system boot and management security.
BIOS Secure Flash and BIOS Lock Enable (BLE)	Reduce attacks from malicious software on the BIOS flash region.
Dual-image Mechanism for BMC and BIOS	Recovers firmware upon detection of corrupted firmware.
BMC Secure Boot	Hardware-based BMC Secure Boot protects BMC from malicious tampering.
BIOS Secure Boot	BIOS Secure Boot based on Trusted Platform Module (TPM) protects BIOS from malicious tampering.
BMC Access Control Policies	Flexible BMC access control policies, double factor authentication, and single sign-on improve BMC management security.
Intel SGX Technology	Intel Software Guard Extensions (SGX) technology allows applications to run in their own isolated space, helping prevent malicious theft and modification of critical codes and data.
Data Secure Erase Function	The optional KSManage Server Provisioning can securely wipe server storage data, operation logs, firmware configuration information, etc.

2.4 Energy Efficiency

Technical Feature	Description
80 Plus Platinum/Titanium PSUs	Equipped with 80 Plus Platinum/Titanium PSUs of different power efficiency levels, with a power efficiency of up to 96% at a load of 50%.
2+2/3+1 Redundant PSUs	Support AC/DC power input with improved power conversion efficiency.
VRD Solution	Features the high-efficiency single-board voltage regulator-down (VRD) solution, reducing DC-DC conversion loss.
PID Intelligent Fan Speed Control and CPU Frequency Scaling	Supports Proportional-Integral-Derivative (PID) intelligent fan speed control and intelligent CPU frequency scaling, conserving energy.
System Cooling Design	Offers a fully-optimized system cooling design with energy-efficient cooling fans, lowering energy consumption from system cooling.
Power Capping and Power Control	Provides power capping and power control measures.
Staggered Spin-up of Drives	Supports staggered spin-up of drives, reducing power consumption during server startup.
Intel Intelligent Power Capability	Supports Intel Intelligent Power Capability (IIPC) to optimize energy usage in the processor cores by turning computing functions on only when needed.
Less Energy Consumption per Core	The 4th Gen Intel Xeon Scalable processors (Sapphire Rapids) consume less energy per core, improving energy efficiency and reducing operation cost per unit.

3 System Parts Breakdown

Figure 3-1 Exploded View (24 × 2.5-Inch Drive Configuration)



Item	Feature	Item	Feature
1	Drive	14	ICM Tray
2	Rear Top Cover of the Front Module	15	OCP 3.0 Card
3	Drive Blind-Mate Connector Bracket	16	PCIe Riser Module
4	Front Module	17	CRPS PSU
5	Fan	18	Node Air Duct
6	Fan Cage	19	Node Chassis
7	Fan Board	20	Node Top Cover
8	Flow-Equalization Air Duct	21	Node Motherboard
9	Anti-Backflow Air Duct	22	Middle Top Cover of the Server Chassis
10	Midplane Retention Bracket	23	Storage Controller Card
11	Left Midplane	24	Super-Capacitor
12	Right Midplane	25	Drive Backplane
13	ICM	26	Server Chassis

4 System Logical Diagram

Figure 4-1 System Logical Diagram

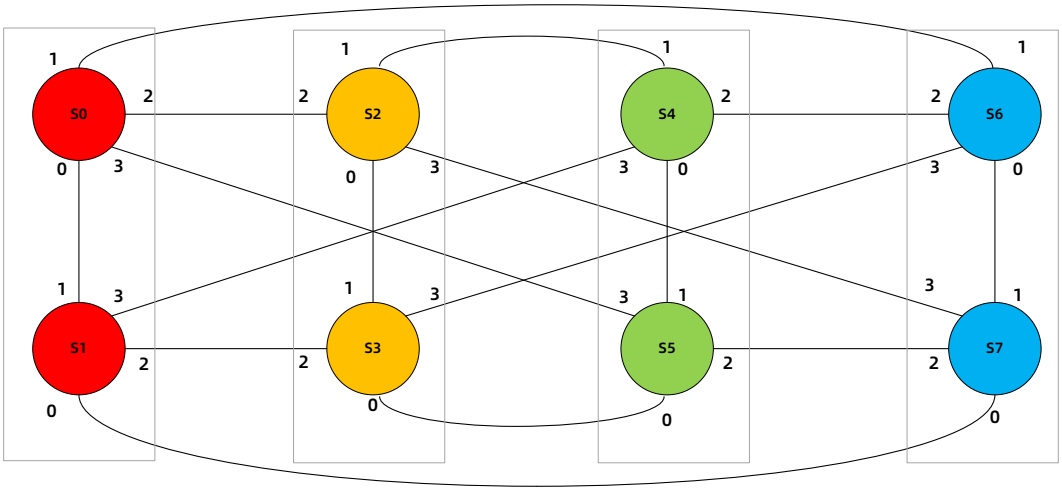
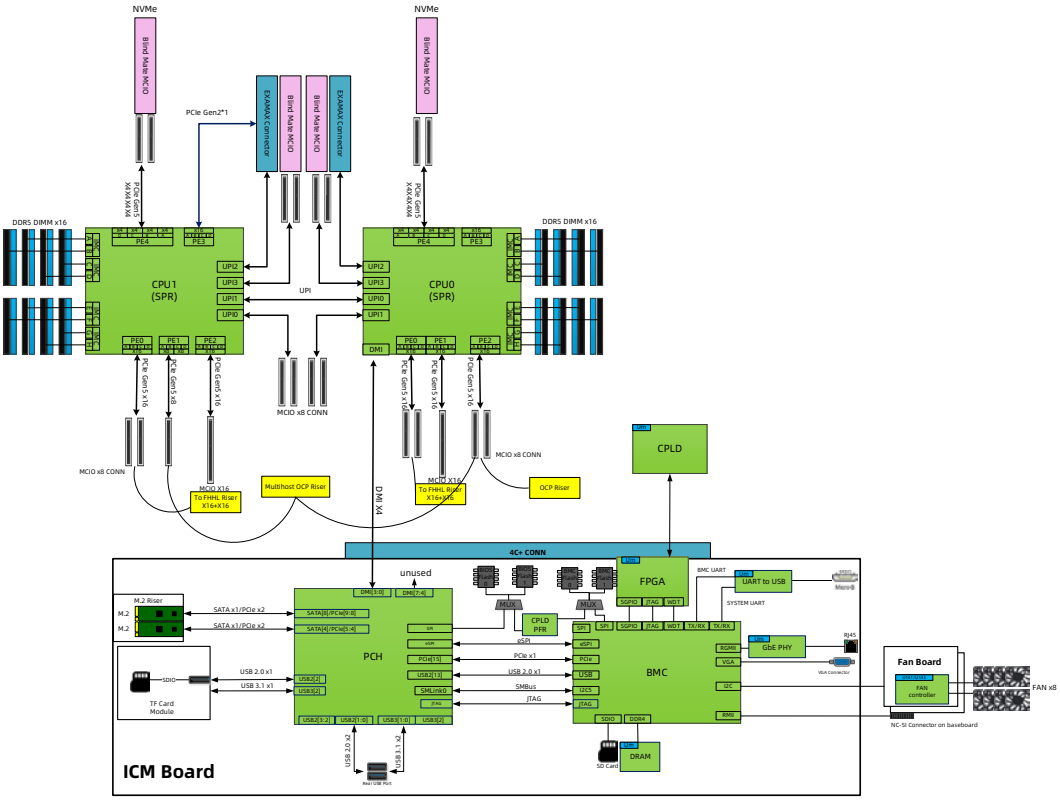


Figure 4-2 8-Socket System Topology (Node 0)



- Up to eight 4th Gen Intel Xeon Scalable processors (Sapphire Rapids).
- Up to 128 DDR5 DIMMs.
- 4 UPI links per CPU at up to 16 GT/s per link.
- Up to 16 PCIe 5.0 expansion slots and 4 OCP 3.0 slots. The motherboard of each node supports 1 single-host or multi-host OCP 3.0 card.
- The RAID card is connected to the CPU via the PCIe bus, and is connected to the drive backplane via the SAS signal cable. One or two drive backplanes and up to 24 SAS/SATA drives are supported. When the server is configured with Broadcom 95xx tri-mode storage adapters and 12 × 2.5-inch x1 NVMe drive backplanes, up to 24 NVMe drives are supported.
- Up to 24 front NVMe drives directly connected to the CPU.
- Each of the upper and lower front modules has a 12-drive backplane, which supports the mixing of SAS/SATA/NVMe drives.
- The ICM board integrates the Emmitsburg (EBG) Platform Controller Hub (PCH) to support 2 USB 3.0 ports, 2 SATA/PCIe M.2 connectors, and up to 3 TF cards (up to 2 supported by the PCH, and 1 supported by the BMC chip).
- The ICM board integrates a BMC management chip and supports a VGA port, a BMC management network port, a serial port, TF card slots, and other connectors.

5 Hardware Description

NOTE

The figures are for reference only. The actual configuration may differ.

5.1 Front Panel

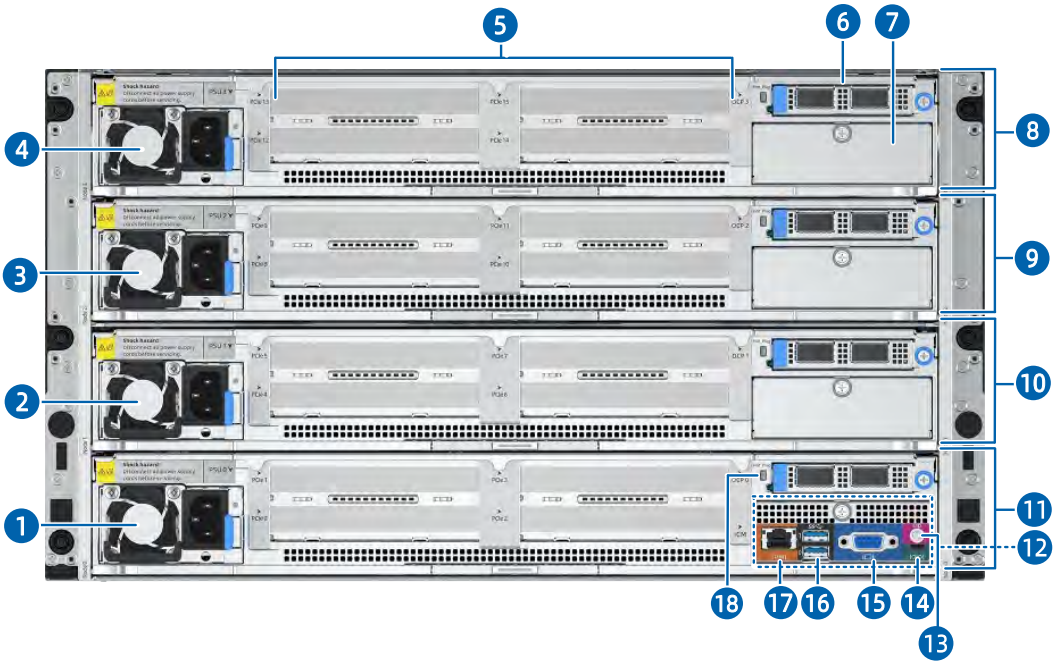
Figure 5-1 Front View (24 × 2.5-Inch Drive Configuration)

Item	Feature
1	Captive Screw (securing the server to the rack)
2	UID/BMC RST Button and LED
3	LEDs
4	Power Button and LED
5	System Load LED
6	Fan Module
7	2.5-Inch Drive Bay
8	VGA Port
9	USB 3.0 Port
10	USB 2.0/LCD Port
11	Serial Label Pull Tag (with an SN label and drive numbers)

5.2 Rear Panel

5.2.1 16 × PCIe Slot Configuration

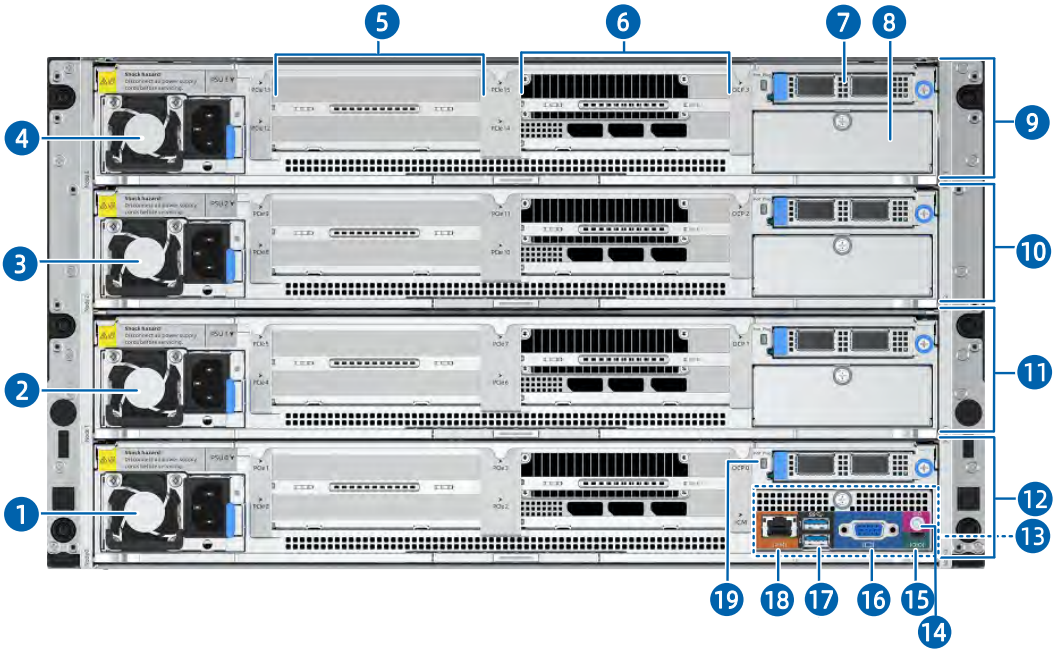
Figure 5-2 Rear View



Item	Feature	Item	Feature
1	PSU0	10	Node 1
2	PSU1	11	Node 0
3	PSU2	12	ICM
4	PSU3	13	UID/BMC RST Button and LED
5	PCIe Slot (PCIe 0 to PCIe 15)	14	System/BMC Serial Port
6	OCP 3.0 Card Note: The OCP 3.0 slots support single-host or multi-host OCP 3.0 cards. Only single-host OCP 3.0 cards are hot-pluggable.	15	VGA Port
7	Blank Filler Panel	16	USB 3.0 Port
8	Node 3	17	BMC Management Network Port
9	Node 2	18	OCP 3.0 Card Hot-Plug Button and Power LED

5.2.2 8 × PCIe Slot + 4 × GPU Slot Configuration

Figure 5-3 Rear View



Item	Feature	Item	Feature
1	PSU0	11	Node 1
2	PSU1	12	Node 0
3	PSU2	13	ICM
4	PSU3	14	UID/BMC RST Button and LED
5	PCIe Slot (PCIe 0/1/4/5/8/9/12/13)	15	System/BMC Serial Port
6	GPU Slot (PCIe 3/7/11/15)	16	VGA Port
7	OCP 3.0 Card Note: The OCP 3.0 slots support single-host or multi-host OCP 3.0 cards. Only single-host OCP 3.0 cards are hot-pluggable.	17	USB 3.0 Port
8	Blank Filler Panel	18	BMC Management Network Port
9	Node 3	19	OCP 3.0 Card Hot-Plug Button and Power LED
10	Node 2	-	-

5.3 LEDs and Buttons

Table 5-1 Front/Rear Panel LED and Button Description

Icon	Feature	Description
	System Load LED	• Off = Standby state • Amber green = CPU load ranges from 0% to 30% • Blue = CPU load ranges from 31% to 80% • Yellow = CPU load ranges from 81% to 100%
	Power Button and LED	• Power LED: - Off = No power - Solid green = Power-on state - Solid orange = Standby state • Power button: - Press and release the button to power on the system from the standby state. - Press and hold the button for 6 seconds to force a shutdown from the power-on state.
	UID/BMC RST Button and LED	• Solid blue = The UID LED is activated by the UID button or via the BMC • Gradually turning blue within 2 seconds and then gradually turning off within 2 seconds = PFR authentication in progress (Note: The server can be powered on only after this LED turns off.) • Press and hold the button for 6 seconds to force a BMC reset.
	Memory Status LED	• Off = Normal • Solid red = A failure occurs • Blinking red = A warning occurs
	System Status LED	• Off = Normal • Solid red = A failure occurs • Blinking red = A warning occurs

Icon	Feature	Description
	Power Status LED	• Off = Normal • Solid red = A power failure occurs • Blinking red = Power state is abnormal
	System Overheat LED	• Off = Normal • Solid red = CPU/Memory is overheating
	Fan Status LED	• Off = Normal • Solid red = Fan speed cannot be read • Blinking red = Speed read by BMC is abnormal
	Network Status LED	• Blinking green = Network connected with data being transmitted. • Solid green = Network connected without data being transmitted. • Off = No network connection Note: It only indicates the working status of the self-developed OCP card.
-	OCP 3.0 Card Hot-Plug Button and Power LED	It is used for hot-plugging the OCP 3.0 card: • When the server is running properly, to remove the OCP 3.0 card, press the button, and remove the OCP 3.0 card after the LED turns off, indicating that the card is powered off. • After reinstalling the OCP 3.0 card, press the button to power on the card. If the LED is solid green, the OCP 3.0 card works properly.

5.4 Port Description

Table 5-2 Port Description

Feature	Type	Quantity	Description
VGA Port	DB15	2	Enables you to connect a display terminal, for example, a monitor or KVM, to the system.

Feature	Type	Quantity	Description
USB 3.0 Port	USB 3.0	3	Enables you to connect a USB 3.0/2.0 device to the system.
USB 2.0/LCD Port	USB 2.0	1	• Enables you to connect a USB 2.0 device to the system. • Enables you to connect a self-developed LCD module to the system.
PSU Socket	-	4	Connected through a power cord. You can select the PSUs as needed. Note: Make sure that the total rated power of the PSUs is greater than that of the server.
System/BMC Serial Port	Micro USB	1	• Enables you to debug and monitor the system. • Enables you to debug and monitor the BMC.
BMC Management Network Port	RJ45	1	Enables you to manage the server. Note: It is a GbE port of 100/1,000 Mbps auto-negotiation.

5.5 Processors

- Supports four or eight 4th Gen Intel Xeon Scalable processors. The 4-layer motherboards accommodate CPU0/1, CPU2/3, CPU4/5, and CPU6/7 respectively, from the bottom up.
- If 4 processors are configured, install them in CPU0, CPU1, CPU2, and CPU3 sockets.
- The processors used in a server must be the same model.

For specific processor options, consult your local sales representative or refer to 7.2 Hardware Compatibility.

Figure 5-4 Processor Locations (Node 0)

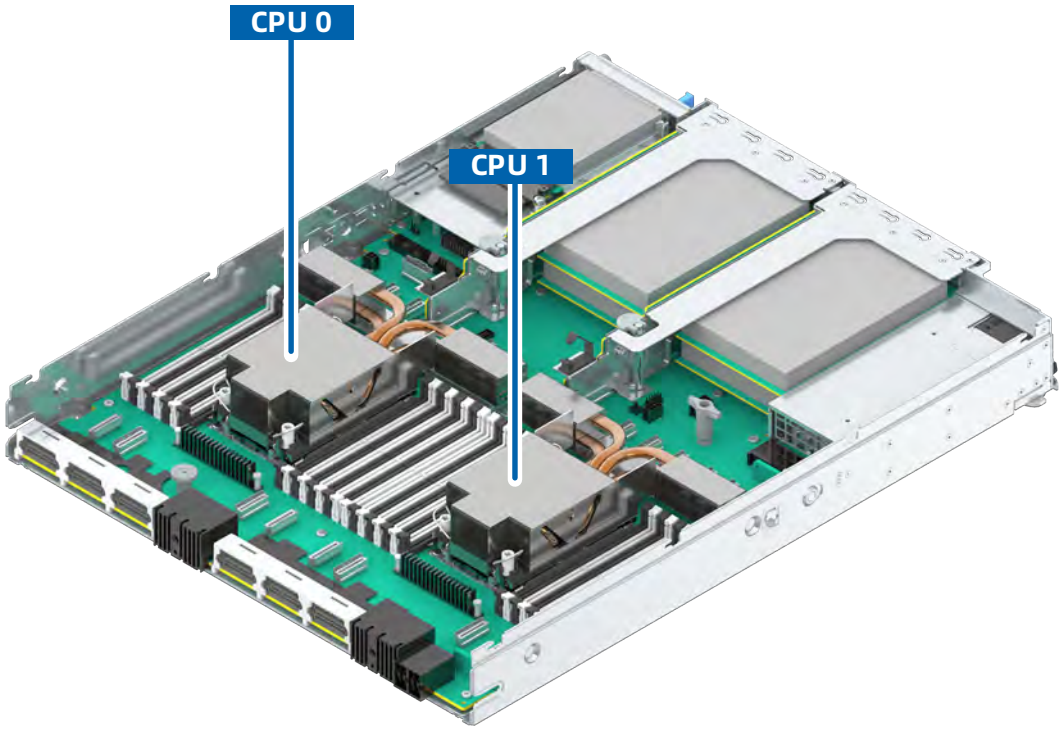


Table 5-3 Processor Locations of Each Node (Octa-CPU Configuration)

Node	Left CPU (Facing the Rear Panel)	Right CPU (Facing the Rear Panel)
Node 0	CPU1	CPU0
Node 1	CPU3	CPU2
Node 2	CPU5	CPU4
Node 3	CPU7	CPU6

Table 5-4 Processor Locations of Each Node (Quad-CPU Configuration)

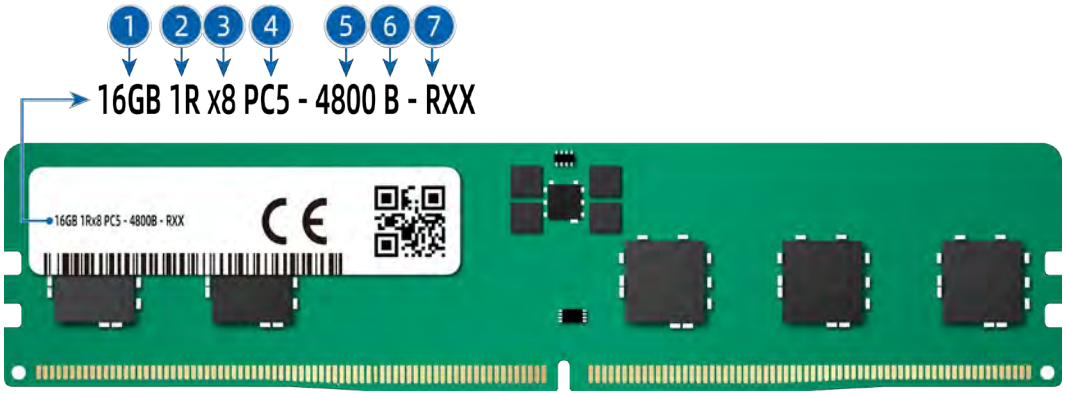
Node	Left CPU (Facing the Rear Panel)	Right CPU (Facing the Rear Panel)
Node 0	CPU1	CPU0
Node 1	CPU3	CPU2
Node 2	-	-
Node 3	-	-

5.6 DDR5 DIMMs

5.6.1 Identification

To determine DIMM characteristics, refer to the label attached to the DIMM and the following figure and table.

Figure 5-5 DIMM Identification



Item	Description	Example
1	Capacity	• 16 GB • 32 GB • 64 GB • 96 GB • 128 GB
2	Rank(s)	• 1R = Single rank • 2R = Dual rank • 2S2R = Two ranks of two high stacked 3DS DRAM
3	Data width of DRAM	• x4 = 4 bits • x8 = 8 bits
4	DIMM slot type	PC5 = DDR5
5	Maximum memory speed	4,800 MT/s
6	CAS latency	• SDP 4800B = 40-39-39 • 3DS 4800B = 46-39-39
7	DIMM type	R = RDIMM

5.6.2 Memory Subsystem Architecture

The server supports 128 DIMM slots, and a single motherboard supports 8 memory channels per CPU.

Table 5-5 DIMM Slot List (Node 0)

CPU	Channel ID	Silk Screen
CPU0	Channel 0	CPU0_C0D0
		CPU0_C0D1
	Channel 1	CPU0_C1D0
		CPU0_C1D1
	Channel 2	CPU0_C2D0
		CPU0_C2D1
	Channel 3	CPU0_C3D0
		CPU0_C3D1
	Channel 4	CPU0_C4D0
		CPU0_C4D1
	Channel 5	CPU0_C5D0
		CPU0_C5D1
	Channel 6	CPU0_C6D0
		CPU0_C6D1
	Channel 7	CPU0_C7D0
		CPU0_C7D1
CPU1	Channel 0	CPU1_C0D0
		CPU1_C0D1
	Channel 1	CPU1_C1D0
		CPU1_C1D1
	Channel 2	CPU1_C2D0
		CPU1_C2D1
	Channel 3	CPU1_C3D0
		CPU1_C3D1
	Channel 4	CPU1_C4D0
		CPU1_C4D1
	Channel 5	CPU1_C5D0
		CPU1_C5D1

CPU	Channel ID	Silk Screen
	Channel 6	CPU1_C6D0
		CPU1_C6D1
	Channel 7	CPU1_C7D0
		CPU1_C7D1

5.6.3 Compatibility

Refer to the following rules to configure the DDR5 DIMMs.

IMPORTANT

- A server must use DDR5 DIMMs with the same part number (P/N code). All DDR5 DIMMs operate at the same speed, which is the lowest of:
  - Memory speed supported by a specific CPU.
  - Maximum operating speed of a specific memory configuration.
- Mixing DDR5 DIMMs of different types (RDIMM, 3DS RDIMM) or specifications (capacity, bit width, rank, height, etc.) is not supported.
- For specific memory options, consult your local sales representative or refer to 7.2 Hardware Compatibility.

NOTE

Maximum number of DIMMs supported per channel ≤ Maximum number of ranks supported per channel/Number of ranks per DIMM.

- DDR5 DIMMs can be used with the 4th Gen Intel Xeon Scalable processors (Sapphire Rapids). A single CPU supports a memory capacity of up to 4 TB and 8 CPUs support a total memory capacity of up to 32 TB.
- The maximum number of DIMMs supported varies with the CPU type, DIMM type and rank quantity.
- For 96 GB DDR5 DIMMs, the quantity supported by a single node can only be 16 or 32, and they should be installed according to the population rules in Table 5-7.

Table 5-6 DDR5 DIMM Specifications

Item	Value				
Capacity per DDR5 DIMM (GB)	16	32	64	96	128

Item		Value				
Type		RDIMM	RDIMM	RDIMM	RDIMM	3DS RDIMM
Rated speed (MT/s)		4,800	4,800	4,800	4,800	4,800
Operating voltage (V)		1.1	1.1	1.1	1.1	1.1
Maximum number of DDR5 DIMMs supported in a server[a]		128	128	128	128	128
Maximum capacity of DDR5 DIMMs supported in a server (GB)[b]		2,048	4,096	8,192	12,288	16,384
Actual speed (MT/s)	1 DPC[c,d]	4,800	4,800	4,800	4,800	4,800
	2 DPC[c,d]	4,400	4,400	4,400	4,400	4,400

a. The maximum number of DDR5 DIMMs supported is based on the octa-CPU configuration. The number is halved for the quad-CPU configuration.

b. It indicates the maximum memory capacity supported when all the DIMM slots are populated with DDR5 DIMMs. The maximum DDR5 capacity varies with the CPU type.

c. DPC (DIMM per channel) is the number of DIMMs per memory channel.

d. When configured with Sapphire Rapids processors, the maximum speed of DDR5 DIMMs is 4,800 MT/s at 1 DPC or 4,400 MT/s at 2 DPC.

The above information is for reference only. Consult your local sales representative for details.

5.6.4 DIMM Population Rules

General population rules for DDR5 DIMMs:

- Install DIMMs only when the corresponding processor is installed.
- Mixing RDIMMs and 3DS RDIMMs is not allowed.
- Install dummies in the empty DIMM slots.

Population rules for DDR5 DIMMs in memory mirroring mode:

- Follow the general population rules.
- Each processor supports 4 integrated memory controllers (iMCs). Each iMC has 2 channels to be populated with DIMMs. Installed DIMMs must be of the same capacity and organization.

- In a multi-processor configuration, each processor must have a valid memory mirroring configuration.

5.6.5 DIMM Slot Layout

Up to 128 DDR5 DIMMs can be installed in a server, and a balanced DIMM configuration is recommended for optimal memory performance. DIMM configuration must be compliant with the DIMM population rules.

IMPORTANT

At least 1 DDR5 DIMM must be installed for each CPU.

Figure 5-6 DIMM Slot Layout (Node 0)

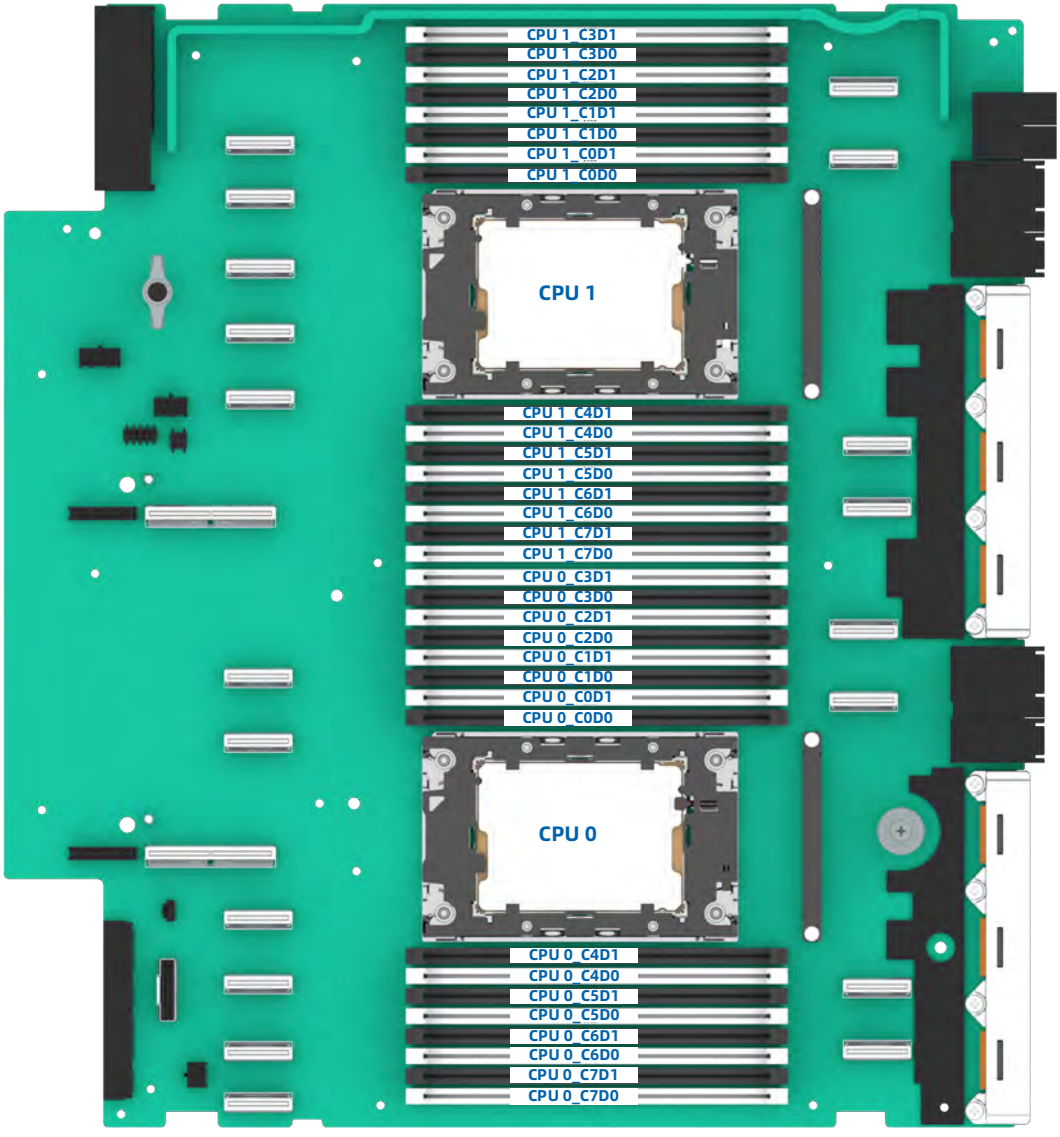


Table 5-7 DDR5 DIMM Population Rules (Dual-CPU Configuration of Node 0)

DIMM Slot 2 DPC		CPU0																CPU1															
		C0D0	C0D1	C1D0	C1D1	C2D0	C2D1	C3D0	C3D1	C4D0	C4D1	C5D0	C5D1	C6D0	C6D1	C7D0	C7D1	C0D0	C0D1	C1D0	C1D1	C2D0	C2D1	C3D0	C3D1	C4D0	C4D1	C5D0	C5D1	C6D0	C6D1	C7D0	C7D1
DIMM Qty.	2	●																●															
	4	●												●				●												●			
	8	●				●				●				●				●				●				●				●			
	12	●				●		●		●		●		●				●				●		●		●		●		●			
	16	●		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●	
	24	●	●	●		●	●	●		●	●	●		●	●	●		●	●	●		●	●	●		●	●	●		●	●	●	
	32	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Note: For 96 GB DDR5 DIMMs, the quantity supported by a single node can only be 16 or 32.

5.7 Storage

CAUTION

Please avoid mixing storage controllers, as doing so may cause drive letter drift under the system.

5.7.1 Drive Configurations

NOTE

For the physical drive No. of each configuration, refer to 5.7.2 Drive Numbering.

Table 5-8 Drive Configurations

Configuration	Front Drives	Internal Drives	Drive Management Mode
12 × 2.5-Inch Drive Configuration	12 × 2.5-inch drive: Drive bays with physical drive No. 0 to 11 support SAS/SATA drives	2 × SATA/NVMe M.2 SSD: supported by the M.2 adapter (installed on ICM)	SAS/SATA drive: 1 × PCIe RAID card (8i or 16i)
24 × 2.5-Inch Drive Configuration	24 × 2.5-inch drive: Drive bays with physical drive No. 0 to 23 support SAS/SATA drives	2 × SATA/NVMe M.2 SSD: supported by the M.2 adapter (installed on ICM)	SAS/SATA drive: • 2 × PCIe RAID card (16i + 16i)

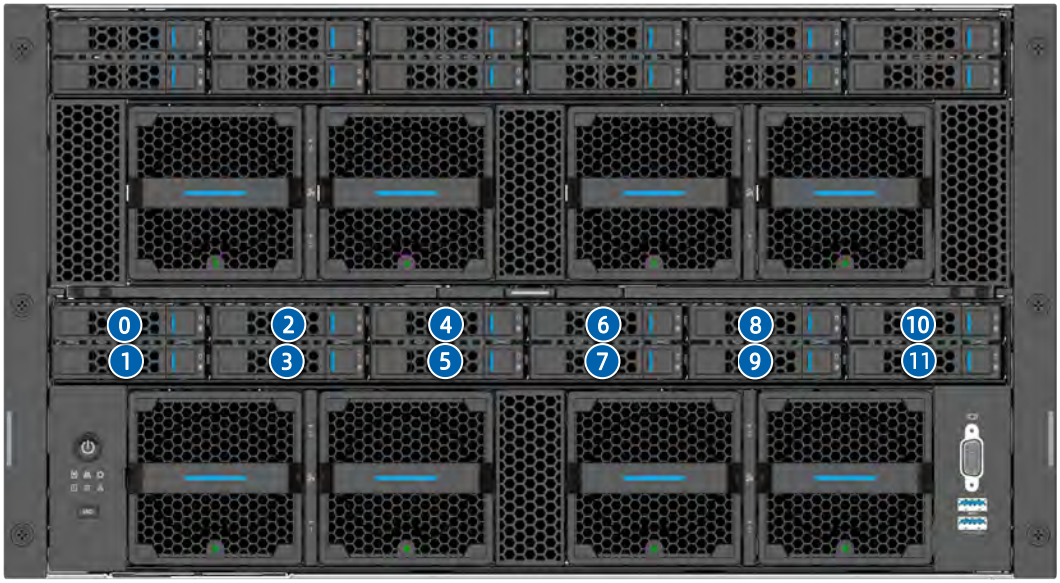
Configuration	Front Drives	Internal Drives	Drive Management Mode
			• 1 × PCIe RAID card (24i)
24 × 2.5-Inch Drive Configuration	24 × 2.5-inch drive: Drive bays with physical drive No. 0 to 23 support NVMe drives	2 × SATA/NVMe M.2 SSD: supported by the M.2 adapter (installed on ICM)	NVMe drive: CPU
8 × 2.5-Inch Drive Configuration	8 × 2.5-inch drive: Drive bays with physical drive No. 0 to 3 and drive bays with physical drive No. 12 to 15 support NVMe drives	2 × SATA/NVMe M.2 SSD: supported by the M.2 adapter (installed on ICM)	NVMe drive: 2 × tri-mode storage adapter (16i + 16i)
24 × 2.5-Inch Drive Configuration	24 × 2.5-inch drive: Drive bays with physical drive No. 0 to 23 support NVMe drives	2 × SATA/NVMe M.2 SSD: supported by the M.2 adapter (installed on ICM)	NVMe drive: 2 × Broadcom 95xx tri-mode storage adapter (8i + 8i or 16i + 16i)

Note: A Marvell 9230 PCIe expansion card (with M.2 SSDs installed) can be selected.

5.7.2 Drive Numbering

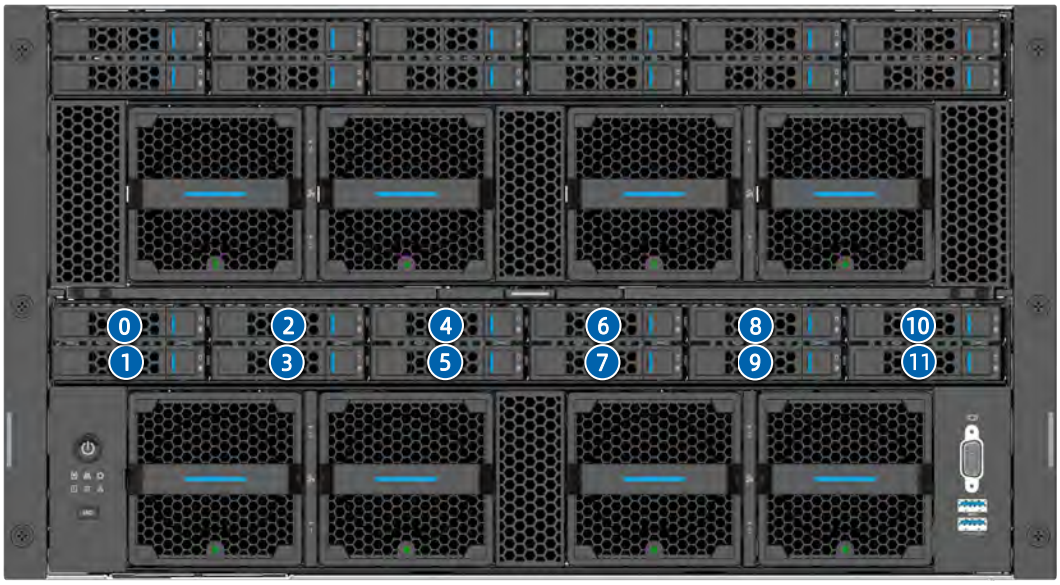
1. 12 × 2.5-Inch SAS/SATA Drive Configuration

Figure 5-7 Drive Numbering (with an 8i RAID Card)



Physical Drive No.	Drive No. Identified by the BMC	Drive No. Identified by the 8i RAID Card
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	-	-
9	-	-
10	-	-
11	-	-

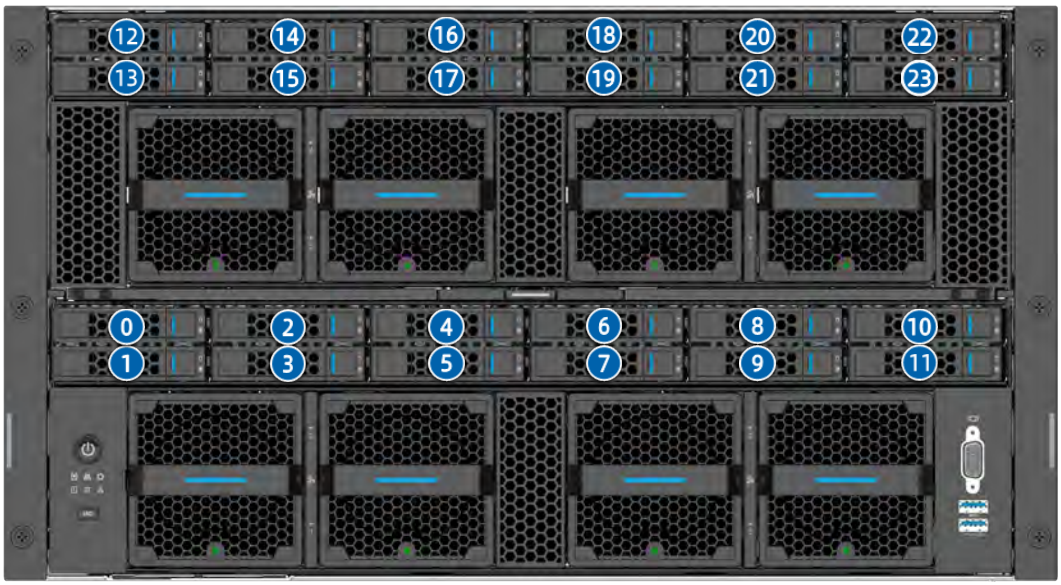
Figure 5-8 Drive Numbering (with a 16i RAID Card)



Physical Drive No.	Drive No. Identified by the BMC	Drive No. Identified by the 16i RAID Card
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
11	11	11

2. 24 × 2.5-Inch SAS/SATA Drive Configuration

Figure 5-9 Drive Numbering

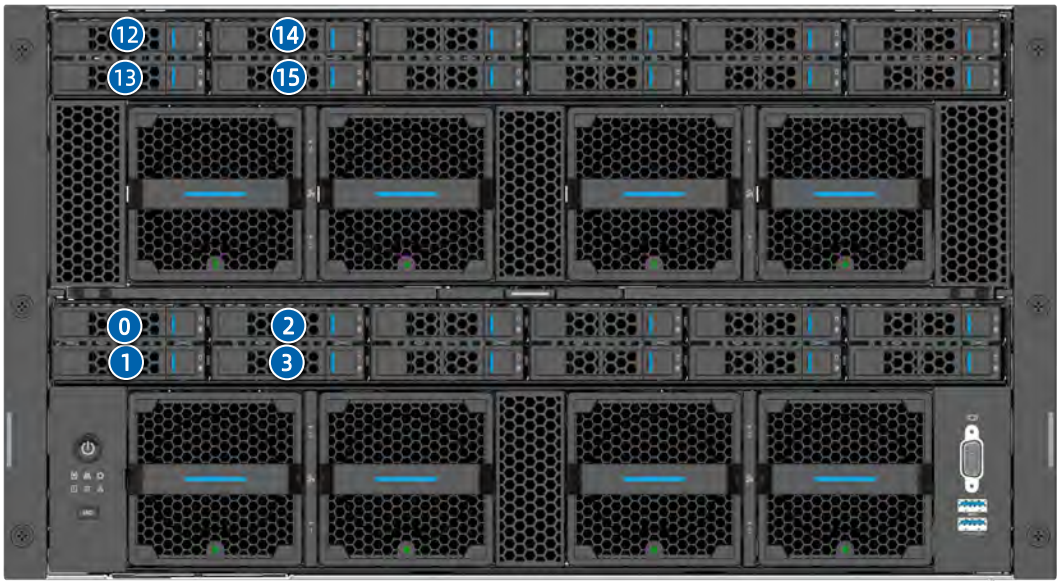


Physical Drive No.	Drive No. Identified by the BMC	Drive No. Identified by two 16i RAID Cards	Drive No. Identified by the 24i RAID Card
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
10	10	10	10
11	11	11	11
12	12	0	12
13	13	1	13
14	14	2	14
15	15	3	15
16	16	4	16

Physical Drive No.	Drive No. Identified by the BMC	Drive No. Identified by two 16i RAID Cards	Drive No. Identified by the 24i RAID Card
17	17	5	17
18	18	6	18
19	19	7	19
20	20	8	20
21	21	9	21
22	22	10	22
23	23	11	23

3. 8 × 2.5-Inch NVMe Drive Configuration

Figure 5-10 Drive Numbering

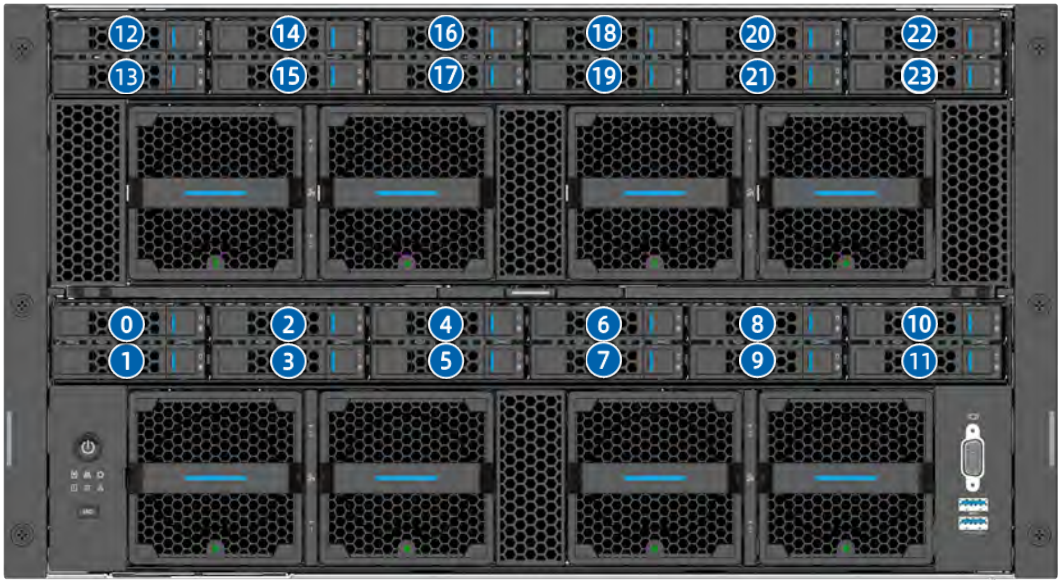


Physical Drive No.	Drive No. Identified by the BMC	Drive No. Identified by Two 16i Tri-Mode Storage Adapters
0	0	0
1	1	1
2	2	2
3	3	3
12	12	0
13	13	1
14	14	2

Physical Drive No.	Drive No. Identified by the BMC	Drive No. Identified by Two 16i Tri-Mode Storage Adapters
15	15	3

4. 24 × 2.5-Inch NVMe Drive Configuration

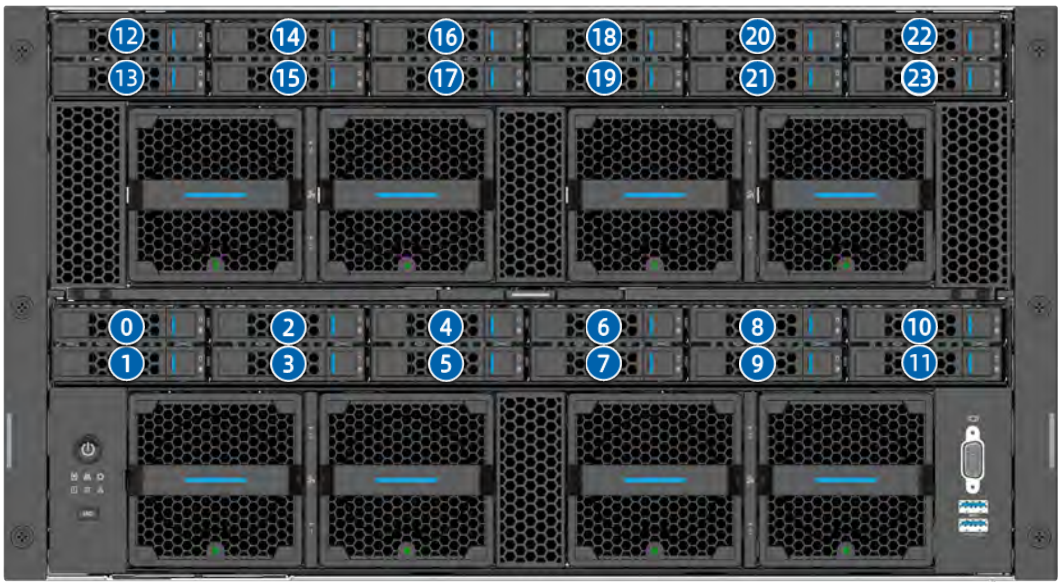
Figure 5-11 Drive Numbering (with Two Broadcom 95xx 8i Tri-Mode Storage Adapters)



Physical Drive No.	Drive No. Identified by the BMC	Drive No. Identified by Two Broadcom 95xx 8i Tri-Mode Storage Adapters
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	-	-
9	-	-
10	-	-

Physical Drive No.	Drive No. Identified by the BMC	Drive No. Identified by Two Broadcom 95xx 8i Tri-Mode Storage Adapters
11	-	-
12	12	0
13	13	1
14	14	2
15	15	3
16	16	4
17	17	5
18	18	6
19	19	7
20	-	-
21	-	-
22	-	-
23	-	-

Figure 5-12 Drive Numbering (with Two Broadcom 95xx 16i Tri-Mode Storage Adapters)



Physical Drive No.	Drive No. Identified by the BMC	Drive No. Identified by Two Broadcom 95xx 16i Tri-Mode Storage Adapters
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
11	11	11
12	12	0
13	13	1
14	14	2
15	15	3
16	16	4
17	17	5
18	18	6
19	19	7
20	20	8
21	21	9
22	22	10
23	23	11

5.7.3 Drive LEDs

1. SAS/SATA Drive LEDs

Figure 5-13 SAS/SATA Drive LEDs

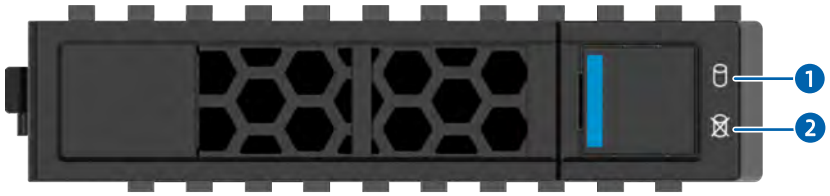
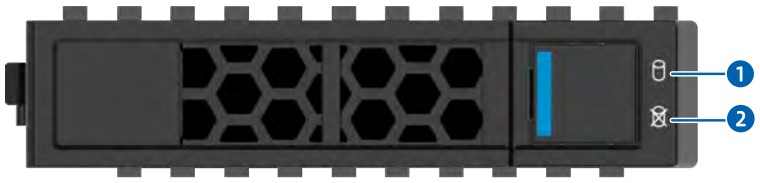


Table 5-9 SAS/SATA Drive LED Description

Activity LED (①)	Locator/Error LED (②)			Description
Green	Blue	Red		
Off	Off	RAID created	RAID not created	Drive absent
		Solid on	Off	
Solid on	Off	Off		Drive present but not in use
Blinking	Off	Off		Drive present and in use
Blinking	Solid pink			Copyback/Rebuild in progress
Solid on	Solid on	Off		Drive selected but not in use
Blinking	Solid on	Off		Drive selected and in use
Off	Solid on	Off		Drive is selected but fails
Any status	Off	Solid on		Drive fails

2. NVMe Drive LEDs

Figure 5-14 NVMe Drive LEDs



When the VROC and VMD functions are enabled, and the latest VMD driver and

RAID key are installed, the NVMe drives support RAID (The RAID key should be purchased separately).

Table 5-10 NVMe Drive LED Description

Activity LED (①)	Locator/Error LED (②)		Description
Green	Blue	Red	
Off	Off	Off	Drive absent
Solid on	Off	Off	Drive present but not in use
Blinking	Off	Off	Drive present and in use
Blinking	Solid pink		Copyback/Rebuild/Initializing /Verifying in progress
Solid on	Solid on	Off	Drive selected but not in use
Blinking	Solid on	Off	Drive selected and in use
Off	Solid on	Off	Drive is selected but fails
Any status	Off	Solid on	Drive fails

5.7.4 RAID Cards

The RAID card provides functions such as RAID configuration, RAID level migration, and drive roaming. For specific RAID card options, consult your local sales representative or refer to 7.2 Hardware Compatibility.

5.8 Network

NICs provide network expansion capabilities.

- The OCP slots support single-host or multi-host OCP 3.0 cards. Users can select the OCP 3.0 cards as needed.
- The PCIe expansion slots support PCIe NICs. Users can select the PCIe expansion cards as needed.
- For specific NIC options, consult your local sales representative or refer to 7.2 Hardware Compatibility.

5.9 I/O Expansion

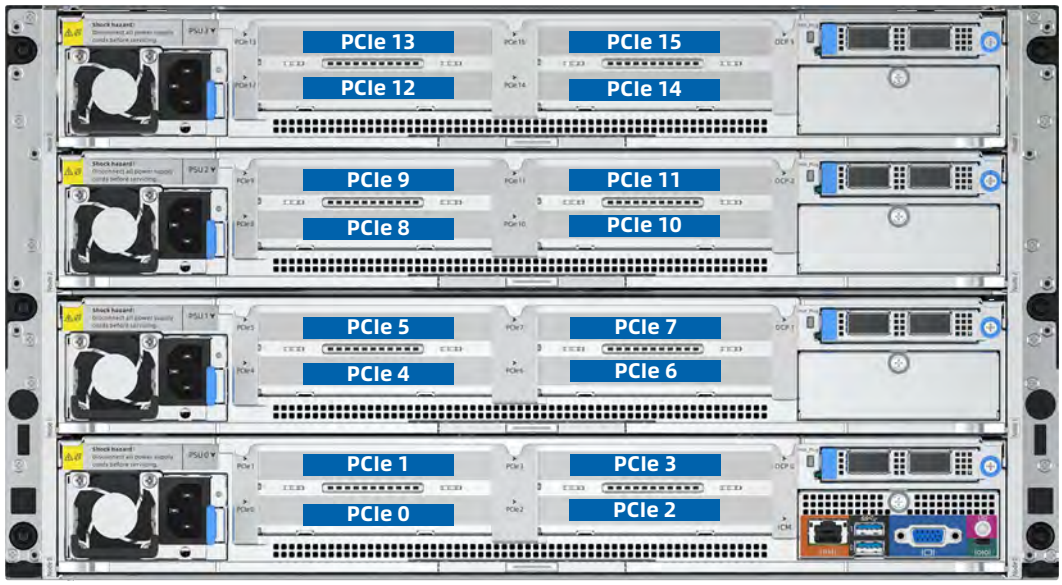
5.9.1 PCIe Expansion Cards

PCIe expansion cards provide system expansion capabilities.

- The server supports up to 16 PCIe 5.0 expansion slots and 4 dedicated slots for OCP 3.0 cards (single-host or multi-host OCP 3.0 cards).
- For specific PCIe expansion card options, consult your local sales representative or refer to 7.2 Hardware Compatibility.
- Limited by the Intel Eagle Stream platform, the specific installation position of a PCIe expansion card varies with its type. Consult your local sales representative.

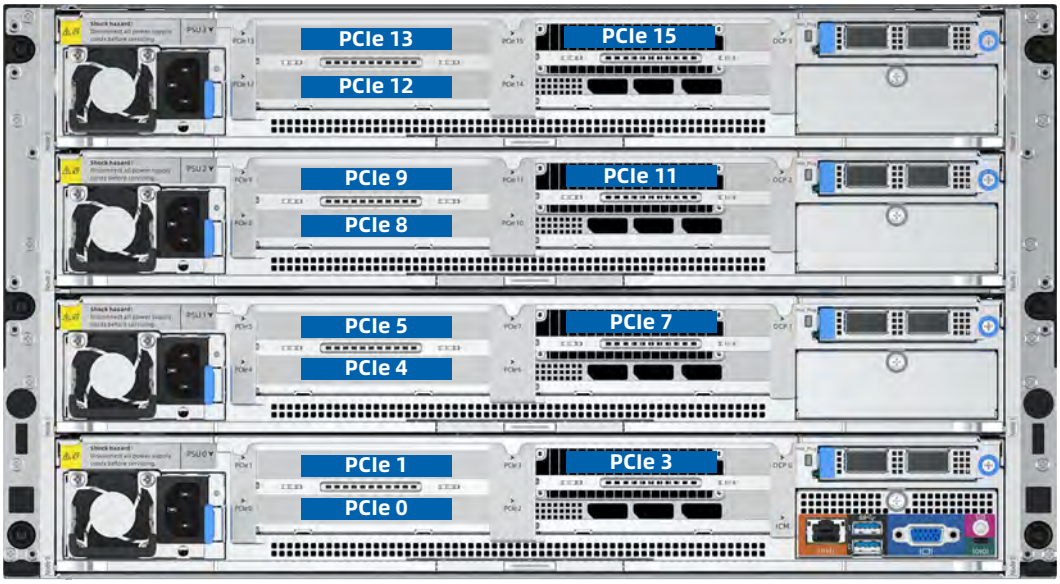
5.9.2 PCIe Slot Locations

Figure 5-15 16 × PCIe Slot Configuration



The PCIe riser modules (2 × PCIe x8 slot or 2 × PCIe x16 slot) can be installed in either set of PCIe slots.

Figure 5-16 8 × PCIe Slot + 4 × GPU Configuration



PCIe riser modules (2 × PCIe x8 slot or 2 × PCIe x16 slot) can be installed in PCIe slots 0/1/4/5/8/9/12/13. GPU riser modules (1 × PCIe x16 slot) can be installed in PCIe slots 3/7/11/15, which are dedicated slots for GPUs.

5.9.3 PCIe Riser Modules

- PCIe riser module (2 × PCIe x8 slot or 2 × PCIe x16 slot)
  - Standard PCIe x8 cards are used with PCIe x8 riser modules.
  - Standard PCIe x16 cards are used with PCIe x16 riser modules.

Figure 5-17 PCIe Riser Module (2 × PCIe x8 Slot)

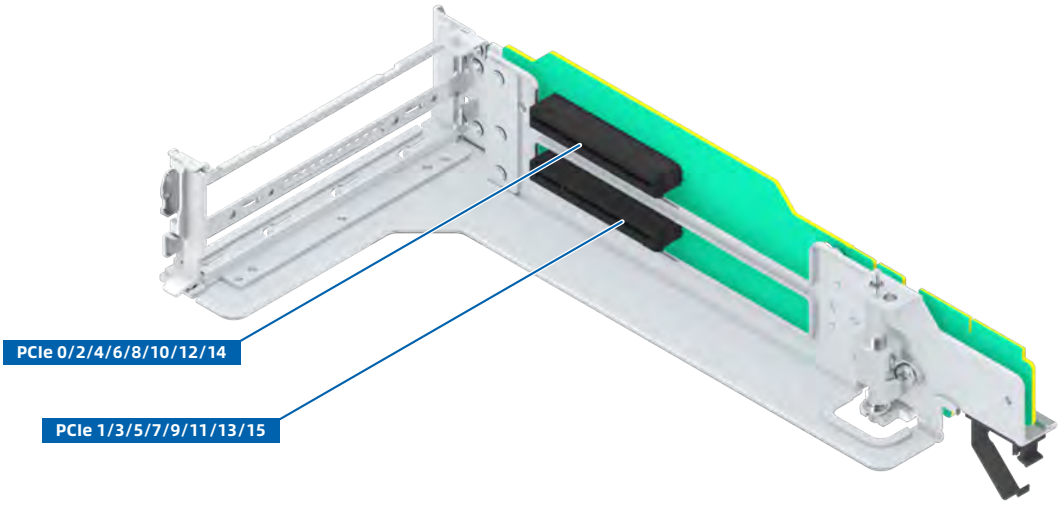
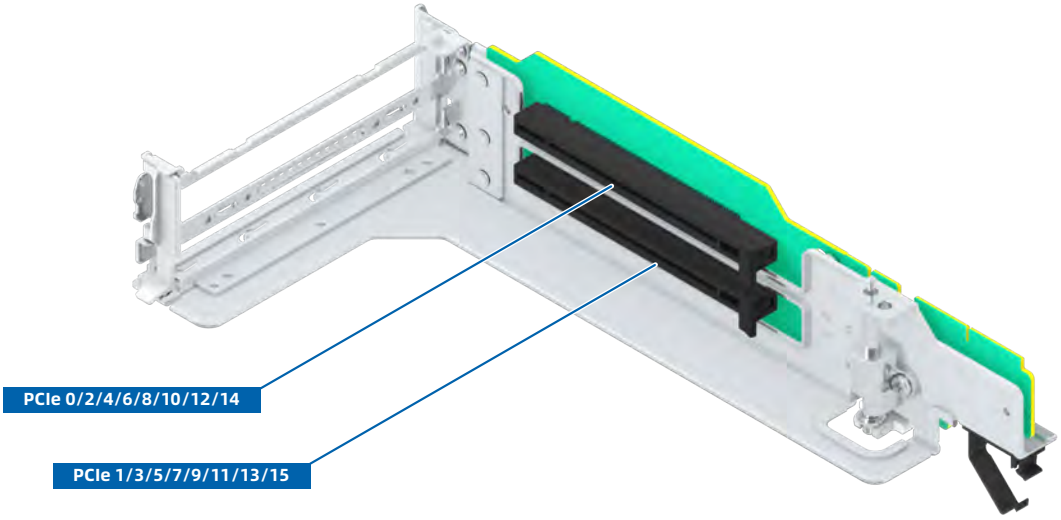
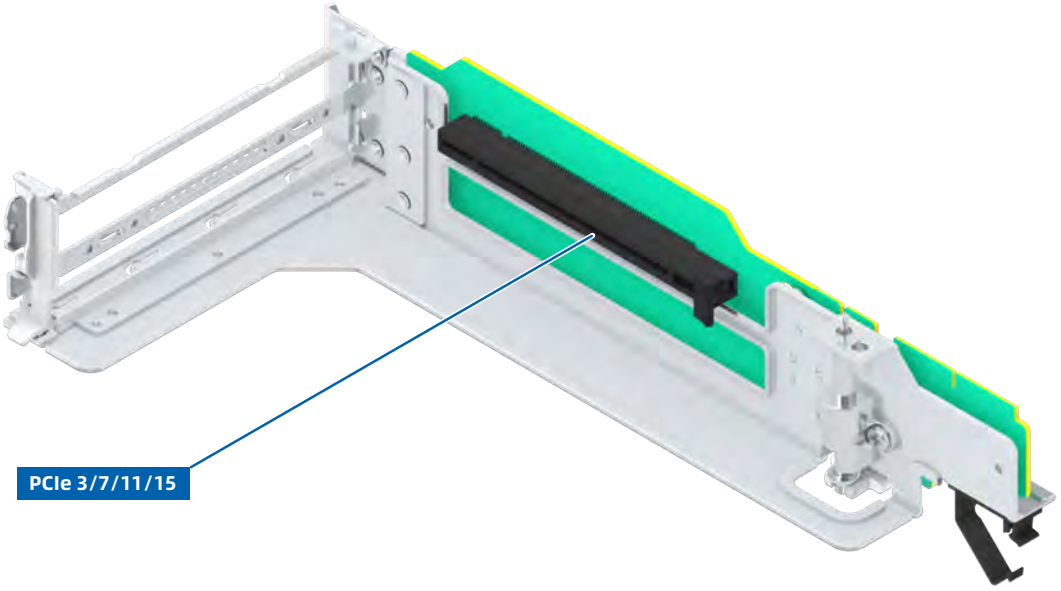


Figure 5-18 PCIe Riser Module (2 × PCIe x16 Slot)



- PCIe riser module (1 × PCIe x16 Slot)
  - GPUs must be installed in the dedicated slots (PCIe 3/7/11/15) for GPUs.

Figure 5-19 PCIe Riser Module (1 × PCIe x16 Slot)



5.9.4 PCIe Slot Description

NOTE

When a CPU is absent, its corresponding PCIe slots are not available.

Table 5-11 PCIe Slot Description

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
PCIe 0	CPU1	PCIe 5.0	x16	x16	PE2	FHFL
PCIe 1	CPU1	PCIe 5.0	x16	x16	PE0	FHFL
PCIe 2	CPU0	PCIe 5.0	x16	x16	PE1	FHHL
PCIe 3	CPU0	PCIe 5.0	x16	x16	PE0	FHHL
OCP 3.0 Slot (Node 0)	CPU0	PCIe 5.0	x16	x16	PE2	SFF
PCIe 4	CPU3	PCIe 5.0	x16	x16	PE2	FHFL
PCIe 5	CPU3	PCIe 5.0	x16	x16	PE0	FHFL
PCIe 6	CPU2	PCIe 5.0	x16	x16	PE1	FHHL
PCIe 7	CPU2	PCIe 5.0	x16	x16	PE0	FHHL
OCP 3.0 Slot (Node 1)	CPU2	PCIe 5.0	x16	x16	PE2	SFF
PCIe 8	CPU5	PCIe 5.0	x16	x16	PE2	FHFL
PCIe 9	CPU5	PCIe 5.0	x16	x16	PE0	FHFL
PCIe 10	CPU4	PCIe 5.0	x16	x16	PE1	FHHL
PCIe 11	CPU4	PCIe 5.0	x16	x16	PE0	FHHL
OCP 3.0 Slot (Node 2)	CPU4	PCIe 5.0	x16	x16	PE2	SFF
PCIe 12	CPU7	PCIe 5.0	x16	x16	PE2	FHFL
PCIe 13	CPU7	PCIe 5.0	x16	x16	PE0	FHFL
PCIe 14	CPU6	PCIe 5.0	x16	x16	PE1	FHHL
PCIe15	CPU6	PCIe 5.0	x16	x16	PE0	FHHL
OCP 3.0 Slot (Node 3)	CPU6	PCIe 5.0	x16	x16	PE2	SFF

5.10 PSUs

- The server supports 2 or 4 PSUs.
- The server supports AC or DC power input.

- The PSUs are hot-swappable.
- When the server is configured with 4 PSUs, the PSUs support 2+2/3+1 redundancy.
- The server must use PSUs with the same part number (P/N code).
- The PSUs provide short-circuit protection.

Figure 5-20 PSU Locations

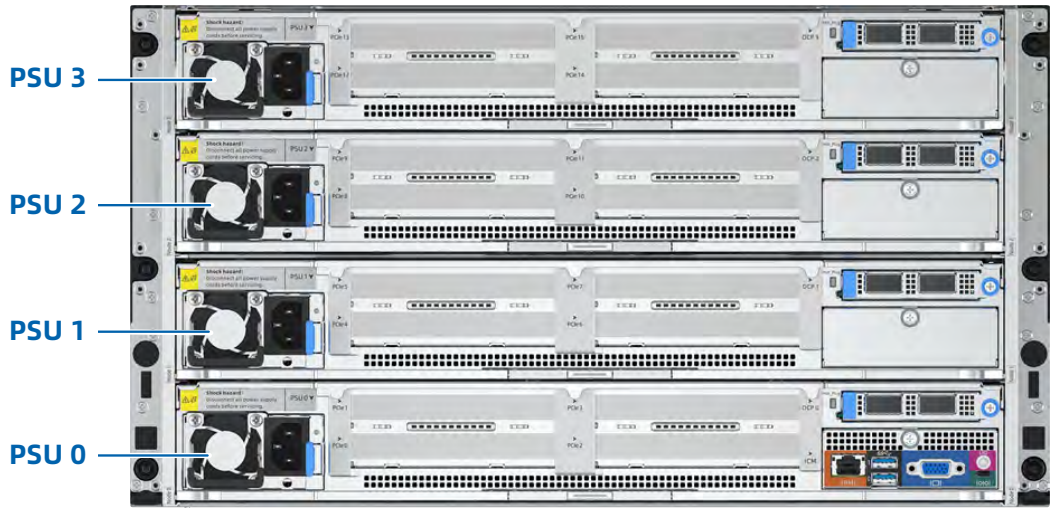


Figure 5-21 PSU LED

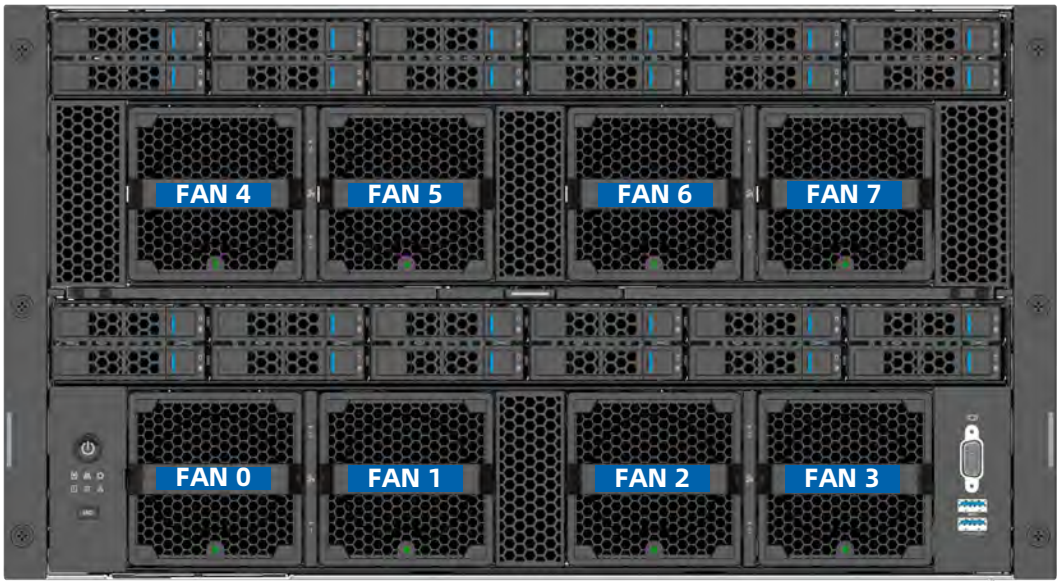
PSU LED (①) Status	Description
Solid green	Normal
Off	No AC/DC input to the PSU
Solid amber	PSU critical event causing a shutdown (possible causes: PSU overtemperature protection, PSU overcurrent protection, PSU overvoltage protection, short circuit protection)

PSU LED (①) Status	Description
Blinking amber at 1 Hz	PSU warning event where the PSU continues to operate (possible causes: PSU overtemperature warning, PSU overcurrent warning, excessively low fan speed warning)
Blinking green at 1 Hz	PSU operating in standby state with normal input
Blinking green (on for 2 seconds and off for 1 second)	PSU in sleep state for cold redundancy
Blinking green at 2 Hz	PSU firmware updating

5.11 Fan Modules

- The server supports 8 fan modules (8056).
- The fan modules are hot-swappable.
- The fan modules support N+1 redundancy.
- The server supports intelligent fan speed control.
- The server must use fan modules with the same part number (P/N code).

Figure 5-22 Fan Module Locations



5.12 LCD Module

5.12.1 Function

The LCD module reads server-related information from the BMC, such as the operating status of processors and memories, network status, logs, and alerts, and transmits the information to client mobile terminals via Bluetooth.

The LCD module synchronizes information with the BMC through I^2C and can display information on an LCD screen or in the app. The server's basic information, system status and alert diagnosis can be displayed in the app via Bluetooth, facilitating the operation and maintenance.

Figure 5-23 How LCD Subsystem Works 1

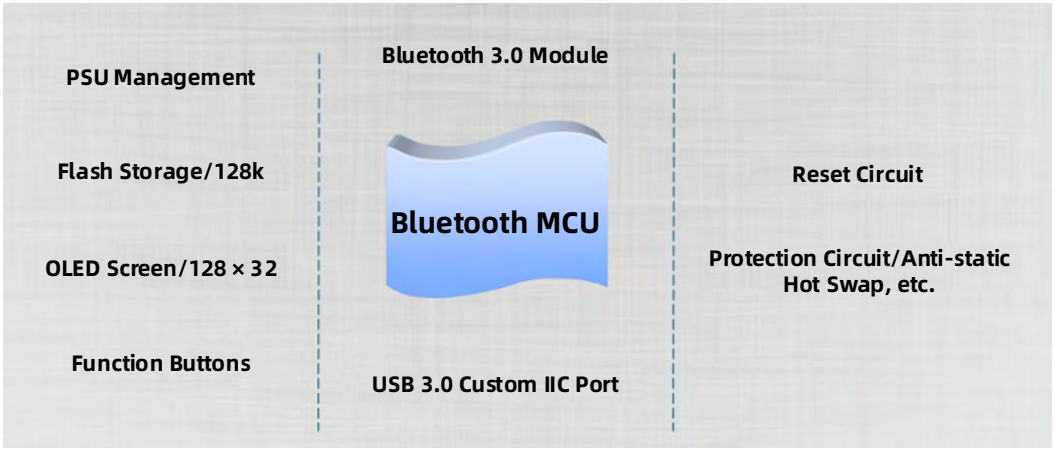
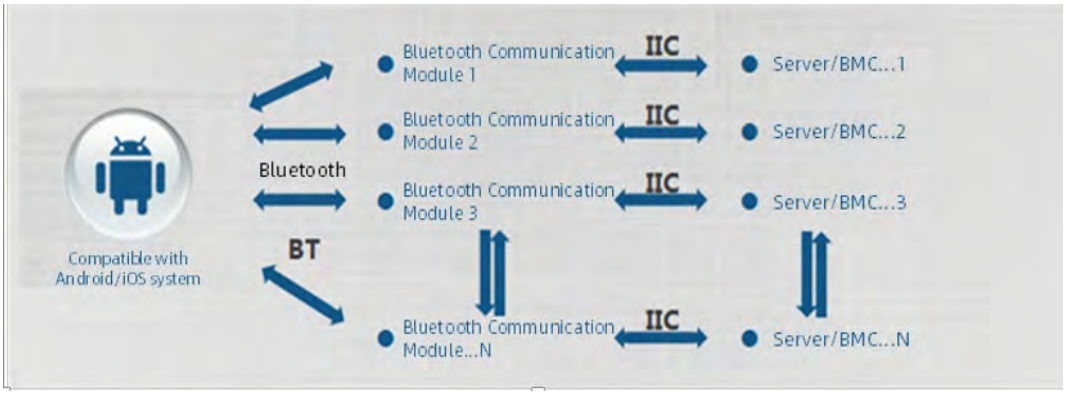


Figure 5-24 How LCD Subsystem Works 2



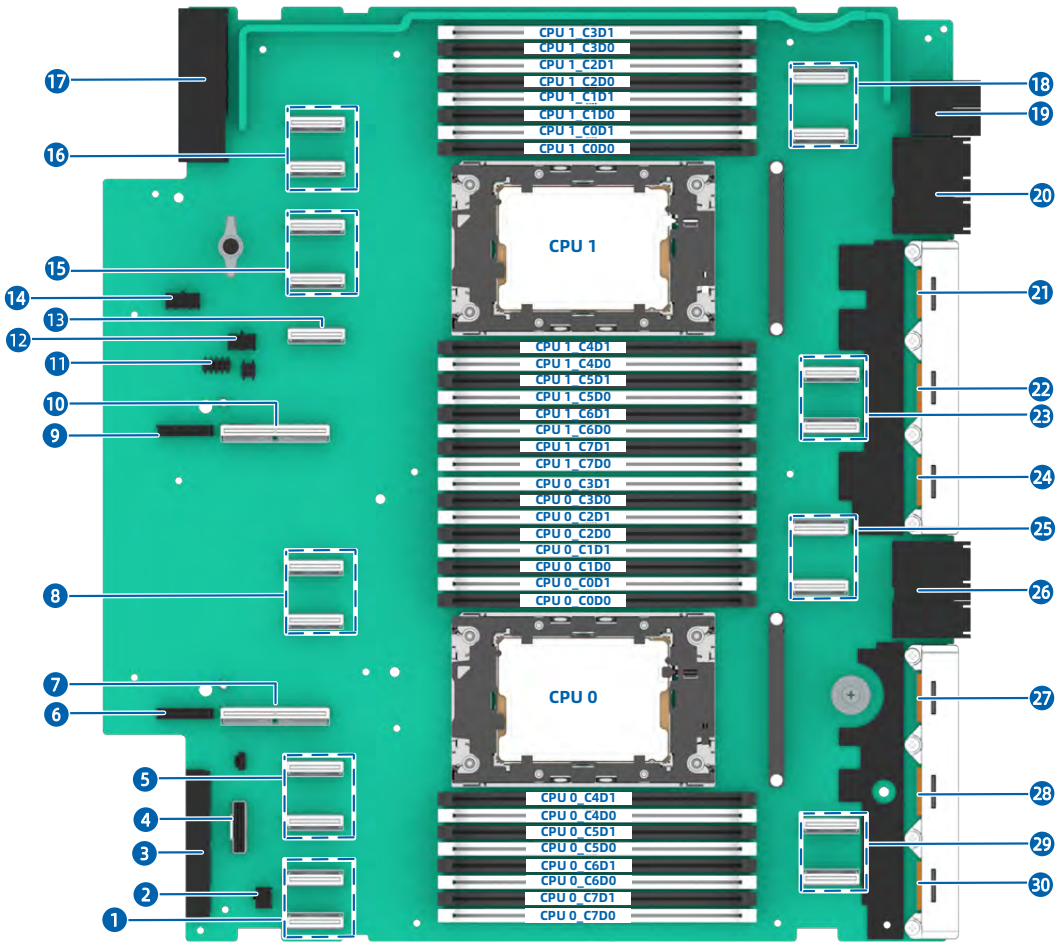
5.12.2 Interface

Figure 5-25 App Home Screen

5.13 Boards

5.13.1 Node Motherboard

Figure 5-26 Node Motherboard Layout

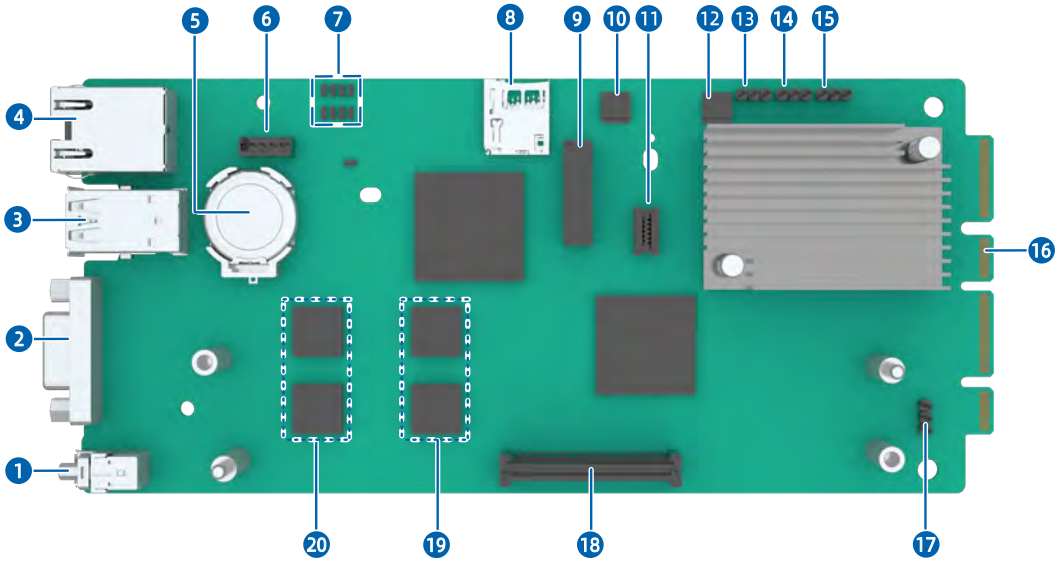


Item	Feature	Item	Feature
1	OCP 3.0 Card Signal Connector	16	CPU1 x16 Riser MCIO Connector
2	OCP 3.0 Card Power Connector	17	PSU Connector
3	ICM Board Connector	18	CPU1 NVMe MCIO Connector
4	NC-SI Connector	19	Fan Board Power Connector
5	CPU0_UPI1 MCIO Connector	20	Right Midplane Connector
6	CPU0 Riser Power Connector	21	CPU1 NVMe Blind-Mate Connector
7	CPU0 Riser Signal Connector	22	CPU1_UPI3 Blind-Mate Connector
8	CPU0 x16 Riser MCIO Connector	23	CPU1_UPI3 MCIO Connector
9	CPU1 Riser Power Connector	24	CPU0_UPI3 Blind-Mate Connector

Item	Feature	Item	Feature
10	CPU1 Riser Signal Connector	25	CPU0 NVMe/RAID Riser MCIO Connector
11	CPLD JTAG Connector	26	Left Midplane Connector
12	Smart NIC Power Connector	27	CPU1_UPI0 Blind-Mate Connector
13	MHCOP Connector	28	CPU0 NVMe/RAID Riser Blind-Mate Connector
14	GPU Power Connector	29	CPU0_UPI3 MCIO Connector
15	CPU1_UPI0 MCIO Connector	30	CPU0_UPI1 Blind-Mate Connector

5.13.2 ICM Board

Figure 5-27 ICM Board Layout



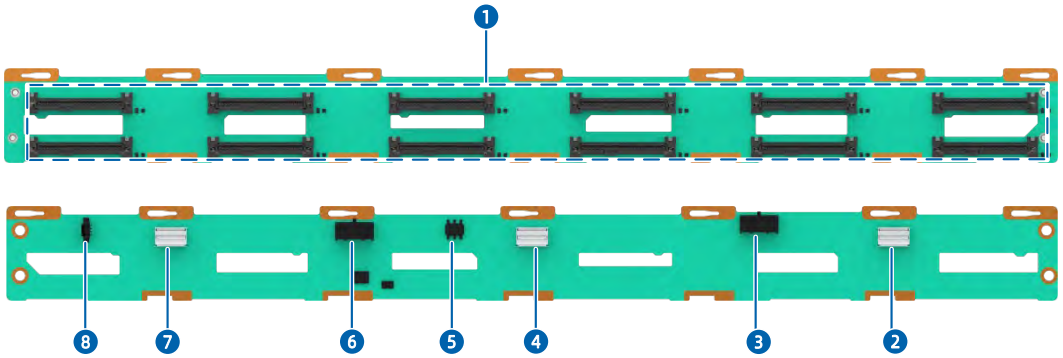
Item	Feature	Item	Feature
1	UID/BMC RST Button and LED	11	TPM/TCM Connector
2	VGA Port	12	DIP Switch 2
3	USB 3.0 Port	13	CMOS Jumper
4	BMC Management Network Port	14	SMlink Debug Header
5	Button Cell Battery Socket	15	Password Clear Jumper
6	RAID Key Connector	16	Gold Finger
7	Port 80 LEDs	17	BIOS Recovery Jumper
8	BMC TF Card Slot	18	M.2 Adapter Connector

Item	Feature	Item	Feature
9	PCH TF Card Module Connector	19	BIOS Flash Chip
10	DIP Switch 1	20	BMC Flash Chip

5.13.3 Drive Backplanes

- 12 × 2.5-Inch SAS/SATA Drive Backplane

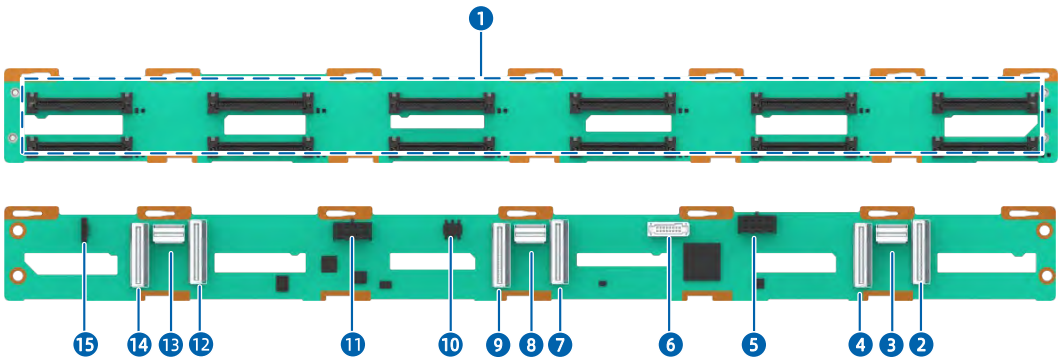
Figure 5-28 12 × 2.5-Inch SAS/SATA Drive Backplane



Item	Feature	Item	Feature
1	Drive Connector	5	CPLD JTAG Connector
2	SAS Signal Connector 1 (for drives 0 to 3)	6	Power Connector (for drives 6 to 11)
3	Power Connector (for drives 0 to 5)	7	SAS Signal Connector 3 (for drives 8 to 1)
4	SAS Signal Connector 2 (for drives 4 to 7)	8	I^2C Connector

- 12 × 2.5-Inch SAS/SATA/NVMe Drive Backplane

Figure 5-29 12 × 2.5-Inch SAS/SATA/NVMe Drive Backplane



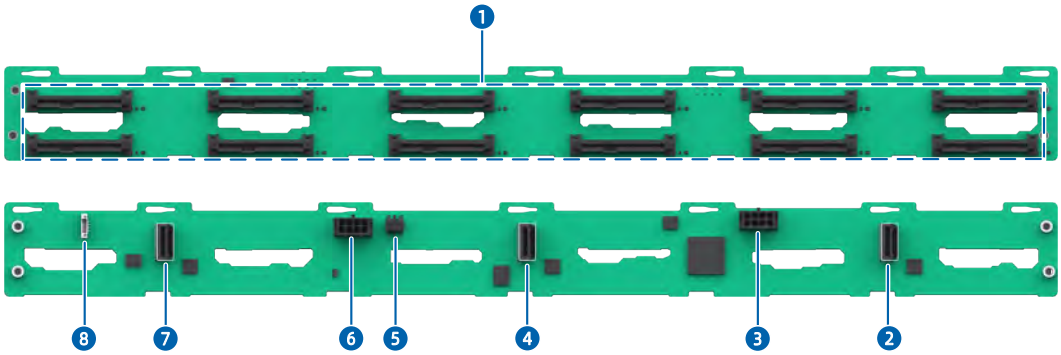
Item	Feature	Item	Feature
1	Drive Connector	9	NVMe Signal Connector 4 (for drives 6 to 7)
2	NVMe Signal Connector 1 (for drives 0 to 1)	10	CPLD JTAG Connector
3	SAS Signal Connector 1 (for drives 0 to 3)	11	Power Connector (for drives 6 to 11)
4	NVMe Signal Connector 2 (for drives 2 to 3)	12	NVMe Signal Connector 5 (for drives 8 to 9)
5	Power Connector (for drives 0 to 5)	13	SAS Signal Connector 3 (for drives 8 to 11)
6	VPP Connector	14	NVMe Signal Connector 6 (for drives 10 to 11)
7	NVMe Signal Connector 3 (for drives 4 to 5)	15	I^2C Connector
8	SAS Signal Connector 2 (for drives 4 to 7)	-	-

- 12 × 2.5-Inch x1 NVMe Drive Backplane

NOTE

When the server is configured with a 12 × 2.5-inch x1 NVMe drive backplane, the communication bandwidth of a single 2.5-inch NVMe drive is limited to x1.

Figure 5-30 12 × 2.5-Inch x1 NVMe Drive Backplane



Item	Feature	Item	Feature
1	Drive Connector	5	CPLD JTAG Connector
2	NVMe Signal Connector 1 (for drives 0 to 3)	6	Power Connector (for drives 6 to 11)

3	Power Connector (for drives 0 to 5)	7	NVMe Signal Connector 3 (for drives 8 to 11)
4	NVMe Signal Connector 2 (for drives 4 to 7)	8	I^2C Connector

6 Product Specifications

6.1 Technical Specifications

Table 6-1 Technical Specifications

Item	Description
Form Factor	6U8S rack server
Chipset	Intel Emmitsburg
Processor	• Four or eight 4th Gen Intel Xeon Scalable processors (Sapphire Rapids) • Integrated memory controllers and 8 memory channels per processor • Integrated PCIe 5.0 controllers and 80 PCIe lanes per processor • 4 UPI links per CPU at up to 16 GT/s per link • Up to 60 cores • Max. Turbo frequency of 4.2 GHz (18 cores) • Max. L3 cache per core of 2.8125 MB • TDP up to 350 W Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.
Memory	• 8 memory channels per CPU • Up to 2 DIMM slots per channel • Up to 128 DDR5 DIMMs - RDIMMs or 3DS RDIMMs supported - Up to 4,800 MT/s (1 DPC) or 4,400 MT/s (2 DPC) - Mixing DDR5 DIMMs of different types (RDIMM, 3DS RDIMM) or specifications (capacity, bit width, rank, height, etc.) is not supported - A server must use DDR5 DIMMs with the same part number (P/N code). Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.

Item	Description
Storage	Supports multiple drive configurations. For detailed information, refer to 5.7.1 Drive Configurations. Front: Up to 24 × 2.5-inch SAS/SATA/NVMe drive (hot-swap) Internal: • Up to 3 TF cards (up to 2 supported by the PCH, and 1 supported by the BMC chip) • Up to 2 SATA/NVMe M.2 SSDs - When the server is configured with an SND 9230 RAID card, the M.2 SSDs support RAID configuration. - When the server is configured with an M.2 adapter, the M.2 SSDs support VROC (SATA/PCIe RAID) configuration. Note: When the server is configured with a 12 × 2.5-inch x1 NVMe drive backplane, the communication bandwidth of a single 2.5-inch NVMe drive is limited to x1.
Network	• 4 optional single-host/multi-host OCP 3.0 cards (1/10/25/40/100/200/400 Gb). Only single-host OCP 3.0 cards are hot-pluggable. • Standard PCIe NICs (1/10/25/40/100/200/400 Gb) • NC-SI feature supported • 1 BMC management network port of 100/1,000 Mbps auto-negotiation
I/O Expansion	• Up to 16 standard PCIe x16 slots, supporting 8 FHHL PCIe 5.0 x16 cards and 8 FHFL PCIe 5.0 x16 cards • Up to 4 smart NICs • Up to 4 dual-slot GPUs Note: For details, see 5.9.2 PCIe Slot Locations and 5.9.4 PCIe Slot Description.
Port	• Front: - 1 × USB 2.0/LCD port - 1 × USB 3.0 port - 1 × VGA port (DB15) • Rear: - 2 × USB 3.0 port - 1 × VGA port (DB15)

Item	Description
	- 1 × system/BMC serial port (micro USB) - 1 × BMC management network port (RJ45) • Internal: - 1 × USB 3.0 port (optional) Note: OS installation on the USB storage media is not recommended.
Display	Integrated VGA on the motherboard with a video memory of 1 GB (shared with the BMC on the ICM board) and a maximum 16M color resolution of 1,920 × 1,200 at 60 Hz. Notes: • The integrated VGA can support a maximum resolution of 1,920 × 1,200 only when the video driver matching the OS version is installed; otherwise, only the default resolution of the OS is supported. • When both the front and rear VGA ports are connected to monitors, only the monitor connected to the front VGA port works.
System Management	• UEFI • BMC • NC-SI • KSManage
Security	• Intel Platform Firmware Resilience (PFR) • Trusted Platform Module (TPM) 2.0 and Trusted Cryptography Module (TCM) • Intel Trusted Execution Technology • Firmware update mechanism based on digital signatures • UEFI Secure Boot • Hierarchical BIOS password protection • BIOS Secure Flash and BIOS Lock Enable (BLE) • BMC and BIOS dual-image mechanism • Double factor authentication • BIOS Secure Boot based on TPM • BMC Secure Boot

6.2 Environmental Specifications

Table 6-2 Environmental Specifications

Parameter	Description
Temperature[1,2,3]	• Operating: 5°C to 45°C (41°F to 113°F) • Storage (packed): -40°C to 70°C (-40°F to 158°F) • Storage (unpacked): -40°C to 55°C (-40°F to 131°F)
Relative Humidity (non-condensing)	• Operating: 5% to 90% RH • Storage (packed): 5% to 93% RH • Storage (unpacked): 5% to 93% RH
Operating Altitude	≤3,050 m (10,007 ft)
Corrosive Gaseous Contaminants	Maximum growth rate of corrosion film thickness: • Copper coupon: 300 Å/month (compliant with the gaseous corrosivity level of G1 defined in ANSI/ISA-71.04-2013) • Silver coupon: 200 Å/month (compliant with the gaseous corrosivity level of G1 defined in ANSI/ISA-71.04-2013)
Acoustic Noise[4,5,6]	Noise emissions are measured in accordance with ISO 7779 (ECMA 74) and declared in accordance with ISO 9296 (ECMA 109). Listed are the declared A-weighted sound power levels (LWAd) and the declared average bystander position A-weighted sound pressure levels (LpAm) at a server operating temperature of 23°C (73.4°F): • Idle: - LWAd: 7.4 B - LpAm: 59.2 dBA • Operating: - LWAd: 7.4 B - LpAm: 59.2 dBA

Notes:

1. Not all configurations support an operating temperature range of 5°C to 45°C (41°F to 113°F). For GPU configurations, the supported temperature ranges from 10°C to 25°C (50°F to 77°F).

2. Standard operating temperature:

   - 10°C to 35°C (50°F to 95°F) is the standard operating temperature range at sea level. At the altitude of 0 to 3,050 m (0 to 10,007 ft), derate the maximum allowable temperature by 1°C per 305 m (1°F per 556 ft). No direct sustained sunlight is permitted. The maximum

temperature gradient is 20°C/h (36°F/h). Both the operating altitude and maximum temperature gradient vary with server configuration.

- Any fan failure or operations above 30°C (86°F) may lead to system performance degradation.

3. Expanded operating temperature:

   - For some configurations, the supported system inlet ambient temperature can be expanded to 5°C to 10°C (41°F to 50°F) and 35°C to 40°C (95°F to 104°F) at sea level. At an altitude of 0 to 950 m (0 to 3,117 ft), derate the maximum allowable operating temperature by 1°C per 305 m (1°F per 556 ft). At an altitude of 950 to 3,050 m (3,117 to 10,007 ft), derate the maximum allowable operating temperature by 1°C per 175 m (1°F per 319 ft).
   - For some configurations, the supported system inlet ambient temperature can be expanded to 40°C to 45°C (104°F to 113°F) at sea level. At an altitude of 0 to 950 m (0 to 3,117 ft), derate the maximum allowable operating temperature by 1°C per 305 m (1°F per 556 ft). At an altitude of 950 to 3,050 m (3,117 to 10,007 ft), derate the maximum allowable operating temperature by 1°C per 125 m (1°F per 228 ft).
   - Any fan failure or operations under the expanded operating temperature may lead to system performance degradation.

4. This document lists the LWAd and LpAm of the product at a 23°C (73.4°F) ambient environment. All measurements are conducted in conformance with ISO 7779 (ECMA 74) and declared in conformance with ISO 9296 (ECMA 109). Contact your sales representative for more information.
5. The sound levels shown here were measured based on the specific configurations of a server. Sound levels vary with the server configuration, workload, ambient temperature, and other factors. These values are for reference only and subject to change without notice.
6. Product conformance to cited normative standards is based on sample testing, evaluation, or assessment. This product or family of products is eligible to bear the appropriate compliance logos and statements.

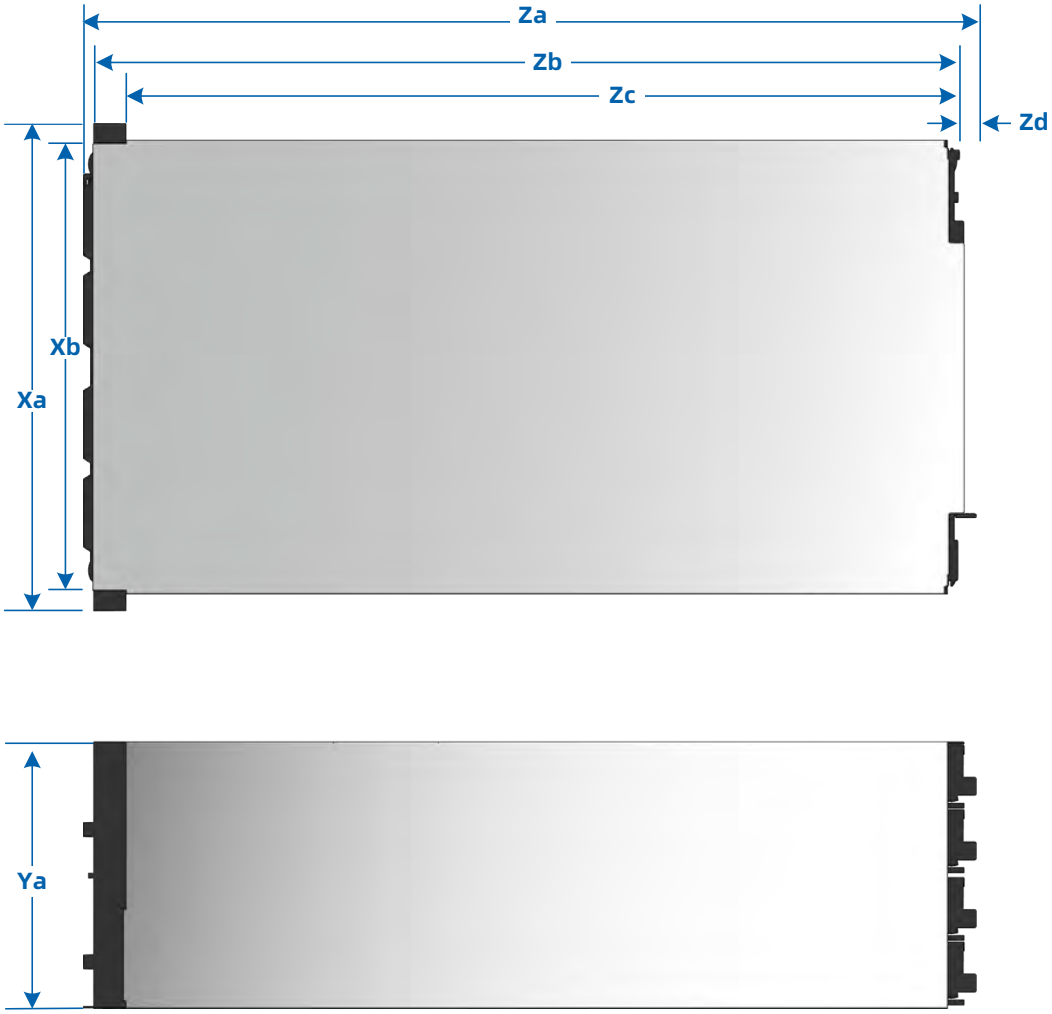
6.3 Physical Specifications

Table 6-3 Physical Specifications

Item	Description
Outer Packaging Dimensions (L × W × H)	With pallet: 1,200 × 800 × 574 mm (47.24 × 31.50 × 22.60 in.) Without pallet: 1,200 × 740 × 448 mm (47.24 × 29.13 × 17.64 in.)
Installation Dimension Requirements	• Installation requirements for the cabinet are as follows: - General cabinet compliant with the International Electrotechnical Commission 297 (IEC 297) standard - Width: 482.6 mm (19 in.) - Depth: Above 1,000 mm (39.37 in.)

Item	Description
	• Installation requirements for the server rails are as follows: - L-bracket rails: Intended for 9.5 mm (0.37 in.) square-hole cabinets and ϕ7.1 mm (0.28 in.) round-hole cabinets. - Static rail kit: The distance between the front and rear mounting flanges ranges from 645 to 917 mm (25.39 to 36.10 in.). - Used with stoppers: The distance between the front and rear mounting flanges ranges from 772 to 815 mm (30.39 to 32.09 in.).
Weight	24 × 2.5-inch drive configuration (24 × drive + 4 × GPU) • Net weight: 96.8 kg (213.41 lbs) • Gross weight: 126 kg (277.78 lbs, including server, packaging box, pallet, rails and accessory box) Note: The server weight varies by configuration.

Figure 6-1 Chassis Dimensions



Model	Za	Zb	Zc	Zd	Xa	Xb	Ya
KR6880-X2-A0-R0-00	870 mm (34.25 in.)	852 mm (33.54 in.)	820 mm (32.28 in.)	7.2 mm (0.28 in.)	482 mm (18.98 in.)	448 mm (17.64 in.)	263.2 mm (10.36 in.)

7 Operating System and Hardware Compatibility

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

IMPORTANT

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

7.1 Supported Operating Systems

Table 7-1 Supported Operating Systems

OS Version
Red Hat Enterprise Linux 8.6
Red Hat Enterprise Linux 8.9
Red Hat Enterprise Linux 9.0
Red Hat Enterprise Linux 9.3
SUSE 15.4
Windows Server 2022
KOS V5.8
Oracle Linux 8.9

Oracle Linux 9.3

7.2 Hardware Compatibility

7.2.1 Component Installation Location Requirements

Table 7-2 Component Installation Location Requirements

Component	Installation Location Requirements
Graphics Card	No limit
GPU	No limit
HBA Card	Must be installed in node 0/1
HCA Card	Must be installed in node 0/1
FPGA Card	No limit
Marvell 9230 PCIe Expansion Card (with M.2 SSDs installed)	No limit
SAS Card	No limit
RAID Card	No limit
Intel X710 Dual-Port PCIe Card	Must be installed in node 0/1
NIC (≤10 Gb)	No limit
NIC (≥25 Gb)	Must be installed in node 0/1
U.2 NVMe SSD	No limit

7.2.2 CPU Specifications

The server supports up to eight 4th Gen Intel Xeon Scalable processors. For the KR6880-X2-A0-R0-00 servers, the 84XX series CPU is applicable to both 8-socket and 4-socket configurations, and the 64XX series CPU is only applicable to the 4-socket configuration.

Table 7-3 CPU Specifications

Model	Cores	Threads	Base Frequency (GHz)	Max. Turbo Frequency (GHz)	Cache (MB)	TDP (W)
8450H	28	56	2.0	3.5	75	250

Model	Cores	Threads	Base Frequency (GHz)	Max. Turbo Frequency (GHz)	Cache (MB)	TDP (W)
8444H	16	32	2.9	4.0	45	270
8454H	32	64	2.1	3.4	82.5	270
8460H	40	80	2.2	3.8	105	330
8468H	48	96	2.1	3.8	105	330
8490H	60	120	1.9	3.5	112.5	350
6448H	32	64	2.4	4.1	60	250
6418H	24	48	2.1	4.0	60	185
6434H	8	16	3.7	4.1	22.5	195
6416H	18	36	2.2	4.2	45	165

7.2.3 DIMM Specifications

The server supports up to 128 DDR5 DIMMs (RDIMMs supported). Each processor supports 8 memory channels with 2 DIMMs per channel.

Table 7-4 DIMM Specifications

Type	Capacity (GB)	Speed (MT/s)	Data Width	Organization
RDIMM	16	4,800	x64	1R x8
RDIMM	32	4,800	x64	1R x4/2R x8
RDIMM	64	4,800	x64	2R x4
RDIMM	96	4,800	x64	2R x4
RDIMM	128	4,800	x64	2S2R x4

7.2.4 Drive Specifications

Table 7-5 HDD Specifications

Type	Speed in rpm	Capacity	Max. Qty.
2.5-Inch SAS HDD	10k	600 GB/1.2 TB/1.8 TB/2.4 TB	24
2.5-Inch SAS HDD	15k	300 GB/600 GB/900 GB	24

Table 7-6 SATA SSD Specifications

Type	Capacity	Max. Qty.
SATA SSD	240 GB/480 GB/960 GB/1.92 TB/3.84 TB	24

Table 7-7 U.2 NVMe SSD Specifications

Type	Capacity	Max. Qty.
U.2 NVMe SSD	960 GB/1.92 TB/3.84 TB	24

Table 7-8 M.2 SSD Specifications

Type	Capacity	Max. Qty.
SATA M.2 SSD	240 GB/480 GB	2

7.2.5 SAS/RAID Card Specifications

Table 7-9 SAS/RAID Card Specifications

Type	Description
SAS Card	SAS_PM8222_PM8222_8_SAS3_PCIE
	SAS_PM8222_SmartHBA_8_SAS3_PCIE3
RAID Card	RAID_PM8204_RA_8_2GB_SAS3_PCIE3
	RAID_PM8204_RA_8_4GB_SAS3_PCIE3
	RAID_L_8R0_9560-8i_4G_HDM12G_PCIE4

7.2.6 NIC Specifications

Table 7-10 OCP Card Specifications

Type	Description	Speed (Gbps)	Port Qty.
OCP 3.0 Card	NIC_M_I350_1G_RJ_PCIEx4-G2_4_OCP	1	4
	NIC_SND_10G_X550_RJ_OCP3x4_2_XR	10	2
	NIC_Andes-M6_X710_10G_LC_O3x8_2_M7	10	2
	NIC_M_25G_MCX631432AN_LC_OCP3x8_2_XR	25	2
	NIC_Andes-M6_E810_25G_LC_OCP3x8_2	25	2
	NIC_M_100G_MCX623436AN_LC_OCP3x16_2_XR	100	2

Table 7-31 PCIe NIC Specifications

Type	Description	Speed (Gbps)	Port Qty.
PCIe NIC	NIC_Vostok_I350_1G_RJ_PCIEx4-G3_2	1	2
	NIC_Vostok_I350_1G_RJ_PCIEx4_4	1	4
	NIC_I_10G_X710DA2_LC_PCIEx8_2_XR_M7	10	2
	NIC_Vostok_X710_10G_LC_PCIEx8_2_M7	10	2
	NIC_Pyxis_X550_10G_RJ_PCIEx8_2_XR	10	2
	NIC_M_25G_MCX631102AN_LC_PCIEx8_2_XR	25	2
	NIC_M_25G_MCX512A-ACAT_LC_PCIEx8_2_XR	25	2
	NIC_Andes-M6_E810_25G_LC_PCIEx8_2	25	2
	NIC_M_100G_MCX623106AN_LC_PCIEx16_2_XR	100	2

7.2.7 HBA/HCA Card Specifications

Table 7-42 HBA Card Specifications

Type	Description	Speed (Gbps)	Port Qty.
HBA Card	HBA_QL_4R2_QLE2692-ISR-BK_FC16G_PCIE	16	2
	HBA_E_8R0_LPE31000-M6_FC16G_PCIE	16	1

Type	Description	Speed (Gbps)	Port Qty.
	HBA_E_8R2_LPE31002-M6_FC16G_PCIE	16	2
	HBA_E_0R1_LPE35000-AP_FC32G_PCIE	32	1
	HBA_E_0R2_LPE35002_FC32G_PCIE	32	2
	HBA_E_0R2_LPE36002_FC64G_PCIE	64	2

Table 7-53 HCA Card Specifications

Type	Description	Speed (Gbps)	Port Qty.
HCA Card	HCA_M_1-HDR100_MCX653105A-ECAT_PCIE	100	1
	HCA_M_2-HDR100_MCX653106A-ECAT_PCIE	100	2
	HCA_NV_1-NDR200_MCX75310AAS-HEAT_PCIE	100	1
	HCA_NV_1-NDR_MCX75310AAS-NEAT_PCIE	100	1

7.2.8 PSU Specifications

The server supports up to 4 hot-swap PSUs in 2+2 or 3+1 redundancy that follow the Intel Common Redundant Power Supply (CRPS) specification. The PSUs share a common electrical and structural design that allows for hot-swap and tool-less installation into the server with the PSUs locking automatically after being inserted into the power bay. The CRPS PSUs are 80 Plus Platinum or Titanium rated with various output powers, allowing customers to choose as needed.

- The following rated 110 Vac and 230 Vac PSUs are supported:
  - 1,300/1,600/2,000/2,700 W Platinum PSU: 1,000 W (110 Vac), 2,000 W (230 Vac)

  Note: At a rated input voltage of 110 Vac, the output power of a 1,300/1,600/2,000 W PSU will be derated to 1,000 W and that of a 2,700 W PSU will be derated to 1,200 W.

  Operating voltage range:

  - 110 Vac/230 Vac: 90 Vac to 264 Vac

8 Regulatory Information

8.1 Safety

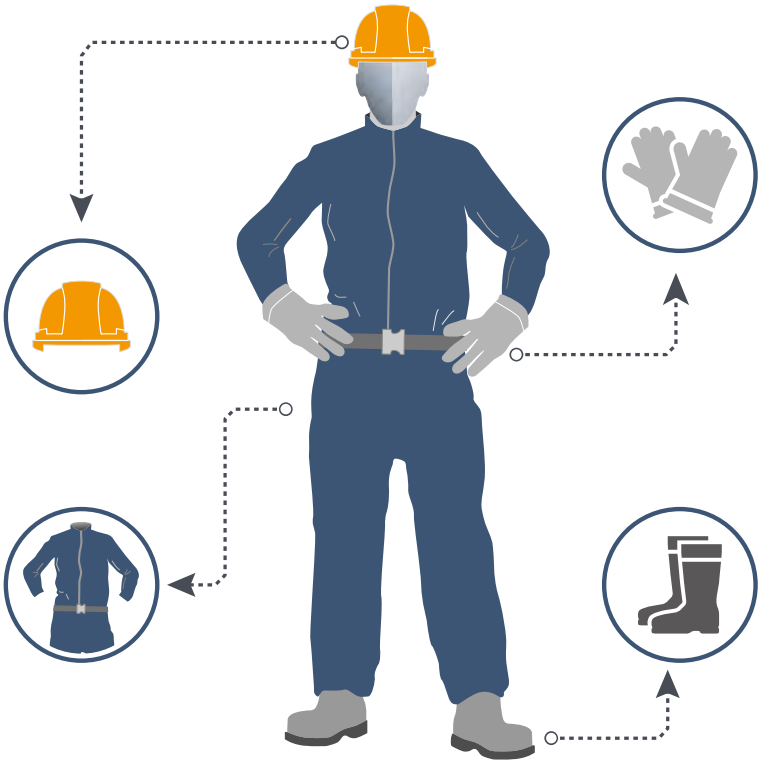
8.1.1 General

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

8.1.2 Personal Safety

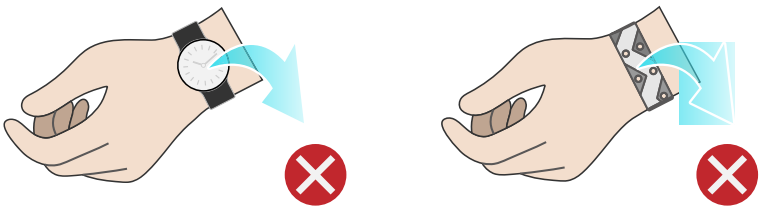
- Only personnel certified or authorized by us are allowed to perform the installation procedures.
- Stop any operation that could cause personal injury or equipment damage. Report to the project manager and take effective protective measures.
- Working during thunderstorms, including but not limited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

Figure 8-1 Protective Clothing



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

Figure 8-2 Removing Conductive Objects



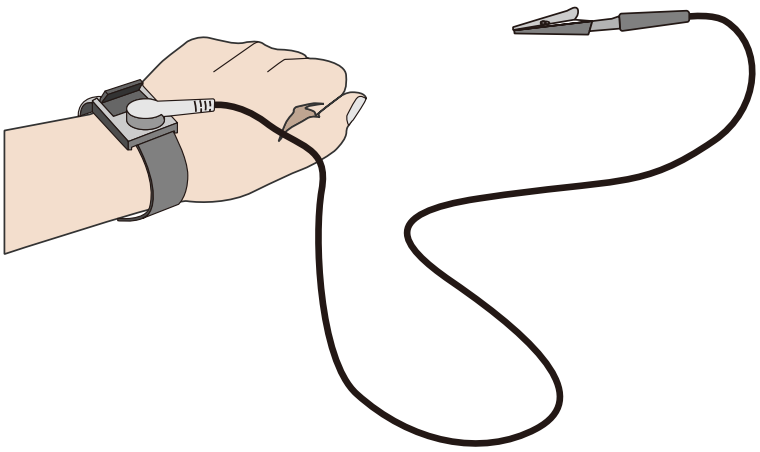
How to put on an ESD strap (as shown in the following figure).

a. Put your hand through an ESD wrist strap.

b. Tighten the strap buckle to ensure a snug fit.

c. Plug the alligator clip of the ESD wrist strap into the corresponding jack on the grounded cabinet or grounded chassis.

Figure 8-3 Wearing an ESD Wrist Strap



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

8.1.3 Equipment Safety

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

- To ensure equipment safety, always ground the equipment before powering it on.

8.1.4 Transportation Precautions

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

- Hire a trusted logistics company to move all equipment. The transportation process must comply with international transportation standards for electronic equipment. Always keep the equipment being transported right-side up. Avoid collision, moisture, corrosion, packaging damage or contamination.
- Transport the equipment in its original packaging.
- If the original packaging is unavailable, separately package heavy and bulky components (such as chassis, blade servers and blade switches), and fragile components (such as optical modules and PCIe expansion cards).
- Power off all equipment before shipping.

8.1.5 Manual Handling Weight Limits

 CAUTION

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

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

Table 8-1 Manual Handling Weight Limits per Person

Organization	Weight Limit (kg/lbs)
European Committee for Standardization (CEN)	25/55.13
International Organization for Standardization (ISO)	25/55.13
National Institute for Occupational Safety and Health (NIOSH)	23/50.72
Health and Safety Executive (HSE)	25/55.13
General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China (AQSIQ)	• Male: 15/33.08 • Female: 10/22.05

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.

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 our 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 original 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). The shipping cost coverage varies by region. Contact your sales representative for details.

NOTE

- Customer should return the defective parts in original 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 any time, 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 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.

10 System Management

10.1 Intelligent Management System BMC

BMC supports mainstream management specifications in the industry such as IPMI 2.0 and Redfish 1.13. BMC features high operational reliability, easy serviceability for different business scenarios, accurate and comprehensive fault diagnosis capabilities, and industry-leading security reinforcement capabilities.

BMC supports:

- IPMI 2.0
- Redfish 1.13
- SNMP v1/v2c/v3
- HTML5/Java remote consoles (Keyboard, Video, Mouse)
- remote virtual media
- login via web browsers
- intelligent fault diagnosis

Table 10-1 BMC Features

Feature	Description
Management Interface	Supports extensive remote management interfaces for various server O&M scenarios. The supported interfaces include: • IPMI • SSH CLI • SNMP • HTTPS • Web GUI • Redfish • RESTful • Syslog
Accurate and Intelligent Fault Location	IDL, a fault diagnosis system, offers accurate and comprehensive hardware fault location capabilities, and outputs detailed fault causes and handling suggestions.
Alert Management	Supports rich automatic remote alert capabilities, including proactive alerting mechanisms such as SNMP Trap

Feature	Description
	(v1/v2c/v3), email alerts and syslog remote alerts to ensure 24 × 7 reliability.
Remote Console KVM	Supports HTML5- and Java-based remote console to remotely control and operate the monitor/mouse/keyboard of the server, providing highly available remote management capabilities without on-site operation.
Virtual Network Console (VNC)	Supports mainstream third-party VNC clients without relying on Java, improving management flexibility.
Remote Virtual Media	Supports virtualizing local images, USB devices, and folders as media devices of remote servers, simplifying OS installation, file sharing, and other O&M tasks.
Web GUI	Supports the visual management interface developed by us, displaying abundant information of the server and components, and offers easy-to-use Web GUIs.
Crash Screenshot and Crash Video Recording	• Supports automatic crash screenshot and crash video recording (video needs to be enabled manually) to capture the last screen and video before crash. • Provides manual screenshot, which can quickly capture the screen for easy inspection at scheduled time.
Dual Flash and Dual Image	Supports dual flash and dual image, enabling automatic flash failover in case of software or flash corruption, improving operational reliability.
Power Capping	Supports power capping, increasing deployment density and reducing energy consumption.
IPv4/IPv6	Supports both IPv4 and IPv6, enhancing network deployment flexibility.
Auto-Switching of Management Network Port	Supports auto-switching between the dedicated management network port and shared management network port, providing customers with flexible network deployment solutions for different management network deployment scenarios.
BMC Self-Diagnosis and Self-Recovery System	• Supports the reliable dual watchdog mechanism for hardware and software, enabling automatic restoration of BMC in case of BMC abnormality. • Provides a thermal protection mechanism, which is automatically triggered when the BMC is abnormal to ensure that the fan operates at safe speeds to avoid system overheating. • Supports self-diagnosis of processors, memory modules, and storage devices of BMC, and automatically cleans

Feature	Description
	the workload to restore to normal when the device usage rate is too high.
Power Control	Supports virtual power buttons for power on/off, reset, and power cycle.
UID LED	Supports remote lighting of the UID LED for locating the server in the server room.
Secure Firmware Update	• Supports firmware update based on secure digital signatures, and mismatch prevention mechanism for firmware from different manufacturers and firmware for different server models. • Supports firmware update of BMC/BIOS/CPLD/PSU.
Serial Port Redirection	Supports remote redirection of the system serial port, BMC serial port and other serial ports, and directs the server-side serial port output to the local administrator via the network for server debugging.
Storage Information Display	Displays RAID logical array information and drive information, and supports remote RAID creation for improved deployment efficiency.
User Role Management	Supports user detail management based on user roles and flexible creation of user roles with different privileges, and provides more user roles to allow administrators to grant different privileges to O&M personnel.
Security Features	Adopts the industry-leading server security baseline standard V3.0. SSH, HTTPS, SNMP and IPMI use secure and reliable algorithms. BMC offers capabilities including secure update and boot and security reinforcement mechanisms such as anti-replay, anti-injection, and anti-brute force.
Double Factor Authentication	Supports double factor authentication for local BMC users. Users need to log in to the BMC with both password and certificate, thus to prevent attacks caused by password leakage.
Configuration Exporting and Importing	To import and export the existing system configurations.
System Information Display	Displays the server basic information such as the information and health status of major server components, including CPU, memory, power supply, device inventory, hard drive, network adapter, and security chip.
Fan Management	Displays the status, current speed, duty ratio, and other information of a fan module. You can select the fan control mode and preset the speed for each fan module in the Manual Fan Control mode.

Feature	Description
Power Policy	To set how the server operating system reacts under the BMC's control when AC power is reconnected to the server.
One-Key Erasing	To perform non-recoverable erasing on all storage devices of the server, preventing data leakage when the server is to be retired.
System Lockdown	After this feature is enabled, some parameters of the server cannot be set and some operations cannot be performed on the server.

10.2 KSManage

The server is compatible with the latest version of KSManage, a new-generation infrastructure O&M management platform for data centers.

Built on cutting-edge O&M concepts, KSManage provides users with leading and efficient overall management solutions for data centers to ensure advanced infrastructure management. This platform provides a rich set of functions such as centralized asset management, in-depth fault diagnosis, component fault early warning, intelligent energy consumption management, 3D automatic topologies, and stateless automatic deployment. With these functions, users can implement centralized O&M of servers, storage devices, network devices, security devices, and edge devices, effectively improving O&M efficiency, reducing O&M costs, and ensuring the secure, reliable, and stable operation of data centers. KSManage offers:

- lightweight deployment in multiple scenarios and full lifecycle management of devices
- high reliability and on-demand scalability enabled by 1 to N data collectors
- intelligent asset management and real-time tracking of asset changes
- comprehensive monitoring for overall business control
- intelligent fault diagnosis for reduced maintenance time
- second-level performance monitoring for real-time status of devices
- batch configuration, deployment and update, shortening the time needed to bring the production environment online
- improved firmware version management efficiency
- standardized northbound interfaces for easy integration and interfacing

Table 10-21 KSManage Features

Feature	Description
Home	• Display of basic information (data centers, server rooms, cabinets, assets and alerts), quick addition of devices and custom home page
Assets	• Batch asset import, automatic asset discovery, and full lifecycle management of assets • Management of the full range of our server family, including general-purpose rack servers, AI servers, multi-node servers, edge servers and all-in-one servers) • Management of our general-purpose disk arrays and distributed storage devices • Management of network devices (switches, routers, etc.), security devices (firewalls, load balancers, etc.), cabinets and clouds • Management of data centers • Asset warranty information management, asset inventory reports for server acceptance, asset attribute expansion, etc.
Monitor	• Display of real-time alerts, history alerts, blocked alerts and events • Fault prediction of drives and memories • Custom inspection plan and inspection result management • Notification record viewing • Intelligent fault diagnosis and analysis, automatic fault reporting and repair ticket viewing • Trap management and Redfish management • Management of monitoring rules, such as alert rules, notification rules, blocking rules, alert noise reduction rules, compression rules and fault reporting rules, and redefinition of above rules
Control	• Quick start of firmware update, OS installation, power management, drive data erasing and stress test • Batch firmware update (BMC/BIOS/RAID Card/NIC/Drive/HBA Card/MB CPLD/BP CPLD/PSU) • Batch firmware configuration (BMC/BIOS) • Batch RAID configuration and OS deployment for servers • Secure and quick drive data erasing • CPU and memory stress test • Automatic firmware baseline management • BMC and BIOS snapshot management • Repositories for update files

Feature	Description
Log	• Fault log record management • Diagnosis record and diagnosis rule management
Topologies	• Centralized management of multiple data centers and panoramic 3D views, including dynamic display of power consumption, temperature, alerts and cabinet capacity of the data center • Network topologies
Reports	• Management of warranty information reports, alert reports, asset reports, hardware reports and performance reports • Export of reports in .xlsx format
System	• Password management, alert forwarding and data dump • Customized KSManage parameters
Security	Security control of KSManage via a set of security policies such as user management, role management, authentication management (local authentication and LDAP authentication) and certificate management.

10.3 KSManage Tools

Table 10-3 Features of KSManage Tools

Feature	Description
KSManage Kits	A lightweight automatic batch O&M tool for servers, mainly used for server deployment, routine maintenance, firmware update, fault handling, etc.
KSManage Boot	A unified batch management platform for bare metals, with features including firmware management, hardware configuration, system deployment and migration, stress test and in-band management
KSManage Server CLI	Fast integration with third-party management platforms, delivering a new O&M mode of Infrastructure as Code (IaC)
KSManage Driver	Operates under the OS and gets system asset and performance information via the in-band mode, providing users with more comprehensive server management capabilities
KSManage Server Provisioning	Offers users RAID configuration, intelligent OS installation, firmware update, hardware diagnosis, secure erasing and software upgrade, using the TF card as the carrier

11 Certifications

Country/Region	Certification	Mandatory/Voluntary
International	CB	Voluntary
EU	CE	Mandatory
US	FCC	Mandatory
	UL	Voluntary
EAEU	EAC	Mandatory

12 Appendix A

12.1 Operating Temperature Specification Limits

Table 12-1 Operating Temperature Specification Limits

Configuration	Max. Operating Temperature: 30°C (86°F)	Max. Operating Temperature: 35°C (95°F)	Max. Operating Temperature: 40°C (104°F)	Max. Operating Temperature: 45°C (113°F)
8-Socket Configuration (8 × 250 W CPU)	• CPU TDP ≤ 250 W • 64 × RDIMM • 8 × HHHL PCIe expansion card • 24 × SATA/SAS/ NVMe drive • 4 × SFF OCP 3.0 card • 2 × M.2 SSD • GPUs not supported	• CPU TDP ≤ 250 W • 64 × RDIMM • 8 × HHHL PCIe expansion card • 24 × SATA/SAS/ NVMe drive (NVMe drive TDP ≤20 W) • 4 × SFF OCP 3.0 card • 2 × M.2 SSD • GPUs not supported	• CPU TDP ≤ 250 W • 64 × RDIMM (128 GB DIMMs not supported) • 4 × HHHL PCIe expansion card (≤25 Gb, AOC not supported) • 24 × SATA/SAS drive (≤480 GB) • NVMe drives not supported • 4 × SFF OCP 3.0 card (≤25 Gb, AOC not supported) • 2 × M.2 SSD (≤960 GB)	• CPU TDP ≤ 250 W • 64 × RDIMM (128 GB DIMMs not supported) • 4 × HHHL PCIe expansion card (≤25 Gb, AOC not supported) • 24 × SATA/SAS drive (≤480 GB) • NVMe drives not supported • 4 × SFF OCP card (≤25 Gb, AOC not supported) • 2 × M.2 SSD (≤960 GB)

Configuration	Max. Operating Temperature: 30°C (86°F)	Max. Operating Temperature: 35°C (95°F)	Max. Operating Temperature: 40°C (104°F)	Max. Operating Temperature: 45°C (113°F)
			• GPUs not supported	• GPUs not supported
8-Socket Configuration (8 × 350 W CPU)	• CPU TDP ≤350 W • 128 × RDIMM • 8 × HHHL PCIe expansion card • 24 × SATA/SAS/ NVMe drive • 4 × SFF OCP 3.0 card • 2 × M.2 SSD • GPUs not supported	• CPU TDP ≤350 W • 128 × RDIMM • 4 × HHHL PCIe expansion card • 24 × SATA/SAS/ NVMe drive (NVMe drive TDP ≤20 W) • 4 × SFF OCP 3.0 card • 2 × M.2 SSD • GPUs not supported	Not supported	Not supported
4-Socket Configuration (4 × 250 W CPU)	• CPU TDP ≤ 250 W • 128 × RDIMM • 4 × HHHL PCIe expansion card • 24 × SATA/SAS/ NVMe drive	• CPU TDP ≤ 250 W • 128 × RDIMM • 2 × HHHL PCIe expansion card • 24 × SATA/SAS/ NVMe drive	Not supported	Not supported

Configuration	Max. Operating Temperature: 30°C (86°F)	Max. Operating Temperature: 35°C (95°F)	Max. Operating Temperature: 40°C (104°F)	Max. Operating Temperature: 45°C (113°F)
	• 2 × SFF OCP 3.0 card • 2 × M.2 SSD • GPUs not supported	(NVMe drive TDP ≤20 W) • 2 × SFF OCP 3.0 card • 2 × M.2 SSD • GPUs not supported		
GPU Configuration (8 × 250 W CPU + 4 × 300 W GPU)	• CPU TDP ≤ 250 W • 128 × RDIMM • 24 × 2.5-inch NVMe drive • 4 × HHHL 300 W GPU • 8 × HHHL PCIe expansion card • 4 × SFF OCP 3.0 card • 2 × M.2 SSD	Not supported	Not supported	Not supported

NOTE

- The maximum operating temperature is 5°C (9°F) lower than the rated value if a single fan fails.
- Single fan failure may affect system performance.

12.2 Model

Table 12-2 Model

Certified Model	Description
KR6880-X2-A0-R0-00	Global

12.3 RAS Features

The server supports a variety of RAS (Reliability, Availability, and Serviceability) features. By configuring these features, the server can provide greater reliability, availability, and serviceability.

12.4 Sensor List

Table 12-3 Sensor Description

Sensor	Description	Sensor Location
Inlet_Temp	Air inlet temperature	Motherboard
CPUx_VR_Temp	CPUx VR temperature	CPUx • x indicates the CPU number with a value of 0 - 7
PSUx_VIN	PSUx input voltage	PSUx • x indicates the PSU number with a value of 0 - 3
PSUx_VOUT	PSUx output voltage	PSUx • x indicates the PSU number with a value of 0 - 3
SYS_3V3	System 3.3 V voltage	Motherboard
RTC_Battery	Motherboard RTC battery voltage	Motherboard
PVNN_MAIN_CPUx	CPUx voltage	CPUx • x indicates the CPU number with a value of 0 - 7
P12V_CPUx_DIMM	CPUx DIMM voltage	CPUx

Sensor	Description	Sensor Location
		• x indicates the CPU number with a value of 0 - 7
PVNN_PCH_STBY	PCH core voltage	Motherboard
P1V05_PCH_STBY	PCH logic voltage	Motherboard
CPUx_Temp	CPUx core temperature	CPUx • x indicates the CPU number with a value of 0 - 7
CPUx_DTS	CPU_DTS temperature CPU margin temperature before it reaches the throttling frequency	CPUx • x indicates the CPU number with a value of 0 - 7
CPUx_DIMM_Temp	The maximum temperature among DDR5 DIMMs of CPUx	CPUx • x indicates the CPU number with a value of 0 - 7
PCH_Temp	PCH temperature	Motherboard
PSU_Inlet_Temp	PSU temperature	-
Total_Power	Total power	-
FAN_Power	Total fan power	-
PSUx_PIN	PSUx input power	PSUx • x indicates the PSU number with a value of 0 - 3
PSUx_POUT	PSUx output power	PSUx • x indicates the PSU number with a value of 0 - 3
CPU_Power	Total CPU power (obtained through ME)	-
Memory_Power	Total memory power (obtained through ME)	-
FANx_F_Speed, FANx_R_Speed	FANx speed	FANx • x indicates the fan number with a value of 0 - 7

Sensor	Description	Sensor Location
RAID_Temp	PCIe RAID card temperature (The max. temp. will be taken in case of multiple RAID cards, including SAS card, RAID card, and HBA card)	-
HDD_MAX_Temp	The maximum temperature among all drives	-
NVMe_Temp	The maximum temperature among all NVMe drives	-
OCP_NIC_Temp	OCP card temperature (The max. temp. will be taken in case of multiple OCP cards)	-
PCIE_NIC_Temp	PCIe NIC temperature (The max. temp. will be taken in case of multiple PCIe NICs)	-
MEM_ResourceRate	Memory utilization rate	-
CPU_ResourceRate	CPU utilization rate	-
GPUx_Temp	GPUx core temperature	GPUx • x indicates the GPU number with a value of 0 - 3
MB_Inlet_Temp_x	MBx air inlet temperature	-
MB_Outlet_Temp_x	MBx air outlet temperature	-
P3V3_BMC_RGM	BMC RGM 3.3 V voltage	Motherboard
P1V2_BMC_STBY	BMC 1.2 V standby voltage	Motherboard
P1V8_PCH_STBY	PCH 1.8 V standby voltage	Motherboard
P12V_STBY	Motherboard 12 V standby voltage	Motherboard
P2V5_STBY	Motherboard 2.5 V standby voltage	Motherboard
P3V3_STBY	Motherboard 3.3 V standby voltage	Motherboard

Sensor	Description	Sensor Location
P5V_STBY	Motherboard 5 V standby voltage	Motherboard
P1V_STBY	Motherboard 1 V standby voltage	Motherboard
M.2 Inlet	M.2 SSD air inlet temperature	Motherboard
Disk_Power	Drive power	-
CPUx_Status	CPUx status	CPUx • x indicates the CPU number with a value of 0 - 7
SEL_Status	SEL status	-
PSU_Mismatch	Monitored PSU models mismatch	-
PSU_Redundant	PSU redundancy status	-
FANx_Status	FANx status	FANx • x indicates the fan number with a value of 0 - 7
FAN_Redundant	Fan redundancy status	-
PCIe_Status	The status of PCIe device (including PCIe bus, slots and cards)	-
POST_Status	System firmware and POST status	-
PWR_CAP_Fail	Power capping failure	-
CPUN1_CN2DN3	DIMM health status	Motherboard • N1 indicates the CPU number with a value of 0 - 7 • N2 indicates the channel number with a value of 0 - 7 • N3 indicates the DIMM slot number with a value of 0 - 1

Sensor	Description	Sensor Location
CPU_Config	CPU configuration status (mixing of CPUs, or primary CPU not installed)	-
PSUx_Status	PSUx status	PSUx • x indicates the PSU number with a value of 0 - 3
K_HDDx	Drive health status	Drive • K denotes front/internal, with a value of F/I respectively • x indicates the drive number
ACPI_PWR	ACPI status	-
Sys_Health	System health status	-
BMC_Boot_Up	BMC boot up complete	-
BIOS_Boot_Up	BIOS boot up complete	-
ME_FW_Status	ME health status	-
TPM_Verify	TPM verification status	-

13 Appendix B Acronyms and Abbreviations

13.1 A - E

A

AC	Alternating Current
ACPI	Advanced Configuration and Power Interface
AI	Artificial Intelligence
ANSI	American National Standards Institute
AOC	Active Optical Cable
AQSIQ	General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China
ARMA	Advanced Return Material Authorization
AVX	Advanced Vector Extensions

B

BIOS	Basic Input Output System
BLE	BIOS Lock Enable
BMC	Baseboard Management Controller

C

CAS	Column Address Strobe
CB	Certification Body
CCC	China Compulsory Certificate
CEN	European Committee for Standardization
CLI	Command-Line Interface
CMOS	Complementary Metal-Oxide-Semiconductor
CPLD	Complex Programmable Logic Device
CPU	Central Processing Unit

CRPS	Common Redundant Power Supply
CXL	Compute Express Link

D

DC	Direct Current
DDR5	Double Data Rate 5
DIMM	Dual In-line Memory Module
DIP	Dual In-line Package
DL	Deep Learning
DOA	Dead on Arrival
DPC	DIMM Per Channel
DRAM	Dynamic Random-Access Memory
DTS	Digital Thermal Sensor

E

EBG	Emmitsburg
ECC	Error-Correcting Code
ECMA	European Computer Manufacturers Association
ERP	Enterprise Resource Planning
ESD	Electrostatic Discharge

13.2 F - J

F

FHFL	Full-Height Full-Length
FHHL	Full-Height Half-Length
FPGA	Field Programmable Gate Array

G

GPU	Graphics Processing Unit

GUI	Graphical User Interface

H

HANA	High-performance ANalytic Appliance
HBA	Host Bus Adapter
HCA	Host Channel Adapter
HDD	Hard Disk Drive
HHHL	Half-Height Half-Length
HSE	Health and Safety Executive
HTTPS	HyperText Transfer Protocol Secure

I

ID	Identification
IEC	International Electrotechnical Commission
IIPC	Intel Intelligent Power Capability
iMC	Integrated Memory Controller
I/O	Input/Output
IP	Internet Protocol
IPMI	Intelligent Platform Management Interface
ISA	International Society of Automation
ISO	International Organization for Standardization

J

JTAG	Joint Test Action Group

13.3 K - O

K

KVM	Keyboard, Video, Mouse

L

LCD	Liquid Crystal Display
LDAP	Lightweight Directory Access Protocol
LED	Light Emitting Diode

M

MCIO	Mini Cool Edge Input/Output
ME	Management Engine
MTBF	Mean Time Between Failures

N

NBD	Next Business Day
NC-SI	Network Controller Sideband Interface
NIC	Network Interface Card
NIOSH	National Institute for Occupational Safety and Health
NVMe	Non-Volatile Memory Express

O

OCP	Open Compute Project
OS	Operating System

13.4 P - T

P

PCH	Platform Controller Hub
PCIe	Peripheral Component Interconnect Express
PFR	Platform Firmware Resilience
PID	Proportional, Integral, Derivative
POST	Power-On Self-Test
PSU	Power Supply Unit

R

RAID	Redundant Arrays of Independent Disks
RAS	Reliability, Availability, Serviceability
RDIMM	Registered Dual In-line Memory Module
RH	Relative Humidity
RJ45	Registered Jack 45
RMA	Return Material Authorization
RST	Reset
RTC	Real Time Clock

S

SAS	Serial Attached SCSI
SATA	Serial Advanced Technology Attachment
SCSI	Small Computer System Interface
SDP	Single Die Package
SEL	System Event Log
SFF	Small Form Factor
SGX	Software Guard Extensions
SLA	Service Level Agreement
SN	Serial Number
SNMP	Simple Network Management Protocol
SSD	Solid State Drive
SSH	Secure Shell
STBY	Standby
SYS	System

T

TCM	Trusted Cryptography Module
TDP	Thermal Design Power
TF	TransFlash
TPM	Trusted Platform Module

13.5 U - Z

U

UEFI	Unified Extensible Firmware Interface
UID	Unit Identification
UPI	Ultra Path Interconnect
USB	Universal Serial Bus

V

VGA	Video Graphics Array
VLAN	Virtual Local Area Network
VMD	Volume Management Device
VNC	Virtual Network Console
VNNI	Vector Neural Network Instructions
VPP	Virtual Pin Port
VR	Voltage Regulator
VRD	Voltage Regulator-Down
VROC	Virtual RAID on CPU