KAYTUS

White Paper for

KAYTUS KR6288V2 Series Servers

Powered by Intel Processors

For KR6288-X2-A0-R0-00

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Applicable Model

Model	Maintenance	Cooling
KR6288-X2-A0-R0-00	Rear access	Air cooling

Technical Support

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Preface

Abstract

This document describes the KR6288V2 Intel-based server's appearance, features, performance parameters, and software and hardware compatibility, providing in-depth information of KR6288V2.

Intended Audience

This white paper 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	2023/09/12	Initial release
V1.1	2023/10/26	Optimized the contents in Chapter 1 Product Overview

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1 Product Overview

The KR6288V2 Intel-based system is a 6U AI server. It delivers a new generation training platform compatible with multiple architectures. It features superior performance, extreme scalability and flexible deployment. It is ideal for ultra-large data center deployment in application scenarios such as ultra-large model training, meta-universe, natural language understanding (NLU), and recommendation.

Based on an advanced topology, the system can house two 4th Gen Intel Xeon Scalable processors (Sapphire Rapids) and 8 NVIDIA Hopper 700 W GPUs in a 6U space, delivering unparalleled computing power density. With NVIDIA NVSwitch interconnect fabric, any two GPUs can have direct P2P data communication. The server supports a total GPU memory capacity of 640 GB and a total GPU memory bandwidth of 26.8 TB/s. It accommodates 12 PCIe 5.0 x16 expansion slots, achieving an ultimate GPU:IB for computing:IB for storage devices ratio of 8:8:2. The system supports up to 4.0 Tbps network bandwidth and 128 TB NVMe SSDs, which can meet the demand for parallel training of super-large models with trillion-level parameters. The discrete 12 V PSUs for the motherboard and 54 V PSUs for the GPUs offer a higher system energy efficiency ratio over the predecessor; layered and isolated air flow to the GPU and to the motherboard brings optimal cooling efficiency. In addition, the excellent and reliable redundancy design, including 12 V PSUs with 1+1 redundancy, 54 V PSUs with 3+3 redundancy, and motherboard fan modules with N+1 redundancy and rear fan modules with N+1 redundancy for cooling, makes the system perfect for data center deployment, providing customers with unprecedented reliability and stability.

Figure 1-1 KR6288V2 Intel-based System
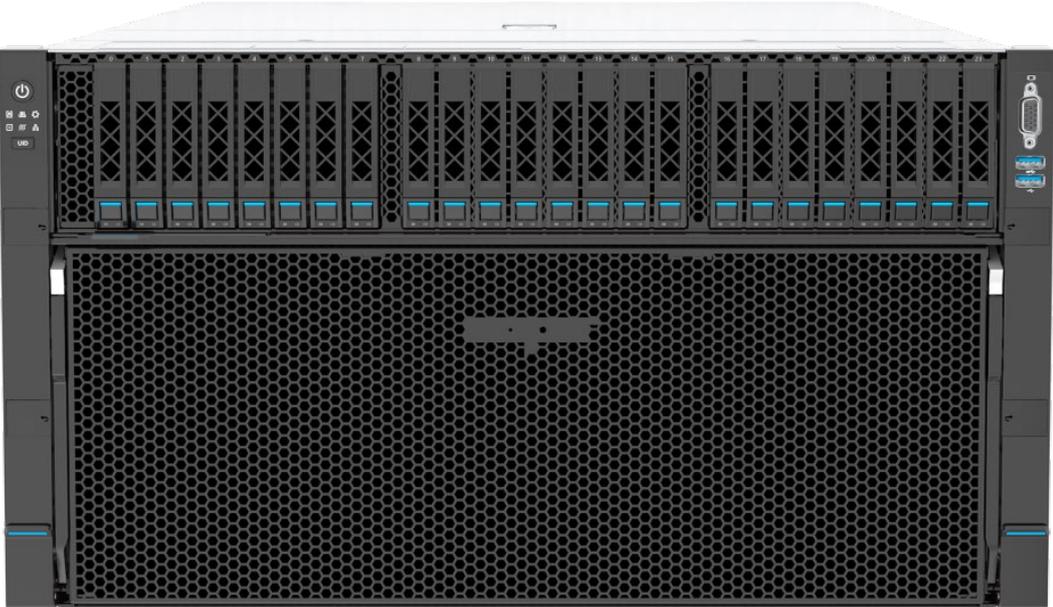
2 Features

2.1 Scalability and Performance

- Features the 4ᵗʰ Gen Intel Xeon Scalable processors (Sapphire Rapids), with up to 56 cores per processor, a max base frequency of 2.6 GHz, a max Turbo frequency of 3.8 GHz, an L3 cache up to 2.8 MB per core, and 3 UPI links per CPU at up to 16 GT/s, delivering unrivaled processing performance.

  - 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 for L3 cache capacity.

  - 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 assist for the virtualization software, allowing the operating system to better use hardware for handling virtualized workloads.

  - Supports Intel Advanced Vector Extensions 512 (Intel AVX-512), significantly accelerating the workloads that are strongly floating point compute intensive.

- Supports up to 32 DDR5 ECC DIMMs (4,800 MT/s, RDIMMs), delivering superior speed, high availability, and a memory capacity up to 4 TB.

- Flexible drive configurations provide elastic and scalable storage solutions to meet different capacity and upgrade requirements.

- Delivers all-SSD configuration, bringing higher I/O performance over all-HDD configuration or HDD-SSD mixing configuration.

- Offers 24 Gbps serial attached SCSI (SAS 4.0), doubling the data transfer rate of internal storage of 12 Gbps SAS (SAS 3.0) solution and maximizing the performance of storage I/O-intensive applications.

- With the Intel integrated I/O technology, the processors integrate the PCIe 5.0 controller to significantly reduce I/O latency and enhance overall system performance.

- Brand new CXL 2.0 technology built on PCIe 5.0 enables resource sharing among different PCIe devices.

- Up to 12 PCIe 5.0 expansion slots (populated with up to 11 PCIe expansion cards).

- One hot-plug OCP slot that can flexibly support one 10/25/100 Gb OCP 3.0 card.

2.2 Availability and Serviceability

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

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

- The BMC management network port on the rear panel enables local ISBMC O&M, improving O&M efficiency.

- Up to 2 hot-swap 12 V PSUs with 1+1 redundancy and 6 hot-swap 54 V PSUs with 3+3 redundancy; 6 hot-swap motherboard fan modules with N+1 redundancy and 6 rear hot-swap fan modules with N+1 redundancy respectively, improving system availability.

- The ISBMC monitors system parameters in real time and sends alerts in advance, enabling technicians to take appropriate measures to ensure stable system operation and minimize system downtime.

- Online memory diagnosis helps service technicians quickly locate the failed DIMMs, improving maintenance efficiency.

2.3 Manageability and Security

- The ISBMC monitors system operating status and enables remote management.

- The Network Controller Sideband Interface (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 ISBMC.

- The industry-standard UEFI improves the efficiency of setup, configuration and update, and simplifies the error handling process.

- Intel Platform Firmware Resilience (PFR) further protects BMC and BIOS firmware from malicious tampering, detects and automatically restores corrupted firmware, thus avoiding intrusions into the system.

- Trusted Platform Module (TPM) 2.0 and Trusted Cryptography Module (TCM) provide advanced encryption.

- Intel Trusted Execution Technology provides enhanced security through hardware-based resistance to malicious software attacks.

- 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 protects BMC from malicious tampering.

- Flexible BMC access control policies improve BMC management security.

- Chassis intrusion detection enhances physical security.

📄 NOTE

The NC-SI port supports the following features:
- The NC-SI port can be bonded to any network port of the OCP 3.0 card or of PCIe NIC that supports NC-SI.
- Supports the enablement/disablement and configuration of Virtual Local Area Network ID (VLAN ID). VLAN is disabled by default.
- Supports IPv6 and IPv4 addresses. IP address, subnet mask, default gateway, and prefix length of IPv6 address can be configured.

⚠️ CAUTION

UEFI mode is supported by default. If Legacy mode is needed, contact our Customer Service.

2.4 Energy Efficiency

- Equipped with 80 Plus Platinum/Titanium power supplies of different power efficiency levels, with power efficiency up to 96% at a load of 50%.

- Supports two 12 V PSUs with 1+1 redundancy and six 54 V PSUs with 3+3 redundancy, supports AC/DC power input, improving power conversion efficiency.

- Features the high-efficiency single-board voltage regulator down (VRD) solution, reducing DC-DC conversion loss.

- Supports Proportional-Integral-Derivative (PID) intelligent fan speed control and intelligent CPU frequency scaling, conserving energy.

- Offers a fully-optimized system cooling design with energy-efficient cooling fans, lowering energy consumption from system cooling.

- Provides power capping and power control measures.

- Supports staggered spin-up of drives, reducing power consumption during server startup.

- Supports Intel Intelligent Power Capability (IIPC) to optimize energy usage in the processor cores by turning computing functions on only when needed.

- Supports the 4th Gen Intel Xeon Scalable processors (Sapphire Rapids), consuming less energy per core, improving energy efficiency, and reducing operation cost per unit.

3 System Parts Breakdown

Figure 3-1 Exploded View
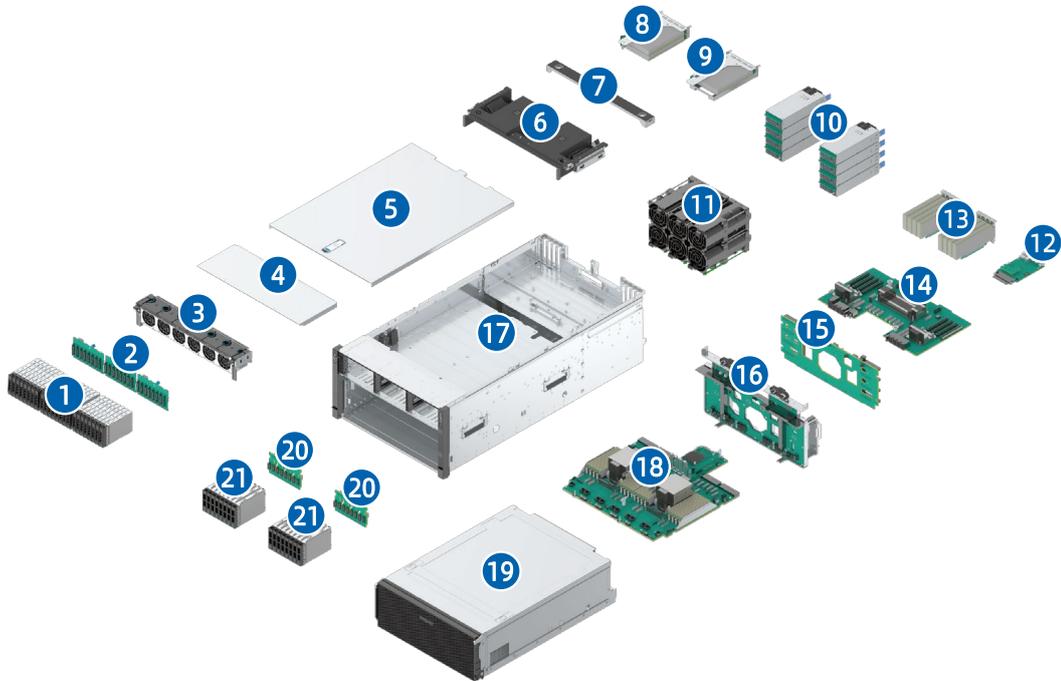
Item	Feature	Item	Feature
1	2.5-inch Drive × 24 (or 2.5-inch Drive × 16/8)	12	DC-SCM Board
2	2.5-inch Drive Backplane × 3	13	LP Card × 8
3	Motherboard Fan Module × 6	14	Switch Board
4	Middle Top Cover	15	PDB Board (with rear fan connectors)
5	Rear Top Cover	16	Mid-plane Board
6	Air Duct Module	17	Chassis
7	Reinforcement Crossbar	18	Motherboard
8	PCIe Riser Module (for up to 2 PCIe expansion cards)	19	GPU Box
9	PCIe Riser Module (for 1 PCIe expansion card and 1 OCP 3.0 card)	20	E3.S SSD Backplane × 2
10	PSU × 8 (two 12 V PSUs and six 54 V PSUs)	21	E3.S SSD × 16
11	Rear Fan Module × 6	-	-

4 Logical Diagram

4.1 System Logical Diagram

Figure 4-1 Motherboard Logical Diagram
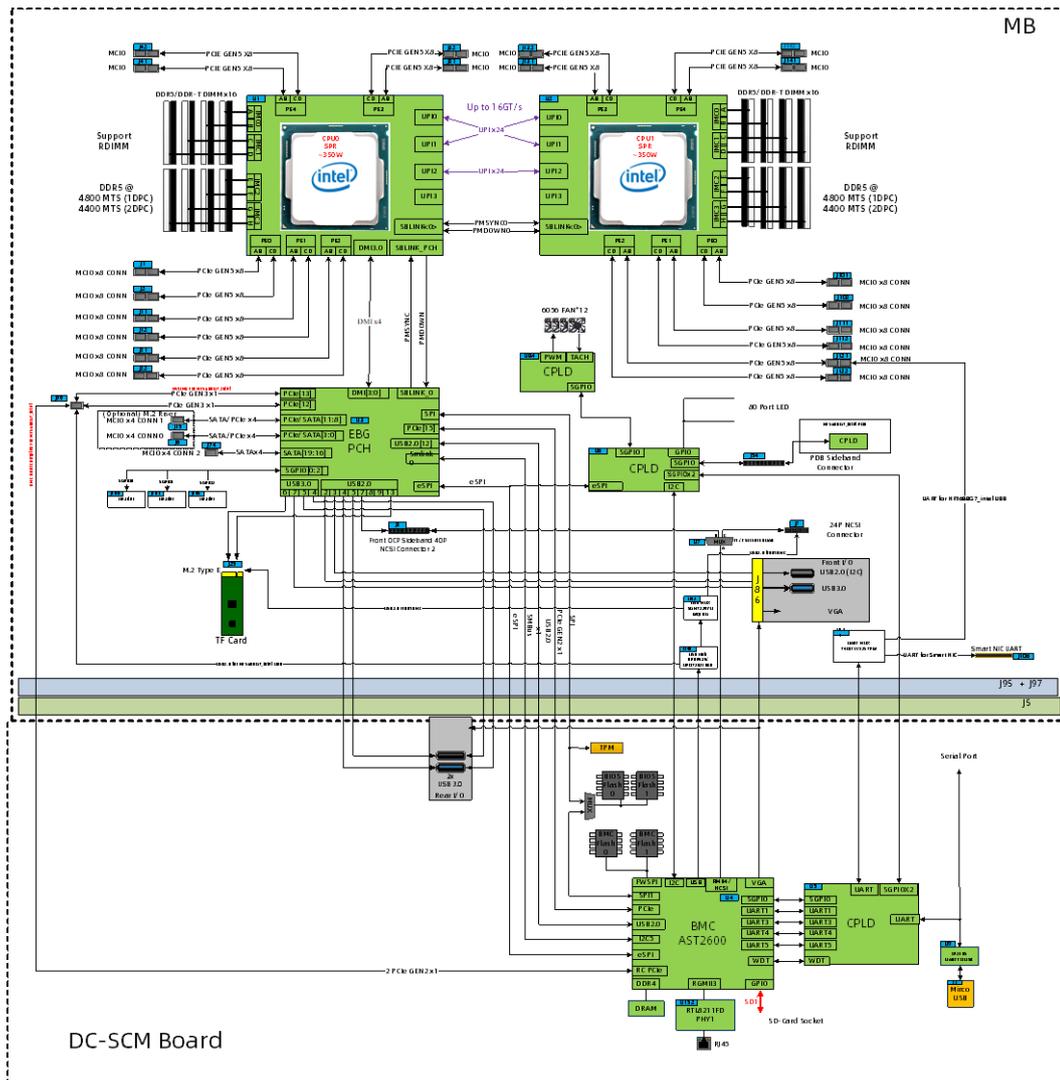
- Two 4th Gen Intel Xeon Scalable processors (Sapphire Rapids).

- Up to 32 DIMMs.

- Up to 3 UPI links per CPU at up to 16 GT/s.

- Up to 12 PCIe 5.0 expansion slots. CPU0 supports 1 single-host OCP 3.0 card or CPU0 and CPU1 support 1 socket-direct OCP 3.0 card.

- Multiple local storage configurations are supported through different drive backplanes.

- The motherboard integrates the Emmitsburg (EBG) Platform Controller Hub (PCH) to support 3 USB 3.0 ports, 1 USB 2.0 port, eight 2.5-inch SATA 3.0 drives or 2 SATA M.2 or 2 NVMe M.2 SSDs, and 1 or 2 TF cards via 1 TF card adapter.

- The DC-SCM board integrates an AST2600 management chip and supports 1 VGA port, 1 BMC management network port, 1 system/BMC serial port, 1 TF card slot, and other connectors.

4.2 PCIe Logical Diagram

Figure 4-2 PCIe Topology Logical Diagram
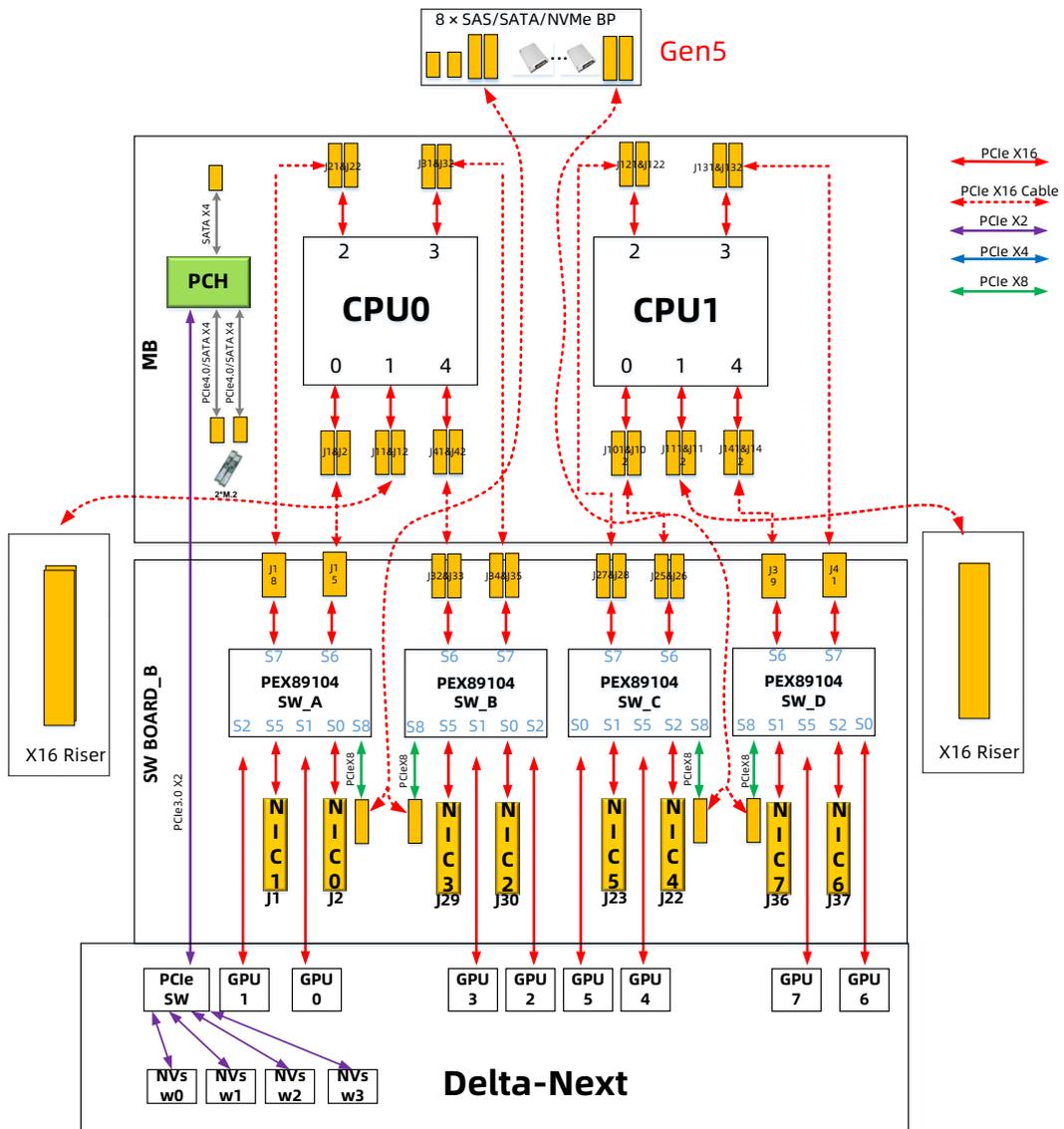
- The PCIe switch employs Broadcom's latest Atlas2 104-lane PCIe switch chip in internal Synthetic Switch mode (iSSw) mode.

- PE0/PE2/PE3/PE4 of each CPU is connected to 2 PCIe switches, and each PCIe switch has 2 uplink ports and 6 downlink ports; the 6 downlink ports can be connected to 2 GPUs, 2 NICs and 2 NVMe drives, maximizing PCIe utilization.

- The system can be equipped with NVIDIA Hopper HGX 8-GPU baseboard in application scenarios of large-scale AI training such as search, recommendation, Natural Language Processing (NLP), Computer Vision (CV) and autopilot. It can meet the computing power demand of large-scale AI training applications and match the AI application needs of cloud service, Intelligent Virtual Assistant (IVA), finance and education and research.

5 Hardware Description

5.1 Front Panel

5.1.1 24 × 2.5-inch Drive Configuration

> 📄 NOTE
>
> Applicable model: KR6288-X2-A0-R0-00.

Figure 5-1 Front View
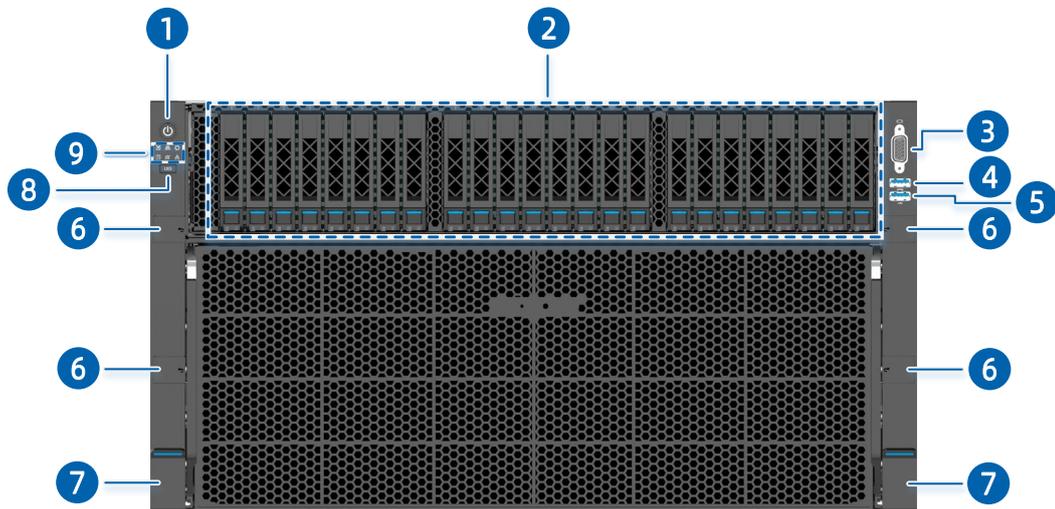
Item	Feature
1	Power Button and LED
2	Drive Bay × 24
3	VGA Port
4	USB 3.0 Port
5	USB 2.0 Port
6	Server Fixing Screw Cover × 4
7	Ear Latch × 2
8	UID/BMC RST Button and LED
9	LEDs

5.1.2　16 × 2.5-inch Drive Configuration

📄 NOTE

Applicable model: KR6288-X2-A0-R0-00.

Figure 5-2 Front View
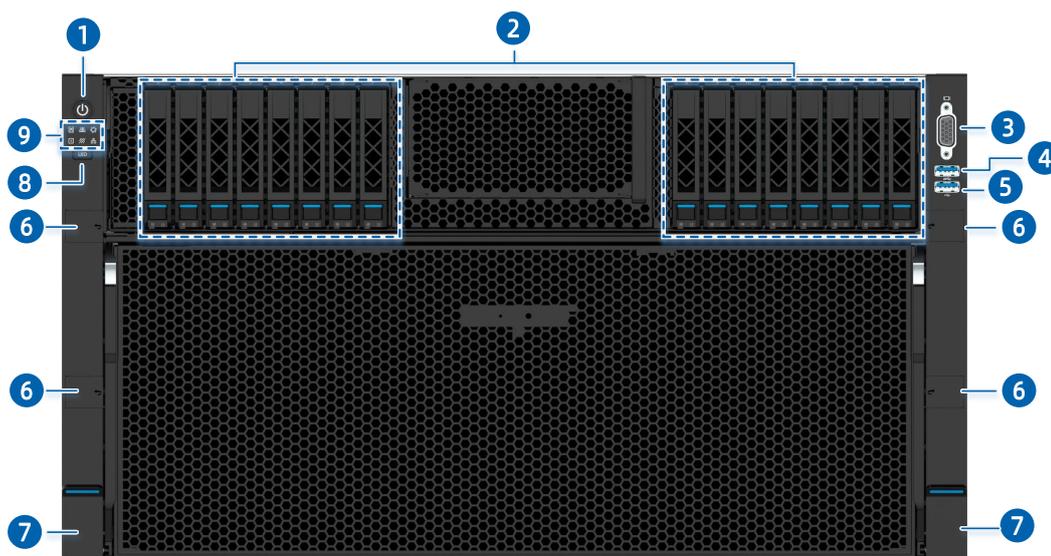
Item	Feature
1	Power Button and LED
2	Drive Bay × 16
3	VGA Port
4	USB 3.0 Port
5	USB 2.0 Port
6	Server Fixing Screw Cover × 4
7	Ear Latch × 2
8	UID/BMC RST Button and LED
9	LEDs

5.1.3　16 × E3.S SSD Configuration

📄 NOTE

Applicable model: KR6288-X2-A0-R0-00.

Figure 5-3 Front View
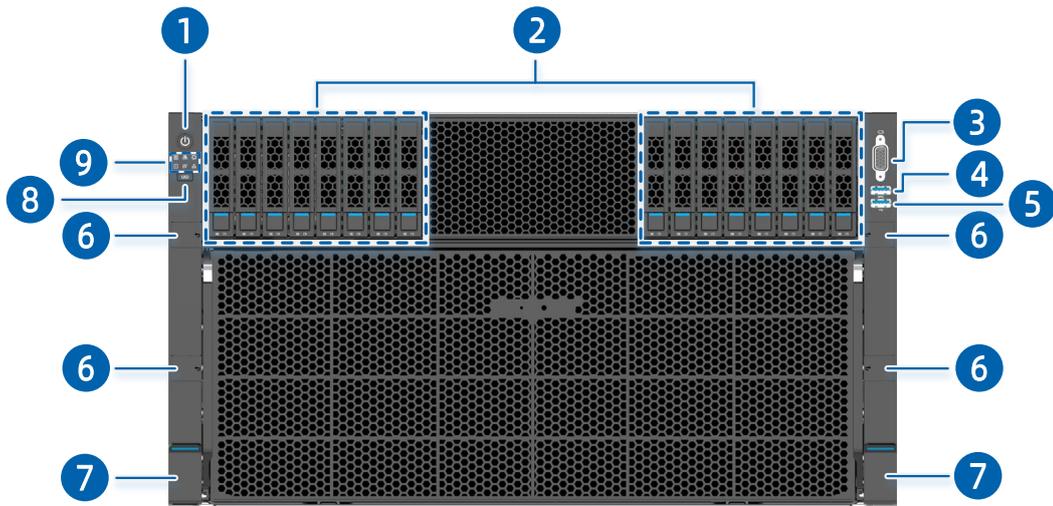
Item	Feature
1	Power Button and LED
2	E3.S Drive Bay × 16
3	VGA Port
4	USB 3.0 Port
5	USB 2.0 Port
6	Server Fixing Screw Cover × 4
7	Ear Latch × 2
8	UID/BMC RST Button and LED
9	LEDs

5.1.4 8 × 2.5-inch Drive Configuration

📄 NOTE

Applicable model: KR6288-X2-A0-R0-00.

Figure 5-4 Front View
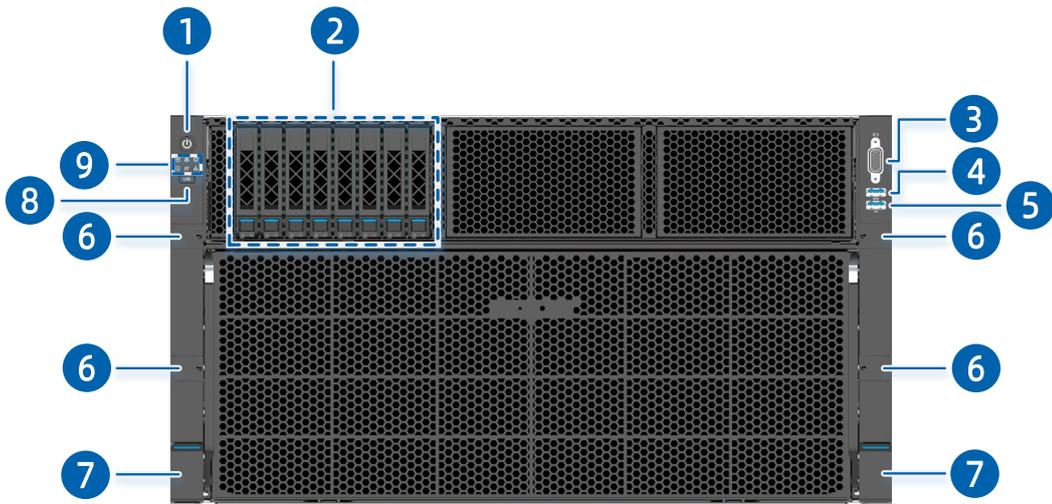
Item	Feature
1	Power Button and LED
2	Drive Bay × 8
3	VGA Port
4	USB 3.0 Port
5	USB 2.0 Port
6	Server Fixing Screw Cover × 4
7	Ear Latch × 2
8	UID/BMC RST Button and LED
9	LEDs

5.2 Rear Panel

📄 NOTE

Applicable model: KR6288-X2-A0-R0-00.

Figure 5-5 Rear View
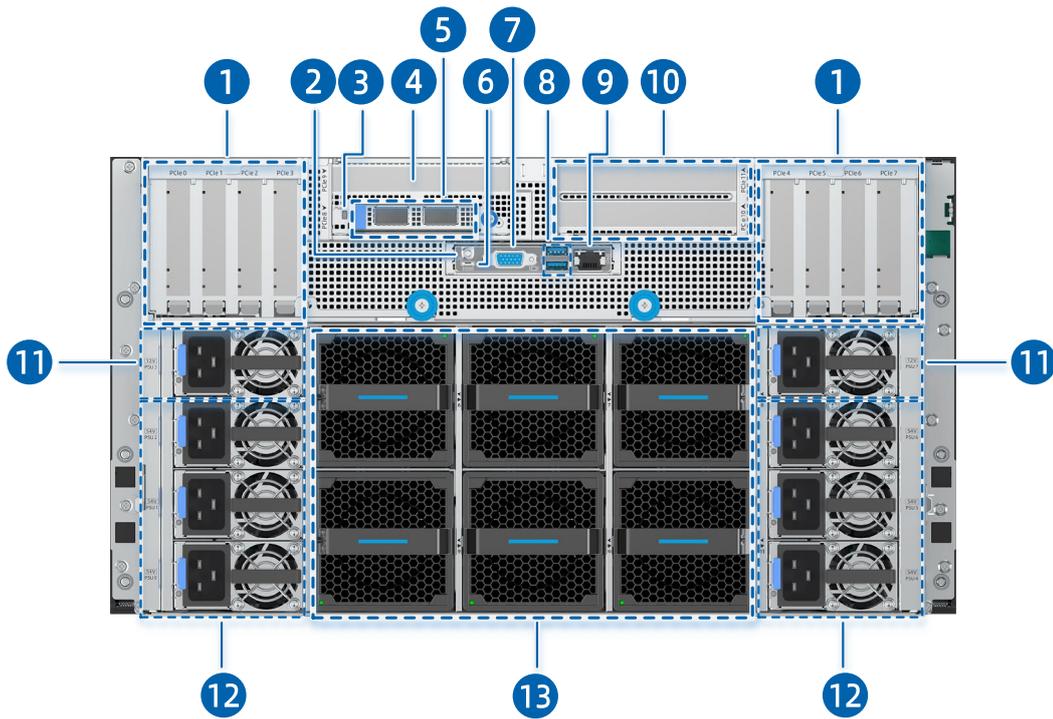
Item	Feature	Item	Feature
1	LP Card Slot × 8	8	USB 3.0 Port × 2
2	UID/BMC RST Button and LED	9	BMC Management Network Port
3	OCP Hot-Plug Button and LED	10	PCIe Riser Module (PCIe Slot 10 and 11)
4	PCIe Slot 9	11	12 V PSU × 2
5	OCP 3.0 Card (occupies PCIe slot 8)	12	54 V PSU × 6
6	System/BMC Serial Port	13	Rear Fan Module × 6
7	VGA Port	-	-

5.3 LEDs and Buttons

Table 5-1 LED and Button Description

Item	Icon	Feature	Description
1	⏻	Power Button and LED	Power LED: • Off = No power • Solid green = Power-on state

Item	Icon	Feature	Description
			• 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.
2		System Status LED	• Off = Normal
			• Flashing red (1 Hz) = A warning error is detected on CPU, memory, power supply, drive, fan, etc.
			• Solid red = A critical error is detected on CPU, memory, power supply, drive, fan, etc.
3		Memory Status LED	• Off = Normal
			• Flashing red (1 Hz) = A warning error occurs
			• Solid red = A critical error occurs
4		Fan Status LED	• Off = Normal
			• Flashing red (1 Hz) = A warning error occurs
			• Solid red = A critical error occurs, including fan failure and fan absence
5		Power Status LED	• Off = Normal
			• Flashing red (1 Hz) = A warning error occurs
			• Solid red = A critical error occurs
6		System Overheat LED	• Off = Normal
			• Flashing red (1 Hz) = A warning error occurs, including Proc Hot, resulting in CPU throttling

Item	Icon	Feature	Description
			• Solid red = A critical error occurs, including CPU Thermal Trip/PCH Hot/MEM Hot, etc.
7		Network Status LED	• Off = No network connection • Flashing green = Network connected with data being transmitted • Solid green = Network connected without data being transmitted Note: It only indicates the status of the self-developed OCP card.
8	UID	UID/BMC RST Button and LED	• Solid blue = The UID LED is activated by the UID button or via the BMC • Gradually turn blue within 2 seconds and then gradually turn off within 2 seconds = PFR is booting normally • Press and hold the button for 6 seconds to force a BMC reset
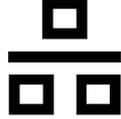
5.4 Port Description

Table 5-2 Port Description

Item	Port	Description
1	VGA Port	Enables you to connect a display terminal, for example, a monitor, to the system.
2	USB 3.0 Port	Enables you to connect a USB 3.0 device to the system. Note: Make sure that the USB device is in good condition or it may cause the server to work abnormally.
3	USB 2.0 Port	Enables you to connect a USB 2.0 device to the system Note: Make sure that the USB device is in good condition or it may cause the server to work abnormally.
4	System/BMC Serial Port	• Enables you to capture system or BMC logs and debug the BMC.

Item	Port	Description
		• Enables you to print system logs.
5	BMC Management Network Port	ISBMC management network port, used to manage the server. Note: It is a Gigabit Ethernet port that supports 10 Mbps, 100 Mbps and 1,000 Mbps auto-negotiation.
6	OCP Network Port	Enables you to connect the system to the network.

5.5 Processors

- Two 4th Gen Intel Xeon Scalable processors.

- The processors used in a server must bear the same model.

For specific system processor options, consult your local sales representative.

Figure 5-6 Processor Locations
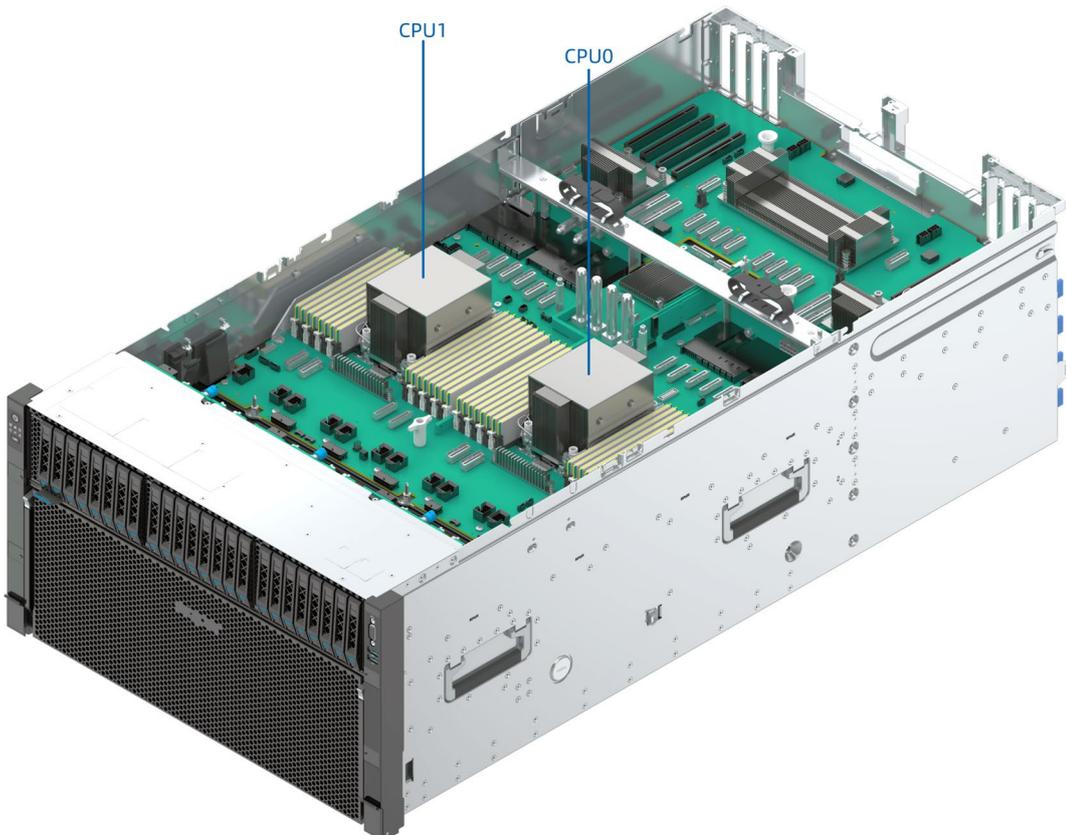
5.6 Memory

5.6.1 DDR5 DIMMs

1. Identification

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

Figure 5-7 DIMM Identification
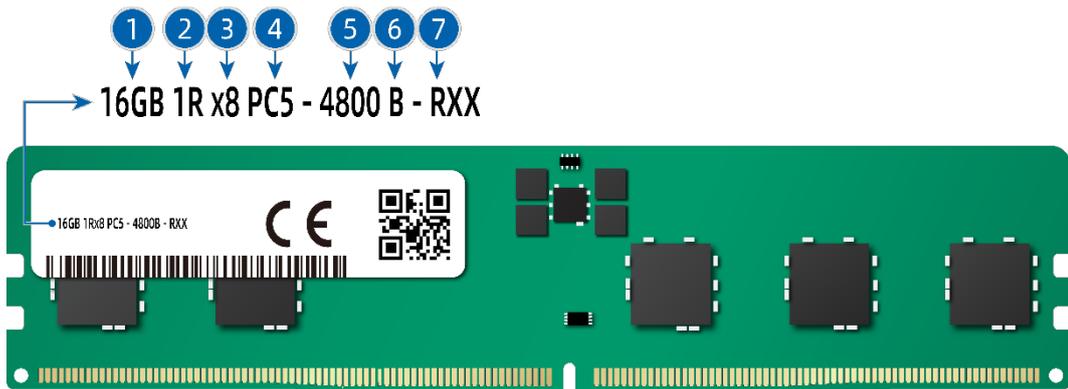
Item	Description	Example
1	Capacity	• 16 GB • 32 GB • 64 GB • 128 GB • 256 GB
2	Rank(s)	• 1R = Single rank • 2R = Dual rank • 2S2R = Two ranks of two high stacked 3DS DRAM • 2S4R = Four ranks of two high stacked 3DS DRAM • 4R = Quad rank
3	Data width of DRAM	• x4 = 4 bits • x8 = 8 bits

Item	Description	Example
4	DIMM slot type	PC5 = DDR5
5	Maximum memory speed	• 4,800 MT/s • 5,600 MT/s
6	CAS latency	• SDP 4800B = 40-39-39 • 3DS 4800B = 46-39-39 • SDP 5600B = 46-45-45 • 3DS 5600B = 52-45-45
7	DIMM type	R = RDIMM

2. Memory Subsystem Architecture

The server supports 32 DIMM slots and 8 memory channels per CPU.

Within a channel, populate the DIMM slot with its silk screen ending with D0 first and second the DIMM slot with its silk screen ending with D1. For instance, within CPU0 Channel 0, populate CPU0_C0D0 first and second CPU0_C0D1.

Table 5-3 DIMM Slot List

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

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

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 DIMM specifications (capacity, bit width, rank, height, etc.) is not supported.
> - For specific system memory options, consult your local sales representative.

- DDR5 DIMMs can be used with the 4th Gen Intel Xeon Scalable processors (Sapphire Rapids). The maximum memory capacity supported is identical for different CPU models.

- The total memory capacity is the sum of the capacities of all DDR5 DIMMs.

> **NOTE**
>
> Maximum number of DIMMs supported per channel ≤ Maximum number of ranks

supported per channel/Number of ranks per DIMM

Table 5-4 DDR5 DIMM Specifications

Item	Value			
Capacity per DDR5 DIMM (GB)	16	32	64	128
Type	RDIMM	RDIMM	RDIMM	RDIMM
Rated speed (MT/s)	4,800	4,800	4,800	4,800
Operating voltage (V)	1.1	1.1	1.1	1.1
Maximum number of DDR5 DIMMs supported in a server[1]	32	32	32	32
Maximum capacity of DDR5 DIMMs supported in a server (GB)[2]	512	1,024	2,048	4,096
Actual speed (MT/s)	1DPC[3]	4,800	4,800	4,800	4,800
	2DPC	4,400	4,400	4,400	4,400

1. The maximum number of DDR5 DIMMs supported is based on the dual-CPU configuration.

2. It indicates the maximum memory capacity supported when all the DIMM slots are populated with DDR5 DIMMs.

3. DPC (DIMM Per Channel) is the number of DIMMs per memory channel.

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

4. Population Rules

General population rules for DDR5 DIMMs:

● Install DIMMs only when the corresponding processor is installed.

● Install dummies in the empty DIMM slots.

Population rules for DDR5 DIMMs in specific modes:

● Memory sparing

  - Follow the general population rules.

  - Each channel must have a valid online spare configuration.

- Each channel can have a different online spare configuration.

- Each channel with a DIMM installed must have a spare rank.

● Memory mirroring

- 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. DIMM Slot Layout

Up to 32 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.

Figure 5-8 DIMM Slot Layout
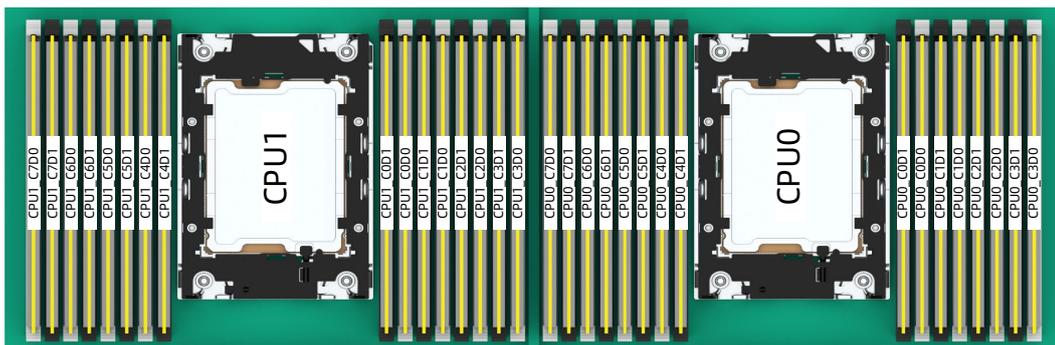
Table 5-5 DDR5 DIMM Population Rules (Dual-CPU Configuration)

DDR QTY		2	4	8	12	16	24	32
CPU0	C0D0	●	●	●	●	●	●	●
	C0D1						●	●
	C1D0					●	●	●
	C1D1							●
	C2D0			●	●	●	●	●
	C2D1						●	●
	C3D0				●	●	●	●
	C3D1							●
	C4D0			●	●	●	●	●
	C4D1						●	●
	C5D0				●	●	●	●
	C5D1							●
	C6D0		●	●	●	●	●	●
	C6D1						●	●
	C7D0					●	●	●
	C7D1							●
CPU1	C0D0	●	●	●	●	●	●	●
	C0D1						●	●
	C1D0					●	●	●
	C1D1							●
	C2D0			●	●	●	●	●
	C2D1						●	●
	C3D0				●	●	●	●
	C3D1							●
	C4D0			●	●	●	●	●
	C4D1						●	●
	C5D0				●	●	●	●
	C5D1							●
	C6D0		●	●	●	●	●	●
	C6D1						●	●
	C7D0					●	●	●
	C7D1							●

5.7 Storage

5.7.1 Drive Configurations

1. KR6288-X2-A0-R0-00

📄 NOTE

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

Table 5-6 Drive Configurations

Configuration	Front Drives	Internal Drives	Drive Management Mode
24 × 2.5-inch Drive Configuration (8 × NVMe + 16 × SAS/SATA)	• Drive bays with physical drive No. 0 to 7 support NVMe drives only • Drive bays with physical drive No. 8 to 23 support SAS/SATA drives only	M.2 SSD on the M.2 adapter	• NVMe drives: switch board • SAS/SATA drives: 1 RAID card
16 × 2.5-inch Drive Configuration (16 × SAS/SATA)	Drive bays with physical drive No. 0 to 15 support SAS/SATA drives only	M.2 SSD on the M.2 adapter	SAS/SATA drives: 1 or 2 RAID cards
16 × 2.5-inch Drive Configuration (8 × NVMe + 8 × SAS/SATA)	• Drive bays with physical drive No. 0 to 7 support NVMe drives only • Drive bays with physical drive No. 8 to 15 support SAS/SATA drives only	M.2 SSD on the M.2 adapter	• NVMe drives: switch board • SAS/SATA drives: PCH
8 × 2.5-inch Drive Configuration (8 × NVMe)	Drive bays with physical drive No. 0 to 7 support NVMe drives only	M.2 SSD on the M.2 adapter	NVMe drives: switch board
			NVMe drives: 2 tri-mode RAID cards
8 × 2.5-inch Drive Configuration (8 × SAS/SATA)	Drive bays with physical drive No. 0 to 7 support SAS/SATA drives only	N/A	SAS/SATA drives: 1 RAID card

5.7.2 Drive Numbering

● 8 × 2.5-inch Drive Configuration (8 × SAS/SATA drive)

Figure 5-9 Drive Numbering
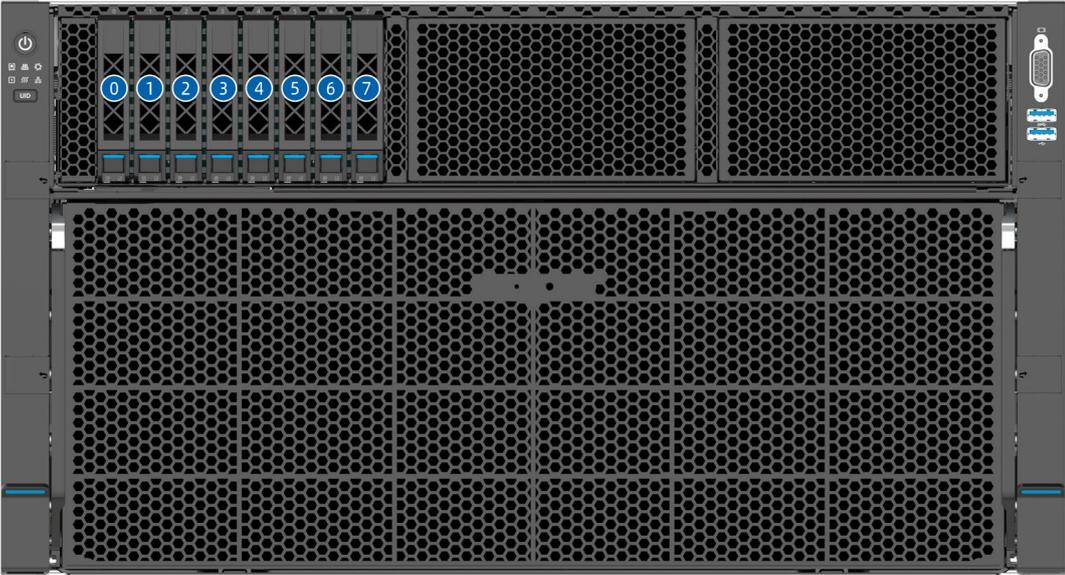
Physical Drive No.	Drive No. Identified by the ISBMC	Drive No. Identified by an 8i RAID Card
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7

● 8 × 2.5-inch Drive Configuration (8 × NVMe drive, drives to backplane to switch board)

Figure 5-10 Drive Numbering

Physical Drive No.	Drive No. Identified by the ISBMC	Drive No. Identified by a RAID Card
0	0	-
1	1	-
2	2	-
3	3	-
4	4	-
5	5	-
6	6	-
7	7	-

● 8 × 2.5-inch Drive Configuration (8 × NVMe drive, drives to backplane to 2 tri-mode RAID cards)

Figure 5-11 Drive Numbering
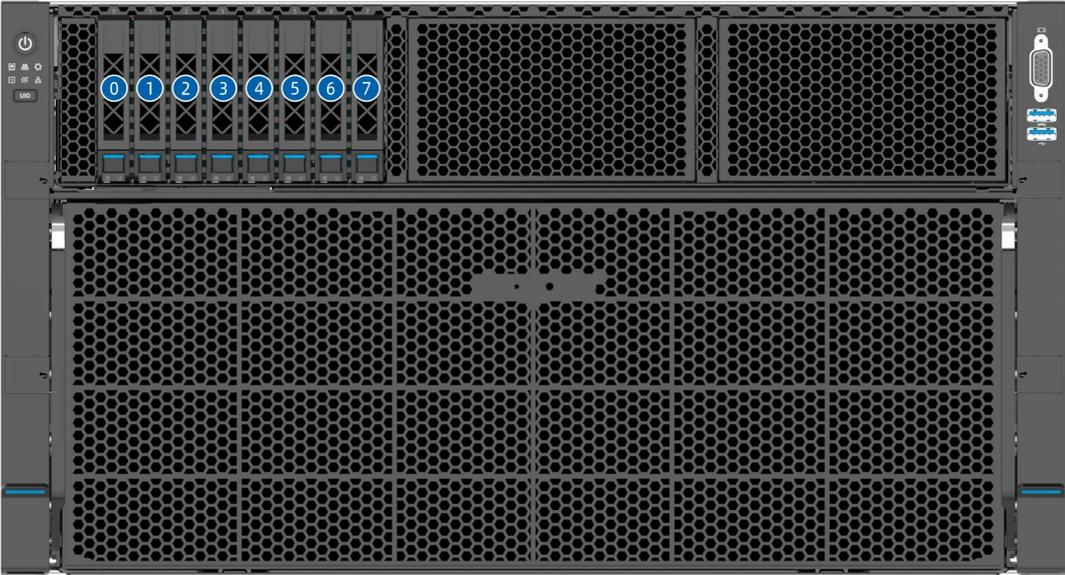
Physical Drive No.	Drive No. Identified by the ISBMC	Drive No. Identified by 2 Tri-Mode RAID Cards
0	0	0
1	1	1
2	2	2
3	3	3
4	4	0
5	5	1
6	6	2
7	7	3

- 16 × 2.5-inch Drive Configuration (16 × SAS/SATA drive, drives to backplane to a 16i RAID cards)

Figure 5-12 Drive Numbering

Physical Drive No.	Drive No. Identified by the ISBMC	Drive No. Identified by a 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
12	12	12
13	13	13
14	14	14
15	15	15

- 16 × 2.5-inch Drive Configuration (16 × SAS/SATA drive, drives to backplane to two 8i RAID cards)

Figure 5-13 Drive Numbering
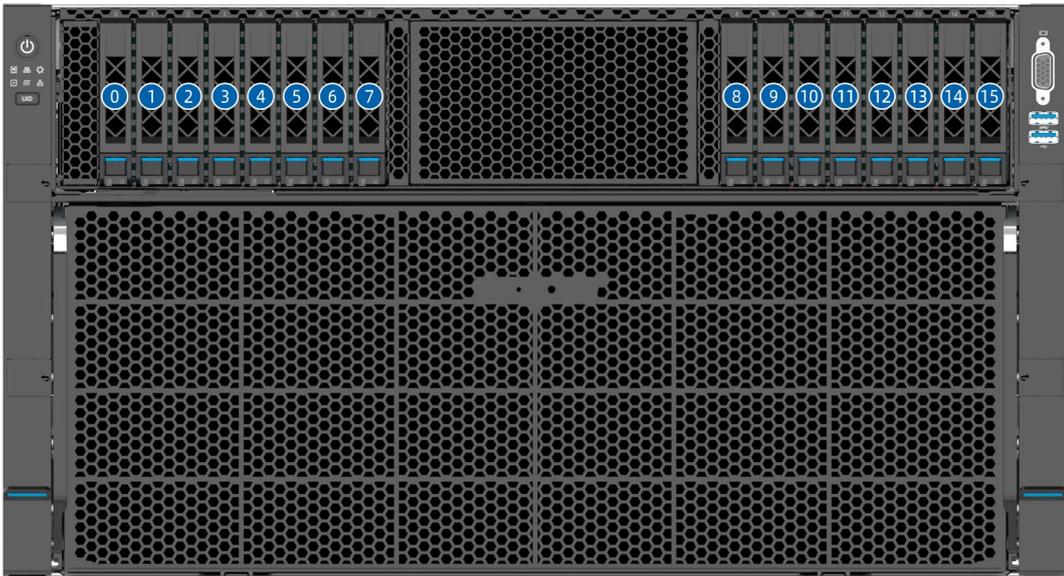
Physical Drive No.	Drive No. Identified by the ISBMC	Drive No. Identified by two 8i RAID Cards
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	0
9	9	1
10	10	2
11	11	3
12	12	4
13	13	5
14	14	6
15	15	7

- 16 × 2.5-inch Drive Configuration (8 × NVMe + 8 × SAS/SATA drive)

Figure 5-14 Drive Numbering

Physical Drive No.	Drive No. Identified by the ISBMC	Drive No. Identified by a RAID Card
0	0	-
1	1	-
2	2	-
3	3	-
4	4	-
5	5	-
6	6	-
7	7	-
8	8	-
9	9	-
10	10	-
11	11	-
12	12	-
13	13	-
14	14	-
15	15	-

● 24 × 2.5-inch Drive Configuration (8 × NVMe + 16 × SAS/SATA drive)

Figure 5-15 Drive Numbering

Physical Drive No.	Drive No. Identified by the ISBMC	Drive No. Identified by a 16i RAID Card
0	0	-
1	1	-
2	2	-
3	3	-
4	4	-
5	5	-
6	6	-
7	7	-
8	8	0
9	9	1
10	10	2
11	11	3
12	12	4
13	13	5
14	14	6
15	15	7
16	16	8
17	17	9
18	18	10

Physical Drive No.	Drive No. Identified by the ISBMC	Drive No. Identified by a 16i RAID Card
19	19	11
20	20	12
21	21	13
22	22	14
23	23	15

5.7.3 Drive LEDs

1. SAS/SATA Drive LEDs

Figure 5-16 SAS/SATA Drive LEDs

Table 5-7 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
Flashing	Off	Off		Drive present and in use
Flashing	Solid pink			Copyback/Rebuild in progress
Solid on	Solid on	Off		Drive selected but not in use
Flashing	Solid on	Off		Drive selected and in use
Off	Solid on	Off		Drive selected but failed

Activity LED (①)	Locator/Error LED (②)		Description
Green	Blue	Red	
-	Off	Solid on	Drive failed

2. NVMe Drive LEDs

Figure 5-17 NVMe Drive LEDs

VMD is not supported by default.

When the NVMe drive is connected to the switchboard via a backplane, RAID is not supported. Only the activity LED functions.

Table 5-8 NVMe Drive LED Description

Activity LED (①)	Description
Green	
Off	Drive absent
Solid on	Drive present but not in use
Flashing	Drive present and in use

When the NVMe drive is connected to a tri-mode RAID card via a backplane, RAID is supported. The drive LED descriptions are indicated in the following table.

Table 5-9 NVMe Drive LED Description – Used with a Tri-Mode RAID card

Activity LED (①)	Error LED (②)		Description
Green	Blue	Red	
Off	Off	Off	Drive absent
Solid on	Off	Off	Drive present but not in use
Flashing	Off	Off	Drive present and in use

Activity LED (①)	Error LED (②)		Description
Green	Blue	Red	
Flashing	Solid pink		Copyback/Rebuild/Initializing/Verifying in progress
Solid on	Solid on	Off	Drive selected but not in use
Flashing	Solid on	Off	Drive selected and in use
Any status	Solid on	Off	Drive selected but failed
Any status	Off	Solid on	Drive failed

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.

5.8 Network

NICs provide network expansion capabilities.

- The PCIe expansion slots support PCIe NICs. Users can select the PCIe NICs as needed.

- For specific NIC options, consult your local sales representative.

5.9 I/O Expansion

5.9.1 PCIe Cards

The PCIe cards provide system expansion capabilities.

- Supports up to 12 PCIe 5.0 expansion slots (populated with up to 11 PCIe expansion cards).

- For specific PCIe card options, consult your local sales representative.

5.9.2 PCIe Slots

1. PCIe Slot Locations

Figure 5-18 PCIe Slot Locations – 12 PCIe Expansion Slots
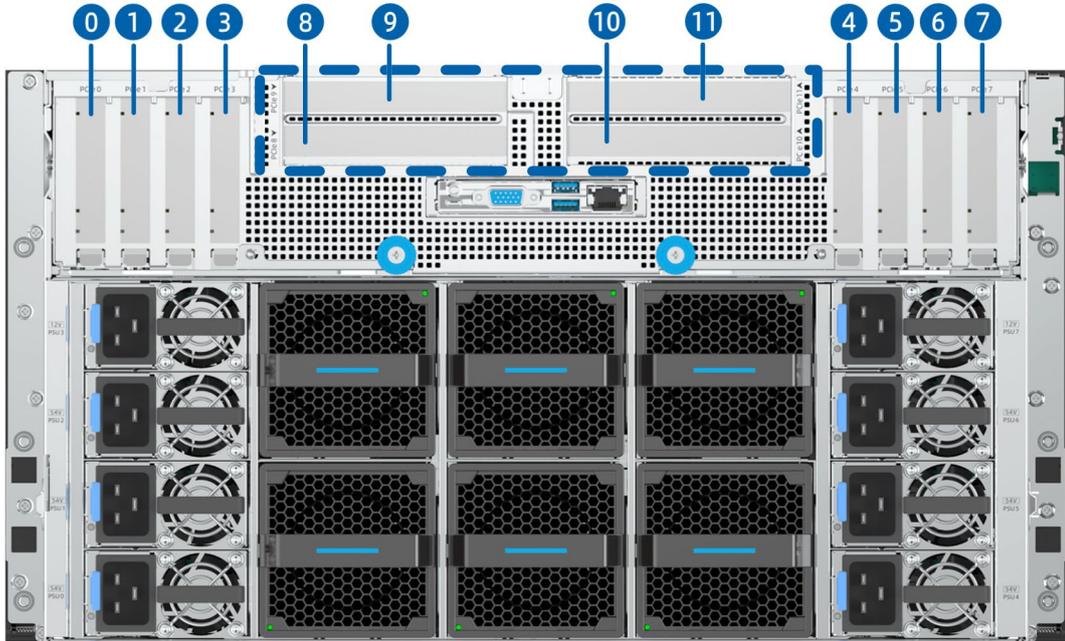
Figure 5-19 PCIe Slot Locations - Including a Dedicated Slot for the OCP 3.0 Card
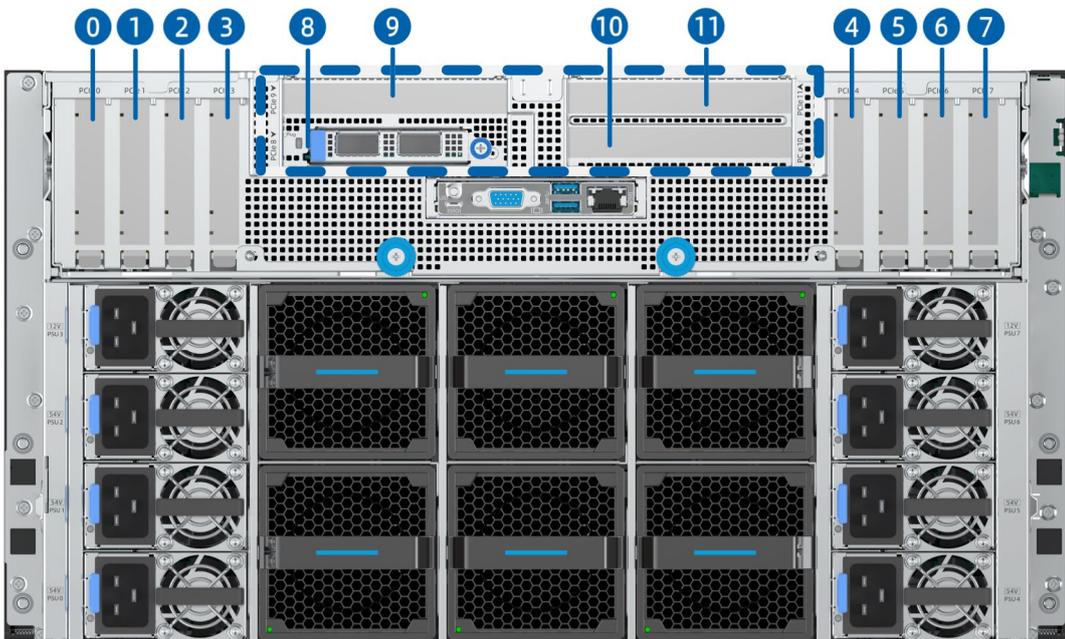
- PCIe slot 8 to PCIe slot 11 can be populated with 3 single-width FHHL cards. PCIe slot 8 can be populated with 1 dual-width FHHL card (occupies PCIe slot 8 and slot 9).

- PCIe slot 8 can be populated with 1 optional OCP 3.0 card.

2. PCIe Riser Modules

- PCIe riser module 0 supports two x16 single-width FHHL PCIe expansion cards. PCIe slot 8 can be populated with 1 dual-width FHHL card (occupies PCIe slot 8 and slot 9).

    - Slot 8 and slot 9 reside in this PCIe riser module.

Figure 5-20 PCIe Riser Module (slot 8 and slot 9)
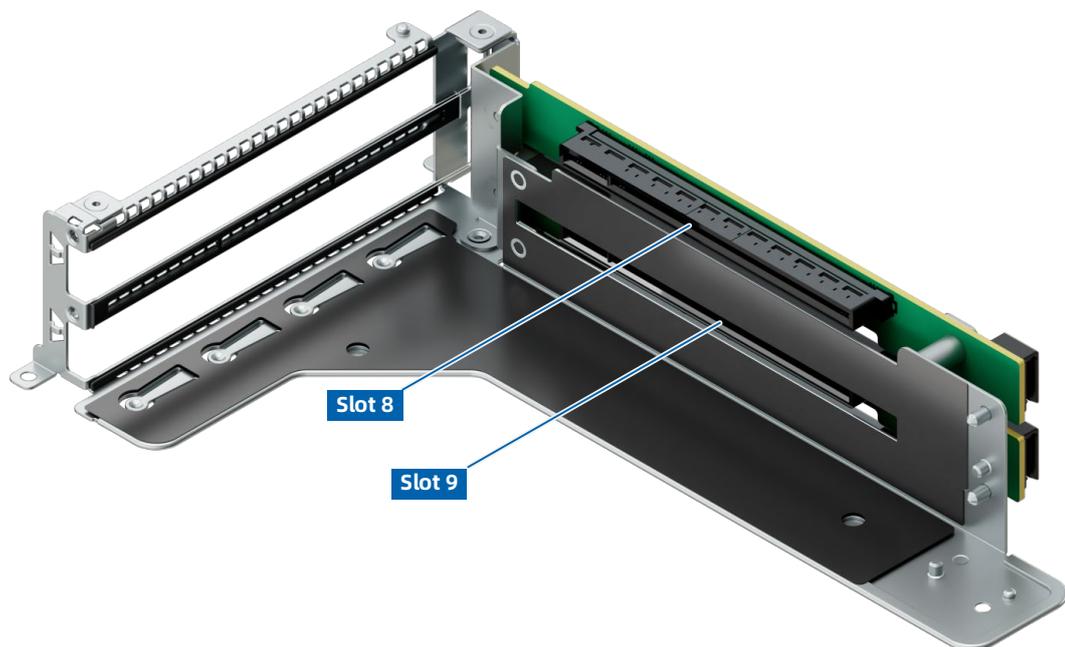
- PCIe riser module 1 supports two x16 single-width FHHL PCIe expansion cards.

    - Slot 10 and slot 11 reside in this PCIe riser module.

Figure 5-21 PCIe Riser Module (slot 10 and slot 11)

Slot 10

Slot 11
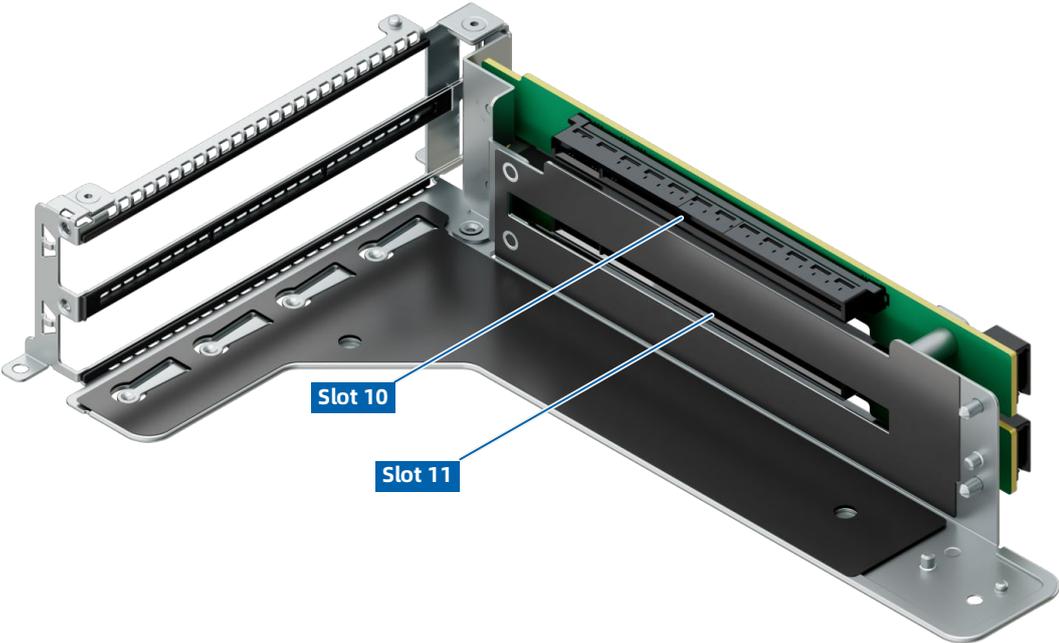
PCIe riser module 2 supports one x16 single-width FHHL PCIe expansion card and one OCP 3.0 card.

- Slot 9 and OCP 3.0 slot (occupies slot 8) reside in the PCIe riser module.

Figure 5-22 PCIe Riser Module 2 (slot 9 and OCP 3.0 slot)

Slot 9

OCP 3.0 Slot
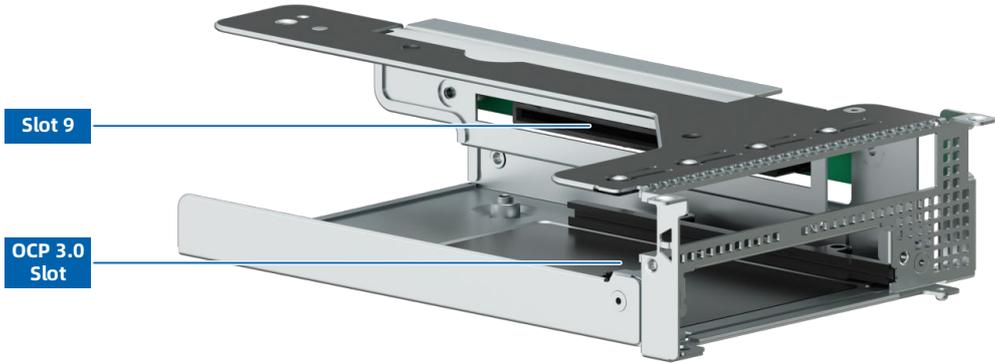
5.9.3 PCIe Slot Description

Table 5-10 PCIe Slot Description

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
Slot 0	SWA	PCIe 5.0	x16	x16	S0	HHHL
Slot 1	SWA	PCIe 5.0	x16	x16	S5	HHHL
Slot 2	SWB	PCIe 5.0	x16	x16	S0	HHHL
Slot 3	SWB	PCIe 5.0	x16	x16	S5	HHHL
Slot 4	SWC	PCIe 5.0	x16	x16	S2	HHHL
Slot 5	SWC	PCIe 5.0	x16	x16	S1	HHHL
Slot 6	SWD	PCIe 5.0	x16	x16	S2	HHHL
Slot 7	SWD	PCIe 5.0	x16	x16	S1	HHHL
Slot 8	CPU0	PCIe 5.0	x16	x8/x16	PE1	FHHL
Slot 9	CPU0	PCIe 5.0	x16	x8	PE1	FHHL
Slot 10	CPU1	PCIe 5.0	x16	x8/x16	PE1	FHHL
Slot 11	CPU1	PCIe 5.0	x16	x8	PE1	FHHL
OCP 3.0 Slot (occupies slot 8)	CPU0	PCIe 5.0	x16	x8 x8	PE1	SFF OCP 3.0

5.10 PSUs

- Up to two 12 V PSUs and six 54 V PSUs.

- When the server is configured with two 12 V PSUs and six 54 V PSUs, the 12 V PSUs support 1+1 redundancy and the 54 V PSUs support 3+3 redundancy.

- Supports AC or DC power input.

- The PSUs are hot-swappable.

- The server must use 12 V PSUs with the same part number (P/N code) and 54 V PSUs with the same part number (P/N code).

- The PSUs feature short-circuit protection.

> **NOTE**
>
> - When the GPU module is installed, at least one 54 V PSU must be used to boot the server.
> - When the GPU module is installed, at least three 54 V PSUs must be used to ensure proper system running and help avoid system crash.

Figure 5-23 PSU Locations
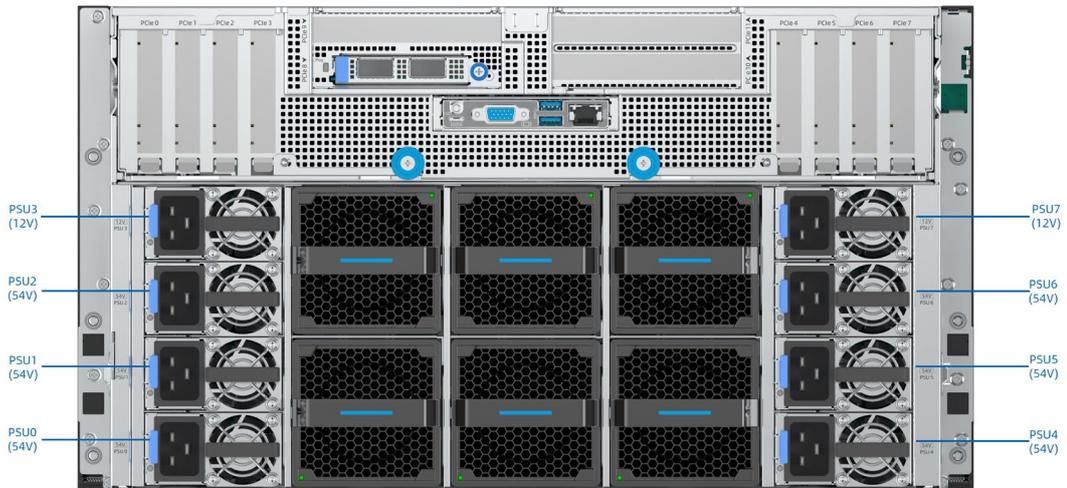
5.11 Fan Modules

- The server supports six 6056 motherboard fan modules and 6 rear 8086 fan modules.

- The fan modules are hot-swappable.

- The 6 motherboard fan modules and 6 rear fan modules support N+1 redundancy, which means that the server can continue working when a single fan fails. The maximum ambient temperature supported is 30°C (86°F) with a single fan failure.

- Supports intelligent fan speed control.

- The server must use motherboard fan modules with the same part number (P/N code) and rear fan modules with the same part number (P/N code).

Figure 5-24 Motherboard Fan Modules
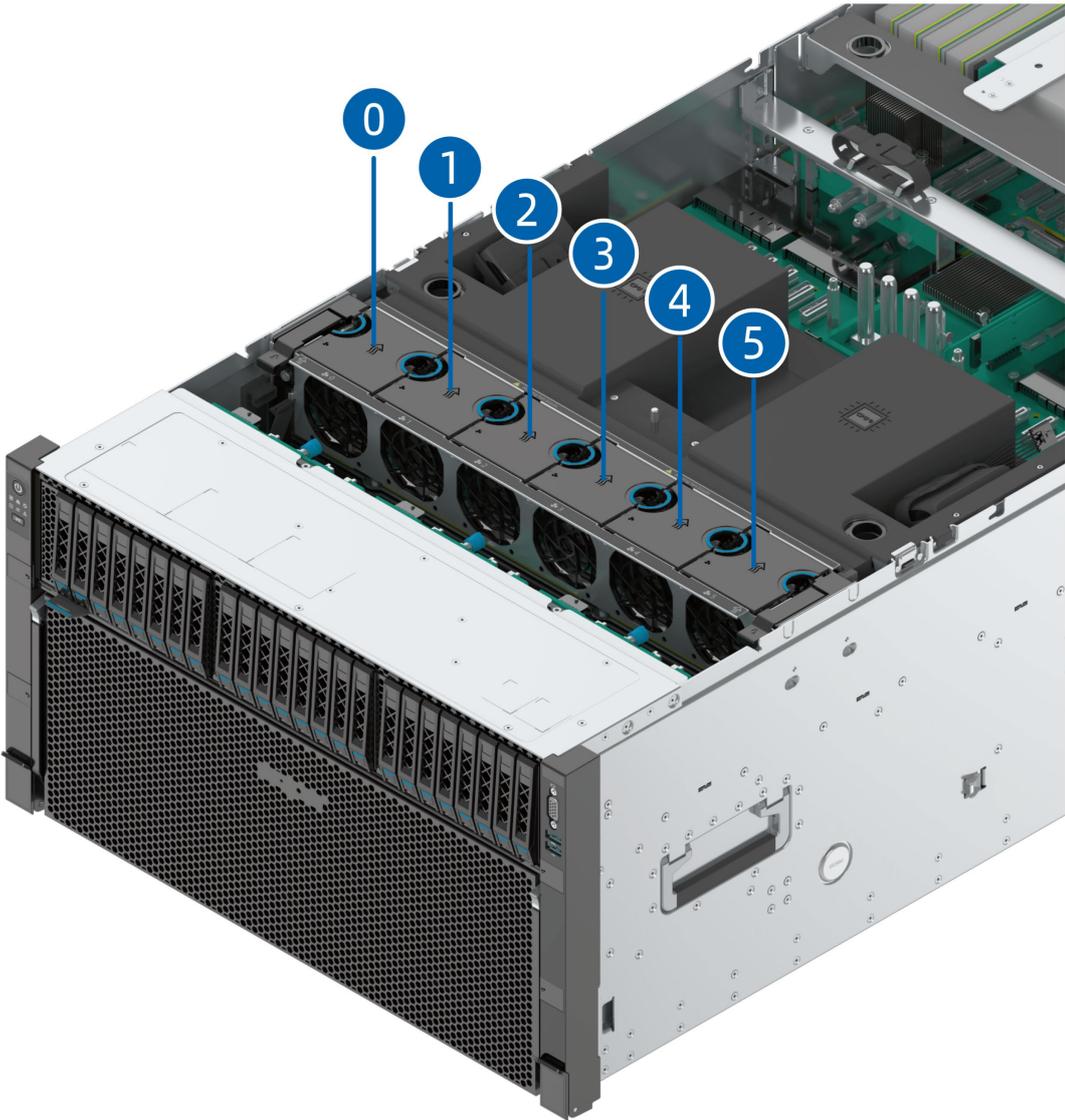
Figure 5-25 Rear Fan Modules
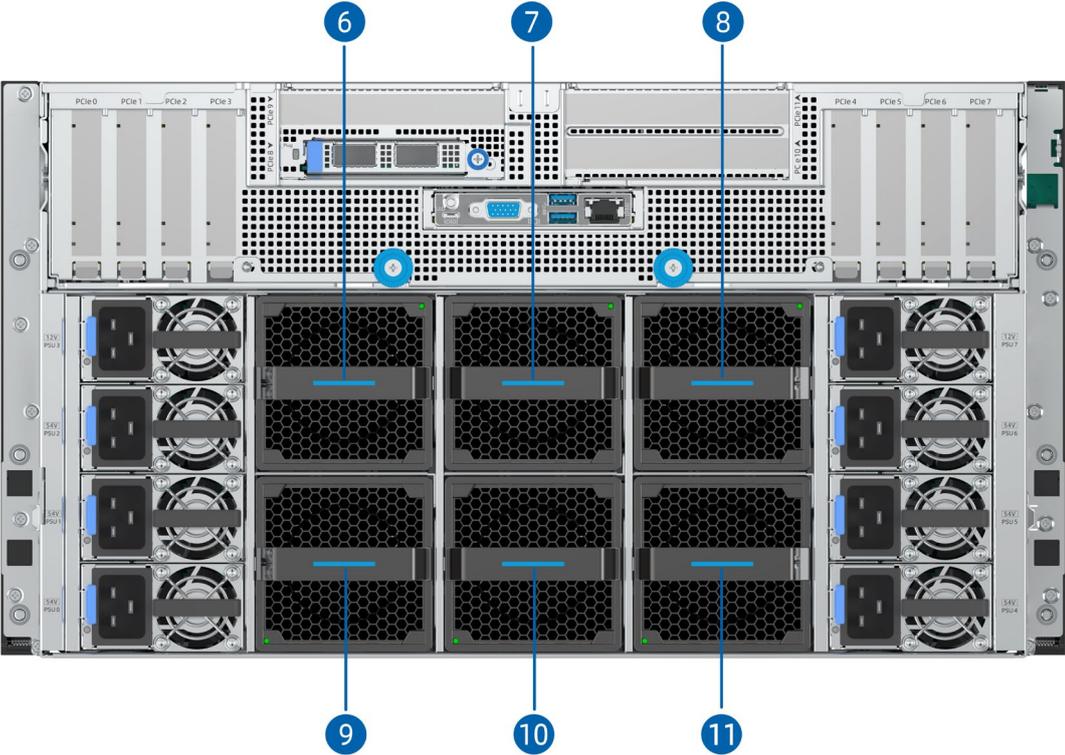
5.12 Boards

5.12.1 Motherboard

Figure 5-26 Motherboard Layout
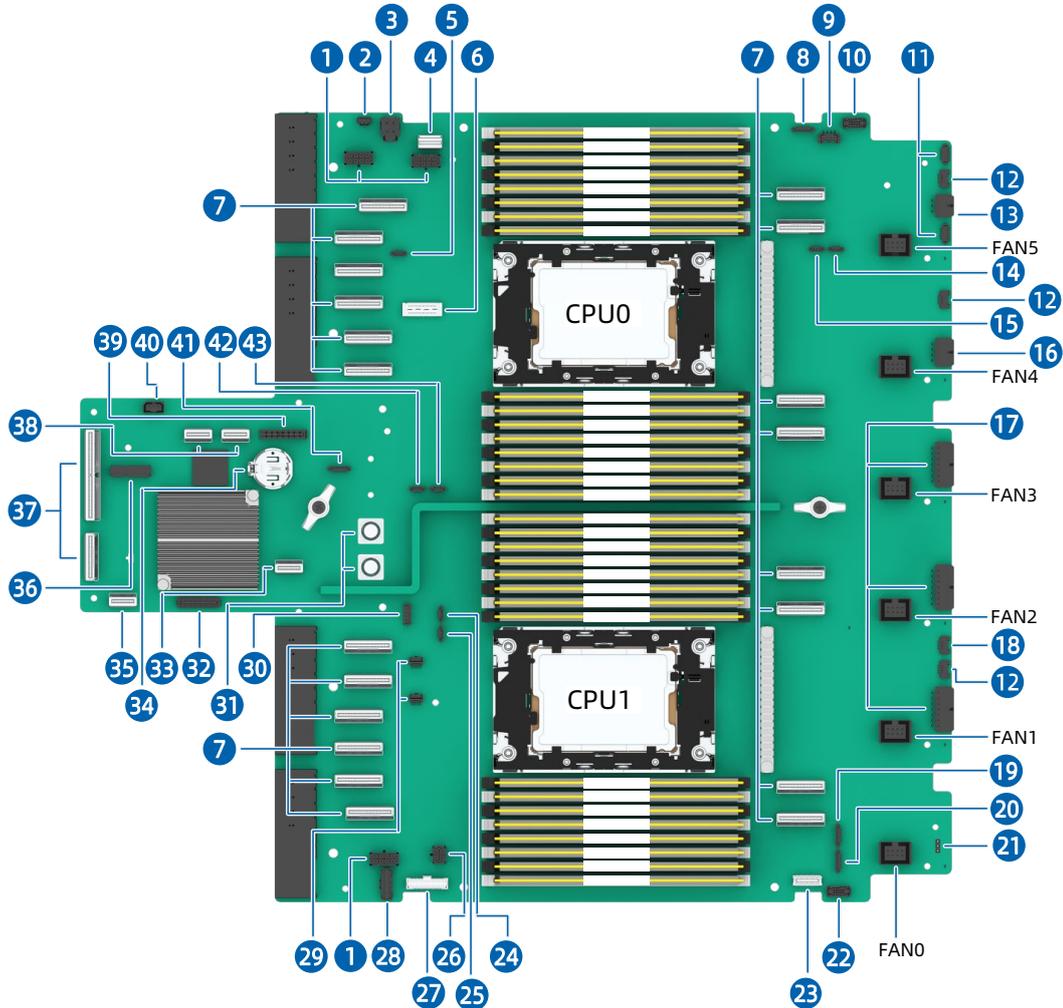
Item	Feature	Item	Feature
1	GPU Module Power Connector × 3	23	Left Control Panel Connector
2	OCP Hot-Plug Button Connector	24	MCU COM2 Connector
3	OCP Power Connector	25	MCU COM3 Connector
4	Right Control Panel Connector	26	Smart NIC Power Connector
5	Smart NIC Connector	27	PDB Sideband Connector
6	XDP Connector	28	Smart NIC Sideband Connector
7	MCIO x8 Connector × 20	29	Leak Detection Connector × 2
8	SGPIO2 Connector	30	RAID Key Connector

Item	Feature	Item	Feature
9	Chassis Temperature Sensor Connector	31	Motherboard Power Connector × 2
10	CPU VPP0 Connector	32	OCP Sideband Connector
11	Riser Card I^{2}C Connector × 2	33	SATA Connector
12	BP I^{2}C Connector × 3	34	CMOS Battery Socket
13	Riser Card (dedicated for RAID card) Power Connector	35	NVLink Connector
14	MCU COM5 Connector	36	SYS_TF Connector
15	MCU COM4 Connector	37	DC-SCM Connector
16	PCIe Riser Card Power Connector	38	M.2 Riser Card SATA Connector × 2
17	BP Power Connector × 3	39	M.2 Riser Card Power Connector
18	TSOM I^{2}C Connector	40	Intrusion Switch Connector
19	SGPIO1 Connector	41	PDB SGPIO Connector
20	SGPIO0 Connector	42	MCU COM1 Connector
21	CLR_CMOS Jumper	43	MCU COM0 Connector
22	CPU VPP1 Connector	-	-

5.12.2 DC-SCM Board

Figure 5-27 DC-SCM Board
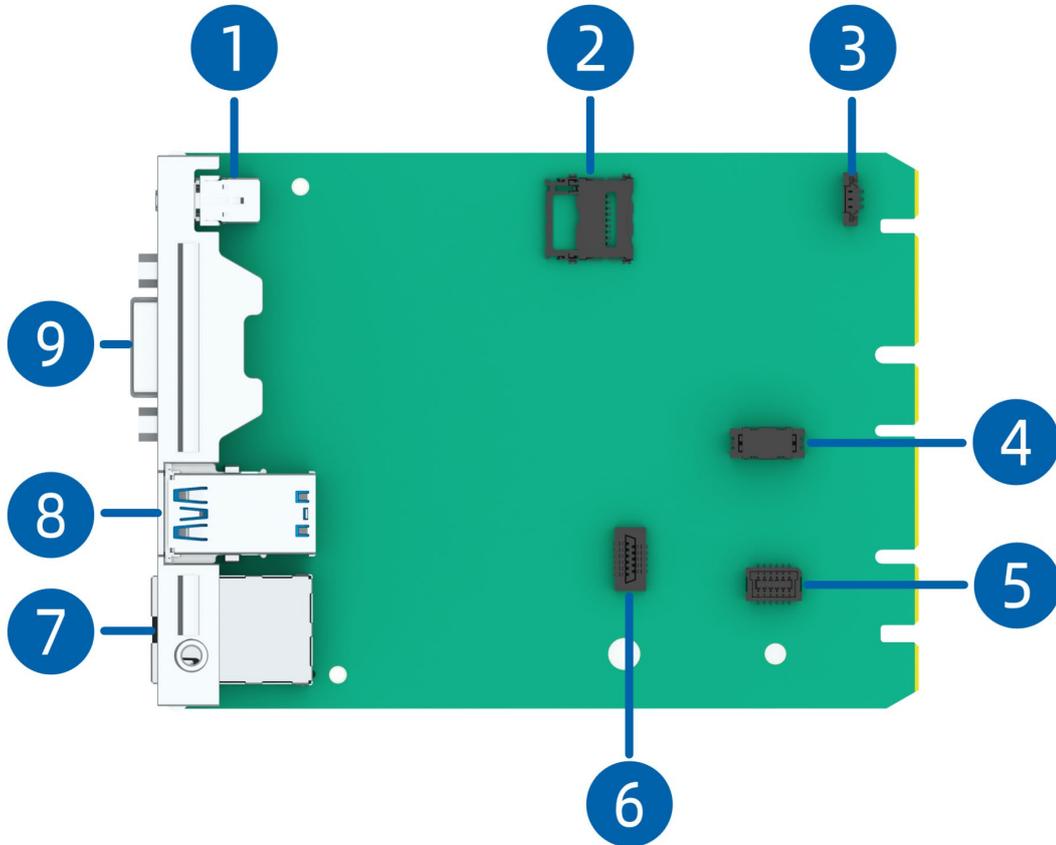
Item	Feature	Item	Feature
1	UID/BMC RST Button and LED	2	TF Card Slot
3	BMC_RTC_BAT Connector (Reserved)	4	Board to Board PHY Connector (Reserved)
5	Front Panel USB Type-C Port Connector (Reserved)	6	TCM/TPM Connector
7	BMC Management Network Port	8	USB 3.0 Port × 2
9	VGA Port	-	-

5.12.3 Drive Backplanes

1. Front Drive Backplanes

- SAS/SATA/NVMe Drive Backplane

Figure 5-28 SAS/SATA/NVMe Drive Backplane
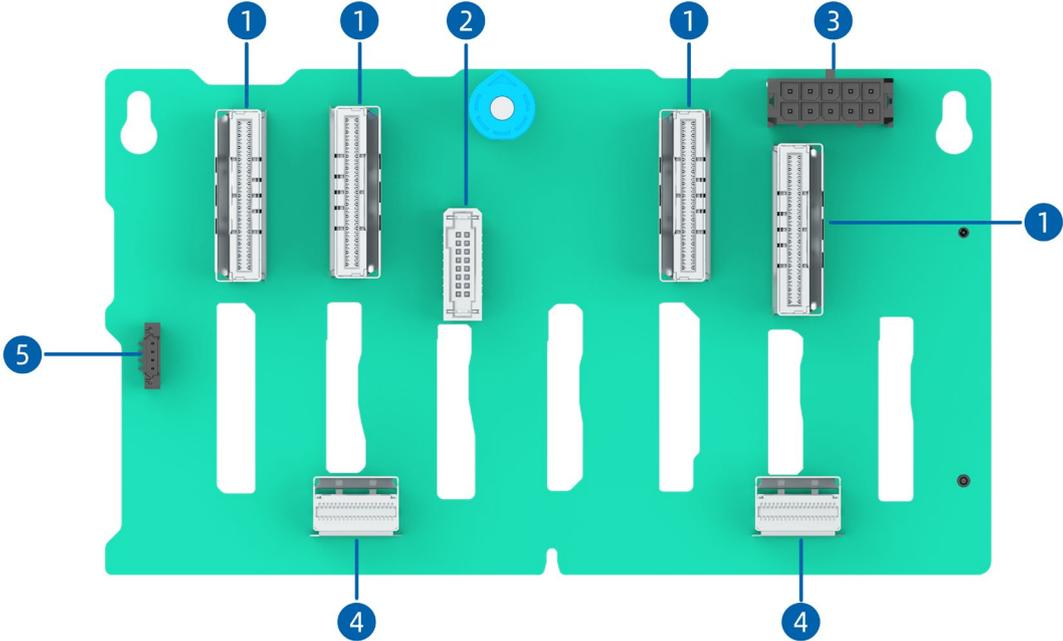
Item	Feature	Item	Feature
1	MCIO x8 Connector × 4	2	VPP Connector
3	Backplane Power Connector	4	Slimline x4 Connector × 2
5	BMC_I^{2}C Connector	-	-

- E3.S SSD Backplane

Figure 5-29 E3.S SSD Backplane
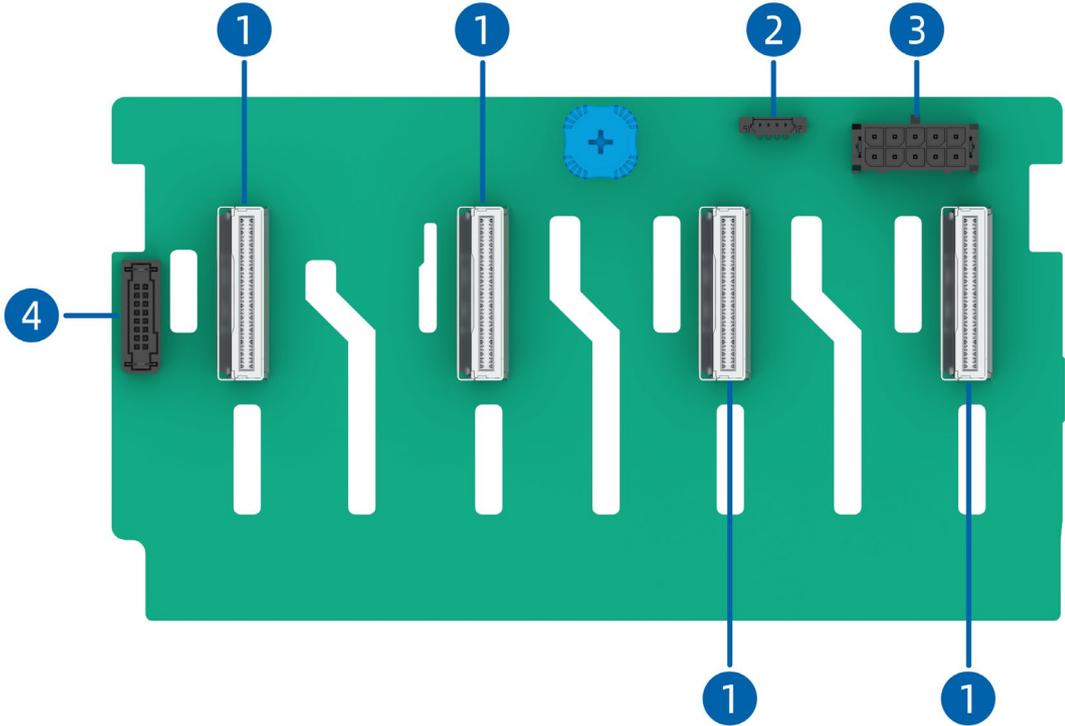
Item	Feature	Item	Feature
1	MCIO x8 Connector × 4	2	BMC_I^{2}C Connector
3	Backplane Power Connector	4	VPP Connector

6 System Specifications

6.1 KR6288-X2-A0-R0-00

6.1.1 Technical Specifications

Table 6-1 Technical Specifications

Item	Description
Form Factor	6U rack server
Chipset	Intel Emmitsburg C740 Series
Processor	Two 4th Gen Intel Xeon Scalable processors (Sapphire Rapids): • Up to 56 cores • Max base frequency at 2.6 GHz and max Turbo frequency at 3.8 GHz Note: NVIDIA Hopper HGX 8-GPU baseboard needs to be used with CPUs with base frequency higher than 2.0 GHz and core counts more than 48. • Up to 3 UPI links per CPU at up to 16 GT/s • TDP up to 350 W
Memory	• Up to 32 DIMMs • 8 memory channels per processor • Up to 2 DIMMs per channel • Speed up to 4,800 MT/s • Supports RDIMMs • Supports ECC
Storage	Front: • 24 × 2.5-inch drive (16 × 2.5-inch SAS/SATA drive + 8 × 2.5-inch NVMe drive) • 16 × 2.5-inch SAS/SATA drive • 16 × 2.5-inch drive (8 × NVMe drive + 8 × SAS/SATA drive) • 16 × E3.S SSD

Item	Description
	• 8 × 2.5-inch SAS/SATA/NVMe drive Internal: • Up to 2 M.2 SSDs • Up to 2 TF cards
Network	• 1 optional 10/25/100 Gb OCP 3.0 card • 1/10/25/40/100/200 Gb PCIe NICs • 100/200/400 Gb HCA cards
I/O Expansion	Up to 12 PCIe expansion slots Up to 11 PCIe expansion cards, including 1 optional OCP 3.0 card (occupies PCIe slot 8): • PCIe slot 0 – 7: Up to 8 HHHL PCIe expansion cards • PCIe slot 8 – 11: Up to 3 single-width FHHL PCIe expansion cards; PCIe slot 8 can be populated with 1 dual-width FHHL PCIe expansion card (occupies PCIe slot 8 and slot 9) For details, see 5.9.2 PCIe Slots and 5.9.3 PCIe Slot Description.
Port	Front: • 1 × VGA port • 1 × USB 3.0 port • 1 × USB 2.0 port Rear: • 2 × USB 3.0 port • 1 × BMC management network port • 1 × system/BMC serial port • 1 × VGA port Note: OS installation on the USB storage media is not recommended.
Display	Integrated VGA on the DC-SCM board with a video memory of 64 MB 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.

Item	Description
	When the front and rear VGA ports are both connected to monitors, only the monitor connected to the front VGA port works.
System Management	• UEFI • ISBMC • NC-SI • InManage
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 • Chassis intrusion detection

6.1.2　Environmental Specifications

Table 6-2 Environmental Specifications

Item	Description
Temperature	• Operating: 10°C to 35°C (50°F to 95°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 (RH, non-condensing)	• Operating: 10% to 80% RH • Storage (packed): 10% to 93% RH • Storage (unpacked): 10% to 93% RH
Operating Altitude	≤3,050 m (10,007 ft)

Item	Description
	• 0 to 900 m (0 to 2,953 ft): Operating temperature ranges from 10℃ to 35℃ (50°F to 95°F) • 900 to 3,050 m (2,953 to 10,007 ft): Derate the maximum allowable temperature by 1℃ per 300 m (1°F per 546.81 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	Noise levels are within the limits defined by OSHA and occupational health and safety regulations in China. Listed is noise measured at a server operating temperature of 25℃ (77°F):
	
	• Idle:
	
	    - 8.7 Bel
	
	• Operating:
	
	    - 9.6 Bel

 NOTE

- 10℃ to 35℃ (50°F to 95°F) is the standard operating temperature range at an altitude of 0 to 900 m (0 to 2953 ft). Derate the maximum allowable temperature by 1℃ per 300 m (1°F per 546.81 ft) at an altitude of 900 to 3,050 m (2,953 to 10,007 ft). No direct sustained sunlight is permitted. The maximum operating altitude is 3,050 m (10,007 ft) and the maximum temperature gradient is 20℃/h (36°F/h), both varying with different system configurations.
- Any fan failure or operations above 30℃ (86°F) may lead to system performance degradation.
- This document lists the LWAd of the product at a 25℃ (77°F) ambient environment. All measurements are conducted in conformance with ISO 7779 (ECMA 74) and declared in conformance with ISO 9296 (ECMA 109). The listed sound levels apply to the standard configuration. Additional options

may result in increased sound levels. Contact your sales representative for more information.
- The sound levels shown here were measured based on the specific configurations of a server. Sound levels vary with server configuration. These values are for reference only and subject to change without notice.
- 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.

6.1.3 Physical Specifications

Table 6-3 Physical Specifications

Item	Description
Dimensions (W × H × D)	• With mounting ears: 482 × 263 × 890 mm (18.98 × 10.35 × 35.04 in.) • Without mounting ears: 447 × 263 × 860 mm (17.60 × 10.35 × 33.86 in.) • Outer packaging: 450 × 721 × 1,167 mm (17.72 × 28.39 × 45.94 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.) • Installation requirements for the server rails are as follows: - Static rail kit: Distance between the front and rear mounting flanges ranges from 609 to 914 mm (23.98 to 35.98 in.)
Weight	• 24 × 2.5-inch drive - Net weight: 92 kg (202.83 lbs)

Item	Description
	- Gross weight: 107 kg (235.89 lbs) (including server, packaging box, rails and accessory box)

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.
> - Hardware compatibility may vary by the model. Contact your sales representative for 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 8.8
Ubuntu 20.04
Ubuntu 22.04

7.2 Hardware Compatibility

7.2.1 CPU Specifications

The server supports two 4th Gen Intel Xeon Scalable processors. The 84XX series supports up to 4,800 MHz.

Table 7-2 CPU Specifications

Model	Cores	Threads	Base Frequency (GHz)	Max. Turbo Frequency (GHz)	Cache (MB)	TDP (W)
8480+	56	112	2.0	3.8	105	350
8470	52	104	2.0	3.8	105	350
8468	48	96	2.1	3.8	105	350
8468V	52	104	2.1	3.8	105	350

7.2.2 DIMM Specifications

The server supports up to 32 DDR5 DIMMs. Each processor supports 8 memory channels with up to 2 DIMMs per channel. RDIMMs are supported.

Table 7-3 DIMM Specifications

Type	Capacity (GB)	Frequency (MHz)	Data Width	Organization
RDIMM	32	4,800	x80	2R x8
RDIMM	64	4,800	x80	2R x4
RDIMM	96	4,800	x80	2R x4

7.2.3 Drive Specifications

Table 7-4 SATA SSD Specifications

Type	Capacity	Max. Qty.
SATA SSD	240 GB	16
SATA SSD	480 GB	16
SATA SSD	960 GB	16
SATA SSD	1.9 TB	16
SATA SSD	3.8 TB	16

Table 7-5 U.2 NVMe SSD Specifications

Type	Capacity	Max. Qty.
U.2 NVMe SSD	960 GB	8
U.2 NVMe SSD	1.68 TB	8
U.2 NVMe SSD	1.92 TB	8
U.2 NVMe SSD	3.2 TB	8
U.2 NVMe SSD	3.84 TB	8
U.2 NVMe SSD	6.4 TB	8
U.2 NVMe SSD	7.68 TB	8

Table 7-6 M.2 SSD Specifications

Type	Capacity	Max. Qty.
M.2 SATA SSD	240 GB	2
M.2 SATA SSD	480 GB	2
M.2 PCIe SSD	960 GB	2
M.2 PCIe SSD	1.92 TB	2
M.2 PCIe SSD	3.84 TB	2

7.2.4   RAID Card Specifications

Table 7-7 RAID Card Specifications

Type	Description
RAID Card	RAID_PM8204_RA_8_2GB_SAS3_PCIe3
	RAID_PM8204_RA_8_4GB_SAS3_PCIe3
	RAID_L_8R0_9560-8i_4G_HDM12G_PCIe4
	RAID_L_16R0_9560-16i_8GB_SMSAS3_PCIe4

7.2.5　NIC Specifications

Table 7-8 OCP Card Specifications

Type	Description	Speed (Gbps)	Port Qty.
OCP 3.0 Card	NIC_I_10G_X710T2L_RJ_OCP3x8_2_XR_M7	10	2
	NIC_BRCM_10G_57416_RJ_OCP3x8_2_XR	10	2
	NIC_M_25G_MCX631432AN_LC_OCP3x8_2_XR	25	2
	NIC_M_100G_MCX623436AN_LC_OCP3x16_2_XR	100	2

Table 7-9 PCIe NIC Specifications

Type	Description	Speed (Gbps)	Port Qty.
PCIe NIC	NIC_Vostok_I350_1G_RJ_PCIEx4_4	1	4
	NIC_Vostok_X710_10G_LC_PCIEx8_2_M7	10	2
	NIC_M_25G_MCX631102AN_LC_PCIEx8_2_XR	25	2
	NIC_M_100G_MCX623106AN_LC_PCIEx16_2_XR	100	2
	NIC_M_200G_MCX623105AN_LC_PCIEx16_XR	200	1
	NIC_M_200G_755106AS_LC_PCIEx16_2_XR	200	2

7.2.6　HCA Card Specifications

Table 7-10 HCA Card Specifications

Type	Description	Speed (Gbps)	Port Qty.
HCA Card	HCA_M_1-HDR200_MCX653105A-HDAT_PCIE_NV	200	1
	HCA_M_2-HDR200_MCX653106A-HDAT_PCIE	200	2
	HCA_NV_1-NDR200_MCX75310AAS-HEAT_PCIE	200	1
	HCA_NV_1-NDR_MCX75310AAS-NEAT_PCIE	400	1

7.2.7   GPU Specifications

Table 7-11 GPU Specifications

Type	Description	Max. Qty.
GPU	GPU_NV_640G_HGX-A100-8GPU_5120b_MPv3	1

7.2.8   PSU Specifications

The server supports up to two 12 V PSUs with 1+1 redundancy and six 54 V PSUs with 3+3 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, 230 VAC and 240 VDC power supplies are supported:

12 V power supply:

- 2,700 W Platinum/Titanium PSU: 1,200 W (110 VAC), 2,700 W (230 VAC), 2,700 W (240 VDC for China)

- 3,200 W Titanium PSU: 1,400 W (110 VAC), 3,200 W (230 VAC), 3,200 W (240 VDC for China)

54 V power supply:

- 2,700 W Titanium PSU: 1,200 W (110 VAC), 2,700 W (230 VAC), 2,700 W (240 VDC for China)

- 3,200 W Titanium PSU: 1,400 W (110 VAC), 3,200 W (230 VAC), 3,200 W (240 VDC for China)

Operating voltage range:

- 110 VAC: 90 to 132 V

- 230 VAC: 180 to 264 V

- 240 VDC: 180 to 320 V

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 Figure 8-1.

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 Figure 8-2, in order to avoid electric shock or burns.

Figure 8-2 Removing Conductive Objects
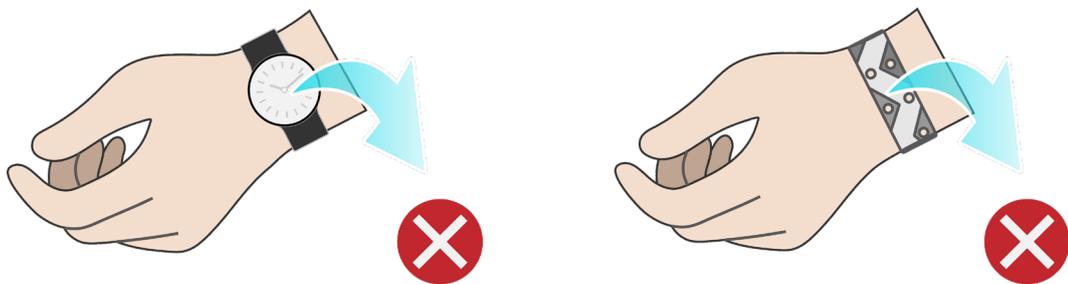
How to put on an ESD strap (Figure 8-3).

1. Put your hand through an ESD wrist strap.

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

3. 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
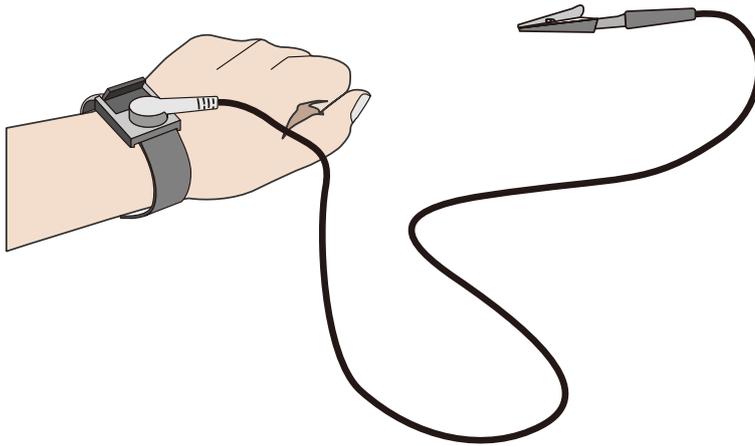
- Use tools correctly to avoid personal injury.

- 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 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 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.

Table 8-1 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 ISBMC

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

ISBMC 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 ISBMC 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

Feature	Description
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 (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 images, USB devices, folders and local media devices 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.
ISBMC 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

Feature	Description
	ensure that the fan operates at safe speeds to avoid system overheating. • Supports self-diagnosis of processors, memory modules, and storage devices of ISBMC, and automatically cleans the workload to restore to normal when the device usage rate is too high.
Power Control	Supports virtual power buttons for power on/off, power cycle and reset.
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 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, 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. ISBMC 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.

Feature	Description
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.
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 InManage

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

Built on cutting-edge O&M concepts, InManage 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. InManage 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 10-2 InManage 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

Feature	Description
	• 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 the 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
Energy Efficiency	• Overview of data center power consumption trend chart and carbon emission trend chart • Setting of server dynamic power consumption policies and minimum power consumption policies • Server temperature optimization, utilization optimization, power consumption characteristics analysis, power consumption prediction, load distribution, etc. • Carbon asset and carbon emission management
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

Feature	Description
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 InManage parameters
Security	Security control of InManage via a set of security policies such as user management, role management, authentication management (local authentication and LDAP authentication) and certificate management.

10.3 InManage Tools

Table 10-3 Features of InManage Tools

Feature	Description
InManage Kits	A lightweight automatic batch O&M tool for servers, mainly used for server deployment, routine maintenance, firmware update, fault handling, etc.
InManage 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
InManage Server CLI	Fast integration with third-party management platforms, delivering a new O&M mode of Infrastructure as Code (IaC)
InManage 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
InManage Server Provisioning	Offers users with RAID configuration, intelligent OS installation, firmware update, hardware diagnosis, secure erasing and software upgrade, using the TF card as the carrier

11 Certifications

11.1 KR6288-X2-A0-R0-00

Country/Region	Certification	Mandatory/Voluntary
China	China Environmental Labelling	Voluntary
International Mutual Recognition	CB	Voluntary
EU	CE	Mandatory
US	FCC	Mandatory
	UL	Voluntary
Canada	IC	Mandatory
	CUL	Voluntary
South Korea	KC	Mandatory
Eurasian Economic Union	EAC	Mandatory
	EAC-RoHS	Mandatory
	FSS	Mandatory

12 Appendix A

12.1 Operating Temperature Specification Limits

Table 12-1 Operating Temperature Specification Limits

Configuration	Max. Operating Temp. 35°C (95°F)
24 × 2.5-inch Drive Configuration	• 8 NVMe drives and 16 SATA drives • RDIMMs ≤32 • CPU ≤350 W • 10 PCIe cards • NVIDIA Hopper HGX 8-GPU baseboard
16 × 2.5-inch Drive Configuration	• 16 SATA drives • RDIMMs ≤32 • CPU ≤350 W • 10 PCIe cards • NVIDIA Hopper HGX 8-GPU baseboard
	• 8 NVMe drives and 8 SATA drives • RDIMMs ≤32 • CPU ≤350 W • 10 PCIe cards • NVIDIA Hopper HGX 8-GPU baseboard
8 × 2.5-inch Drive Configuration	• 8 SATA drives or 8 NVMe drives • RDIMMs ≤32 • CPU ≤350 W • 10 PCIe cards • NVIDIA Hopper HGX 8-GPU baseboard

📄 NOTE

- The maximum operating temperature will drop by 5°C (9°F) if a single fan fails.
- Single fan failure may affect system performance.
- The maximum operating temperature is 28°C (82.4°F) when the server is configured with 400 Gb NICs or HCA cards.

12.2 Model

Certified Model	Description
KR6288-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

Sensor	Description	Sensor Location
Inlet_Temp	Air inlet temperature	-
Outlet_Temp	Air outlet temperature	-
CPUx_VR_Temp	CPUx VR temperature	CPUx x indicates the CPU number with a value of 0 - 1
CPUx_Temp	CPUx core temperature	CPUx x indicates the CPU number with a value of 0 - 1
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 - 1
CPUx_DIMM_T	The maximum temperature among DDR5 DIMMs of CPUx	CPUx x indicates the CPU number with a value of 0 - 1
PCH_Temp	PCH temperature	Motherboard
PSU_Inlet_Temp	PSU temperature	PSU
PVNN_MAIN_CPUx	CPU voltage	CPUx x indicates the CPU number with a value of 0 - 1
PSUx_VIN	PSUx input voltage	PSUx x indicates the PSU number with a value of 0 - 7
PSUx_VOUT	PSUx output voltage	PSUx x indicates the PSU number with a value of 0 - 7
SYS_12V	System 12 V voltage (output by HSC)	Motherboard

Sensor	Description	Sensor Location
SYS_5V	System 5 V voltage	Motherboard
SYS_3V3	System 3.3 V voltage	Motherboard
PVNN_PCH_STBY	PCH core voltage	Motherboard
P1V05_PCH_STBY	PCH logic voltage	Motherboard
RTC_Battery	Motherboard RTC battery voltage	Motherboard
Total_Power	Total power	/
PSUx_PIN	PSUx input power	PSUx x indicates the PSU number with a value of 0 - 7
PSUx_POUT	PSUx output power	PSUx x indicates the PSU number with a value of 0 - 7
CPU_Power	Total CPU power (obtained through ME)	/
Memory_Power	Total memory power (obtained through ME)	/
FANx_F_Speed, FANx_R_Speed	FANx speed in rpm	FANx x indicates the fan number with a value of 0 - 11
P3V3_STBY_SCALED	3.3 V voltage on motherboard	Motherboard
RAID_Temp	PCIe RAID card temperature (Max temp. will be taken in case of multiple RAID cards, including SAS, RAID, and HBA)	RAID card
HDD_MAX_Temp	Maximum temperature among all drives	-
OCP_RAID_Temp	RAID mezz card temperature (reserved sensor)	-
NVME_Temp	Maximum temperature among all NVMe drives	-
OCP_NIC_SFP_Temp	OCP 3.0 card SFP module temperature	OCP 3.0 card SFP module
PCIe_NIC_SFP_T	PCIe NIC SFP module temperature	PCIe NIC SFP module
OCP_NIC_Temp	OCP 3.0 card temperature (Max temp. will be taken	OCP 3.0 card

Sensor	Description	Sensor Location
	in case of multiple OCP 3.0 cards)	
PCIE_NIC_Temp	PCIe NIC temperature (Max temp. will be taken in case of multiple PCIe NICs)	PCIe NIC
FAN_Power	Total fan power	-
P12V_CPUx_DIMM	CPUx DIMM voltage	CPUx x indicates the CPU number with a value of 0 - 1
PVCCIN_CPUx	CPUx core voltage	CPUx x indicates the CPU number with a value of 0 - 1
PVCCFA_FIVR_CPUx	UPI IIO voltage	CPUx x indicates the CPU number with a value of 0 - 1
PVCCINFAON_CPUx	CPUx boot voltage	CPUx x indicates the CPU number with a value of 0 - 1
PVCCFA_EHV_CPUx	Controller voltage	CPUx x indicates the CPU number with a value of 0 - 1
PVCCD_HV_CPUx	Memory controller voltage	CPUx x indicates the CPU number with a value of 0 - 1
Riser0_Temp	Temperature of riser card 0	Riser card 0
FanBoard_Temp	Fan board temperature	Fan board
MidPlane_Temp	Mid-plane temperature	Mid-plane
M.2 Inlet	M.2 SSD inlet temperature	-
Left_UI_Temp	Left mounting ear temperature	Left mounting ear
CPUx_Status	CPUx status	CPUx x indicates the CPU number with a value of 0 - 1
PSU_Redundant	PSU redundancy status	-
FanX_Status	FanX status	FanX X indicates the fan number with a value of 0 - 11
CPUx1_Cx2Dx3	DIMM silkscreen	Motherboard

Sensor	Description	Sensor Location
		x1 indicates the CPU number with a value of 0 - 1 x2 indicates the channel number with a value of 0 - 7 x3 indicates the DIMM slot number with a value of 0 - 1
PSU_Mismatch	Monitored PSU model mismatch	-
POST_Status	System firmware and POST status	-
CPU_Config	CPU configuration status (mixing of CPUs, or primary CPU not installed)	-
SEL_Status	SEL status	-
PCIe_Status	The status of PCIe device (including PCIe bus, slots and cards)	-
PWR_CAP_Fail	Power capping failure	-
PSUx_Status	PSUx status	PSUx x indicates the PSU number with a value of 0 - 7
K_HDDx	HDD	HDDx K denotes front, internal and rear, with a value of F/I/R respectively x indicates the drive number
BMC_Boot_Up	BMC boot up complete	-
BIOS_Boot_Up	BIOS boot up complete	-
FAN_Redundant	Fan redundancy status	-
Sys_Health	System health status	-
ACPI_PWR	ACPI status	-
Intrusion	Chassis-opening activity	-
LeakageSensor	Leak detection	Top cover
ME_FW_Status	ME health status	-
TPM_Verify	TPM verification status	-
System_Error	System error	-

Sensor	Description	Sensor Location
CPUx_PMEM_DIMM_T	The maximum temperature among all PMems of CPUx	CPUx x indicates the CPU number with a value of 0 - 1
BMC_Status	FRU status on motherboard	-
GPUx_Temp	GPUx core temperature	GPUx x indicates the GPU number with a value of 0 - 7
MEM_ResourceRate	Memory utilization rate	-
CPU_ResourceRate	CPU utilization rate	-
DELTA_FPGA_Temp	FPGA temperature on Delta-Next board	-
DELTA_NVSWx_Temp	NVSW temperature on Delta-Next board	-
DELTA_HBMx_Temp	DIMM temperature on Delta-Next board	-
DELTA_PCSW_Temp	PCIe switch temperature on Delta-Next board	-
DELTA_RTx_Temp	Retimer temperature on Delta-Next board	-
SWB_Inlet_Temp	Maximum inlet temperature of switch board	-
SWB_Outlet_Temp	Maximum outlet temperature of switch board	-
SWB_PCIEIN_Temp	Maximum inlet temperature of PCIe slots on switch board	-
MBP_GPUOUT_Temp	Average outlet temperature of GPU on mid-plane board	-
MBP_PSUIN_Temp	Average inlet temperature of PSUs on mid-plane board	-
PDB_FANIN_Temp	Average inlet temperature of rear 8086 fans on PDB board	-
PDB_PSUIN_Temp	Average inlet temperature of PSUs on PDB board	-
UID_Button	Long press the UID button to reset the BMC	-

13 Appendix B Acronyms and Abbreviations

13.1 A - E

A

AC	Alternating Current
ACPI	Advanced Configuration and Power Interface
AD	App Direct
AI	Artificial Intelligence
ANSI	American National Standards Institute
AQSIQ	General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China
ARMA	Advanced Return Material Authorization
ARS	Address Range Scrub
AVX	Advanced Vector Extensions

B

BIOS	Basic Input Output System
BIS	Bureau of Indian Standards
BLE	BIOS Lock Enable
BMC	Baseboard Management Controller
BP	Backplane
BPS	Barlow Pass

BSMI	The Bureau of Standards, Metrology and Inspection

C

CAS	Column Address Strobe
CB	Certification Body
CCC	China Compulsory Certificate
CE	Conformitè Europëenne
CECP	China Energy Conservation Program
CEN	European Committee for Standardization
CLI	Command-Line Interface
CLK	Clock
CMOS	Complementary Metal-Oxide-Semiconductor
CPLD	Complex Programmable Logic Device
CPS	Crow Pass
CPU	Central Processing Unit
CRPS	Common Redundant Power Supply
CSP	Cloud Service Provider
CV	Computer Vision
CXL	Compute Express Link

D

DC	Direct Current
DCMI	Data Center Manageability Interface
DDR5	Double Data Rate 5
DIMM	Dual In-line Memory Module
DL	Deep Learning

DMPU	Data Mining Processing Unit
DPC	DIMM Per Channel
DRAM	Dynamic Random Access Memory
DTS	Digital Thermal Sensor

E

EAC	Eurasian Conformity
EBG	Emmitsburg
ECC	Error-Correcting Code
ECMA	European Computer Manufacturers Association
EMR	Emerald Rapids
ESD	Electrostatic Discharge

13.2 F - J

F

FCC	Federal Communications Commission
FHFL	Full-Height Full-Length
FHHL	Full-Height Half-Length
FPGA	Field Programmable Gate Array
FRU	Field-Replaceable Unit
FW	Firmware

G

GPIO	General Purpose Input/Output
GPU	Graphics Processing Unit

GUI	Graphical User Interface

H

HBA	Host Bus Adapter
HCA	Host Channel Adapter
HDD	Hard Disk Drive
HHHL	Half-Height Half-Length
HSE	Health and Safety Executive
HTML	HyperText Markup Language
HTTPS	Hypertext Transfer Protocol Secure

I

IB	InfiniBand
IC	Industry Canada
ID	Identification
IEC	International Electrotechnical Commission
IIPC	Intel Intelligent Power Capability
IMC	Integrated Memory Controller
IOPS	Input/Output Operations Per Second
IP	Internet Protocol
IPMI	Intelligent Platform Management Interface
ISO	International Organization for Standardization
IVA	Intelligent Virtual Assistant

J

JTAG	Joint Test Action Group

13.3 K - O

K

KC	Korea Certification
KVM	Keyboard Video Monitor

L

LAN	Local Area Network
LCD	Liquid Crystal Display
LDAP	Lightweight Directory Access Protocol
LED	Light Emitting Diode
LOA	Letter of Authority
LP	Low Profile
LRDIMM	Load-Reduced Dual In-line Memory Module

M

MB	Motherboard
ME	Management Engine
MM	Memory Mode

N

NC-SI	Network Controller Sideband Interface
NIC	Network Interface Card
NIOSH	National Institute for Occupational Safety and Health
NLP	Natural Language Processing
NOM	Norma Oficial Mexicana

NUMA	Non-Uniform Memory Access
NVMe	Non-Volatile Memory Express

O

OCP	Open Compute Project
OS	Operating System
OSHA	Occupational Safety and Health Administration

13.4 P - T

P

PCH	Platform Controller Hub
PCIe	Peripheral Component Interconnect Express
PDB	Power Distribution Board
PDU	Power Distribution Unit
PFR	Platform Firmware Resilience
PHY	Physical
PID	Proportional-Integral-Derivative
PMem	Persistent Memory
POST	Power-On Self-Test
PSU	Power Supply Unit
PXE	Preboot Execution Environment

R

RAID	Redundant Arrays of Independent Disks
RAS	Reliability, Availability, Serviceability

RCM	Regulatory Compliance Mark
RDIMM	Registered Dual In-line Memory Module
RH	Relative Humidity
RHEL	Red Hat Enterprise Linux
RMA	Return Material Authorization
RST	Reset
RTC	Real Time Clock

S

SABS	South African Bureau of Standards
SAS	Serial Attached SCSI
SATA	Serial Advanced Technology Attachment
SCM	Secure Control Module
SCSI	Small Computer System Interface
SDDC	Single Device Data Correction
SEL	System Event Log
SFP	Small Form-Factor Pluggable
SGPIO	Serial General Purpose Input/Output
SGX	Software Guard Extensions
SII	The Standards Institution of Israel
SLA	Service Level Agreement
SN	Serial Number
SNMP	Simple Network Management Protocol
SPR	Sapphire Rapids
SSD	Solid State Drive
SSH	Secure Shell

Syslog	System Log

T

TCM	Trusted Cryptography Module
TDP	Thermal Design Power
TF	TransFlash
TME	Total Memory Encryption
TPM	Trusted Platform Module

13.5 U - Z

U

UEFI	Unified Extensible Firmware Interface
UID	Unit Identification
UKCA	UK Conformity Assessed
UL	Underwriters Laboratories
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

VRD	Voltage Regulator-Down

X

XDP	eXtend Debug Port