



White Paper for KAYTUS KR2280V3 Series Servers

Powered by Intel Processors

For KR2280-X3-A0-R0-00

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Applicable Model

Model	Maintenance	Cooling
KR2280-X3-A0-R0-00	Rear access	Air cooling

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Abstract

This document describes the KR2280V3 Intel-based server's appearance, features, performance parameters, and software and hardware compatibility, providing in-depth information of the 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	2024/09/02	Official release
V1.1	2024/11/14	Optimized descriptions

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1 Product Overview

The KR2280V3 Intel-based system is an all-purpose 2U 2-socket server powered by the Intel Xeon 6 processors. It delivers over a hundred configurations through the different combinations of storage, I/O, and heterogeneous computing modules. It can meet the needs of various business scenarios, from general-purpose computing to heterogeneous computing, and from storage-intensive applications to I/O-intensive applications. As the IT architecture of data centers becomes increasingly complex, the server provides differentiated optimal solutions for specific business scenarios. Additionally, with the excellent air cooling design and optimized control strategies, the server supports CPUs with the highest TDP in a 2U space without any configuration restrictions, making it an ideal model for balancing diverse workloads with consistent O&M.

Figure 1-1 24 × 2.5-Inch Drive Configuration

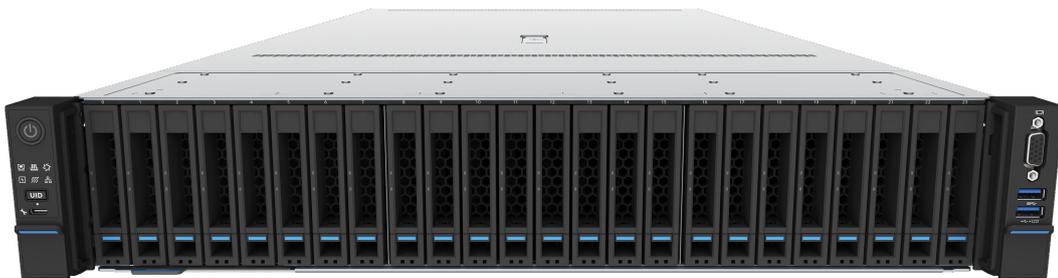


Figure 1-2 12 × 3.5-Inch Drive Configuration



Figure 1-3 25 × 2.5-Inch Drive Configuration



2 Features

2.1 Scalability and Performance

Table 2-1 Scalability and Performance

Technical Feature		Description
Intel Xeon 6 Processors	Granite Rapids (GNR)	<ul style="list-style-type: none">• Supports up to 86 cores, a max. Turbo frequency of 3.2 GHz, an L3 cache of 330 MB, and 4 UPI links per CPU at up to 24 GT/s per link.<ul style="list-style-type: none">- Supports up to 2 processors with 86 cores and 172 threads per processor, maximizing the concurrent execution of multi-threaded applications.- 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 integrates hardware-level virtualization features, allowing the operating system to better utilize the hardware for virtualization workloads.- Supports Intel Advanced Vector Extensions 512 (Intel AVX-512), significantly improving floating-point performance for compute-intensive applications.- Supports Intel Deep Learning Boost (Intel DL Boost) that uses Vector Neural Network Instructions (VNNI), improving the performance for deep learning applications.

Technical Feature		Description
	6700 Series (E-Cores)	<ul style="list-style-type: none"> • Supports up to 144 cores, a max. Turbo frequency of 3.2 GHz, an L3 cache of 330 MB, and 4 UPI links per CPU at up to 24 GT/s per link. <ul style="list-style-type: none"> - Supports up to 2 processors with 144 cores and 144 threads per processor. - 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 TDP for a limited time. - Supports Intel Virtualization technology that integrates hardware-level virtualization features, allowing the operating system to better utilize the hardware for virtualization workloads. - Supports Intel Advanced Vector Extensions 2 (Intel AVX2), significantly improving floating-point performance for compute-intensive applications. - Supports Intel Deep Learning Boost (Intel DL Boost) that uses Vector Neural Network Instructions (VNNI), improving the performance for deep learning applications.
	DIMM Form Factor	<ul style="list-style-type: none"> • Up to 32 DDR5 ECC DIMMs (6,400 MT/s for 1 DPC, 5,200 MT/s for 2 DPC, RDIMMs), delivering superior speed, high availability, and a memory capacity of up to 8 TB. • GNR CPU configuration supports up to 16 MCR DIMMs (8,000 MT/s for 1 DPC).
	Flexible Drive Configurations	Provides elastic and expandable storage solutions to meet different capacity and upgrade requirements.
	Support for All-SSD Configuration	Delivers all-SSD configurations, bringing higher I/O performance over all-HDD or HDD-SSD mixing configurations.
	12 Gbps Serial Attached SCSI (SAS)	Doubles the internal storage data transfer rate of the 6 Gbps SAS solution, maximizing the performance of storage I/O-intensive applications.

Technical Feature	Description
Intel Integrated I/O Technology	The processors integrate the PCIe 5.0 controllers to significantly reduce I/O latency and enhance overall system performance.
PCIe Expansion	Up to 8 PCIe 5.0 expansion cards: <ul style="list-style-type: none"> 8 × FHHL PCIe 5.0 x16 expansion card or 6 × FHHL PCIe 5.0 x16 + 2 × HHL PCIe 5.0 x16 expansion card
CXL Memory Expansion	<ul style="list-style-type: none"> The system supports CXL 2.0 E3.S SSDs. The 6700 series (with E-cores) CPU configuration supports up to 8 front E3.S SSDs, and the GNR CPU configuration supports up to 12 front E3.S SSDs. The GNR CPU configuration supports up to 6 CXL x8 memory expander modules; the 6700 series (E-core) CPU configuration supports up to 4 CXL x8 memory expander modules.
OCP Expansion	Supports 2 OCP slots that can flexibly support 1/10/25/100 Gb hot-plug OCP 3.0 x16 or multi-host cards.

2.2 Availability and Serviceability

Table 2-2 Availability and Serviceability

Technical Feature	Description
Hot-Swap SAS/SATA/NVMe/SATA M.2/PCIe M.2/E3.S Drives	The RAID card supports RAID levels 0/1/10/5/50/6/60 and provides RAID cache, with data protection enabled by the super-capacitor in case of power failures.
Reliability	<ul style="list-style-type: none"> SSDs are much more reliable than traditional HDDs, increasing system uptime. The BMC monitors system parameters in time and sends alerts in advance, enabling technicians to take appropriate measures in time to minimize system downtime.
Availability	<ul style="list-style-type: none"> 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

Technical Feature	Description
	<p>(or failing) components, simplifying maintenance and speeding up troubleshooting.</p> <ul style="list-style-type: none"> Provides 2 hot-swap PSUs with 1+1 redundancy and 6 hot-swap fan modules with N+1 redundancy.
Maintenance Efficiency	<ul style="list-style-type: none"> The BMC management network port on the rear panel enables remote BMC O&M, improving O&M efficiency. Provides online memory diagnosis function, which helps service personnel quickly locate the DIMM to be serviced.

2.3 Manageability and Security

Table 2-3 Manageability and Security

Technical Feature	Description
Memory Protection Technologies	Supports failed DIMM isolation, Single Device Data Correction (SDDC), patrol scrub, DDR command and address parity check and retry, memory thermal throttling, Adaptive Double Device Data Correction (ADDDC), and data scrambling.
Remote Management	The BMC monitors the system operating status and enables remote management.
Network Controller Sideband Interface (NC-SI) Feature	<p>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.</p> <p>Notes:</p> <p>The service port with NC-SI enabled supports:</p> <ul style="list-style-type: none"> 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). VLAN is disabled by default. Both IPv6 and IPv4 addresses. The subnet mask of IPv4 or prefix length of IPv6 subnet mask, IP addresses, and default gateways can be configured.
Intel PFR	Intel Platform Firmware Resilience (PFR) technology is supported.
Unified Extensible Firmware Interface (UEFI)	The industry-standard UEFI improves the efficiency of setup, configuration and update, and simplifies the error handling process.

Technical Feature	Description
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	Protects BMC from malicious tampering.
BMC Access Control Policies	Flexible BMC access control policies improve BMC management security.
Chassis Intrusion Detection	Enhances physical security.
BMC Management Security	Supports flexible BMC access control policies and double factor authentication.
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.
System Secure Erase Function	Optional system secure erase function can wipe data on the storage devices with one click.
Optional Front Bezel with a Lock	Prevents unauthorized users from removing or installing drives, thus ensuring the security of local data.
Memory UCE Prevent and Repair (MUPR) for Intelligent	<ul style="list-style-type: none"> The core of the pre-UCE failure diagnosis and healing technology lies in the ability to forecast the change in the faulty memory cell, to accurately diagnose the memory error type and to fix the faulty memory cell in

Technical Feature	Description
Forewarning and Healing	<p>real time. It enables 24 × 7 monitoring of memory health status from multi-aspects.</p> <ul style="list-style-type: none"> It offers online monitoring of memory errors at cell, row/column and bank/die levels, compares with the memory UCE occurrence characteristics efficiently, and handles the faulty memory cell in time, thus significantly reducing the system downtime risk caused by memory faults.
Intelligent Runtime Update Technology (IRUT) for Hitless Firmware Update	<ul style="list-style-type: none"> Enables runtime firmware out-of-band (OOB) modular update, delivering rapid and flexible firmware update. Offloads RAS to OS, improving system reliability. Updates System Management Mode (SMM) driver in real time. Modifies hardware registers in time, optimizing resource allocation. Supports fast boot, reducing boot time and improving business operational efficiency.
DMPU for Fault Diagnosis	<p>Takes snapshots of power sequence signal changes and CPU error signal changes, supports a virtual oscilloscope visualizing abnormal voltage signals, collects and analyzes out-of-band logs of components, gathers BMC serial port logs, switches between UART topologies, and creates JBOD/RAID 0/RAID 1 with 2 TF cards.</p>

2.4 Energy Efficiency

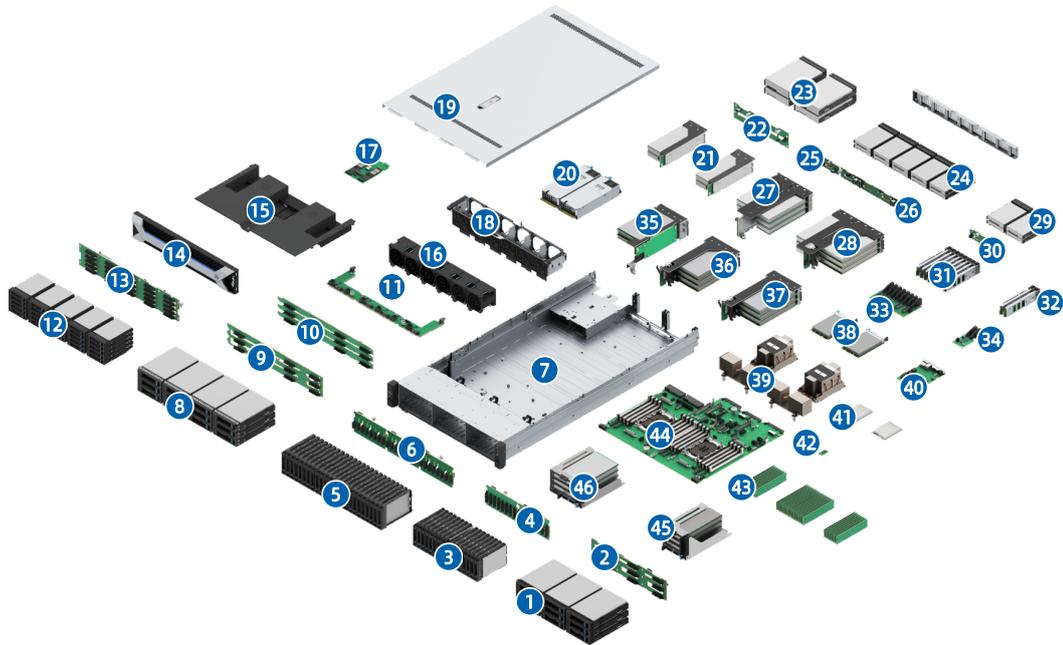
Table 2-4 Energy Efficiency

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 95% at a load of 20% and up to 96% at a load of 50%.
1+1 Redundant PSUs	Supports 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.

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	<ul style="list-style-type: none"> • Supports staggered spin-up of drives, reducing power consumption during server startup. • Supports power control of individual drives, reducing power consumption during server operation.
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.
Low Energy Consumption	Supports low-voltage Intel Xeon 6 processors, consuming less energy and meeting the demands of data centers and telecommunications environments constrained by power and thermal limits.
Power/Performance Profile	Supports various typical power/performance profiles such as performance, balance/energy efficiency, and power. Users can switch among power/performance profiles simply by changing BIOS options. The factory default setting is Custom mode (The initial parameter settings of Custom mode deliver performance similar to that of Performance mode). Other modes can be customized or configured through BIOS options.

3 System Parts Breakdown

Figure 3-1 Exploded View

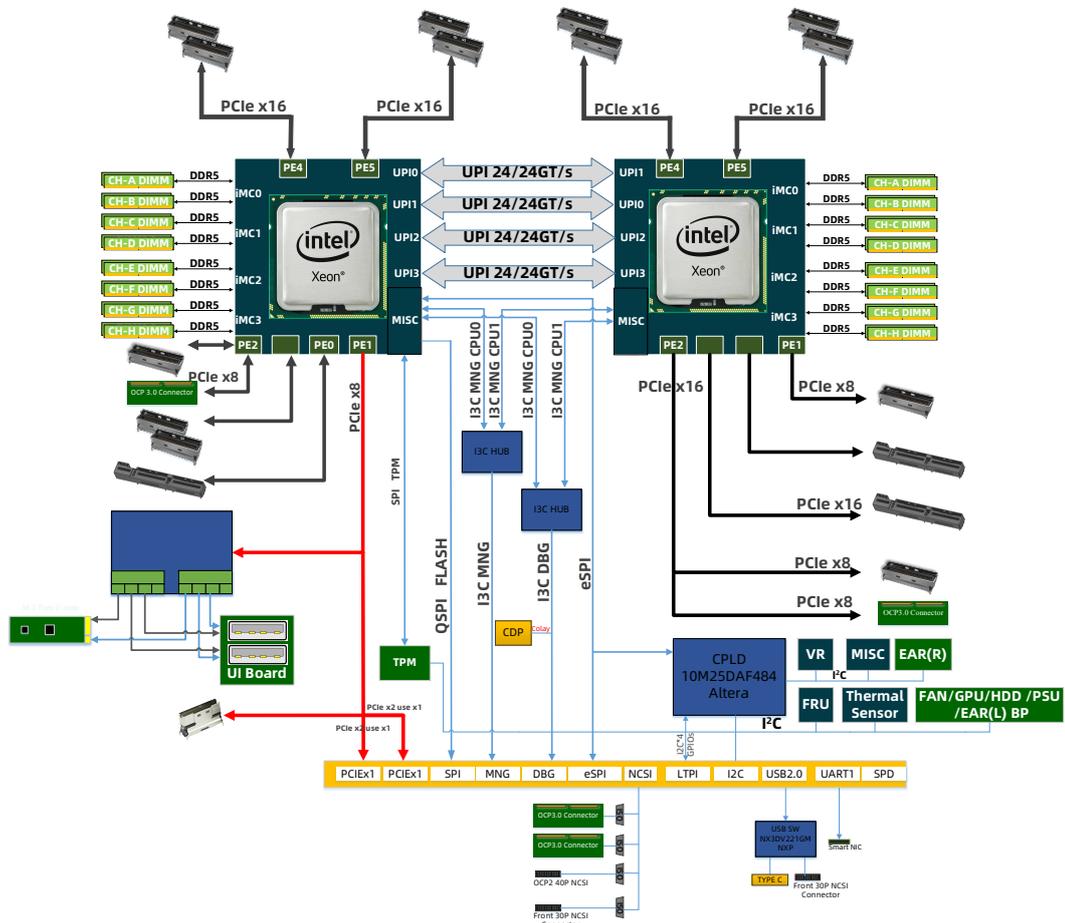


Item	Feature	Item	Feature
1	3.5-Inch Drive Module	24	2.5-Inch Drive Module
2	9 × 3.5-Inch Drive Backplane	25	2 × 2.5-Inch Drive Backplane
3	2.5-Inch Drive Module	26	8 × 2.5-Inch Drive Backplane
4	8 × 2.5-Inch Drive Backplane	27	PCIe Riser Module
5	2.5-Inch Drive Module	28	PCIe Riser Module
6	8 × 2.5-Inch Drive Backplane	29	2.5-Inch Drive Module
7	Chassis	30	2 × 2.5-Inch Drive Backplane
8	3.5-Inch Drive Module	31	E1.S SSD Module
9	12 × 3.5-Inch Drive Backplane	32	M.2 SSD Module
10	4 × 3.5-Inch Drive Backplane	33	8 × E1.S Drive Backplane
11	Fan Board	34	2 × M.2 Drive Backplane
12	2.5-Inch Drive Module	35	PCIe Riser Module
13	25 × 2.5-Inch Drive Backplane	36	PCIe Riser Module
14	Front Bezel	37	PCIe Riser Module

Item	Feature	Item	Feature
15	Air Duct	38	OCP 3.0 Card
16	Fan Module	39	Heatsink
17	Internal M.2 Drive Backplane (with 2 M.2 SSDs)	40	DC-SCM Board
18	Fan Cage	41	CPU
19	Top Cover	42	TPM
20	PSU	43	DIMM
21	PCIe Riser Module	44	Motherboard
22	2 × 3.5-Inch Drive Backplane	45	PCIe Riser Module
23	3.5-Inch Drive Module	46	PCIe Riser Module

4 System Logical Diagram

Figure 4-1 System Logical Diagram



- One or two Intel Xeon 6 processors (GNR/6700 series with E-cores).
- Up to 32 DDR5 ECC DIMMs. The GNR CPU configuration supports up to 16 MCR DIMMs.
- 4 UPI 2.0 links per CPU at up to 24 GT/s per link.
- The PCIe SAS/RAID cards are connected to drive backplanes via SAS signal cables. Multiple local storage configurations are supported through different drive backplanes.
- The motherboard uses an external controller to support the expansion of 3 USB 3.0 ports and 2 PCIe/SATA M.2 SSDs.

- The DC-SCM board integrates an AST2600 management chip and supports 1 Video Graphic Array (VGA) port, 1 BMC management network port and other connectors.



NOTE

Intel Xeon 6 processors adopt a PCH-less design.

5 Hardware Description

5.1 Front Panel

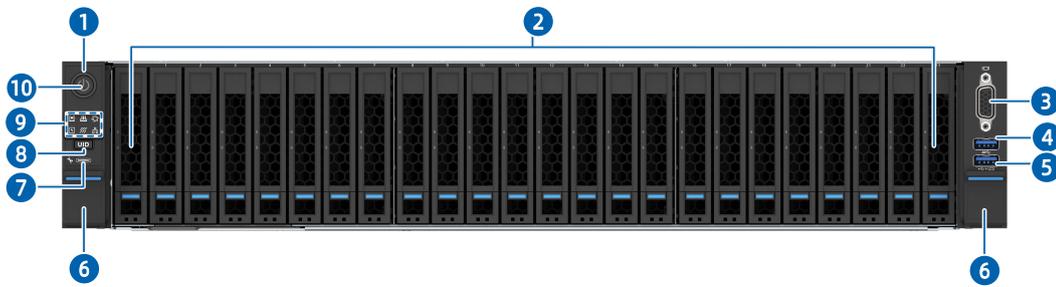
5.1.1 24 × 2.5-Inch Drive Configuration



NOTE

Applicable model: KR2280-X3-A0-R0-00.

Figure 5-1 Front View



Item	Feature	Item	Feature
1	System Load Status LED	6	Ear Latch
2	2.5-Inch Drive Bay	7	USB Type-C Port
3	VGA Port	8	UID/BMC RST Button and LED
4	USB 3.0 Port	9	LEDs
5	USB 2.0/LCD Port	10	Power Button and LED

5.1.2 12 × 3.5-Inch Drive Configuration



NOTE

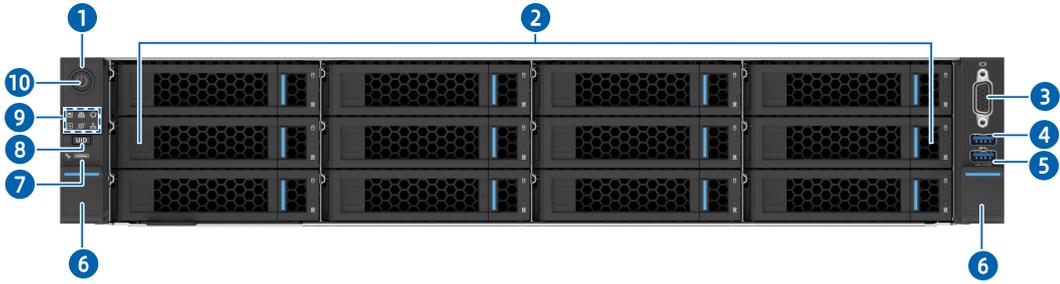
Applicable model: KR2280-X3-A0-R0-00.



IMPORTANT

A 3.5-inch drive tray can accommodate a 2.5-inch drive.

Figure 5-2 Front View



Item	Feature	Item	Feature
1	System Load Status LED	6	Ear Latch
2	3.5-Inch Drive Bay	7	USB Type-C Port
3	VGA Port	8	UID/BMC RST Button and LED
4	USB 3.0 Port	9	LEDs
5	USB 2.0/LCD Port	10	Power Button and LED

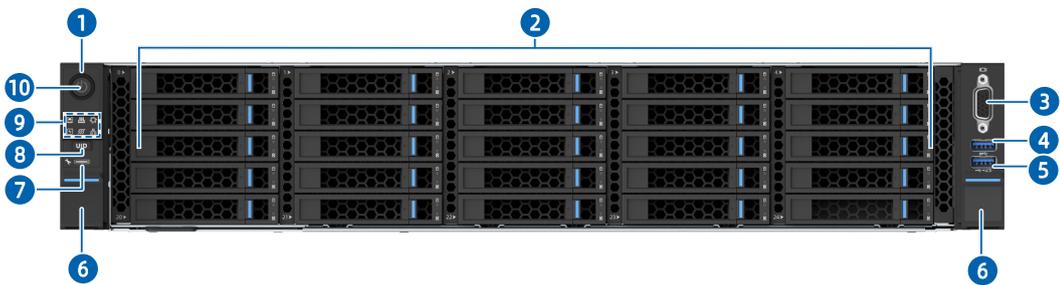
5.1.3 25 × 2.5-Inch Drive Configuration



NOTE

Applicable model: KR2280-X3-A0-R0-00.

Figure 5-3 Front View



Item	Feature	Item	Feature
1	System Load Status LED	6	Ear Latch
2	2.5-Inch Drive Bay	7	USB Type-C Port
3	VGA Port	8	UID/BMC RST Button and LED
4	USB 3.0 Port	9	LEDs

Item	Feature	Item	Feature
5	USB 2.0/LCD Port	10	Power Button and LED

5.2 Rear Panel

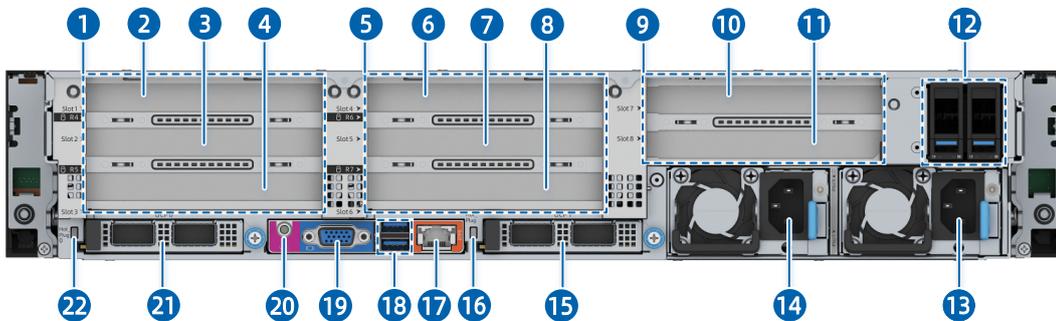
5.2.1 2 × M.2 SSD + 8 × PCIe Slot Configuration



NOTE

Applicable model: KR2280-X3-A0-R0-00.

Figure 5-4 Rear View



Item	Feature	Item	Feature
1	PCIe Riser Module 0	12	M.2 Drive Bay
2	PCIe Slot 1	13	PSU1
3	PCIe Slot 2	14	PSU0
4	PCIe Slot 3	15	OCP 3.0 Card 1
5	PCIe Riser Module 1	16	OCP 3.0 Card 1 Hot-Plug Button and LED
6	PCIe Slot 4	17	BMC Management Network Port
7	PCIe Slot 5	18	USB 3.0 Port
8	PCIe Slot 6	19	VGA Port
9	PCIe Riser Module 2	20	UID/BMC RST Button and LED
10	PCIe Slot 7	21	OCP 3.0 Card 0
11	PCIe Slot 8	22	OCP 3.0 Card 0 Hot-Plug Button and LED

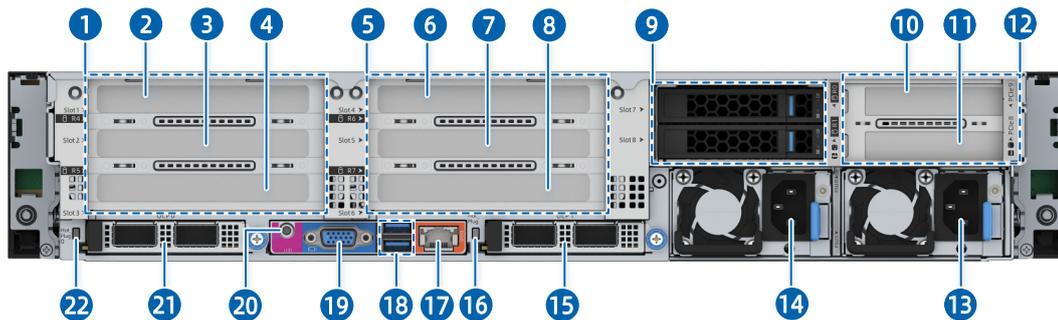
5.2.2 2 × 2.5-Inch Drive + 8 × PCIe Slot Configuration



NOTE

Applicable model: KR2280-X3-A0-R0-00.

Figure 5-5 Rear View



Item	Feature	Item	Feature
1	PCIe Riser Module 0	12	PCIe Riser Module 4
2	PCIe Slot 1	13	PSU1
3	PCIe Slot 2	14	PSU0
4	PCIe Slot 3	15	OCP 3.0 Card 1
5	PCIe Riser Module 1	16	OCP 3.0 Card 1 Hot-Plug Button and LED
6	PCIe Slot 4	17	BMC Management Network Port
7	PCIe Slot 5	18	USB 3.0 Port
8	PCIe Slot 6	19	VGA Port
9	2.5-Inch Drive Bay	20	UID/BMC RST Button and LED
10	PCIe Slot 9	21	OCP 3.0 Card 0
11	PCIe Slot 10	22	OCP 3.0 Card 0 Hot-Plug Button and LED

5.3 LEDs and Buttons

Table 5-1 LED and Button Description

Item	Icon	Feature	Description
1		Power Button and LED	<ul style="list-style-type: none"> Power LED: <ul style="list-style-type: none"> Off = No power Solid green = Power-on state Solid orange = Standby state Power button: <ul style="list-style-type: none"> 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 Load Status LED	<ul style="list-style-type: none"> Solid green = $0 < \text{load} \leq 30\%$ Solid blue = $30\% < \text{load} \leq 80\%$ Solid yellow = $80\% < \text{load} \leq 100\%$
3		System Status LED	<ul style="list-style-type: none"> Off = Normal Blinking 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.
4		Memory Status LED	<ul style="list-style-type: none"> Off = Normal Blinking red (1 Hz) = A warning error occurs Solid red = A critical error occurs
5		Fan Status LED	<ul style="list-style-type: none"> Off = Normal Blinking red (1 Hz) = A warning error occurs Solid red = A critical error occurs, including fan failure and fan absence

Item	Icon	Feature	Description
6		Power Status LED	<ul style="list-style-type: none"> • Off = Normal • Blinking red (1 Hz) = A warning error occurs • Solid red = A critical error occurs
7		System Overheat LED	<ul style="list-style-type: none"> • Off = Normal • Blinking red (1 Hz) = A warning error occurs, including Proc Hot, resulting in CPU throttling • Solid red = A critical error occurs, including CPU Thermal Trip/PCH Hot/MEM Hot
8		Network Status LED	<ul style="list-style-type: none"> • Off = No network connection • Blinking green = Network connected with data being transmitted • Solid green = Network connected without data being transmitted <p>Note: It only indicates the status of the self-developed OCP card.</p>
9		UID/BMC RST Button and LED	<ul style="list-style-type: none"> • UID/BMC RST LED: <ul style="list-style-type: none"> - 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.) - Blinking blue (4 Hz) = PFR authentication fails and the firmware images cannot be recovered - Solid blue = The UID LED is activated by the UID button or via the BMC • UID/BMC RST button: <ul style="list-style-type: none"> - Press and release the button to activate the UID LED.

Item	Icon	Feature	Description
			<ul style="list-style-type: none"> - Press and hold the button for 6 seconds to force a BMC reset.
10	-	USB Type-C Status LED	<ul style="list-style-type: none"> • Connected to a terminal: <ul style="list-style-type: none"> - Off = Not connected to a terminal - Blinking green (2 Hz) for 3 seconds and then off = Port function is disabled - Solid green = Connected to a terminal • Connected to a USB storage device: <ul style="list-style-type: none"> - Off = Not connected to a USB storage device - Blinking red (1 Hz) = Job fails or is completed with an error reported - Blinking green (2 Hz) = Job in progress - Blinking green (2 Hz) 5 times and then off = Port function is disabled - Solid green = Job is completed successfully
11	-	OCP 3.0 Card Hot-Plug Button and LED	<ul style="list-style-type: none"> • OCP 3.0 card hot-plug LED: <ul style="list-style-type: none"> - Off = OCP card is powered off - Blinking green = OCP card is getting ready for hot-plugging or OCP card is being identified after installation - Solid green = OCP card is powered on • OCP 3.0 card hot-plug button: <ul style="list-style-type: none"> - With the LED solid on, press and release the button to power off the OCP card. - With the LED off and the OCP card installed, press and

Item	Icon	Feature	Description
			release the button to power on the OCP card.



NOTE

- Warning error: Errors that result in redundancy degradation or loss, and other errors that have a minor impact on the system running and that require attention.
- Critical error: Errors that result in system crash/restart or part failure, and other errors that have a major impact on the system running and that require immediate action.

5.4 Port Description

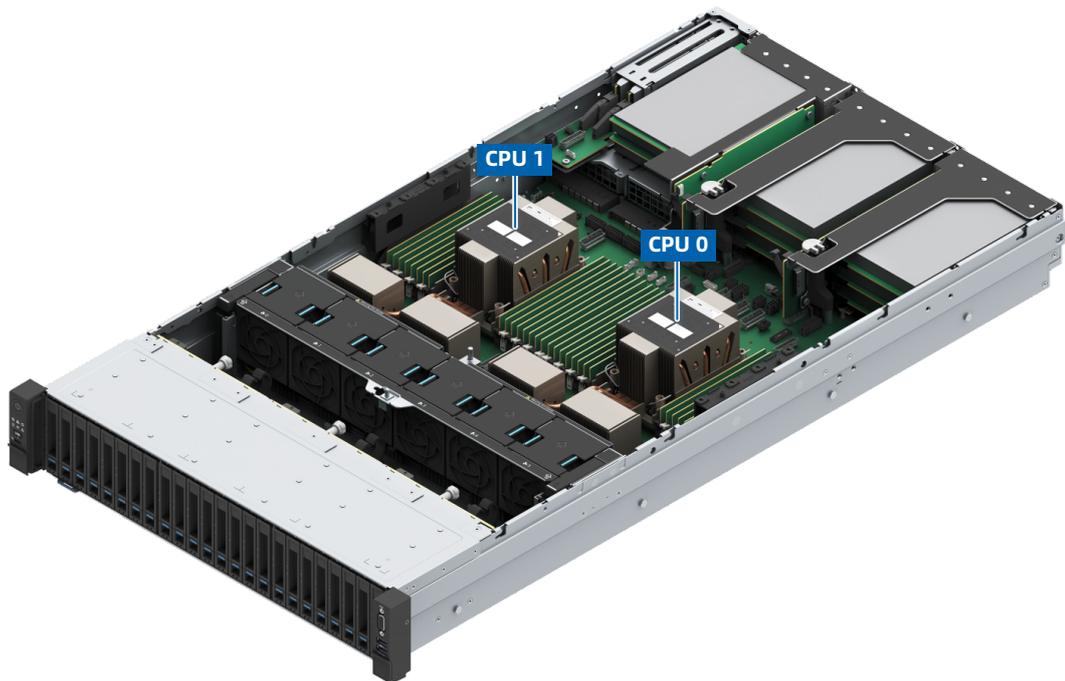
Table 5-2 Port Description

Item	Port	Description
1	VGA Port	Enables you to connect a display terminal to the system.
2	USB 3.0 Port	Enables you to connect a USB 2.0/3.0 device to the system.
3	USB 2.0/LCD Port	Enables you to connect a USB 2.0 device or an LCD module to the system.
4	USB Type-C Port	Enables you to read a USB flash drive through the BMC or access the BMC through an external device.
5	BMC Management Network Port	Enables you to manage the server. Note: It is a Gigabit Ethernet port that supports 100 Mbps and 1,000 Mbps auto-negotiation.
6	OCP 3.0 Network Port	Enables you to connect the system to the network.
7	PCIe NIC Port	Enables you to connect the system to the network.

5.5 Processors

- Supports 1 or 2 processors.
- If only 1 processor is configured, install it in the CPU0 socket.
- The processors used in a server must bear the same part number (P/N code).
- For specific processor options, consult your local sales representative or refer to [7.2 Hardware Compatibility](#).

Figure 5-6 Processor Locations

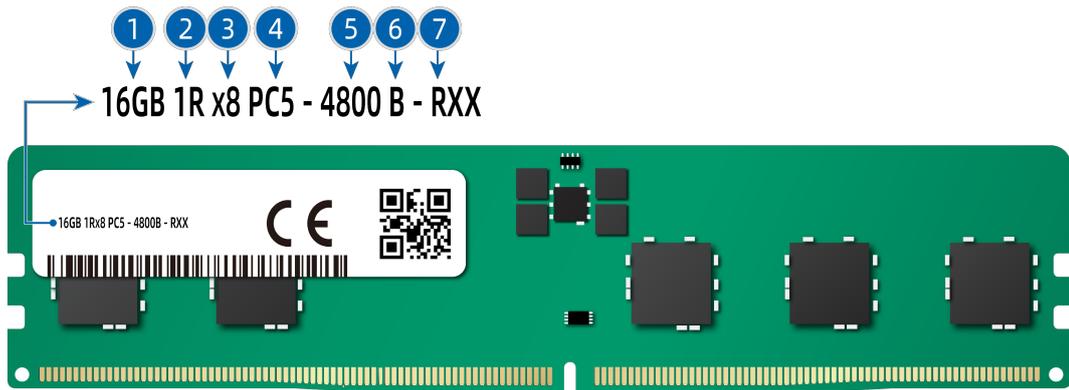


5.6 DDR5 DIMMs

5.6.1 Identification

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

Figure 5-7 DIMM Identification



Item	Description	Example
1	Capacity	<ul style="list-style-type: none"> • 16 GB • 32 GB • 64 GB • 128 GB • 256 GB
2	Rank(s)	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • x4 = 4 bits • x8 = 8 bits
4	DIMM slot type	PC5 = DDR5
5	Maximum memory speed	<ul style="list-style-type: none"> • 5,200 MT/s • 6,400 MT/s
6	CAS latency	<ul style="list-style-type: none"> • 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

5.6.2 Memory Subsystem Architecture

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

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	
	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	

CPU	Channel ID	Silk Screen
	Channel 5	CPU1_C5D0
		CPU1_C5D1
	Channel 6	CPU1_C6D0
		CPU1_C6D1
	Channel 7	CPU1_C7D0
		CPU1_C7D1

5.6.3 Compatibility

Refer to the following rules to select the DDR5 DIMMs.



IMPORTANT

- A server must use DDR5 DIMMs with the same part number (P/N code). All DDR5 DIMMs operate at the same speed, which is the lowest of:
 - Memory speed supported by a specific CPU.
 - Maximum operating speed of a specific memory configuration.
- Mixing DDR5 DIMMs of different 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](#).

- DDR5 DIMMs can be used with the Intel Xeon 6 processors (Birch Stream-SP). The maximum memory capacity supported may vary by CPU models.
- The maximum number of DIMMs supported varies with the CPU type, DIMM type and rank quantity.



NOTE

Maximum number of DIMMs supported per channel \leq Maximum number of ranks supported per channel \div Number of ranks per DIMM.

Table 5-4 DDR5 DIMM Specifications - GNR CPU Configuration

Item	Value						
Capacity per DDR5	16	24	32	48	64	96	128

Item		Value						
DIMM (GB)								
Type		RDIMM						
Rated speed (MT/s)		6,400	6,400	6,400	6,400	6,400	6,400	6,400
Operating voltage (V)		1.1	1.1	1.1	1.1	1.1	1.1	1.1
Maximum number of DDR5 DIMMs supported in a server ¹		16	16	32	16	32	32	32
Maximum capacity of DDR5 DIMMs supported in a server (GB) ²		256	384	1,024	768	2,048	3,072	4,096
Actual speed (MT/s)	1 DPC ³	6,400	6,400	6,400	6,400	6,400	6,400	6,400
	2 DPC	-	-	5,200	-	5,200	5,200	5,200
<p>Notes:</p> <p>1. The maximum number of DDR5 DIMMs supported is based on the dual-CPU configuration. The number is halved for the single-CPU configuration.</p> <p>2. 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.</p> <p>3. DIMM Per Channel (DPC) is the number of DIMMs per memory channel.</p> <p>The information above is for reference only. Consult your local sales representative for details.</p>								

Table 5-5 DDR5 DIMM Specifications - 6700 Series CPU (with E-Cores) Configuration

Item		Value			
Capacity per DDR5 DIMM (GB)		32	64	96	128
Type		RDIMM	RDIMM	RDIMM	RDIMM
Rated speed (MT/s)		6,400	6,400	6,400	6,400
Operating voltage (V)		1.1	1.1	1.1	1.1
Maximum number of DDR5 DIMMs supported in a server ¹		16	32	32	32
Maximum capacity of DDR5 DIMMs supported in a server (GB) ²		512	2,048	3,072	4,096
Actual speed	1 DPC ³	6,400	6,400	6,400	6,400

Item		Value			
(MT/s)	2 DPC	-	5,200	5,200	5,200
Notes:					
1. The maximum number of DDR5 DIMMs supported is based on the dual-CPU configuration. The number is halved for the single-CPU configuration.					
2. 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.					
3. DIMM Per Channel (DPC) is the number of DIMMs per memory channel.					
The information above is for reference only. Consult your local sales representative for details.					

5.6.4 Population Rules

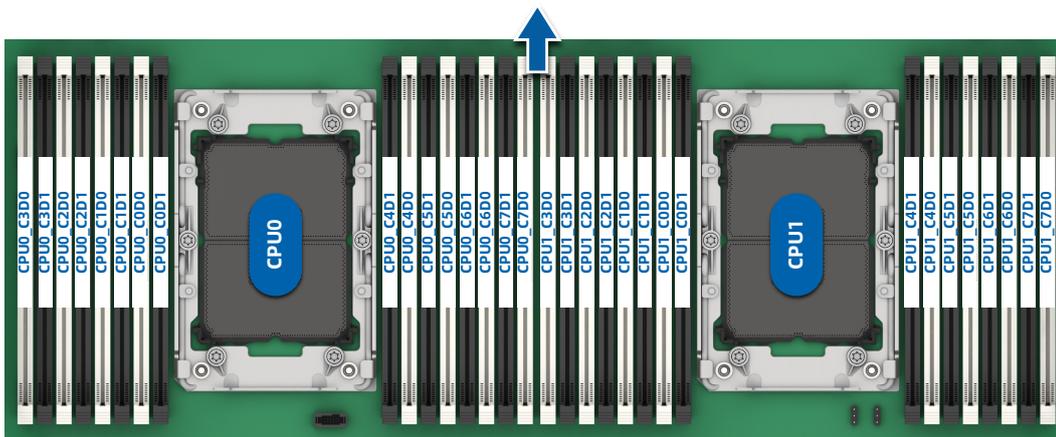
General population rules for DDR5 DIMMs:

- Install DIMMs only when the corresponding processor is installed.
- Install dummies in the empty DIMM slots.

5.6.5 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 [1 DIMM Population Rules](#) and [2 DIMM Population Requirements](#).

Figure 5-8 DIMM Slot Layout



1. DIMM Population Rules

- DDR5 DIMM Population Rules (Single-CPU Configuration)

Table 5-6 DDR5 DIMM Population Rules for GNR CPU Configuration

DDR QTY	CPU0															
	C0D0	C0D1	C1D0	C1D1	C2D0	C2D1	C3D0	C3D1	C4D0	C4D1	C5D0	C5D1	C6D0	C6D1	C7D0	C7D1
1	•															
4	•				•				•				•			
8	•		•		•		•		•		•		•		•	
12	•	•	•		•	•	•		•	•	•		•	•	•	
16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Table 5-7 DDR5 DIMM Population Rules for 6700 Series CPU (with E-Cores) Configuration

DDR QTY	CPU0															
	C0D0	C0D1	C1D0	C1D1	C2D0	C2D1	C3D0	C3D1	C4D0	C4D1	C5D0	C5D1	C6D0	C6D1	C7D0	C7D1
1	•															
4	•				•				•				•			
8	•		•		•		•		•		•		•		•	
16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

- DDR5 DIMM Population Rules (Dual-CPU Configuration)

Table 5-8 DDR5 DIMM Population Rules for GNR CPU Configuration

DDR QTY	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
1	•																•															
2	•																•															
8	•		•		•		•		•		•		•		•		•		•		•		•		•		•		•		•	
16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
24	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
32	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	

Table 5-9 DDR5 DIMM Population Rules for 6700 Series CPU (with E-Cores) Configuration

DDR QTY	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
1	•															•																
2	•															•																
8	•		•		•		•		•		•		•		•		•		•		•		•		•		•		•		•	
16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
32	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	

2. DIMM Population Requirements

- Population Requirements for GNR CPU Configuration

Table 5-10 DDR5 DIMM Population Requirements for GNR CPU Configuration

Capacity (GB)	Organization	Supported Population	
		1 DPC	2 DPC
16	1R x8	√	×
24	1R x8	√	×
32	1R x4	√	×
	2R x8	√	√
48	1R x4	√	×
	2R x8	√	×
64	2R x4	√	√
96	2R x4	√	√
128	2R x4	√	√

- Population Requirements for 6700 Series CPU (with E-Cores) Configuration

Table 5-11 DDR5 DIMM Population Requirements for 6700 Series CPU (with E-Cores) Configuration

Capacity (GB)	Organization	Supported Population	
		1 DPC	2 DPC
32	1R x4	√	×
	2R x8	√	×
64	2R x4	√	√
96	2R x4	√	√
128	2R x4	√	√

5.7 Storage



CAUTION

Mixing of storage controllers may result in drive letter drift under the OS.

5.7.1 Drive Configurations



NOTE

For the physical drive No. of each configuration, refer to [5.7.2 Drive Numbering](#).

Table 5-12 Drive Configurations

Configuration	Front Drives	Rear Drives	Internal Drives	Drive Management Mode
12 × 3.5-Inch Drive	12 × 3.5-inch drive (drive bays with physical drive No. 0 to 11 support SAS/SATA/NVMe drives)	4 × 2.5-inch SAS/SATA/NVMe drive or 2 × SATA/PCIe M.2 SSD	2 × SATA/PCIe M.2 SSD	<ul style="list-style-type: none"> NVMe drive: CPU SAS/SATA drive: IOH card or PCIe RAID card
24 × 2.5-Inch Drive	24 × 2.5-inch drive (drive bays with physical drive No. 0 to 23 support SAS/SATA/NVMe drives)	4 × 2.5-inch SAS/SATA/NVMe drive or 2 × SATA/PCIe M.2 SSD	2 × SATA/PCIe M.2 SSD	<ul style="list-style-type: none"> NVMe drive: CPU SAS/SATA drive: IOH card or PCIe RAID card
25 × 2.5-Inch Drive	25 × 2.5-inch drive (drive bays with physical drive No. 0 to 20 support SAS/SATA drives, and those with physical drive No. 21 to 24 support SAS/SATA/NVMe drives)	4 × 2.5-inch SAS/SATA/NVMe drive or 2 × SATA/PCIe M.2 SSD	2 × SATA/PCIe M.2 SSD	<ul style="list-style-type: none"> NVMe drive: CPU SAS/SATA drive: IOH card or PCIe RAID card

5.7.2 Drive Numbering

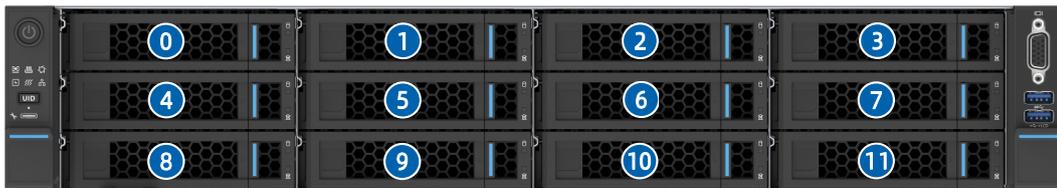
1. 12 × 3.5-Inch Drive Configuration



NOTE

Applicable model: KR2280-X3-A0-R0-00.

Figure 5-9 Drive Numbering



Configuration	Physical Drive No.	Drive No. Identified by the BMC	Front/Rear	Drive Number Identified by the 8i (16i) RAID Card
12 × SAS/SATA	0 to 11	0 to 11	Front	0 to 11

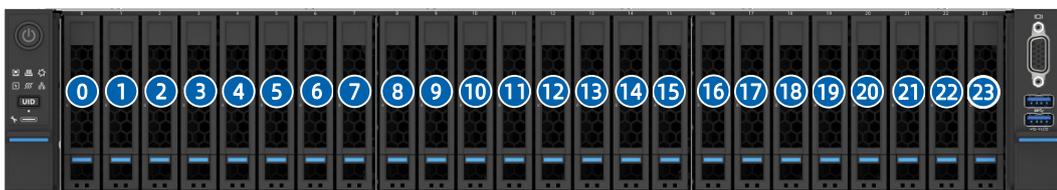
2. 24 × 2.5-Inch Drive Configuration



NOTE

Applicable model: KR2280-X3-A0-R0-00.

Figure 5-10 Drive Numbering



Configuration	Physical Drive No.	Drive No. Identified by the BMC	Front/Rear	Drive Number Identified by the 8i (16i) RAID Card
24 × SAS/SATA	0 to 7	0 to 7	Front	0 to 7
	8 to 23	8 to 23	Front	0 to 15

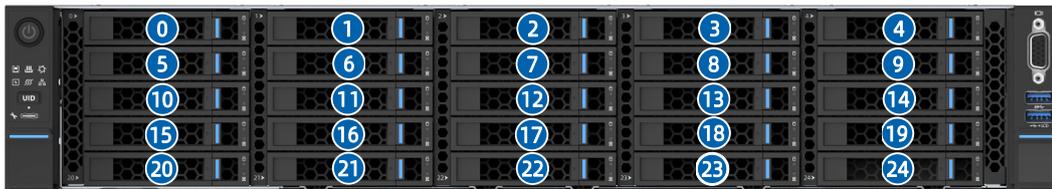
3. 25 × 2.5-Inch Drive Configuration



NOTE

Applicable model: KR2280-X3-A0-R0-00.

Figure 5-11 Drive Numbering



Configuration	Physical Drive No.	Drive No. Identified by the BMC	Front/Rear	Drive Number Identified by the 8i (16i) RAID Card
25 × SAS/SATA	0 to 24	0 to 24	Front	0 to 24

5.7.3 Drive LEDs

1. SAS/SATA Drive LEDs

Figure 5-12 SAS/SATA Drive LEDs



Activity LED (①)	Locator/Error LED (②)		Description
	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 (4 Hz)	Off	Off	Drive present and in use
Blinking (4 Hz)	Solid pink		Copyback/Rebuild in progress

Activity LED (①)	Locator/Error LED (②)		Description
	Blue	Red	
Green	Solid on	Off	Drive selected but not in use
Blinking (4 Hz)	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 5-13 NVMe Drive LEDs



When the VMD function is enabled and the latest VMD driver is installed, the NVMe drives support surprise hot swap, and the LEDs can be lit up.

Table 5-13 NVMe Drive LED Description

Activity LED (①)	Locator/Error LED (②)		Description
	Blue	Red	
Off	Off	Off	Drive absent
Solid on	Off	Off	Drive present but not in use
Blinking (4 Hz)	Off	Off	Drive present and in use
Blinking (4 Hz)	Solid pink		Copyback/Rebuild/Initializing/ Verifying in progress
Solid on	Solid on	Off	Drive selected but not in use
Blinking (4 Hz)	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

RAID cards provide 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](#).

5.7.5 IOH Cards

IOH cards provide 16i SATA ports. An IOH card supports up to 16 SATA drives.

For specific IOH 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 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 cards as needed.
- For specific NIC options, consult your local sales representative or refer to [7.2 Hardware Compatibility](#).

5.9 I/O Expansion

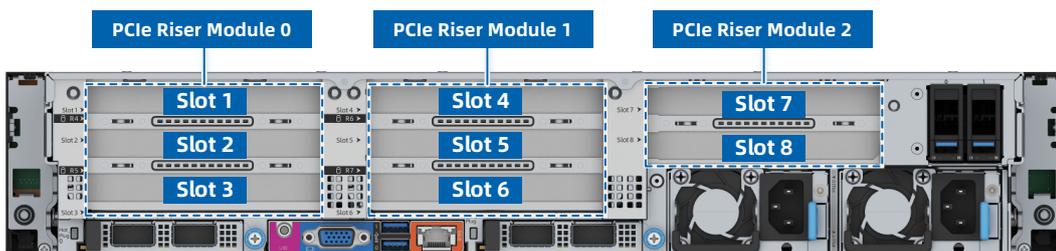
5.9.1 PCIe Expansion Cards

PCIe expansion cards provide system expansion capabilities.

- Up to 8 PCIe 5.0 expansion slots and 2 dedicated slots for OCP 3.0 cards.
- For specific PCIe expansion card options, consult your local sales representative or refer to [7.2 Hardware Compatibility](#).

5.9.2 PCIe Slot Locations

Figure 5-14 PCIe Slots - 8 × Rear PCIe Slot



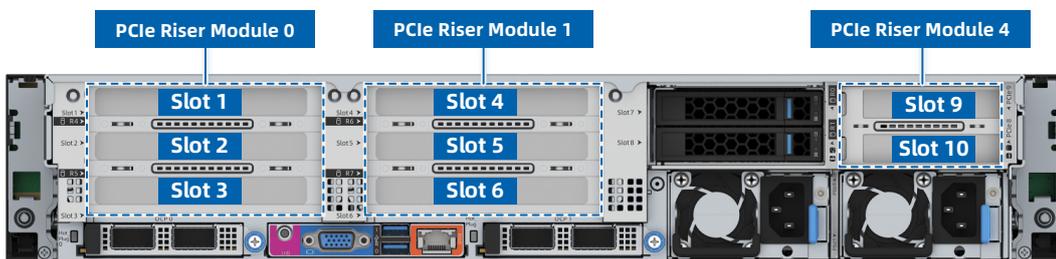


NOTE

Applicable model: KR2280-X3-A0-R0-00.

- Slot 1, slot 2, and slot 3 reside in PCIe riser module 0.
- Slot 4, slot 5, and slot 6 reside in PCIe riser module 1.
- Slot 7 and slot 8 reside in PCIe riser module 2.

Figure 5-15 PCIe Slots - 8 × Rear PCIe Slot



NOTE

Applicable model: KR2280-X3-A0-R0-00.

- Slot 1, slot 2, and slot 3 reside in PCIe riser module 0.
- Slot 4, slot 5, and slot 6 reside in PCIe riser module 1.
- Slot 9 and slot 10 reside in PCIe riser module 4.

5.9.3 PCIe Riser Modules

- PCIe Riser Module 0

Figure 5-16 PCIe Riser Module 0 (3 × PCIe x16 Slot)

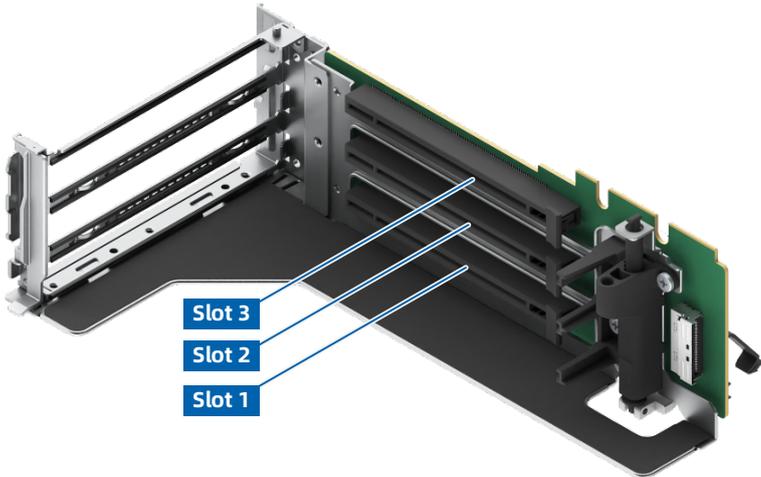
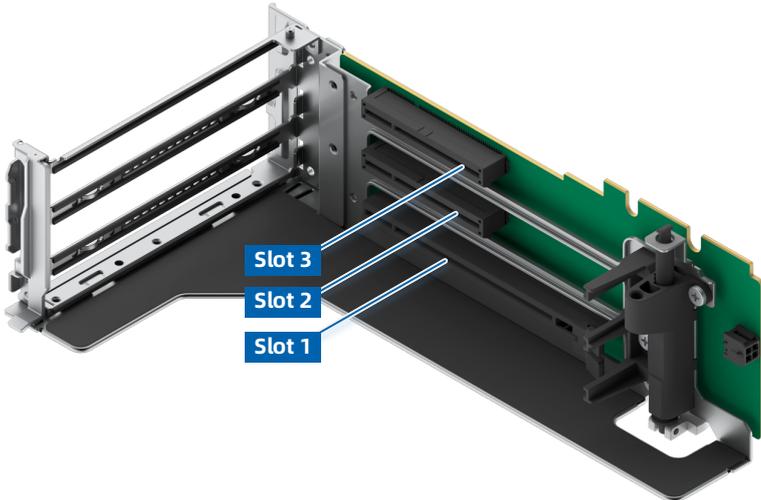


Figure 5-17 PCIe Riser Module 0 (1 × PCIe x16 Slot + 2 × PCIe x8 Slot)



- PCIe Riser Module 1

Figure 5-18 PCIe Riser Module 1 (3 × PCIe x16 Slot)

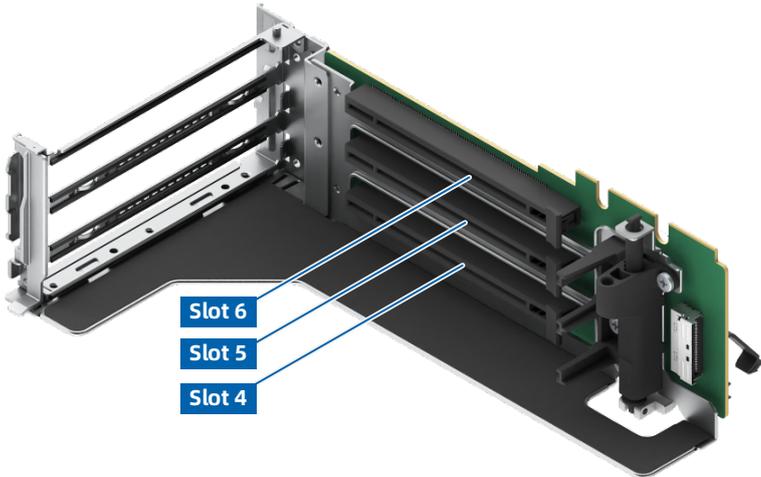
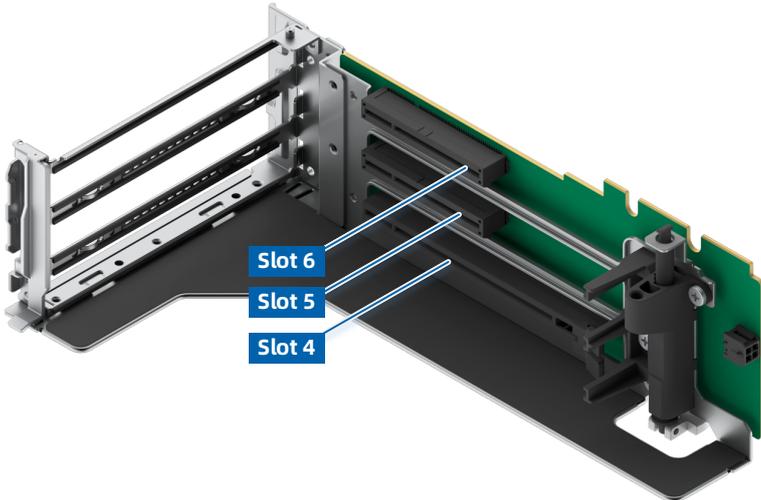
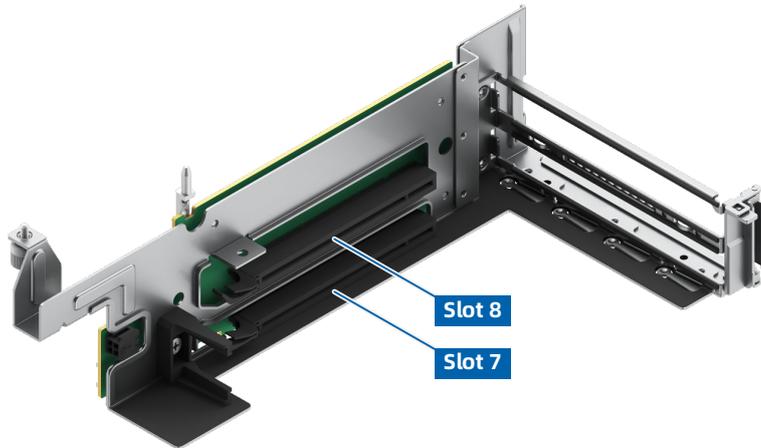


Figure 5-19 PCIe Riser Module 1 (1 × PCIe x16 Slot + 2 × PCIe x8 Slot)



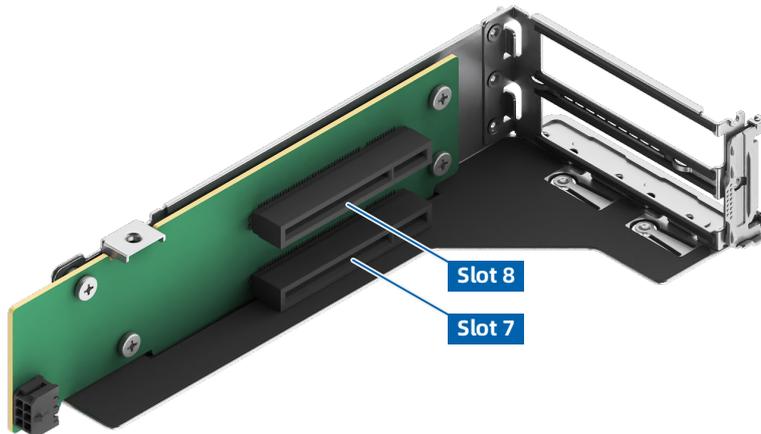
- PCIe Riser Module 2

Figure 5-20 PCIe Riser Module 2 (2 × PCIe x16 Slot)



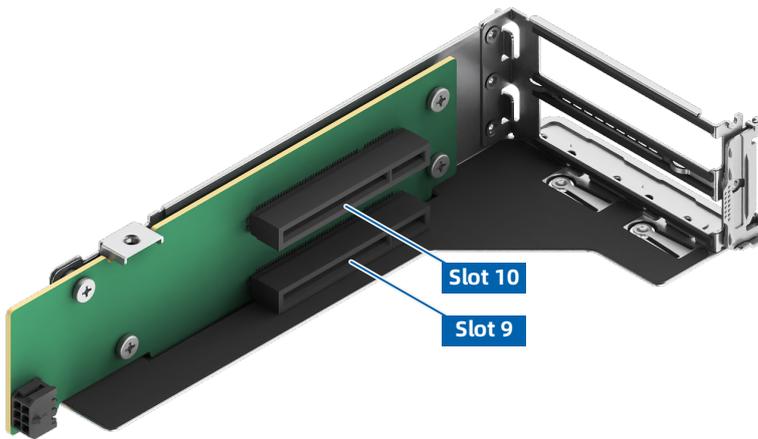
- PCIe Riser Module 3

Figure 5-21 PCIe Riser Module 3 (2 × PCIe x8 Slot)



- PCIe Riser Module 4

Figure 5-22 PCIe Riser Module 4 (2 × PCIe x8 Slot)



5.9.4 PCIe Slot Description



NOTE

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

- 8 × PCIe Expansion Card Configuration 1



NOTE

This configuration supports PCIe riser module 0 (1 PCIe x16 slot and 2 PCIe x8 slots), PCIe riser module 1 (1 PCIe x16 slot and 2 PCIe x8 slots), and PCIe riser module 4 (2 PCIe x8 slots).

Table 5-14 PCIe Slot Description

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
Slot 1	CPU1	PCIe 5.0	x16	x16	PE3	FH3/4L
Slot 2	CPU0	PCIe 5.0	x8	x8	PE0	FH3/4L
Slot 3	CPU0	PCIe 5.0	x8	x8	PE0	FHHL
Slot 4	CPU0	PCIe 5.0	x16	x16	PE3	FH3/4L
Slot 5	CPU1	PCIe 5.0	x8	x8	PE0	FH3/4L
Slot 6	CPU1	PCIe 5.0	x8	x8	PE0	FHHL
Slot 9	CPU0	PCIe 5.0	x8	x8	PE5	HHHL

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
Slot 10	CPU0	PCIe 5.0	x8	x8	PE5	HHHL
OCP 3.0 Slot	CPU0	PCIe 5.0	x16	x16	PE2	SFF/LFF
OCP 3.0 Slot	CPU1	PCIe 5.0	x16	x16	PE2	SFF/LFF

- 6 × PCIe Expansion Card Configuration



NOTE

This configuration supports PCIe riser module 0 (3 PCIe x16 slots) and PCIe riser module 1 (3 PCIe x16 slots).

Table 5-15 PCIe Slot Description

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
Slot 1	CPU1	PCIe 5.0	x16	x16	PE3	FH3/4L
Slot 2	CPU0	PCIe 5.0	x16	x16	PE4	FH3/4L
Slot 3	CPU0	PCIe 5.0	x16	x16	PE0	FHHL
Slot 4	CPU0	PCIe 5.0	x16	x16	PE3	FH3/4L
Slot 5	CPU1	PCIe 5.0	x16	x16	PE5	FH3/4L
Slot 6	CPU1	PCIe 5.0	x16	x16	PE0	FHHL
OCP 3.0 Slot	CPU0	PCIe 5.0	x16	x16	PE2	SFF/LFF
OCP 3.0 Slot	CPU1	PCIe 5.0	x16	x16	PE2	SFF/LFF

- 8 × PCIe Expansion Card Configuration 2



NOTE

This configuration supports PCIe riser module 0 (3 PCIe x16 slots), PCIe riser module 1 (3 PCIe x16 slots), and PCIe riser module 2 (2 PCIe x16 slots).

Table 5-16 PCIe Slot Description

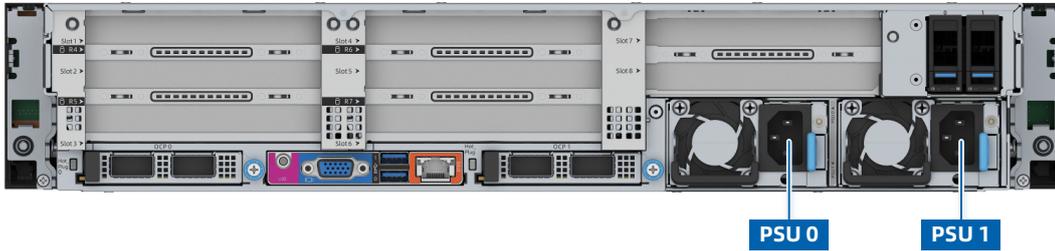
PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
Slot 1	CPU0	PCIe 5.0	x16	x16	PE5	FH3/4L
Slot 2	CPU0	PCIe 5.0	x16	x16	PE4	FH3/4L
Slot 3	CPU0	PCIe 5.0	x16	x16	PE0	FHHL
Slot 4	CPU0	PCIe 5.0	x16	x16	PE3	FH3/4L
Slot 5	CPU1	PCIe 5.0	x16	x16	PE5	FH3/4L
Slot 6	CPU1	PCIe 5.0	x16	x16	PE0	FHHL
Slot 7	CPU1	PCIe 5.0	x16	x16	PE4	FH3/4L
Slot 8	CPU1	PCIe 5.0	x16	x16	PE3	FH3/4L
OCP 3.0 Slot	CPU0	PCIe 5.0	x16	x16	PE2	SFF/LFF
OCP 3.0 Slot	CPU1	PCIe 5.0	x16	x16	PE2	SFF/LFF

5.10 PSUs

- The server supports 1 or 2 PSUs.
- The server supports AC or DC power input.
- The PSUs are hot-swappable.
- The server supports 2 PSUs in 1+1 redundancy.
- The server must use PSUs with the same part number (P/N code).
- The PSUs provide short circuit protection.

5.10.1 PSU Locations

Figure 5-23 PSU Locations



5.10.2 PSU LED

Figure 5-24 PSU LED

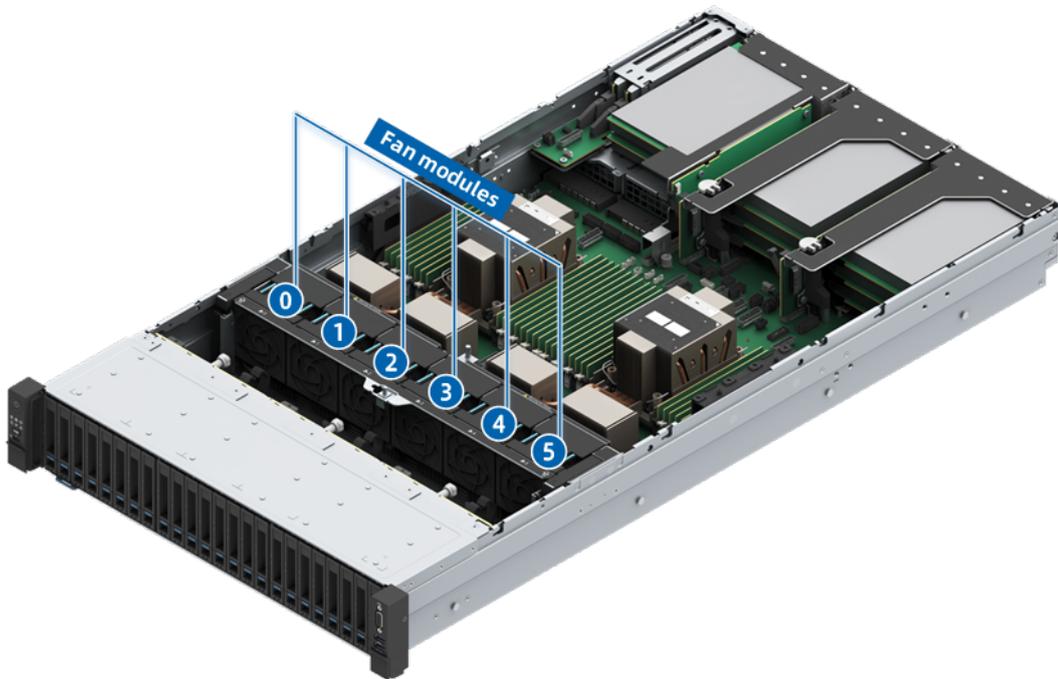


PSU LED (①) Status	Description
Solid green	Normal
Off	No AC/DC input to the PSU
Solid amber	PSU critical event causing a shutdown (possible causes: PSU overtemperature protection, PSU overcurrent protection, PSU overvoltage protection, short circuit protection)
Blinking amber (1 Hz)	PSU warning event where the PSU continues to operate (possible causes: PSU overtemperature warning, PSU overcurrent warning, excessively low fan speed warning)
Blinking green (1 Hz)	PSU operating in standby mode with normal input
Blinking green (on for 2 seconds and off for 1 second)	PSU in sleep state for cold redundancy
Blinking green (2 Hz)	PSU firmware updating

5.11 Fan Modules

- The server supports 6 fan modules. Users can select 6038 and 6056 fans based on the configuration.
- The fan modules are hot-swappable.
- The 6056 fans support N+1 redundancy, which means that the server can continue working properly when a single fan fails.
- The server supports intelligent fan speed control.
- The server must use fan modules with the same part number (P/N code).

Figure 5-25 Fan Module Locations



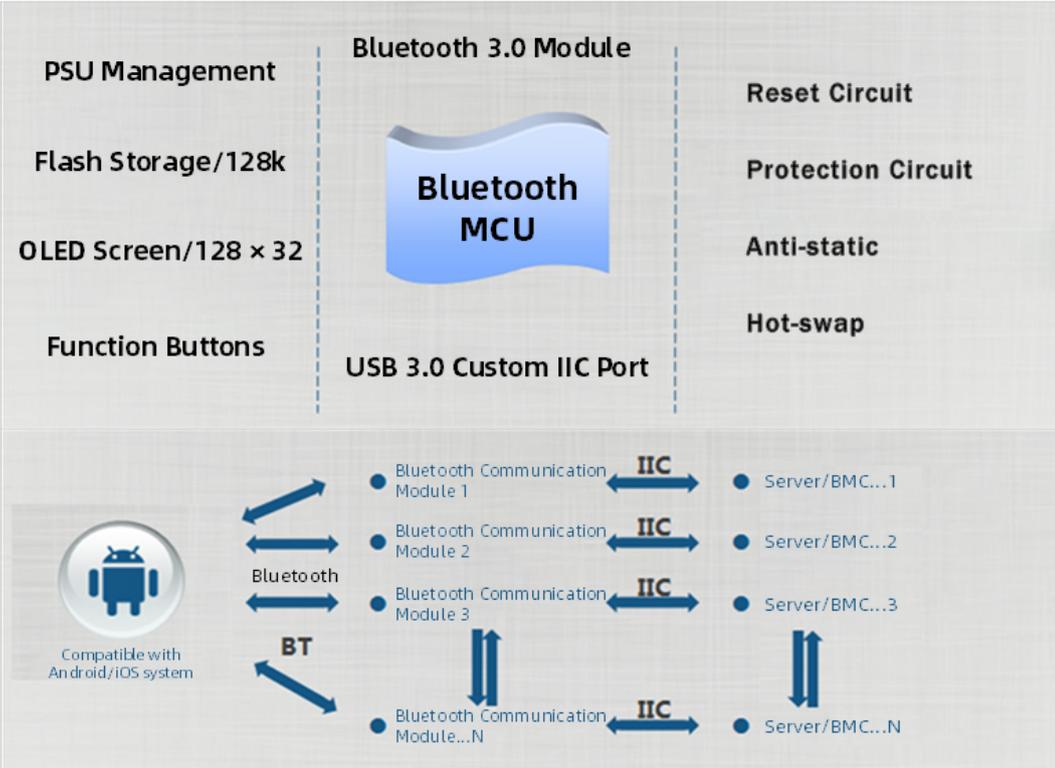
5.12 LCD Module

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.

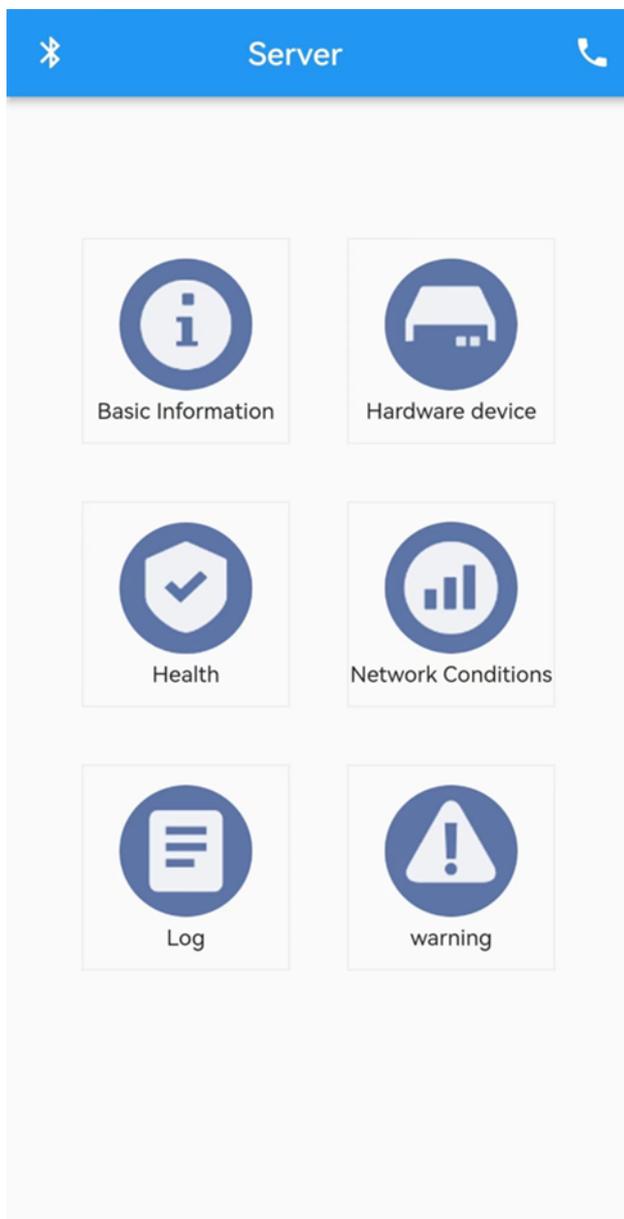
The LCD module synchronizes information with the BMC through I²C and can display information on an LCD screen or in the app. The server's basic information, system status and alert diagnosis can be displayed in the app via Bluetooth, facilitating the operation and maintenance.

Figure 5-26 How LCD Subsystem Works



5.12.2 Interface

Figure 5-27 App Home Screen



5.13 Boards

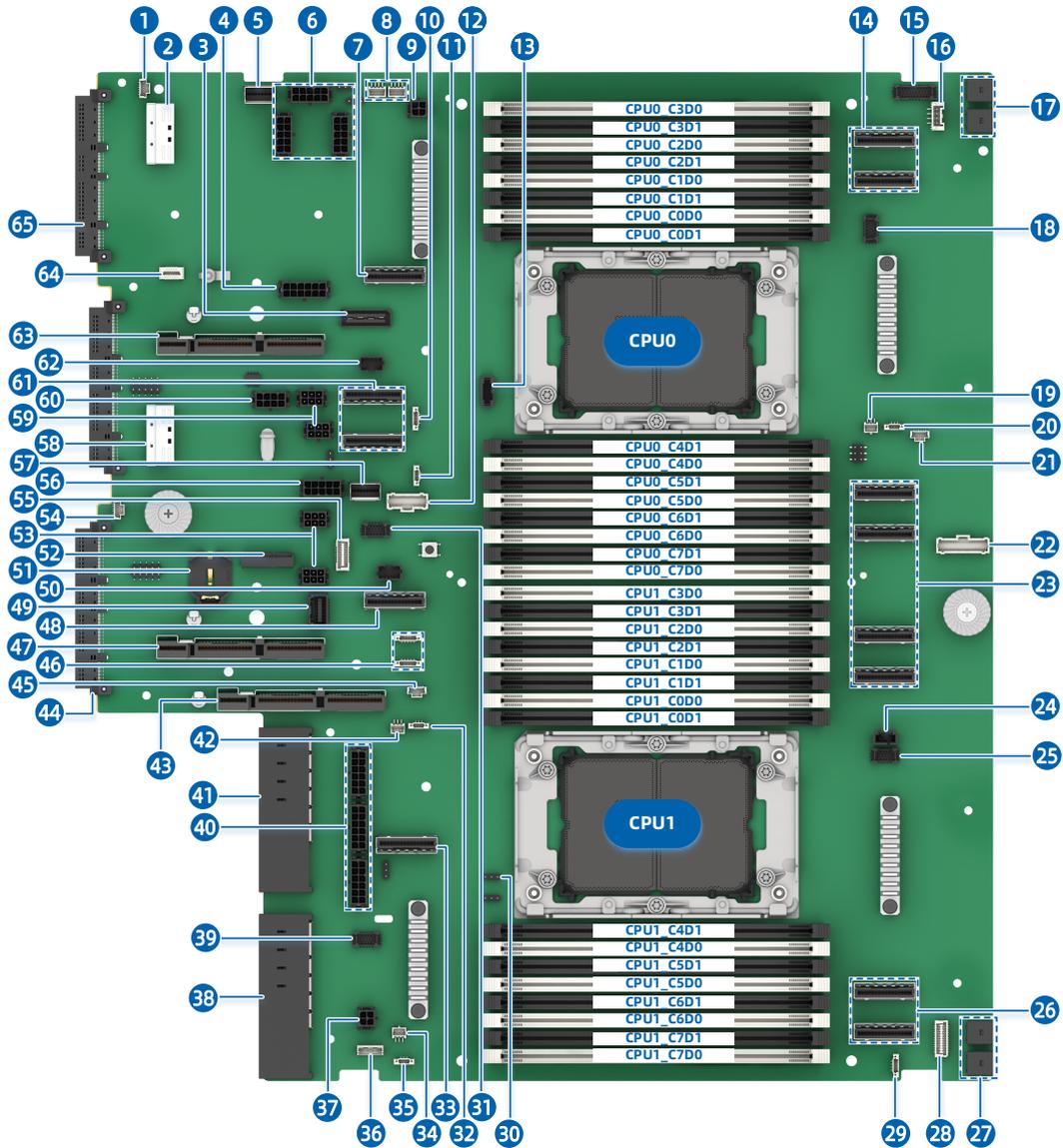


NOTE

The figures below may differ from the actual configuration.

5.13.1 Motherboard

Figure 5-28 Motherboard



Item	Feature	Item	Feature
1	OCP 3.0 Card 0 Hot-Plug Button and LED Connector	34	DMPU UART Connector 3V3_0
2	OCP 3.0 Card 0 MCIO x8 Connector	35	DMPU UART Connector 1V8_0
3	XDP Connector	36	VROC Connector
4	GPU0 Power Connector	37	M.2 Adapter Power Connector
5	Right Control Panel Connector	38	PSU1 Connector

Item	Feature	Item	Feature
6	Front Drive BP/PCIe Riser Power Connector	39	PCIe Riser I ² C Connector 1
7	MCIO x8 Connector	40	GPU Power Connector
8	Leak Detection Connector	41	PSU0 Connector
9	Front OCP 3.0 Card Power Connector	42	DMPU UART Connector 3V3_1
10	Smart NIC Presence Detection and Clock Selection Connector	43	PCIe Riser Connector (x16)
11	Smart NIC UART Connector	44	OCP 3.0 Card 1 Connector
12	NC-SI Connector	45	M.2 Adapter Sideband Connector
13	CDP Connector	46	PCIe Riser I ³ C Connector
14	MCIO x8 Connector	47	PCIe Riser Connector (x16)
15	Fan Board I ² C Connector	48	MCIO x8 Connector
16	Inlet Temperature Sensor Connector	49	Drive BP I ² C Connector 2
17	Fan Board Power Connector	50	Drive BP I ² C Connector 4
18	Drive BP I ² C Connector 1	51	Button Cell Battery Socket
19	DMPU UART Connector	52	System TF Card Adapter Connector
20	DMPU UART Connector 1V8_2	53	Rear Drive BP/PCIe Riser Power Connector
21	Front OCP 3.0 Card Hot-Plug Button and LED Connector	54	OCP 3.0 Card 1 Hot-Plug Button and LED Connector
22	Front OCP 3.0 Card NC-SI Connector	55	Left Control Panel USB Type-C Port Connector
23	MCIO x8 Connector	56	Mid-Drive Power Connector
24	Intrusion Detection Connector	57	M.2 Adapter Connector
25	Drive BP I ² C Connector 0	58	OCP 3.0 Card 1 MCIO x8 Connector
25	MCIO x8 Connector	59	Rear Drive BP/PCIe Riser Power Connector
27	Fan Board Power Connector	60	Smart NIC Power Connector

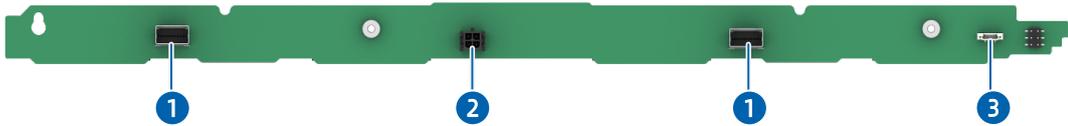
Item	Feature	Item	Feature
28	Left Control Panel Connector (buttons & LEDs)	61	MCIO x8 Connector
29	DMPU/TSOM I ² C Connector	62	Drive BP I ² C Connector 3
30	CMOS Jumper	63	PCIe Riser Connector (x16)
31	PCIe Riser I ² C Connector 0	64	TPM Connector
32	DMPU UART Connector 1V8_1	65	OCP 3.0 Card 0 Connector
33	MCIO x8 Connector	-	-

5.13.2 Drive Backplanes

1. Front Drive Backplanes

- 4 × 3.5-Inch SAS/SATA Drive Backplane

Figure 5-29 4 × 3.5-Inch SAS/SATA Drive Backplane



Item	Feature	Item	Feature
1	Slimline x4 Connector	3	I ² C Connector
2	Power Connector	-	-

- 4 × 3.5-Inch SAS/SATA/NVMe Drive Backplane

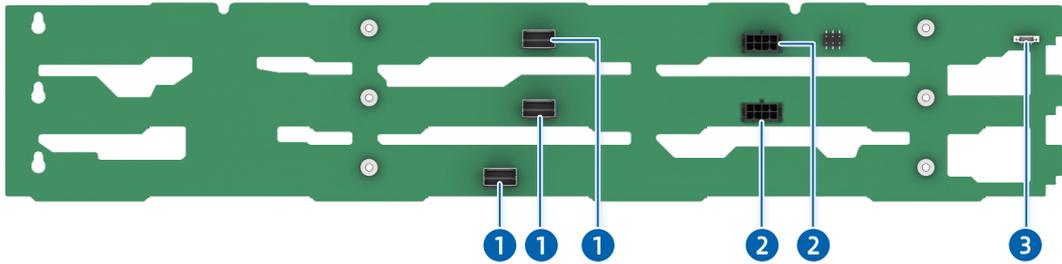
Figure 5-30 4 × 3.5-Inch SAS/SATA/NVMe Drive Backplane



Item	Feature	Item	Feature
1	Slimline x4 Connector	3	Power Connector
2	MCIO Connector	4	I ² C Connector

- 12 × 3.5-Inch SAS/SATA Drive Backplane

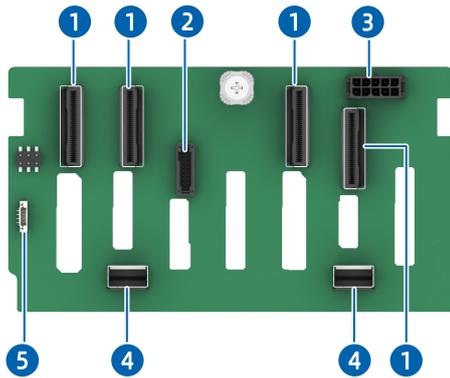
Figure 5-31 12 × 3.5-Inch SAS/SATA Drive Backplane



Item	Feature	Item	Feature
1	Slimline x4 Connector	3	I ² C Connector
2	Power Connector	-	-

- 8 × 2.5-Inch SAS/SATA/NVMe Drive Backplane

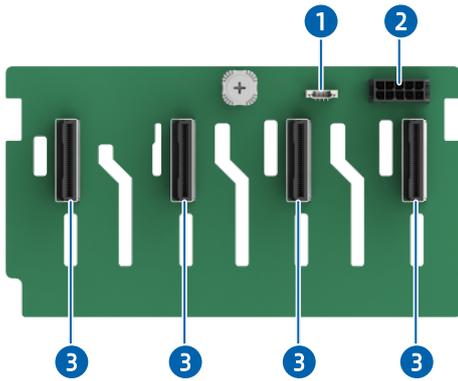
Figure 5-32 8 × 2.5-Inch SAS/SATA/NVMe Drive Backplane



Item	Feature	Item	Feature
1	MCIO Connector	4	Slimline x4 Connector
2	VPP Connector	5	I ² C Connector
3	Power Connector	-	-

- 8 × E3.5 Drive Backplane

Figure 5-33 8 × E3.5 Drive Backplane

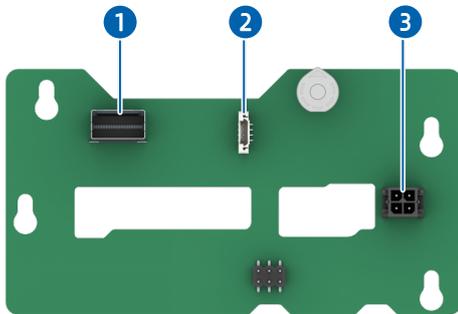


Item	Feature	Item	Feature
1	I²C Connector	3	MCIO Connector
2	Power Connector	-	-

2. Rear Drive Backplanes

- 2 × 3.5-Inch SAS/SATA Drive Backplane

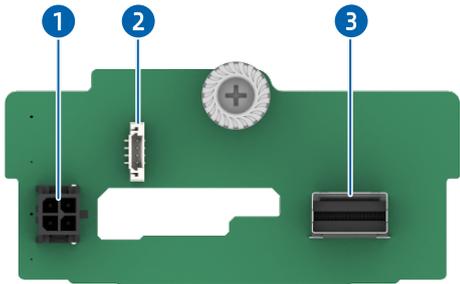
Figure 5-34 2 × 3.5-Inch SAS/SATA Drive Backplane



Item	Feature	Item	Feature
1	Slimline x4 Connector	3	Power Connector
2	I²C Connector	-	-

- 2 × 2.5-Inch SAS/SATA Drive Backplane

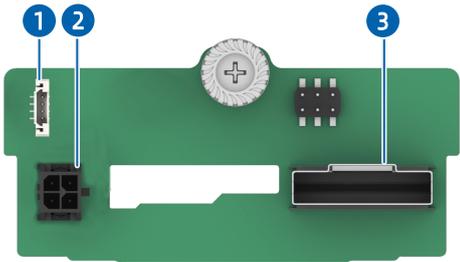
Figure 5-35 2 × 2.5-Inch SAS/SATA Drive Backplane



Item	Feature	Item	Feature
1	Power Connector	3	Slimline x4 Connector
2	I ² C Connector	-	-

- 2 × 2.5-Inch NVMe Drive Backplane

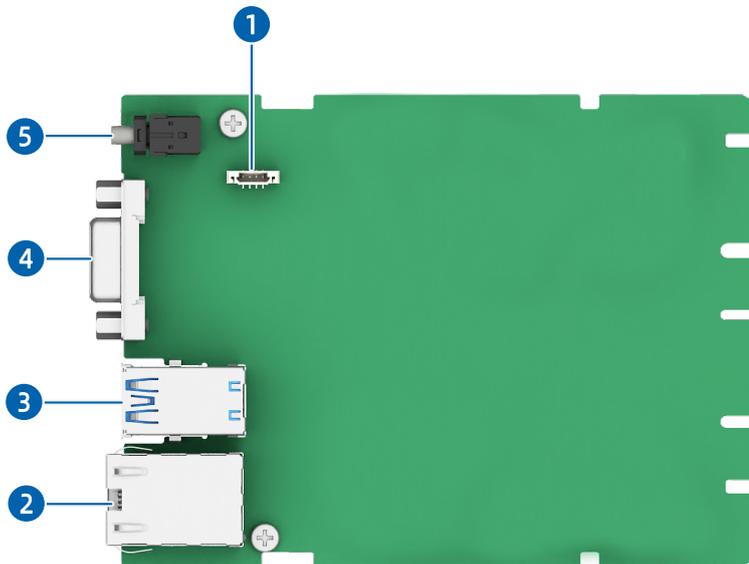
Figure 5-36 2 × 2.5-Inch NVMe Drive Backplane



Item	Feature	Item	Feature
1	I ² C Connector	3	MCIO Connector
2	Power Connector	-	-

5.13.3 DC-SCM Board

Figure 5-37 DC-SCM Board



Item	Feature	Item	Feature
1	I ² C Connector	4	VGA Port
2	BMC Management Network Port	5	UID/BMC RST Button and LED
3	USB 3.0 Port	-	-

6 Product Specifications

6.1 Technical Specifications

Table 6-1 Technical Specifications

Item		Description
Form Factor		2U rack server
Processor	GNR	<p>Supports up to 2 processors.</p> <ul style="list-style-type: none"> • Intel Xeon 6 processors • Integrated memory controllers and 8 memory channels per processor • Integrated PCIe 5.0 controllers and 88 PCIe lanes per processor • 4 UPI links per CPU at up to 24 GT/s per link • Up to 86 cores per CPU • L3 cache up to 330 MB per CPU • TDP up to 350 W <p>Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.</p>
	6700 Series (E-Cores)	<p>Supports up to 2 processors.</p> <ul style="list-style-type: none"> • Intel Xeon 6 processors • Integrated memory controllers and 8 memory channels per processor • Integrated PCIe 5.0 controllers and 88 PCIe lanes per processor • 4 UPI links per CPU at up to 24 GT/s per link • Up to 144 cores per CPU • Max. Turbo frequency of 3.2 GHz • L3 cache up to 330 MB per CPU • TDP up to 330 W <p>Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.</p>
Memory		<p>Supports up to 32 DDR5 RDIMMs or 16 MCR DIMMs.</p> <ul style="list-style-type: none"> • RDIMMs and MCR DIMMs supported • Up to 6,400 MT/s (RDIMMs, 1 DPC)

Item	Description
	<ul style="list-style-type: none"> • Up to 5,200 MT/s (RDIMMs, 2 DPC) • Mixing DDR5 DIMMs of different specifications (capacity, bit width, rank, height, etc.) is not supported. • A server must use DDR5 DIMMs with the same part number (P/N code). <p>Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.</p>
Storage	<ul style="list-style-type: none"> • Supports multiple drive configurations. See 7.2 Hardware Compatibility for details. • Front: <ul style="list-style-type: none"> - Up to 12 × 3.5-inch SATA/SAS/NVMe drive (hot-swap) or - Up to 24 × 2.5-inch SATA/SAS/NVMe drive (hot-swap) or - Up to 21 × 2.5-inch SATA/SAS drive (hot-swap) + 4 × 2.5-inch SATA/SAS/NVMe drive (hot-swap) • Rear: <ul style="list-style-type: none"> - 4 × 2.5-inch SATA/SAS/NVMe drive (hot-swap) or - 2 × SATA/PCIe M.2 SSD (hot-swap) • Internal: <ul style="list-style-type: none"> - Up to 1 TF card (for BIOS) - 4 × 3.5-inch SATA/SAS drive - 2 × SATA/PCIe M.2 SSD
Network	1 BMC management network port of 100/1,000 Mbps auto-negotiation
I/O Expansion	<ul style="list-style-type: none"> • Supports up to 8 standard PCIe expansion cards. <ul style="list-style-type: none"> - 8 × FHHL PCIe 5.0 x16 expansion card or - 6 × FHHL PCIe 5.0 x16 + 2 × HHHL PCIe 5.0 x16 expansion card • Supports up to two 1/10/25/100 Gb hot-plug OCP 3.0 cards. <p>For details, see 5.9.2 PCIe Slot Locations and 5.9.4 PCIe Slot Description.</p>
Port	<ul style="list-style-type: none"> • Front: <ul style="list-style-type: none"> - 1 × USB 2.0 port - 1 × USB 3.0 port - 1 × VGA port

Item	Description
	<ul style="list-style-type: none"> - 1 × USB Type-C port • Rear: <ul style="list-style-type: none"> - 2 × USB 3.0 port - 1 × VGA port - 1 × BMC management network port <p>Note: OS installation on the USB storage media is not recommended.</p>
Display	<p>Integrated VGA on the motherboard with a video memory of 64 MB and a maximum 16M color resolution of 1,920 × 1,200 at 60 Hz</p> <p>Notes:</p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • UEFI/Legacy • BMC • NC-SI • KSMANage • KSMANage Tools
Security	<ul style="list-style-type: none"> • 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 • System secure erase (optional) • Memory protection technologies • DMPU for fault diagnosis • IRUT for hitless firmware update • MUPR for intelligent forewarning and healing

6.2 Environmental Specifications

Table 6-2 Environmental Specifications

Item	Description
Temperature ^{1,2,3}	<ul style="list-style-type: none"> Operating: 5°C to 45°C (41°F to 113°F) Storage (packed): -40°C to 65°C (-40°F to 149°F) Storage (unpacked): -40°C to 55°C (-40°F to 131°F)
Relative Humidity (RH, non-condensing)	<ul style="list-style-type: none"> Operating: 5% to 90% RH Storage (packed): 5% to 95% RH Storage (unpacked): 5% to 95% RH
Altitude	<ul style="list-style-type: none"> Operating: 0 to 3,048 m (0 to 10,000 ft) Shipping (storage): 0 to 12,192 m (0 to 40,000 ft)
Corrosive Gaseous Contaminants	<p>Maximum growth rate of corrosion film thickness:</p> <ul style="list-style-type: none"> 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}	<p>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):</p> <ul style="list-style-type: none"> Idle: <ul style="list-style-type: none"> - LWAd: 6.7 B - LpAm: 55 dBA Operating: <ul style="list-style-type: none"> - LWAd: 7.2 B - LpAm: 60 dBA

Notes:

- Not all configurations support an operating temperature range of 5°C to 45°C (41°F to 113°F). The GPU configuration supports an operating temperature range of 10°C to 30°C (50°F to 86°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 3,048 m (0 to 10,000 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 altitude and the maximum temperature gradient vary with server configurations.
 - 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 3,048 m (3,117 to 10,000 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 3,048 m (3,117 to 10,000 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 server configurations, workloads, ambient temperatures, and other factors. These values are for reference only and subject to change without further 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.

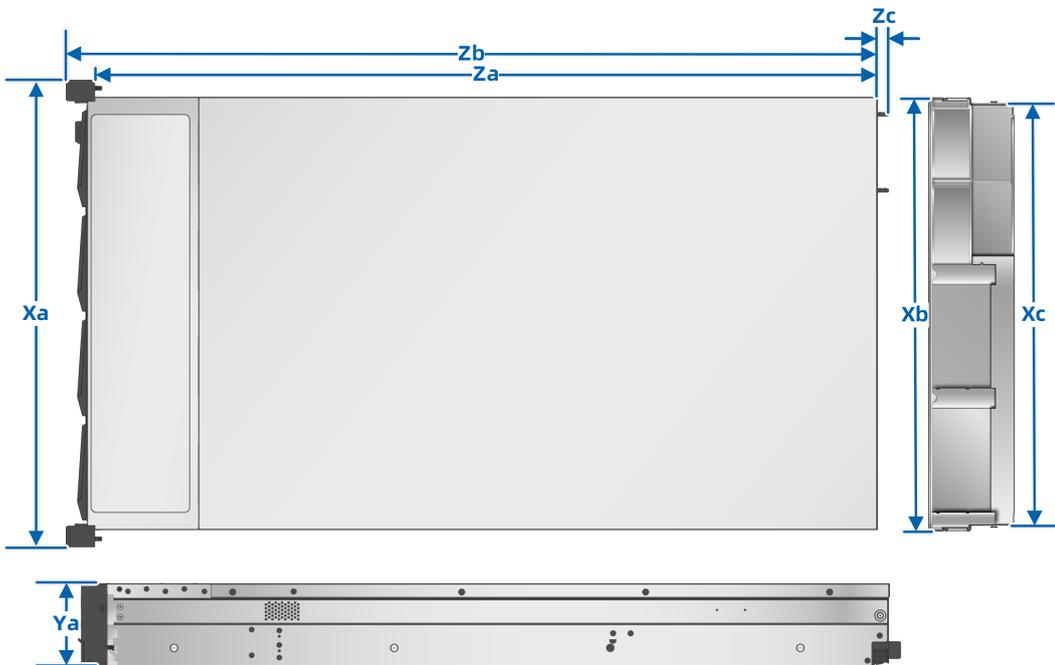
6.3 Physical Specifications

Table 6-3 Physical Specifications

Item	Description
Outer Packaging Dimensions (L × W × H)	<ul style="list-style-type: none"> • 780-mm-deep chassis: 990 × 590 × 295 mm (38.98 × 23.23 × 11.61 in.) • 850-mm-deep chassis: 1,090 × 600 × 295 mm (42.91 × 23.62 × 11.61 in.)
Installation Dimension Requirements	<ul style="list-style-type: none"> • Installation requirements for the cabinet are as follows: <ul style="list-style-type: none"> - 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:

Item	Description
	<ul style="list-style-type: none"> - Static rail kit: The distance between the front and rear mounting flanges ranges from 609 to 914 mm (23.98 to 35.98 in.). - Ball-bearing rail kit: The distance between the front and rear mounting flanges ranges from 609 to 914 mm (23.98 to 35.98 in.).
Weight	<ul style="list-style-type: none"> • 12 × 3.5-inch drive configuration: <ul style="list-style-type: none"> - Net weight: 33 kg (72.75 lbs) - Gross weight: 43.7 kg (96.34 lbs) (including server, packaging box, rails and accessory box) • 24 × 2.5-inch drive configuration: <ul style="list-style-type: none"> - Net weight: 27.6 kg (60.85 lbs) - Gross weight: 37 kg (81.57 lbs) (including server, packaging box, rails and accessory box) <p>Note: The server weight varies by configuration.</p>

Figure 6-1 Chassis Dimensions



Model	Xa	Xb	Xc	Ya	Za	Zb	Zc
780-mm-Deep Chassis	482.2 mm (18.98 in.)	447 mm (17.60 in.)	435 mm (17.13 in.)	87 mm (3.43 in.)	780 mm (30.71 in.)	809.5 mm (31.87 in.)	11.55 mm (0.45 in.)
850-mm-Deep Chassis	482.2 mm (18.98 in.)	447 mm (17.60 in.)	435 mm (17.13 in.)	87 mm (3.43 in.)	850 mm (33.46 in.)	879.5 mm (34.63 in.)	11.55 mm (0.45 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.
- Hardware compatibility may vary by the model. 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 representative 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
Windows Server 2022
SUSE Linux Enterprise Server 15.5 & 15.6
Red Hat Enterprise Linux 8.10
Ubuntu 24.04
KeyarchOS 5.8 SP1U2
VMware ESXi 9.0

7.2 Hardware Compatibility

7.2.1 CPU Specifications

The server supports up to 2 Intel Xeon 6 processors. Each CPU supports up to 16 DDR5 RDIMMs (6,400 MT/s for 1 DPC, 5,200 MT/s for 2 DPC).

Table 7-2 CPU Specifications

Model	Cores	Threads	Base Frequency (GHz)	Max. Turbo Frequency (GHz)	Cache (MB)	TDP (W)
6766E	144	144	1.9	2.7	108	250
6780E	144	144	2.2	3.0	108	330

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)	Speed (MT/s)	Data Width	Organization
RDIMM	32	6,400	x80	1R x4/2R x8
RDIMM	64	6,400	x80	2R x4
RDIMM	128	6,400	x80	2R x4

7.2.3 Drive Specifications

Table 7-4 SAS HDD Specifications

Type	Speed in rpm	Capacity	Max. Qty.
SAS HDD	10k	600 GB	24
SAS HDD	10k	1.2 TB	24
SAS HDD	10k	1.8 TB	24
SAS HDD	10k	2.4 TB	24

Table 7-5 SAS/SATA SSD Specifications

Type	Capacity (TB)	Max. Qty.
SATA SSD	3.8	24
SAS SSD	1.6	24
SAS SSD	3.2	24
SAS SSD	6.4	24

Table 7-6 U.2 NVMe SSD Specifications

Type	Capacity (TB)	Max. Qty.
U.2 NVMe SSD	1.6	24
U.2 NVMe SSD	3.2	24
U.2 NVMe SSD	3.8	24
U.2 NVMe SSD	6.4	24
U.2 NVMe SSD	12.8	24

Table 7-7 M.2 SSD Specifications

Model	Capacity	Max. Qty.
SATA M.2 SSD	240 GB	2
SATA M.2 SSD	480 GB	2
PCIe M.2 SSD	960 GB	2
PCIe M.2 SSD	1.9 TB	2
PCIe M.2 SSD	3.8 TB	2

7.2.4 SAS/RAID Card Specifications

Table 7-8 SAS/RAID Card Specifications

Type	Description
SAS Card	SAS_IAG_8222_S-HBA_8R0_SAS3_PCIE3_M
	SAS_IAG_DW_PM8252SHBA_8R0_SAS4_PCIE4
	SAS_BRCM_8R0_9500-8i_SMSAS3_PCIE4_1

Type	Description
	SAS_BRCM_8R0_9500-8i_SMSAS3_PCIE4
RAID Card	RAID_IAG_DW_PM8254_8R0_4G_SAS4_PCIE4
	RAID_IAG_DW_PM8254_8R0_8G_SAS4_PCIE4
	RAID_BRCM_8R0_9560-8i_4G_SMSAS3_PCIE4_7
	RAID_BRCM_16R_9560-16i_8_SMSAS3_PCIE4_7
	RAID_IAG_8204_Y_8R0_2GB_SAS3_PCIE3_M
	RAID_IAG_8204_Y_8R0_4G_SAS3_PCIE3_M

7.2.5 NIC Specifications

Table 7-9 OCP Card Specifications

Type	Description	Speed (Gbps)	Port Qty.
OCP 3.0 Card	NIC_M_25G_MCX631432AN_LC_OCP3x8_2_XR	25	2

Table 7-10 PCIe NIC Specifications

Type	Description	Speed (Gbps)	Port Qty.
PCIe NIC	NIC_M_25G_MCX631102AN_LC_PCIEx8_2_XR	25	2
	NIC_BRCM_100G_57508_LC_PCIEx16_2_XR	100	2

7.2.6 HBA/HCA Card Specifications

Table 7-11 HBA Card Specifications

Type	Description	Speed (Gbps)	Port Qty.
HBA Card	HBA_E_OR2_LPE35002_FC32G_PCIE	32	2

Table 7-12 HCA Card Specifications

Type	Description	Speed (Gbps)	Port Qty.
HCA Card	HCA_NV_1-NDR200_MCX75310AAS-HEAT_PCIE	200	1

7.2.7 PSU Specifications

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

- The following rated 110 Vac, 230 Vac and 240 Vdc PSUs in 1+1 redundancy are supported:
 - 800 W Platinum PSU: 800 W (110 Vac), 800 W (230 Vac), 800 W (240 Vdc for China)
 - 1,300 W Platinum PSU: 1,000 W (110 Vac), 1,300 W (230 Vac), 1,300 W (240 Vdc for China)
 - 1,600 W Platinum PSU: 1,000 W (110 Vac), 1,600 W (230 Vac), 1,600 W (240 Vdc for China)
 - 2,000 W Platinum PSU: 1,000 W (110 Vac), 2,000 W (230 Vac), 2,000 W (240 Vdc for China)
 - 2,700 W Platinum PSU: 1,000 W (110 Vac), 2,700 W (230 Vac), 2,700 W (240 Vdc for China)
 - 800 W Titanium PSU: 800 W (230 Vac), 800 W (240 Vdc for China)
 - 1,300 W Titanium PSU: 1,300 W (230 Vac), 1,300 W (240 Vdc for China)
 - 1,600 W Titanium PSU: 1,600 W (230 Vac), 1,600 W (240 Vdc for China)
 - 2,000 W Titanium PSU: 2,000 W (230 Vac), 2,000 W (240 Vdc for China)
 - 2,700 W Titanium PSU: 2,700 W (230 Vac), 2,700 W (240 Vdc for China)
 - 3,200 W Titanium PSU: 3,200 W (230 Vac), 3,200 W (240 Vdc for China)

Note: At a rated input voltage of 110 Vac, the output power of a 1,300/1,600/2,000/2,700/3,200 W PSU will be derated to 1,000 W.

Operating voltage range:

- 110 Vac: 90 Vac to 132 Vac

- 230 Vac: 180 Vac to 264 Vac
- 240 Vdc: 180 Vdc to 320 Vdc
- The following rated 336 Vdc PSUs in 1+1 redundancy are supported:
 - 800 W PSU: 800 W (336 Vdc)
 - 1,300 W PSU: 1,300 W (336 Vdc)
 - 1,600 W PSU: 1,600 W (336 Vdc)

Operating voltage range:

- 336 Vdc: 260 Vdc to 400 Vdc, 176 Vac to 264 Vac
- The following rated -48 Vdc PSUs in 1+1 redundancy are supported:
 - 800 W PSU: 800 W (-48 Vdc)
 - 1,300 W PSU: 1,300 W (-48 Vdc)

Operating voltage range:

- -48 Vdc: -40 Vdc to -72 Vdc

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

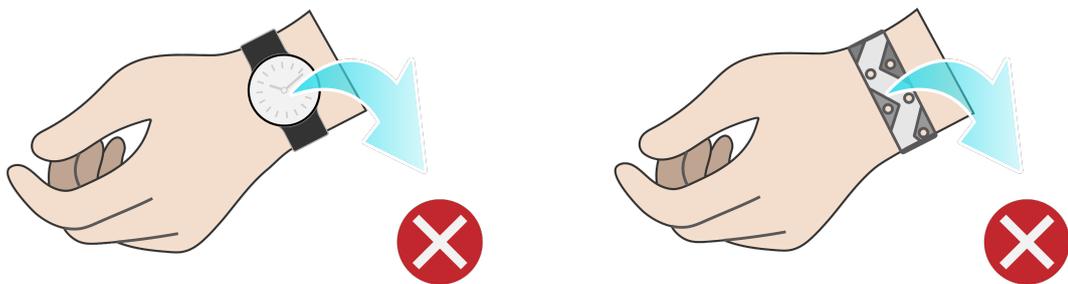
- Only personnel certified or authorized by us are allowed to perform the installation procedures.
- Stop any operation that could cause personal injury or equipment damage. Report to the project manager and take effective protective measures.
- Working during thunderstorms, including but not limited 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.

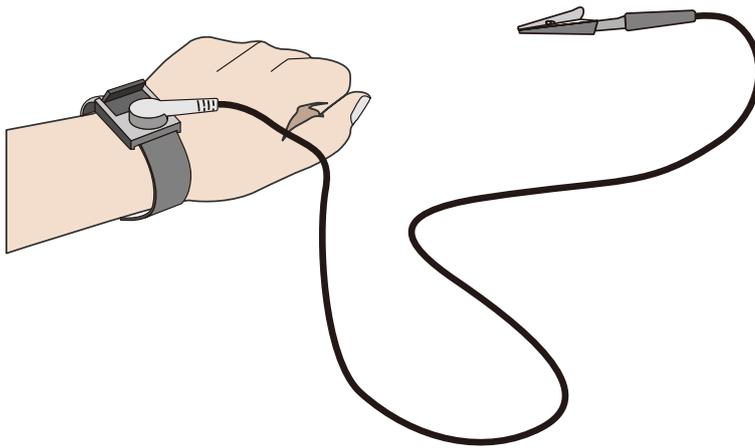
Figure 8-2 Removing Conductive Objects



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 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



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)	<ul style="list-style-type: none"> • Male: 15/33.08

Organization	Weight Limit (kg/lbs)
	<ul style="list-style-type: none"><li data-bbox="1045 257 1342 302">• 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 (SEs 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.



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.



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, a remote server management system, supports mainstream management specifications in the industry such as IPMI 2.0 and Redfish 1.18. 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 1.18
- 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: <ul style="list-style-type: none">• IPMI• SMASH CLP• SNMP• HTTPS• Web GUI• Redfish• 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.

Feature	Description
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 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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
	<p>ensure that the fan operates at safe speeds to avoid system overheating.</p> <ul style="list-style-type: none"> • Supports self-diagnosis of processors, memory modules, and storage devices of BMC, 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	<ul style="list-style-type: none"> • 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, 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 V5.0. 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.

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, 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 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 10-2 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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

Feature	Description
	rules, compression rules and fault reporting rules, and redefinition of above rules
Control	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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
Logs	<ul style="list-style-type: none"> • Fault log record management • Diagnosis record and diagnosis rule management
Topologies	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Management of warranty information reports, alert reports, asset reports, hardware reports and performance reports • Export of reports in .xlsx format
System	<ul style="list-style-type: none"> • Password management, alert forwarding and data dump • Customized KSMange parameters

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

10.3 KSMange Tools

Table 10-3 Features of KSMange Tools

Feature	Description
KSMange Kits	A lightweight automatic batch O&M tool for servers, mainly used for server deployment, routine maintenance, firmware update, fault handling, etc.
KSMange 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
KSMange Server CLI	Fast integration with third-party management platforms, delivering a new O&M mode of Infrastructure as Code (IaC)
KSMange 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.
KSMange 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

Table 11-1 Certifications

Country/Region	Certification	Mandatory/Voluntary
International	CB	Voluntary
EU	CE	Mandatory
US	FCC	Mandatory
	UL	Voluntary
	Energy Star	Voluntary
Canada	IC	Mandatory
	CUL	Voluntary
EAEU	EAC	Mandatory
	EAC-RoHS	Mandatory
	FSS	Mandatory
Korea	KC	Mandatory
	E-Standby	Mandatory
Taiwan, China	BSMI	Mandatory
Uzbekistan	STZ	Mandatory

12 Appendix A

12.1 Thermal Restrictions

Table 12-1 Thermal Restrictions

Configuration	Max. Operating Temp.: 30°C (86°F)	Max. Operating Temp.: 35°C (95°F)	Max. Operating Temp.: 40°C (104°F)	Max. Operating Temp.: 45°C (113°F)
12 × 3.5-Inch Drive, Perforated Chassis	<ul style="list-style-type: none"> 6056 fans CPU TDP ≤350 W OCP cards ≥100 Gb not supported GPUs not supported 	<ul style="list-style-type: none"> 6056 fans CPU TDP ≤350 W OCP cards ≥100 Gb not supported GPUs not supported 	<ul style="list-style-type: none"> 6056 fans RDIMMs ≤32 GB CPU TDP ≤270 W OCP cards ≥100 Gb not supported PCIe NICs ≥100 Gb not supported GPUs not supported 	<ul style="list-style-type: none"> 6056 fans RDIMMs ≤32 GB CPU TDP ≤270 W OCP cards ≥100 Gb not supported PCIe NICs ≥100 Gb not supported GPUs not supported
12 × 3.5-Inch Drive, Non-Perforated Chassis	<ul style="list-style-type: none"> 6056 fans CPU TDP ≤350 W OCP cards ≥100 Gb not supported PCIe NICs ≥100 Gb not supported GPUs not supported 	<ul style="list-style-type: none"> 6056 fans CPU TDP ≤350 W OCP cards ≥100 Gb not supported PCIe NICs ≥100 Gb not supported GPUs not supported 	<ul style="list-style-type: none"> 6056 fans RDIMMs ≤32 GB CPU TDP ≤270 W OCP cards ≥100 Gb not supported PCIe NICs ≥100 Gb not supported 	<ul style="list-style-type: none"> 6056 fans RDIMMs ≤32 GB CPU TDP ≤270 W OCP cards ≥100 Gb not supported PCIe NICs ≥100 Gb not supported

Configuration	Max. Operating Temp.: 30°C (86°F)	Max. Operating Temp.: 35°C (95°F)	Max. Operating Temp.: 40°C (104°F)	Max. Operating Temp.: 45°C (113°F)
			<ul style="list-style-type: none"> GPUs not supported 	<ul style="list-style-type: none"> GPUs not supported
8 × 3.5-Inch Drive	<ul style="list-style-type: none"> 6056 fans CPU TDP ≤350 W GPUs supported 	<ul style="list-style-type: none"> 6056 fans CPU TDP ≤350 W GPUs supported 	<ul style="list-style-type: none"> 6056 fans RDIMMs ≤64 GB CPU TDP ≤330 W OCP cards ≥100 Gb not supported GPUs not supported 	<ul style="list-style-type: none"> 6056 fans RDIMMs ≤64 GB CPU TDP ≤270 W OCP cards ≥100 Gb not supported PCIe NICs ≥100 Gb not supported GPUs not supported
12 × 3.5-Inch Drive + Internal Drives	<ul style="list-style-type: none"> 6056 fans CPU TDP ≤270 W OCP cards ≥100 Gb not supported PCIe NICs ≥100 Gb not supported GPUs not supported Internal drives supported 	<ul style="list-style-type: none"> 6056 fans CPU TDP ≤270 W OCP cards ≥100 Gb not supported PCIe NICs ≥100 Gb not supported GPUs not supported Internal drives supported 	<ul style="list-style-type: none"> 6056 fans RDIMMs ≤32 GB CPU TDP ≤270 W OCP cards ≥100 Gb not supported PCIe NICs ≥100 Gb not supported GPUs not supported Internal drives supported 	<ul style="list-style-type: none"> 6056 fans RDIMMs ≤32 GB CPU TDP ≤270 W OCP cards ≥100 Gb not supported PCIe NICs ≥100 Gb not supported GPUs not supported Internal drives supported

Configuration	Max. Operating Temp.: 30°C (86°F)	Max. Operating Temp.: 35°C (95°F)	Max. Operating Temp.: 40°C (104°F)	Max. Operating Temp.: 45°C (113°F)
24 × 2.5-Inch Drive	<ul style="list-style-type: none"> • 6056 fans • CPU TDP ≤350 W • OCP cards ≥100 Gb not supported • GPUs not supported 	<ul style="list-style-type: none"> • 6056 fans • CPU TDP ≤350 W • OCP cards ≥100 Gb not supported • GPUs not supported 	<ul style="list-style-type: none"> • 6056 fans • RDIMMs ≤32 GB • CPU TDP ≤270 W • OCP cards ≥100 Gb not supported • PCIe NICs ≥100 Gb not supported • GPUs not supported 	<ul style="list-style-type: none"> • 6056 fans • RDIMMs ≤32 GB • CPU TDP ≤270 W • OCP cards ≥100 Gb not supported • PCIe NICs ≥100 Gb not supported • GPUs not supported
16 × 2.5-Inch Drive	<ul style="list-style-type: none"> • 6056 fans • CPU TDP ≤350 W • GPUs supported 	<ul style="list-style-type: none"> • 6056 fans • CPU TDP ≤350 W • OCP cards ≥100 Gb not supported • GPUs supported 	<ul style="list-style-type: none"> • 6056 fans • RDIMMs ≤32 GB • CPU TDP ≤270 W • OCP cards ≥100 Gb not supported • GPUs supported 	<ul style="list-style-type: none"> • 6056 fans • RDIMMs ≤32 GB • CPU TDP ≤270 W • OCP cards ≥100 Gb not supported • NICs ≥100 Gb not supported • GPUs supported
25 × 2.5-Inch Drive	<ul style="list-style-type: none"> • 6056 fans • CPU TDP ≤350 W • OCP cards ≥100 Gb not supported 	<ul style="list-style-type: none"> • 6056 fans • CPU TDP ≤350 W • OCP cards ≥100 Gb not supported 	<ul style="list-style-type: none"> • 6056 fans • RDIMMs ≤32 GB • CPU TDP ≤270 W • OCP cards ≥100 Gb 	<ul style="list-style-type: none"> • 6056 fans • RDIMMs ≤32 GB • CPU TDP ≤270 W • OCP cards ≥100 Gb

Configuration	Max. Operating Temp.: 30°C (86°F)	Max. Operating Temp.: 35°C (95°F)	Max. Operating Temp.: 40°C (104°F)	Max. Operating Temp.: 45°C (113°F)
	<ul style="list-style-type: none"> GPUs not supported 	<ul style="list-style-type: none"> GPUs not supported 	<ul style="list-style-type: none"> not supported PCIe NICs ≥100 Gb not supported GPUs not supported 	<ul style="list-style-type: none"> not supported PCIe NICs ≥100 Gb not supported GPUs not supported
4 × 3.5-Inch Drive (12-Drive Chassis)	<ul style="list-style-type: none"> 6038 fans RDIMMs ≤32 GB CPU TDP ≤205 W OCP cards ≥25 Gb not supported PCIe NICs ≥25 Gb not supported GPUs not supported 			
8 × 2.5-Inch Drive (24-Drive Chassis)	<ul style="list-style-type: none"> 6038 fans RDIMMs ≤32 GB CPU TDP ≤205 W OCP cards ≥25 Gb not supported PCIe NICs ≥25 Gb not supported GPUs 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 Power/Performance Profiles

Table 12-2 Power/Performance Profiles

Profile	Note
Balance/Energy Efficiency	Based on workloads and controlled by the OS policy
Power Saving	-
Low Latency	-
Virtualization - Performance	-
OLTP	Online Transaction Processing
Performance	-
Static Base Frequency	-
Single Core High Performance	-
Virtualization - Balance	-
I/O Sensitive	-
Comprehensive Performance	-
Memory Low Latency - Performance	-
Memory Low Latency - Balance	-
SpecPower	Provides the ultimate energy efficiency ratio
Balance/Energy Efficiency - OOB	Based on workloads, not controlled by the OS policy
Custom	Default mode

12.3 Model

Table 12-3 Model

Certified Model	Description
KR2280-X3-A0-R0-00	Global

12.4 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.

12.5 Sensor List

Table 12-4 Sensor List

Sensor	Description	Sensor Location	Remarks
Inlet_Temp	Air inlet temperature	Right mounting ear	-
Outlet_Temp	Air outlet temperature	Motherboard	-
CPUx_Temp	CPUx core temperature	CPUx	x indicates the CPU number with a value of 0 to 1
CPUx_Margin_Temp	CPUx margin temperature	CPUx	x indicates the CPU number with a value of 0 to 1
CPUx_DIMM_Temp	CPUx DIMM temperature	DIMMs of CPUx	x indicates the CPU number with a value of 0 to 1
CPUx_VR_Temp	The maximum temperature among VR power supplies for CPUx	CPUx	x indicates the CPU number with a value of 0 to 1
PSUx_Inlet_Temp	PSUx inlet temperature	PSUx	x indicates the PSU number with a value of 0 to 1
GPUx_Temp	GPUx temperature	GPUx	x indicates the GPU number with a value of 0 to 7
GPU_MEM_MAX_T	The maximum video memory temperature among all GPUs	GPUs	-

Sensor	Description	Sensor Location	Remarks
GPU_TLM_MIN_T	The minimum Tlimit temperature among all GPUs	GPUs	-
M.2_Temp	The maximum temperature among all M.2 SSDs	M.2 adapter	-
RAID_Temp	The maximum temperature among all RAID cards	RAID cards	-
SSD_MAX_Temp	The maximum temperature among all SAS and SATA SSDs	SSDs	-
HDD_MAX_Temp	The maximum temperature among all SAS and SATA HDDs	HDDs	-
OCP_NIC_Temp	The maximum temperature among all OCP card chips	OCP cards	-
OCP_NIC_SFP_Temp	The maximum temperature among all OCP card SFP modules	OCP cards	-
PCIe_NIC_Temp	The maximum temperature among all PCIe NIC chips	PCIe NICs	-
PCIe_SFP_Temp	The maximum temperature among all SFP modules of the PCIe NIC, BF2 NIC, BF3 NIC, HBA card, and HCA card	PCIe NIC, BF2 NIC, BF3 NIC, HBA card, and HCA card	-
PCIe_HBA_Temp	The maximum temperature among all HBA card chips	HBA cards	-

Sensor	Description	Sensor Location	Remarks
PCIe_HCA_Temp	The maximum temperature among all HCA card chips	HCA cards	-
CPU_Tjmax	The maximum temperature among all CPU cores	Motherboard	-
CPU_TControl	CPU core temperature	Motherboard	-
BP_Front_Temp	Front backplane temperature	Drive backplanes	-
BP_Middle_Temp	Middle backplane temperature	Drive backplanes	-
BP_Rear_Temp	Rear backplane temperature	Drive backplanes	-
PCIe_Retimer_T	The maximum core temperature among all PCIe retimer cards	Retimer cards	-
OCP_Retimer_Temp	The maximum core temperature among all OCP retimer cards	Retimer cards	-
NVME_F_MAX_T	The maximum temperature among all front NVMe drives	Drives	-
NVME_I_R_MAX_T	The maximum temperature among all internal and rear NVMe drives	Drives	-
SYS_12V	Motherboard 12 V voltage	Motherboard	-
SYS_5V	Motherboard 5 V voltage	Motherboard	-
SYS_3V3	Motherboard 3.3 V voltage	Motherboard	-

Sensor	Description	Sensor Location	Remarks
RTC_Battery	Battery voltage	Motherboard RTC battery	-
PSUx_VIN	PSUx input voltage	PSUx	x indicates the PSU number with a value of 0 to 1
PSUx_VOUT	PSUx output voltage	PSUx	x indicates the PSU number with a value of 0 to 1
PVCCIN_CPUx	PVCCIN_CPUx voltage	CPUx	x indicates the CPU number with a value of 0 to 1
PVNN_MAIN_CPUx	PVNN_MAIN_CPUx voltage	CPUx	x indicates the CPU number with a value of 0 to 1
SYS_1V8	Motherboard 1.8 V voltage	Motherboard	-
Air_Pressure	Air pressure	Motherboard	-
CPU_ResourceRate	CPU utilization rate	CPUs	-
MEM_ResourceRate	Memory utilization rate	Memories	-
PSUx_IOUT	PSUx output current	PSUx	x indicates the PSU number with a value of 0 to 1
PSUx_PIN	PSUx input power	PSUx	x indicates the PSU number with a value of 0 to 1
PSUx_POUT	PSUx output power	PSUx	x indicates the PSU number with a value of 0 to 1
CPUx_Power	CPUx power	CPUx	x indicates the CPU number with a value of 0 to 1
Total_Power	Total system input power	PSUs	-
CPU_Total_Power	Total CPU power	CPUs	-

Sensor	Description	Sensor Location	Remarks
MEM_Total_Power	Total memory power	Memories	-
Fan_Total_Power	Total fan power	Fans	-
FANx_F_Speed	FANx speed	FANx	x indicates the fan number with a value of 0 - 5
FANx_R_Speed			x indicates the fan number with a value of 0 - 5
FAN_Redundant	Fan redundancy status	Fans	-
FANx_Status	FANx status	FANx	x indicates the fan number with a value of 0 - 5
FANx_Present	FANx presence status	FANx	x indicates the fan number with a value of 0 - 5
CPUx_Status	CPUx status	CPUx	x indicates the CPU number with a value of 0 to 1
CPUx_CXDY	DIMM status of CPUx	DIMMs of CPUx	x indicates the CPU number with a value of 0 to 1, X indicates the memory channel number with a value of 0 to 7, and Y indicates the DIMM number with a value of 0 to 1
F_HDDx	Front drive status	Drives	x indicates the drive number with a value of 0 to 24
R_HDDx	Rear drive status	Drives	x indicates the drive number

Sensor	Description	Sensor Location	Remarks
			with a value of 0 to 9
I_HDDx	Internal drive status	Drives	x indicates the drive number with a value of 0 to 3
PSU_Redundant	PSU redundancy status	PSUs	-
PSU_Mismatch	PSU models mismatch	PSUs	-
PSUx_Status	PSUx status	PSUx	x indicates the PSU number with a value of 0 to 1
LeakageSensor	Leakage status	Motherboard	-
BMC_Boot_Up	BMC boot up complete	Virtual sensor	-
BIOS_Boot_Up	BIOS boot up complete	Virtual sensor	-
Sys_Health	System health status	Management module	-
SEL_Status	SEL status	Virtual sensor	-
POST_Status	POST status	Virtual sensor	-
BMC_Status	BMC status	Virtual sensor	-
PWR_On_TMOU	Power-on timeout	Motherboard	-
System_Error	Emergency system errors	Virtual sensor	-
Intrusion	Chassis-opening activity	Motherboard	-
CPU_Config	CPU configuration status (mixing of CPUs, or primary CPU not installed)	CPUs	-
ACPI_PWR	ACPI power status	Virtual sensor	-
Watchdog2	Watchdog 2	Motherboard	-

Sensor	Description	Sensor Location	Remarks
PWR_CAP_Fail	Power capping failure	Motherboard	-
PCIe_Status	The error status of PCIe expansion cards	PCIe expansion cards	-

13 Appendix B Acronyms and Abbreviations

A

AC	Alternating Current
ACPI	Advanced Configuration and Power Interface
ADDDC	Adaptive Double Device Data Correction
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
AVX	Advanced Vector Extensions

B

BIOS	Basic Input Output System
BLE	BIOS Lock Enable
BMC	Baseboard Management Controller
BP	Backplane
BSMI	Bureau of Standards, Metrology, and Inspection

C

CAS	Column Address Strobe
CB	Certification Body
CDP	Compact Debug Port

CE	Conformite Europeenne
CEN	European Committee for Standardization
CLP	Command-Line Protocol
CMOS	Complementary Metal-Oxide-Semiconductor
CPLD	Complex Programmable Logic Device
CPU	Central Processing Unit
CRPS	Common Redundant Power Supply
CUL	Canadian Underwriters Laboratories
CXL	Compute Express Link

D

DC	Direct Current
DDR5	Double Data Rate 5
DIMM	Dual In-line Memory Module
DL	Deep Learning
DOA	Dead on Arrival
DPC	DIMM per Channel
DRAM	Dynamic Random Access Memory

E

EAC	Eurasian Conformity
ECC	Error-Correcting Code
ECMA	European Computer Manufacturers Association
ESD	Electrostatic Discharge
E1.S	Enterprise & Data Center SSD Form Factor 1 Unit Short
E3.S	Enterprise & Data Center SSD Form Factor 3 Unit Short

F

FCC	Federal Communications Commission
FHHL	Full-Height Half-Length
FSS	Federal Security Service

G

GNR	Granite Rapids
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
HTTPS	HyperText Transfer Protocol Secure

I

I/O	Input/Output
I ² C	Inter-Integrated Circuit
IC	Industry Canada
ID	Identification
IEC	International Electrotechnical Commission
IIPC	Intel Intelligent Power Capability

IOH	Input/Output Hub
IP	Internet Protocol
IPMI	Intelligent Platform Management Interface
IRUT	Intelligent Runtime Update Technology
ISA	International Society of Automation
ISO	International Organization for Standardization
IT	Information Technology

J

JBOD	Just a Bunch of Disks
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K

KC	Korea Certification
KVM	Keyboard, Video, Mouse

L

LC	Lucent Connector
LCD	Liquid Crystal Display
LDAP	Lightweight Directory Access Protocol
LED	Light Emitting Diode
LFF	Large Form Factor

M

MCIO	Mini Cool Edge Input/Output
MCR	Multiplexer Combined Ranks

MUPR	Memory UCE Prevent and Repair
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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
OLTP	Online Transaction Processing
OOB	Out-of-Band
OS	Operating System

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
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RAS	Reliability, Availability, Serviceability
RDIMM	Registered Dual In-line Memory Module
RH	Relative Humidity
RMA	Return Material Authorization
RoHS	Restriction of Hazardous Substances Directive
RST	Reset
RTC	Real Time Clock

S

SAS	Serial Attached SCSI
SATA	Serial Advanced Technology Attachment
SCSI	Small Computer System Interface
SDDC	Single Device Data Correction
SEL	System Event Log
SFF	Small Form Factor
SFP	Small Form-factor Pluggable
SGX	Software Guard Extensions
SLA	Service Level Agreements
SMASH	Systems Management Architecture for Server Hardware
SMM	System Management Mode
SNMP	Simple Network Management Protocol
SSD	Solid State Drive
SSH	Secure Shell

T

TCM	Trusted Cryptography Module
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TDP	Thermal Design Power
TF	TransFlash
TPM	Trusted Platform Module
TSOM	Transport, Storage, Operation Monitor

U

UART	Universal Asynchronous Receiver/Transmitter
UCE	Uncorrectable Error
UEFI	Unified Extensible Firmware Interface
UID	Unit Identification
UL	Underwriter 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
VR	Voltage Regulator
VRD	Voltage Regulator-Down
VROC	Virtual RAID on CPU

x

XDP	eXtend Debug Port
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