White Paper for KR2266V2 Series Servers

Powered by Intel Processors

For KR2266-X2-A0-R0-00

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Applicable Model

Model	Maintenance	Cooling
KR2266-X2-A0-R0-00	Rear access	Air cooling

Technical Support

Global Service Hotline:	(+1) 844-912-0007
Address:	1501 McCarthy Blvd, Milpitas, CA 95035 AIVRES SYSTEMS INC.
Website:	https://aivres.com
Email:	serversupport@aivres.com

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Preface

Abstract

This document describes the KR2266V2 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

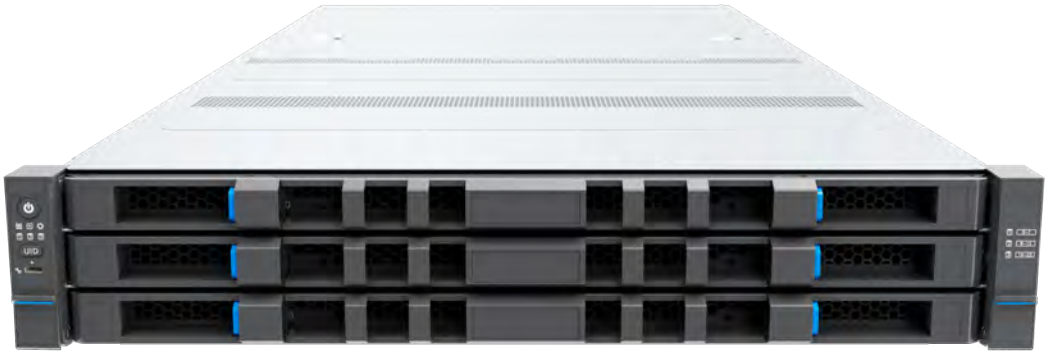
Version	Date	Description of Changes
V1.0	2025/04/25	Initial release

Table of Contents

1 Product Overview

The KR2266V2 Intel-based system is a high-density 2U storage server powered by the 4th/5th Gen Intel Xeon Scalable processors (SPR/EMR). It features an innovative three-layer storage that significantly improves storage density, computing power, network bandwidth, and intelligent management. In addition, the balanced and symmetric system architecture provides increased data capacity, larger data throughput, and stronger data processing capabilities, making it suitable for big data, CDN, hyper-convergence, distributed storage, and other application scenarios.

Figure 1-1 KR2266V2 Intel-Based System



2 Features

2.1 Scalability and Performance

Table 2-1 Scalability and Performance

Technical Feature	Description
Intel Xeon Scalable Processors	• SPR: One processor supports up to 60 cores, a max. Turbo frequency of 4.1 GHz, an L3 cache of 112.5 MB, and 4 UPI links at up to 16 GT/s. • EMR: One processor supports up to 64 cores, a max. Turbo frequency of 4.2 GHz, an L3 cache of 320 MB, and 4 UPI links at up to 16 GT/s. - Provides a larger L2 cache with an optimized processor cache hierarchy. - Supports Intel Turbo Boost Technology 2.0 and automatically scales CPU speeds up to the max. Turbo frequency at peak workloads, allowing processor cores to exceed the thermal design power (TDP) for a limited time. - Supports Intel Hyper-Threading Technology, allowing up to 2 threads to run on each core to improve the performance of multi-threaded applications. - Supports Intel Virtualization Technology that provides hardware assist to the virtualization software, allowing the operating system to better use hardware to handle virtualized workloads. - Supports Intel Advanced Vector Extensions 512 (Intel AVX-512), significantly accelerating the workloads that are strongly floating point compute intensive. - Supports Intel DL Boost (VNNI) instructions, improving the performance for deep learning applications.
DIMM Form Factor	Up to 16 DDR5 ECC DIMMs [4,800 MT/s (SPR) or 5,600 MT/s (EMR), RDIMMs], delivering superior speed, high availability, and a memory capacity of up to 4 TB.
Flexible Drive Configurations	Provides elastic and expandable storage solutions to meet different capacity and upgrade requirements.

Technical Feature	Description

	• Front:
	  - Up to 24 × 3.5-inch SAS/SATA drive (hot-swap)
	• Rear:
	  - Configuration 1: Up to 4 × 3.5-inch SAS/SATA drive (hot-swap) + 2 × 2.5-inch SAS/SATA/NVMe drive (hot-swap)
	  - Configuration 2: Up to 8 × 2.5-inch SAS/SATA/NVMe drive (hot-swap)
	  - Configuration 3: Up to 8 × E1.S SSD (hot-swap)
	• Internal:
	  - Up to 8 × 2.5-inch SAS/SATA drive
	  - 2 × PCIe/SATA M.2 SSD (connected to the onboard M.2 SSD connectors)
	  - 2 × SATA M.2 SSD (expanded through an adapter)

Support for NVMe SSDs	Up to 8 hot-swap PCIe 5.0 NVMe SSDs or E1.S SSDs, providing a significantly higher IOPS number over high-end enterprise-class SATA SSDs and boosting storage performance with the ultimate storage I/O.
12 Gbps Serial Attached SCSI (SAS)	Doubles the internal storage data transfer rate of 6 Gbps SAS solution, maximizing the performance of storage I/O-intensive applications.
Intel Integrated I/O Technology	The processors integrate the PCIe 5.0 controller to significantly reduce I/O latency and enhance overall system performance.
PCIe Expansion	Up to 8 PCIe expansion slots, including 6 standard PCIe slots at the rear, 1 OCP 3.0 slot and 1 internal LP PCIe slot (expanded through an MCIO connector), supporting up to PCIe 5.0.
OCP Expansion	Supports up to 2 OCP 3.0 cards (1 installed into a dedicated OCP 3.0 slot, and the other expanded through a PCIe slot). The OCP 3.0 slots that can flexibly support 1/10/25/100 Gb OCP 3.0 cards.

2.2 Availability and Serviceability

Table 2-2 Availability and Serviceability

Technical Feature	Description
Hot-Swap SAS/SATA/NVMe Drives	Supports hot-swap drives with RAID levels 0/1/1E/10/5/50/6/60 and RAID cache provided by RAID cards, and data protection enabled by the super-capacitor in case of power failures.
Reliability	• The BMC monitors system parameters in real time and sends alerts in advance, enabling technicians to take appropriate measures in time to ensure stable operation and minimize system downtime. • SSDs are much more reliable than traditional HDDs, increasing system uptime.
Availability	• The LEDs on front and rear panels and the BMC Web GUI indicate the status of key components and quickly lead technicians to failed (or failing) components, simplifying maintenance and speeding up troubleshooting. • Provides 2 hot-swap PSUs with 1+1 redundancy. • Provides 6 hot-swap fans (6038 fans and 6056 fans), with N+1 redundancy (6056 fans).
Maintenance Efficiency	The BMC management network port on the rear panel enables remote BMC O&M, improving O&M efficiency.

2.3 Manageability and Security

Table 2-3 Manageability and Security

Technical Feature	Description
Remote Management	The BMC monitors system operating status and enables remote management.
NC-SI Feature	Allows a network port to serve as a management port and a service port. The NC-SI feature is disabled by default and can be enabled/disabled through the BIOS or BMC. Notes: The service port with NC-SI enabled supports: • Being bonded to any network port of the OCP card or of the PCIe NIC that supports NC-SI.

Technical Feature	Description
	• Enablement/Disablement and configuration of Virtual Local Area Network (VLAN), which is disabled by default. • Both IPv6 and IPv4 addresses, of which the IP address, subnet mask, and default gateway can be configured, as well as the prefix length of IPv6 address.
Unified Extensible Firmware Interface (UEFI)	The industry-standard UEFI improves the efficiency of setup, configuration and update, and simplifies the error handling process.
TPM & TCM	Trusted Platform Module (TPM) 2.0 and Trusted Cryptography Module (TCM) provide advanced encryption.
Intel Trusted Execution Technology	Intel Trusted Execution Technology provides enhanced security through hardware-based resistance to malicious software attacks.
Firmware Update Mechanism	The firmware update mechanism based on digital signatures prevents unauthorized firmware updates.
UEFI Secure Boot	Protects the system from malicious bootloaders.
Hierarchical Password Protection in BIOS	Ensures system boot and management security.
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.
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 its 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.
Chassis Intrusion Detection	Enhances physical security.

2.4 Energy Efficiency

Table 2-4 Energy Efficiency

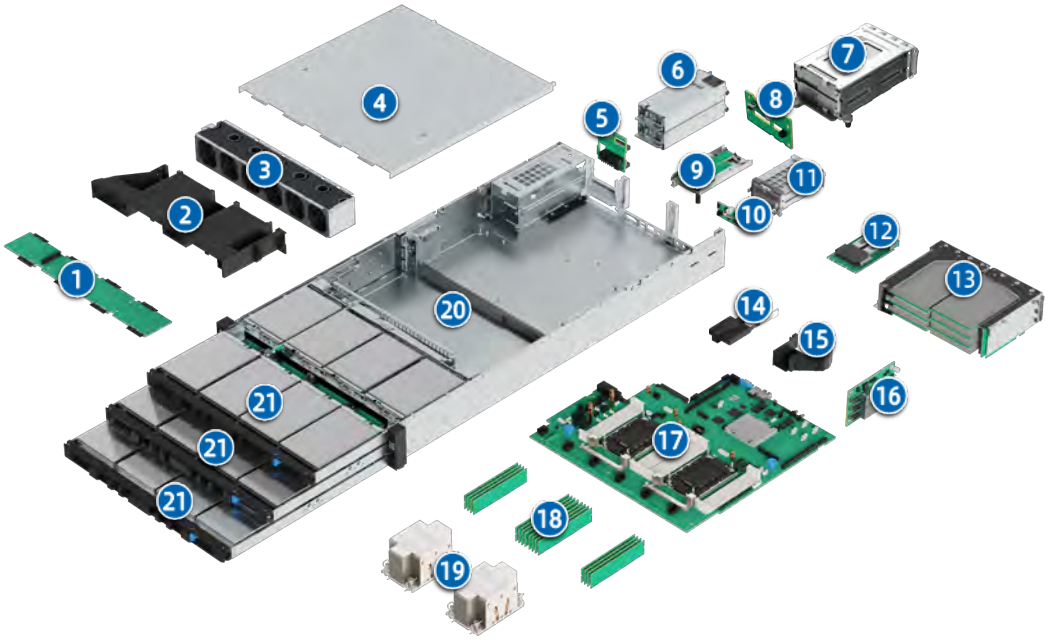
Technical Feature	Description
80 Plus Platinum/ Titanium PSUs	Equipped with 80 Plus Platinum/Titanium PSUs of different power efficiency levels, with a power efficiency of up to 96% at a load of 50%.
1+1 Redundant PSUs	Support AC/DC power input with improved power conversion efficiency.
VRD Solution	Features the high-efficiency single-board voltage regulator-down (VRD) solution, reducing DC-DC conversion loss.
Intelligent Fan Speed Control and CPU Frequency Scaling	Supports Proportional-Integral-Derivative (PID) intelligent fan speed control and intelligent CPU frequency scaling, conserving energy.
System Cooling Design	Offers a fully-optimized system cooling design with energy-efficient cooling fans, lowering energy consumption from system cooling.
Power Capping and Power Control	Provides power capping and power control measures.
Staggered Spin-up of Drives	Supports staggered spin-up of drives, reducing power consumption during server startup.
Intel Intelligent Power Capability	Supports Intel Intelligent Power Capability (IIPC) to optimize energy usage in the processor cores by turning computing functions on only when needed.
Low Power Consumption	Supports low-voltage 4^{th}/5^{th} Gen Intel Xeon Scalable processors, consuming less energy and meeting the demands of data centers and telecommunications environments constrained by power and thermal limits.

3 System Parts Breakdown

NOTE

The exploded view is for reference only. The actual configuration may vary.

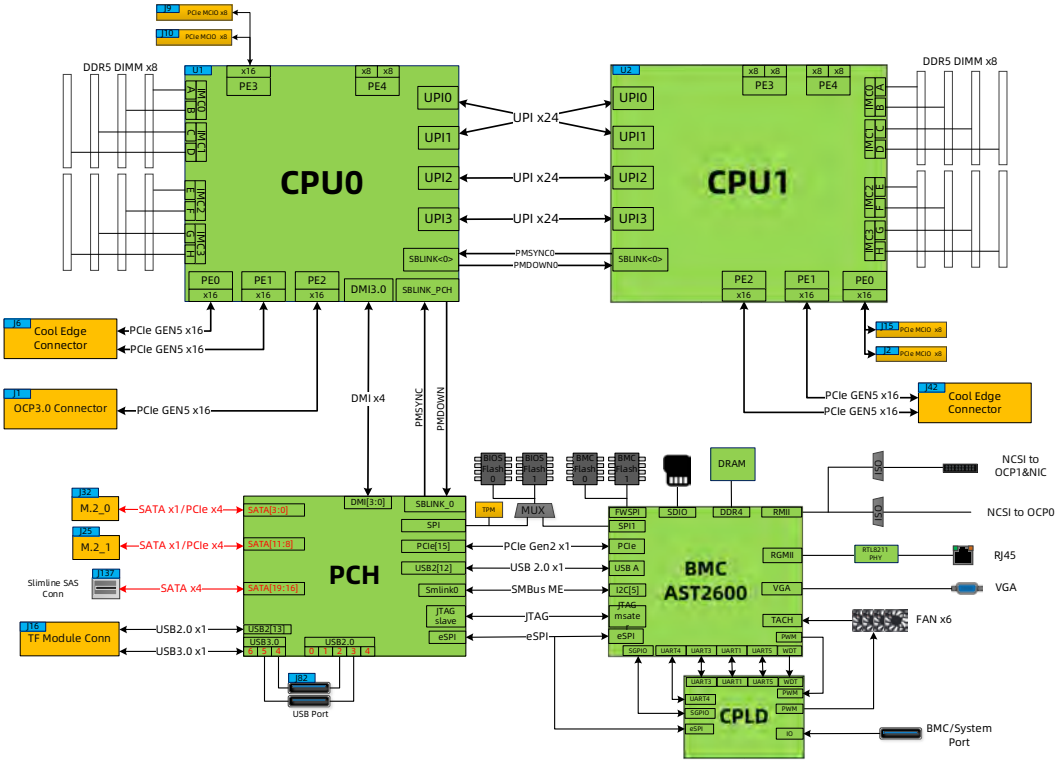
Figure 3-1 Exploded View



Item	Feature	Item	Feature
1	Front Drive Backplane	12	OCP 3.0 Card
2	System Air Duct	13	PCIe Riser Module
3	Fan Module	14	Super-Capacitor
4	Top Cover	15	Rear Drive Air Duct
5	PDB	16	Expander Card
6	PSU	17	Motherboard
7	Rear 3.5-Inch Drive	18	DIMM
8	Rear 3.5-Inch Drive Backplane	19	Processor Heatsink Module
9	PCIe Riser Module	20	Chassis
10	Rear 2.5-Inch Drive Backplane	21	Top/Middle/Bottom Drive Drawer
11	Rear 2.5-Inch Drive	-	-

4 System Logical Diagram

Figure 4-1 System Logical Diagram

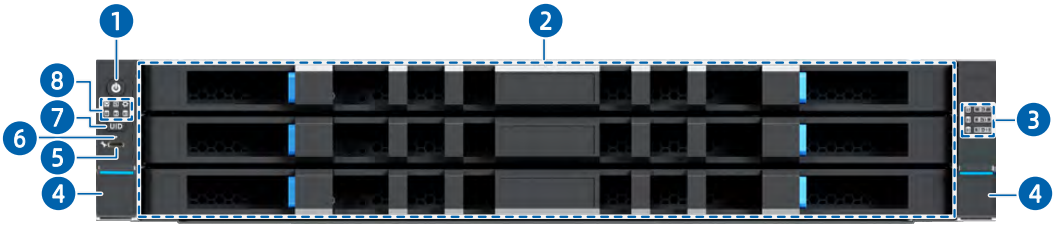


- One or two 4th/5th Gen Intel Xeon Scalable processors (SPR/EMR).
- Up to 16 DDR5 DIMMs.
- 4 UPI links per CPU at up to 16 GT/s per link.
- Up to 6 standard PCIe expansion slots at the rear, supporting up to PCIe 5.0, and up to 2 OCP 3.0 slots (1 dedicated OCP 3.0 slot and the other one needs to be expanded through a PCIe riser card).
- The RAID card occupies a PCIe expansion slot and is connected to the drive backplane through the SAS signal cable. Multiple local storage specifications are supported through different drive backplanes.
- The motherboard integrates Platform Controller Hub (PCH) to support 2 USB 3.0 ports, 2 SATA/PCIe M.2 SSDs, and up to 2 TF cards.
- The motherboard integrates an AST2600 management chip and supports 1 VGA port, 1 BMC management network port, 1 system/BMC serial port, 1 TF card slot, and other connectors.

5 Hardware Description

5.1 Front Panel

Figure 5-1 Front View



Item	Feature	Item	Feature
1	Power Button and LED	5	USB Type-C Port
2	Drive Drawer	6	USB Type-C Status LED
3	Drive Label	7	UID/BMC RST Button and LED
4	Ear Latch	8	LEDs

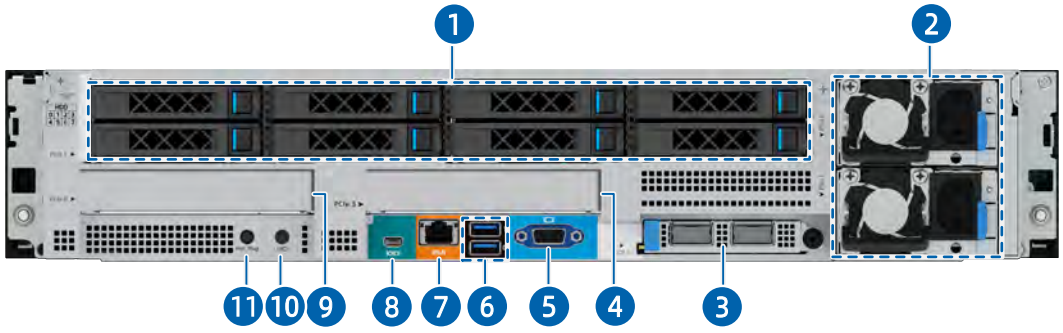
5.2 Rear Panel

NOTE

The rear views herein demonstrate configurations with all drives installed. The actual configuration may vary.

5.2.1 8 × 2.5-Inch Drive Configuration

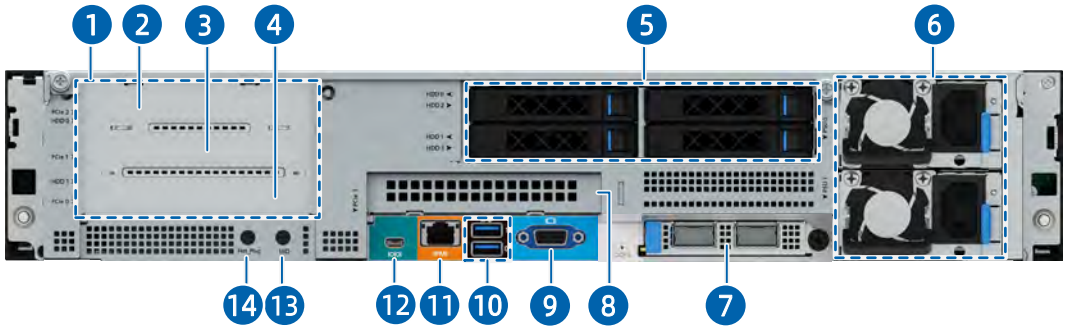
Figure 5-2 Rear View



Item	Feature	Item	Feature
1	2.5-Inch Drive Bay	7	BMC Management Network Port
2	PSU	8	System/BMC Serial Port
3	OCP 3.0 Card 0	9	PCIe Slot 0
4	PCIe Slot 3	10	UID/BMC RST Button and LED
5	VGA Port	11	OCP 3.0 Card 0 Hot-Plug Button and LED
6	USB 3.0 Port	-	-

5.2.2 4 × 2.5-Inch Drive Configuration

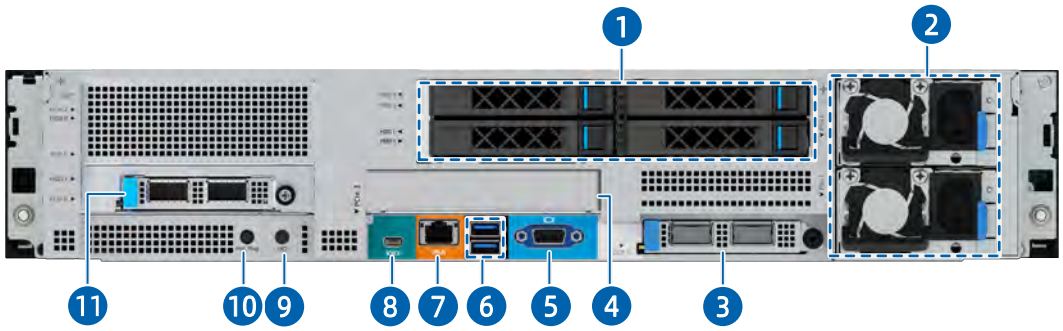
Figure 5-3 Rear View



Item	Feature	Item	Feature
1	PCIe Riser Module 0	8	PCIe Slot 3
2	PCIe Slot 2	9	VGA Port
3	PCIe Slot 1	10	USB 3.0 Port
4	PCIe Slot 0	11	BMC Management Network Port
5	2.5-Inch Drive Bay	12	System/BMC Serial Port
6	PSU	13	UID/BMC RST Button and LED
7	OCP 3.0 Card 0	14	OCP 3.0 Card 0 Hot-Plug Button and LED

5.2.3 4 × 2.5-Inch Drive + 2 × OCP 3.0 Card Configuration

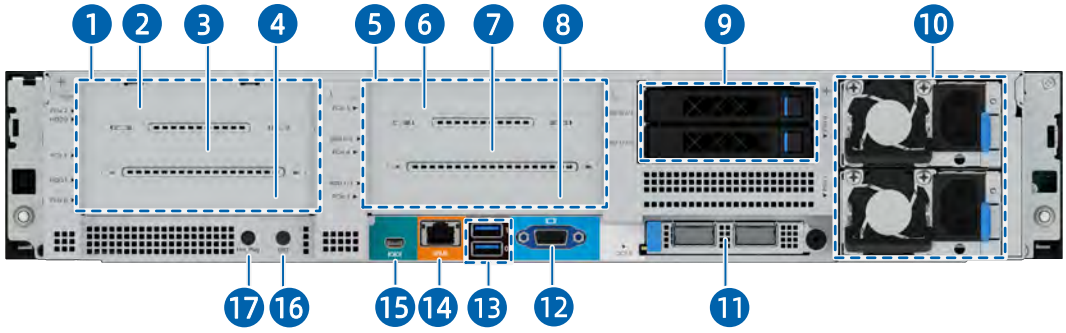
Figure 5-4 Rear View



Item	Feature	Item	Feature
1	2.5-Inch Drive Bay	7	BMC Management Network Port
2	PSU	8	System/BMC Serial Port
3	OCP 3.0 Card 0	9	UID/BMC RST Button and LED
4	PCIe Slot 3	10	OCP 3.0 Card 0 Hot-Plug Button and LED
5	VGA Port	11	OCP 3.0 Card 1
6	USB 3.0 Port	-	-

5.2.4 2 × 2.5-Inch Drive Configuration

Figure 5-5 Rear View

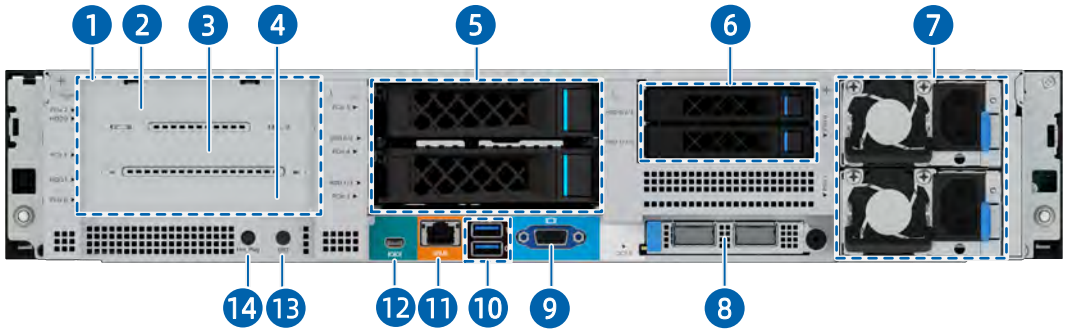


Item	Feature	Item	Feature
1	PCIe Riser Module 0	10	PSU
2	PCIe Slot 2	11	OCP 3.0 Card 0
3	PCIe Slot 1	12	VGA Port

Item	Feature	Item	Feature
4	PCIe Slot 0	13	USB 3.0 Port
5	PCIe Riser Module 1	14	BMC Management Network Port
6	PCIe Slot 5	15	System/BMC Serial Port
7	PCIe Slot 4	16	UID/BMC RST Button and LED
8	PCIe Slot 3	17	OCP 3.0 Card 0 Hot-Plug Button and LED
9	2.5-Inch Drive Bay	-	-

5.2.5 2 × 2.5-Inch Drive + 2 × 3.5-Inch Drive Configuration

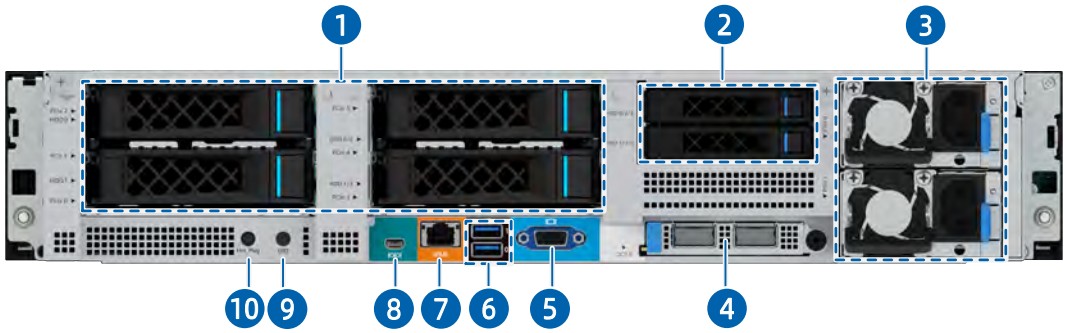
Figure 5-6 Rear View



Item	Feature	Item	Feature
1	PCIe Riser Module 0	8	OCP 3.0 Card 0
2	PCIe Slot 2	9	VGA Port
3	PCIe Slot 1	10	USB 3.0 Port
4	PCIe Slot 0	11	BMC Management Network Port
5	3.5-Inch Drive Bay	12	System/BMC Serial Port
6	2.5-Inch Drive Bay	13	UID/BMC RST Button and LED
7	PSU	14	OCP 3.0 Card 0 Hot-Plug Button and LED

5.2.6 2 × 2.5-Inch Drive + 4 × 3.5-Inch Drive Configuration

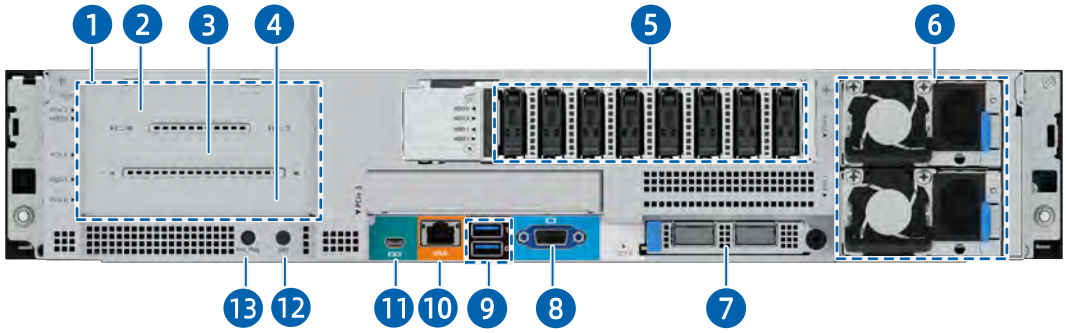
Figure 5-7 Rear View



Item	Feature	Item	Feature
1	3.5-Inch Drive Bay	6	USB 3.0 Port
2	2.5-Inch Drive Bay	7	BMC Management Network Port
3	PSU	8	System/BMC Serial Port
4	OCP 3.0 Card 0	9	UID/BMC RST Button and LED
5	VGA Port	10	OCP 3.0 Card 0 Hot-Plug Button and LED

5.2.7 8 × E1.S Drive Configuration

Figure 5-8 Rear View



Item	Feature	Item	Feature
1	PCIe Riser Module 0	8	VGA Port
2	PCIe Slot 2	9	USB 3.0 Port
3	PCIe Slot 1	10	BMC Management Network Port

Item	Feature	Item	Feature
4	PCIe Slot 0	11	System/BMC Serial Port
5	E1.S SSD	12	UID/BMC RST Button and LED
6	PSU	13	OCP 3.0 Card 0 Hot-Plug Button and LED
7	OCP 3.0 Card 0	-	-

5.3 LEDs and Buttons

Table 5-1 LED and Button Description

Item	Icon	Feature	Description
1		Power Button and LED	• Power LED: - Off = No power - Solid green = Power-on state - Solid orange = Standby state • Power button: - Press and release the button to power on the system from the standby state. - Press and hold the button for 6 seconds to force a shutdown from the power-on state.
2		System Status LED	• Off = Normal • 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.
3		Fan Status LED	• 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
4		Power Status LED	• Off = Normal • Blinking red (1 Hz) = A warning error occurs • Solid red = A critical error occurs
5		Drive Drawer Status LED	• Off = Normal • Solid red = A failure occurs Note: 1, 2, and 3 denote the top, middle, and bottom drive drawers, respectively.
6		UID/BMC RST Button and LED	• UID/BMC RST LED: - Solid blue = The UID LED is activated by the UID button or via the BMC - Gradually turning blue within 2 seconds and then gradually turning off within 2 seconds = PFR authentication in progress (Note: The server can be powered on only after this LED turns off.) - Blinking blue (4 Hz) = PFR authentication fails and the firmware images cannot be recovered • UID/BMC RST button: - Press and release the button to activate the UID LED. - Press and hold the button for 6 seconds to force a BMC reset.
7	-	USB Type-C Status LED	• Connected to a terminal: - 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:

Item	Icon	Feature	Description
			- 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
8	-	OCP 3.0 Card 0 Hot-Plug Button and LED	• OCP 3.0 card hot-plug LED: - Off = OCP card is powered off - Blinking green = OCP card is getting ready for hot-plugging or OCP card is identified after being inserted - Solid green = OCP card is powered on • OCP 3.0 card hot-plug button: - 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 release the button to power on the OCP card. Notes: • Press and release the button before removing or powering on the OCP card. • When the LED is off, the OCP card can be removed. (The OCP card can be removed only when the LED is off.) • The LED blinking frequency may vary with different brands and models.

5.4 Port Description

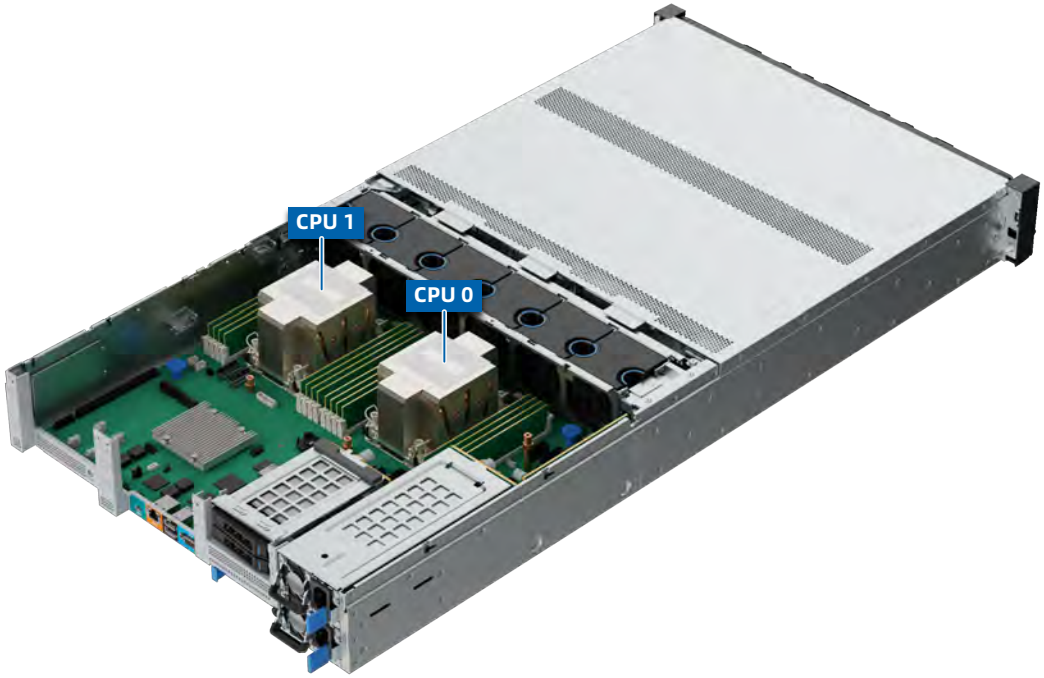
Table 5-2 Port Description

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 device to the system.
3	USB Type-C Port	Enables you to read a USB flash drive through the BMC or access the BMC through an external device. • Connected to a USB device: For automatic log copying to the USB device and automatic configuration importing to the BMC. • Connected to a terminal (PC or phone): For system monitoring and BMC local O&M.
4	System/BMC Serial Port	• BMC serial port: Enables you to print BMC logs and debug the BMC. • System serial port: Enables you to print system logs.
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 one or two Intel Xeon Scalable processors.
- If only 1 processor is configured, install it in the CPU0 socket.
- The processors used in a server must be the same model.
- For specific processor options, consult your local sales representative or refer to 7.2 Hardware Compatibility.

Figure 5-9 Processor Locations

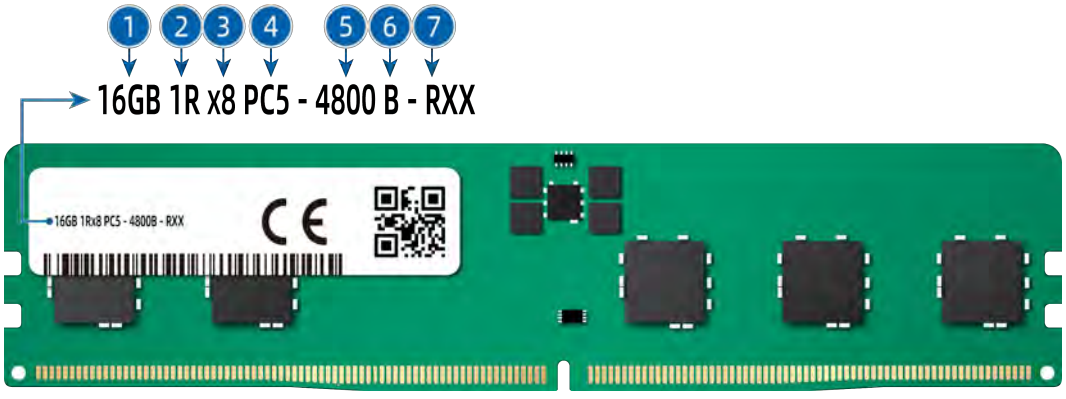


5.6 Memory

5.6.1 Identification

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

Figure 5-10 DIMM Identification



Item	Description	Example
1	Capacity	• 16 GB • 32 GB • 64 GB

Item	Description	Example
		• 128 GB • 256 GB
2	Rank(s)	• 1R = Single rank • 2R = Dual rank • 2S2R = Two ranks of two high stacked 3DS DRAM • 2S4R = Four ranks of two high stacked 3DS DRAM • 4R = Quad rank
3	Data width of DRAM	• x4 = 4 bits • x8 = 8 bits
4	DIMM slot type	PC5 = DDR5
5	Maximum memory speed	• 4,800 MT/s • 5,600 MT/s • 6,400 MT/s
6	CAS latency	• SDP 4800B = 40-39-39 • 3DS 4800B = 46-39-39 • SDP 5600B = 46-45-45 • 3DS 5600B = 52-45-45
7	DIMM type	R = RDIMM

5.6.2 Memory Subsystem Architecture

The server supports 16 DIMM slots and 8 memory channels per CPU.

Table 5-3 DIMM Slot List

CPU	Channel ID	Silk Screen
CPU0	Channel 0	CPU0_C0D0
	Channel 1	CPU0_C1D0
	Channel 2	CPU0_C2D0
	Channel 3	CPU0_C3D0
	Channel 4	CPU0_C4D0
	Channel 5	CPU0_C5D0
	Channel 6	CPU0_C6D0

CPU	Channel ID	Silk Screen
	Channel 7	CPU0_C7D0
CPU1	Channel 0	CPU1_C0D0
	Channel 1	CPU1_C1D0
	Channel 2	CPU1_C2D0
	Channel 3	CPU1_C3D0
	Channel 4	CPU1_C4D0
	Channel 5	CPU1_C5D0
	Channel 6	CPU1_C6D0
	Channel 7	CPU1_C7D0

5.6.3 Compatibility

Refer to the following rules to configure the DDR5 DIMMs.

IMPORTANT

- A server must use DDR5 DIMMs with the same part number (P/N code). All DDR5 DIMMs operate at the same speed, which is the lowest of:
  - Memory speed supported by a specific CPU.
  - Maximum operating speed of a specific memory configuration.
- Mixing DDR5 DIMMs of different 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 4th/5th Gen Intel Xeon Scalable processors (SPR/EMR). The maximum memory capacity supported is identical for different 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 ≤ Maximum number of ranks supported per channel ÷ Number of ranks per DIMM.

Table 5-4 DDR5 DIMM Specifications

Item		Value			
Capacity per DDR5 DIMM (GB)		16	32	64	128
Type		RDIMM	RDIMM	RDIMM	RDIMM
Rated speed (MT/s)		SPR: 4,800 EMR: 5,600	SPR: 4,800 EMR: 5,600	SPR: 4,800 EMR: 5,600	SPR: 4,800 EMR: 5,600
Operating voltage (V)		1.1	1.1	1.1	1.1
Maximum number of DDR5 DIMMs supported in a server[a]		16	16	16	16
Maximum capacity of DDR5 DIMMs supported in a server		256	512	1,024	2,048
Actual speed (MT/s)	1 DPC[c]	SPR: 4,800 EMR: 5,600	SPR: 4,800 EMR: 5,600	SPR: 4,800 EMR: 5,600	SPR: 4,800 EMR: 5,600

Notes:

a: The maximum number of DDR5 DIMMs supported is based on the dual-CPU configuration. The number is halved for the single-CPU configuration.

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

c: 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.

Population rules for DDR5 DIMMs in specific modes:

- Memory sparing mode
  - Follow the general population rules.
  - Each channel must have a valid online spare configuration.
  - Each channel can have a different online spare configuration.
  - Each channel with a DIMM installed must have a spare rank.
- Memory mirroring mode
  - Follow the general population rules.

- Each processor supports 4 integrated memory controllers (iMCs). Each iMC has 2 channels to be populated with DIMMs. Installed DIMMs must be of the same capacity and organization.
- In a multi-processor configuration, each processor must have a valid memory mirroring configuration.

5.6.5 DIMM Slot Layout

Up to 16 DDR5 DIMMs can be installed in a server, and a balanced DIMM configuration is recommended for optimal memory performance. DIMM configuration must be compliant with the DIMM population rules.

Figure 5-11 DIMM Slot Layout

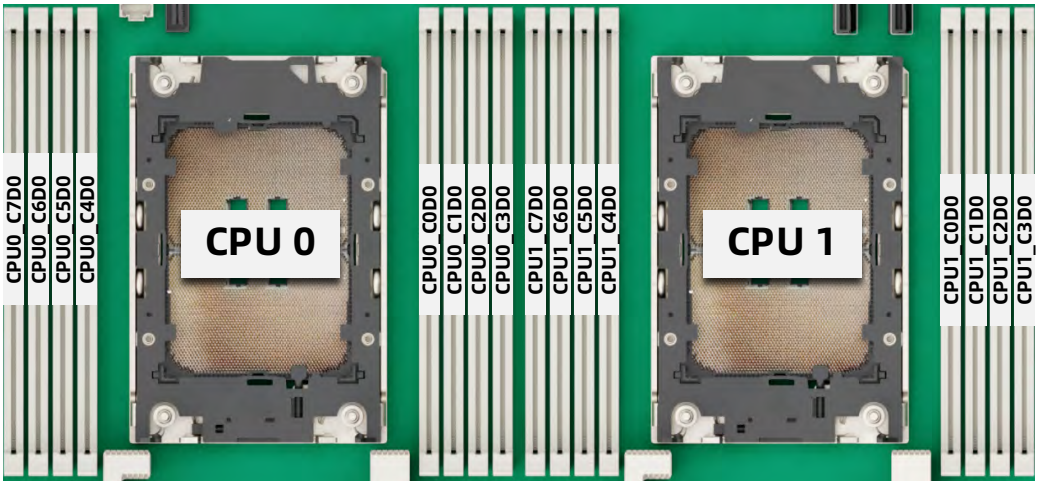


Table 5-5 DDR5 DIMM Population Rules (Single-CPU Configuration)

DDR5 QTY	CPU0							
	C0D0	C1D0	C2D0	C3D0	C4D0	C5D0	C6D0	C7D0
1	●							
2	●						●	
4	●		●		●		●	
6	●		●	●	●	●	●	
8	●	●	●	●	●	●	●	●

Table 5-6 DDR5 DIMM Population Rules (Dual-CPU Configuration)

DDR5 QTY	CPU0								CPU1							
	C0D0	C1D0	C2D0	C3D0	C4D0	C5D0	C6D0	C7D0	C0D0	C1D0	C2D0	C3D0	C4D0	C5D0	C6D0	C7D0
2	●								●							
4	●						●		●						●	
8	●		●		●		●		●		●		●		●	
12	●		●	●	●	●	●		●		●	●	●	●	●	
16	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

5.7 Storage

NOTE

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

5.7.1 Drive Configurations

Table 5-7 Drive Configurations

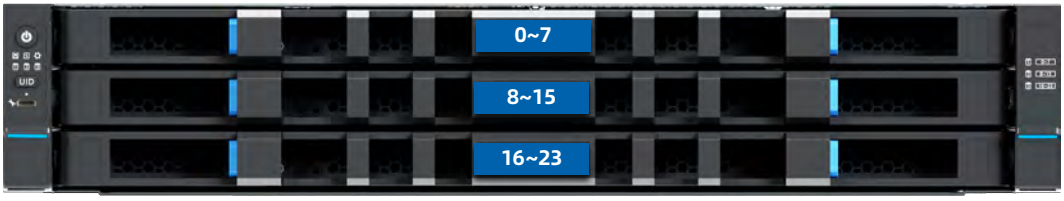
Front Drives	Rear Drives	Internal Drives	Drive Management Mode
24 × 3.5-Inch drive (Drive bays with physical drive No. 0 to 24 support SAS/SATA drives only)	8 × 2.5-inch NVMe drive	N/A	• SAS/SATA drive: PCIe RAID card + expander card • NVMe drive: CPU
	4 × 2.5-inch NVMe drive + 4 × 2.5-inch SAS/SATA drive	N/A	• SAS/SATA drive: PCIe RAID card + expander card • NVMe drive: CPU/PCIe RAID card
	4 × 2.5-inch NVMe drive	N/A	• SAS/SATA drive: PCIe RAID card + expander card • NVMe drive: CPU/PCIe RAID card
	2 × 2.5-inch NVMe drive + 2 × 2.5-inch SAS/SATA drive	N/A	• SAS/SATA drive: PCIe RAID card + expander card • NVMe drive: CPU
	2 × 2.5-inch NVMe drive + 2 × 2.5-inch SAS/SATA drive (system drive)	N/A	• SAS/SATA drive: PCIe RAID card + expander card + PCIe RAID card (for system drives) • NVMe drive: CPU
	4 × 2.5-inch SAS/SATA drive	N/A	SAS/SATA drive: PCIe RAID card + expander card

Front Drives	Rear Drives	Internal Drives	Drive Management Mode
	2 × 2.5-inch NVMe drive	N/A	• SAS/SATA drive: PCIe RAID card + expander card • NVMe drive: CPU
	2 × 2.5-inch SAS/SATA drive	N/A	SAS/SATA drive: PCIe RAID card + expander card
	2 × 3.5-inch SAS/SATA drive + 2 × 2.5-inch SAS/SATA drive	N/A	SAS/SATA drive: PCIe RAID card + expander card
	4 × 3.5-inch SAS/SATA drive + 2 × 2.5-inch SAS/SATA drive	N/A	• 3.5-inch SAS/SATA drive: PCIe RAID card + expander card • 2.5-inch SAS/SATA drive: PCH
	8 × E1.S SSD	N/A	• SAS/SATA drive: PCIe RAID card + expander card • E1.S SSD: CPU
	4 × 2.5-inch SAS/SATA drive	8 × 2.5-inch SAS/SATA drive	SAS/SATA drive: PCIe RAID card + expander card
	4 × 3.5-inch SAS/SATA drive + 2 × 2.5-inch SAS/SATA drive	8 × 2.5-inch SAS/SATA drive	SAS/SATA drive: PCIe RAID card + expander card

5.7.2 Drive Numbering

- 24 × 3.5-Inch SAS/SATA Drive Configuration

Figure 5-12 Drive Numbering



Physical Drive No.	Drive No. Identified by the BMC	Drive Number Identified by an 8i RAID Card and an Expander Card
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
11	11	11
12	12	12
13	13	13
14	14	14
15	15	15
16	16	16
17	17	17
18	18	18
19	19	19
20	20	20
21	21	21
22	22	22
23	23	23

5.7.3 Drive LEDs

1. SAS/SATA Drive LEDs

Figure5-13 SAS/SATA Drive LEDs

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

2. NVMe Drive LEDs

Figure 5-14 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 5-8 NVMe Drive LED Description

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

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

5.8 Network

NICs provide network expansion capabilities.

- The OCP slots support 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.

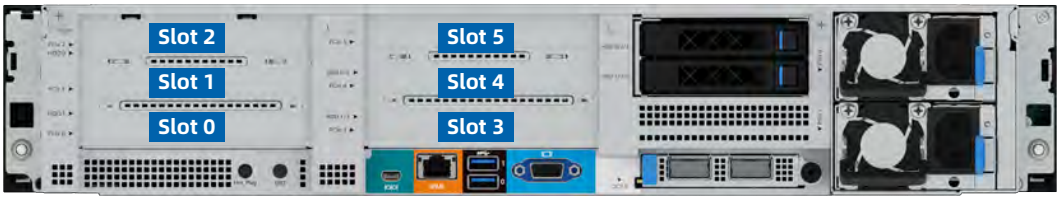
- Up to 6 standard PCIe expansion slots at the rear, including 2 PCIe 5.0 x16 slots.
- 1 dedicated slot for the OCP 3.0 card at the rear.

- 1 OCP 3.0 card expanded through a PCIe slot at the rear.
- 1 internal LP PCIe slot (expanded through an MCIO connector).
- For specific PCIe expansion card options, consult your local sales representative or refer to 7.2 Hardware Compatibility.

5.9.2 PCIe Slot Locations

- 3-Slot PCIe Riser Modules

Figure 5-15 PCIe Slots



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

- 1-Slot PCIe Riser Modules

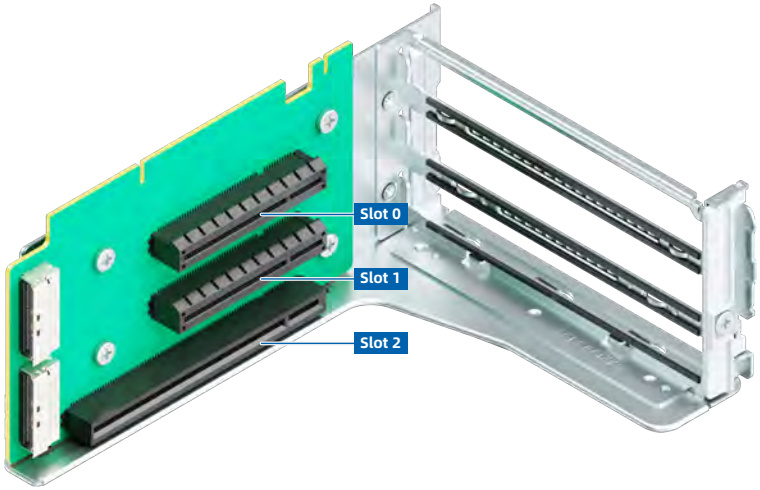
Figure 5-16 PCIe Slots

  - Slot 0 resides in PCIe riser module 2.
  - Slot 3 resides in PCIe riser module 3.

5.9.3 PCIe Riser Modules

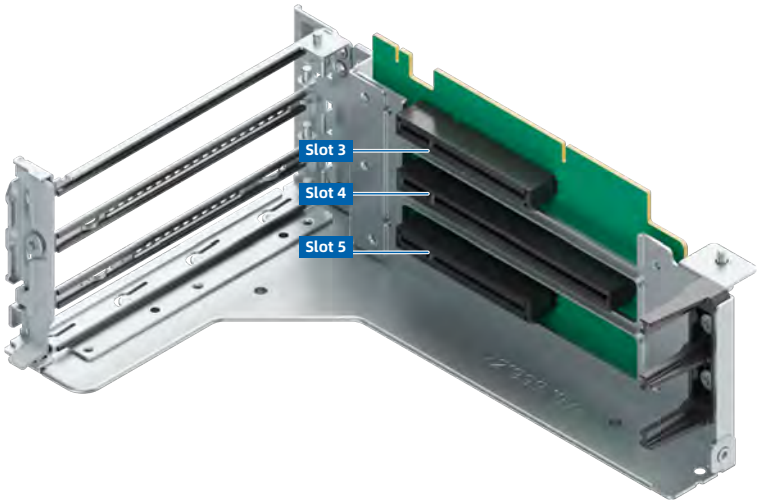
- PCIe Riser Module 0

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



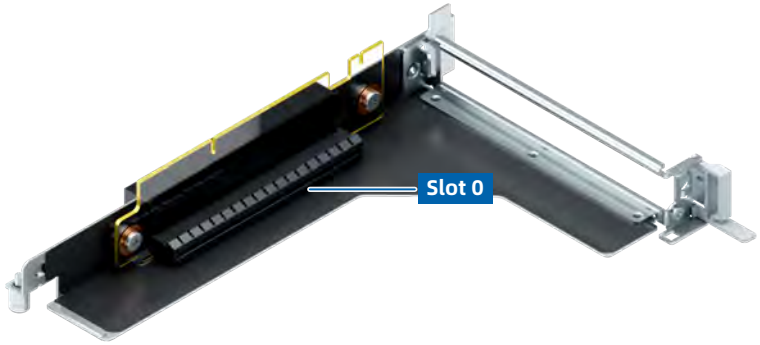
- PCIe Riser Module 1 (2 × PCIe x8 Slot + 1 × PCIe x16 Slot)

Figure 5-18 PCIe Riser Module 1



- PCIe Riser Module 2

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



- PCIe Riser Module 3

Figure 5-20 PCIe Riser Module 3 (1 × PCIe x8 Slot)

5.9.4 PCIe Slot Description

NOTE

When CPU1 is absent, the corresponding PCIe slots are not available.

Table 5-9 PCIe Slot Description

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Form Factor
Slot 0	CPU1	PCIe 4.0	x8	x8	FHHL
Slot 1	CPU1	PCIe 4.0	x8	x8	FHHL
Slot 2	CPU1	PCIe 5.0	x16	x16	FHFL
Slot 3	CPU0	PCIe 4.0	x8	x8	FHHL
Slot 4	CPU0	PCIe 5.0	x16	x16	FHFL
Slot 5	CPU0	PCIe 4.0	x8	x8	FHHL

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Form Factor
OCP 3.0 Slot	CPU0	PCIe 3.0	x16	x16	SFF OCP 3.0
*Internal LP PCIe Slot	CPU0	PCIe 4.0	×8	×8	HHHL

NOTE

The internal LP PCIe slot is expanded through an MCIO connector. For details, contact your local sales representative.

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.

Figure 5-21 PSU Locations

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.

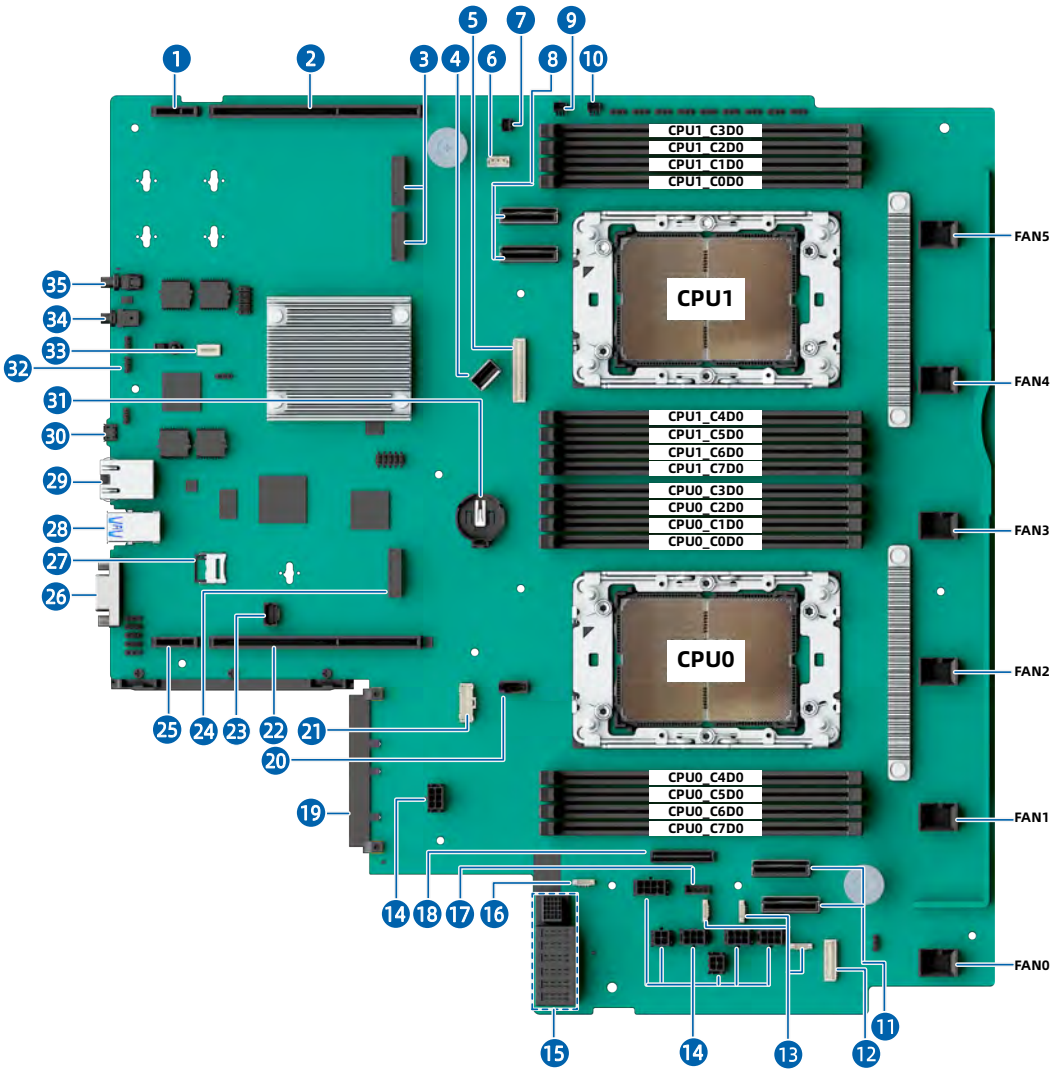
- The 6056 fans support N+1 redundancy, which means that the server can continue working properly when a single fan fails.
- The server supports intelligent fan speed control.
- The server must use fan modules with the same part number (P/N code).

Figure 5-22 Fan Module Locations

5.12 Boards

5.12.1 Motherboard

Figure 5-23 Motherboard



Item	Feature	Item	Feature
1	PCIe Riser Power Connector (CPU1)	19	OCP 3.0 Card 0 Connector
2	PCIe Riser Signal Connector (CPU1)	20	VPP Connector
3	M.2 SSD Connector	21	M.2 Adapter Connector
4	SATA Connector	22	PCIe Riser Signal Connector (CPU0)
5	NC-SI Connector	23	LP Riser Connector
6	Intrusion Detection Connector	24	System TF Card Adapter Connector

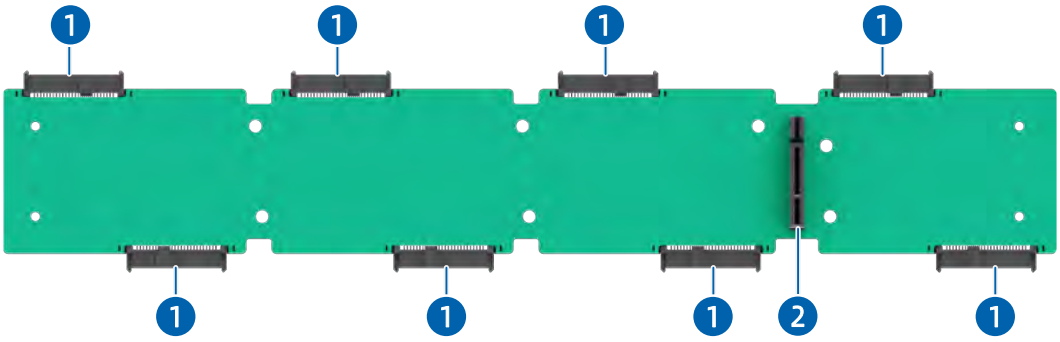
Item	Feature	Item	Feature
7	Bottom Drive Drawer Pull Sensing Connector	25	PCIe Riser Power Connector (CPU0)
8	MCIO x8 Connector (CPU1)	26	VGA Port
9	Middle Drive Drawer Pull Sensing Connector	27	BMC TF Card Connector
10	Top Drive Drawer Pull Sensing Connector	28	USB 3.0 Port
11	MCIO x8 Connector (CPU0)	29	BMC Management Network Port
12	Left Control Panel Connector	30	System/BMC Serial Port
13	Front Drive BP I^2C Connector	31	Button Cell Battery Socket
14	Power Connector	32	CMOS Jumper
15	PDB Connector	33	TPM/TCM Connector
16	Smart NIC UART Connector	34	UID/BMC RST Button and LED
17	RAID Key Connector	35	OCP 3.0 Card 0 Hot-Plug Button and LED
18	I^2C Connector (for front and rear drive backplanes and expander card)	-	-

5.12.2 Drive Backplanes

1. Front Drive Backplane

- 8 × 3.5-Inch SAS/SATA Drive Backplane

Figure 5-24 8 × 3.5-Inch SAS/SATA Drive Backplane

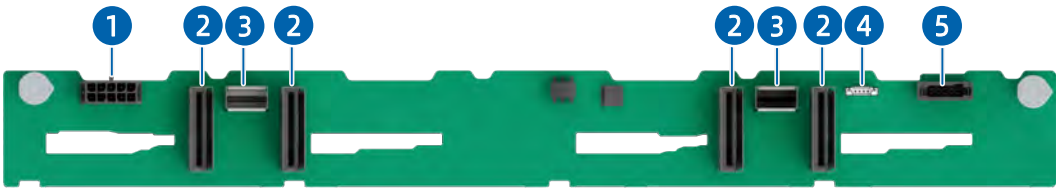


Item	Feature	Item	Feature
1	SAS Connector	2	Gen-Z Connector

2. Rear Drive Backplanes

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

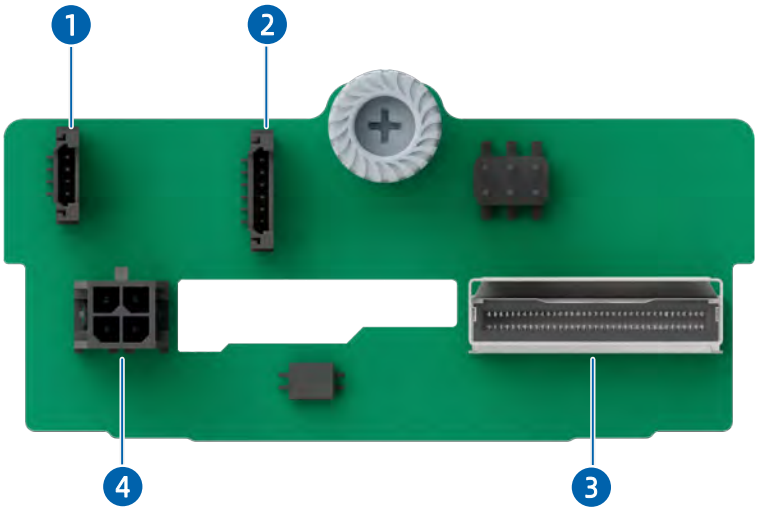
Figure 5-25 8 × 2.5-Inch SAS/SATA/NVMe Drive Backplane



Item	Feature	Item	Feature
1	Power Connector	4	I²C Connector
2	MCIO x8 Connector	5	VPP Connector
3	SAS Connector	-	-

- 2 × 2.5-Inch SAS/SATA/NVMe Drive Backplane

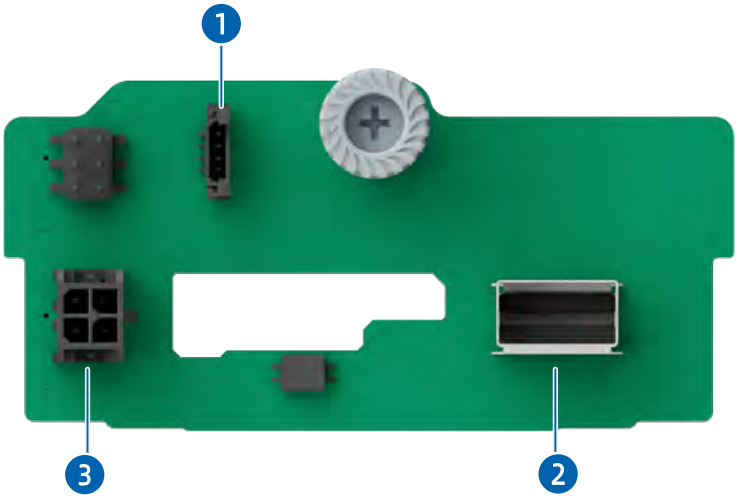
Figure 5-26 2 × 2.5-Inch SAS/SATA/NVMe Drive Backplane



Item	Feature	Item	Feature
1	I²C Connector	3	MCIO x8 Connector
2	VPP Connector	4	Power Connector

- 2 × 2.5-Inch SAS/SATA Drive Backplane

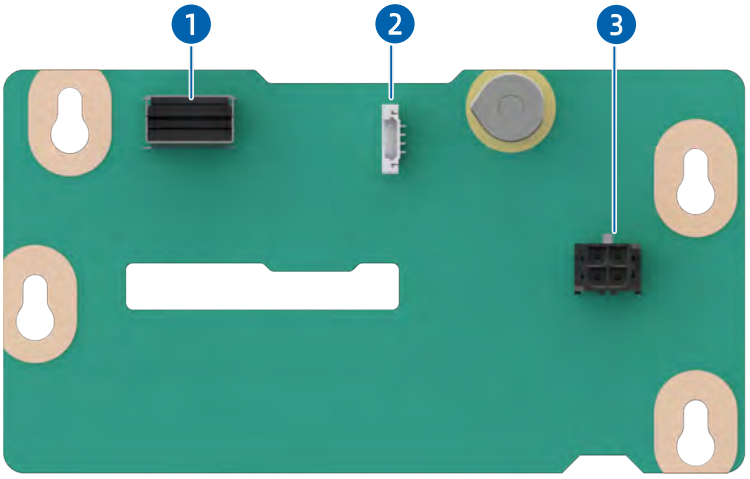
Figure 5-27 2 × 2.5-Inch SAS/SATA Drive Backplane



Item	Feature	Item	Feature
1	I^2C Connector	3	Power Connector
2	SAS Connector	-	-

- 2 × 3.5-Inch SAS/SATA Drive Backplane

Figure 5-28 2 × 3.5-Inch SAS/SATA Drive Backplane



Item	Feature	Item	Feature
1	SAS Connector	3	Power Connector
2	I^2C Connector	-	-

6 Product Specifications

6.1 Technical Specifications

Table 6-1 Technical Specifications

Item	Description
Form Factor	2U rack server
Chipset	Intel Emmitsburg
Processor	Supports 1 or 2 processors. • 4th/5th Gen Intel Xeon Scalable processors (SPR/EMR) • Integrated memory controllers and 8 memory channels per processor • Integrated PCIe 5.0 controllers and 80 PCIe lanes per processor • 4 UPI links per CPU at up to 16 GT/s per link • Up to 60 cores (SPR) or 64 cores (EMR) per CPU • Max. Turbo frequency of 4.1 GHz (SPR) or 4.2 GHz (EMR) • L3 cache up to 112.5 MB (SPR) or 320 MB (EMR) per CPU • TDP up to 350 W Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.
Memory	Supports up to 16 DDR5 DIMMs. • RDIMMs supported • Up to 4,800 MT/s (SPR) or 5,600 MT/s (EMR) • 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). Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.
Storage	Supports multiple drive configurations. See 5.7.1 Drive Configurations for details. • Front: - Up to 24 × 3.5-inch SAS/SATA drive (hot-swap) • Rear:

Item	Description
	- Configuration 1: Up to 4 × 3.5-inch SAS/SATA drive (hot-swap) + 2 × 2.5-inch SAS/SATA/NVMe drive (hot-swap) - Configuration 2: Up to 8 × 2.5-inch SAS/SATA/NVMe drive (hot-swap) - Configuration 3: Up to 8 × E1.S SSD (hot-swap) • Internal: - Up to 8 × 2.5-inch SAS/SATA drive - 2 × PCIe/SATA M.2 SSD (connected to the onboard M.2 SSD connectors) - 2 × SATA M.2 SSD (expanded through an adapter) - When the server is configured with an SND 9230 RAID card, the M.2 SSDs support RAID configuration. Notes: • It is recommended that the M.2 SSD be only used as a boot device for installing the OS. • The M.2 SSD has low endurance and cannot be used as a data storage device, especially in scenarios with frequent data erasing and re-writing. The reason is that write limits can be reached within a short period of time, which will result in damage and unavailability. • For data storage, use enterprise-class HDDs or SSDs with higher DWPD. • Write-intensive business software will cause the M.2 SSD to reach write endurance and wear out; therefore, the M.2 SSD is not recommended for such business scenarios. • Do not use the M.2 SSD as caching. • Supports multiple models of RAID cards. See 7.2 Hardware Compatibility for details. • RAID cards provide functions such as RAID configuration, RAID level migration, and disk roaming. • RAID cards support power failure protection enabled by the super-capacitor to protect user data. • A PCIe RAID card occupies 1 PCIe slot.
Network	Supports multiple network expansion configurations. • OCP 3.0 card - 1 hot-swap OCP 3.0 card installed in the OCP 3.0 slot - 1 OCP 3.0 card expanded through a PCIe slot • Standard PCIe NICs that can be selected as needed
I/O Expansion	Supports up to 8 PCIe expansion slots, including 6 standard PCIe slots at the rear, 1 OCP 3.0 slot and 1 internal LP PCIe slot (expanded through an MCIO connector), supporting up to PCIe 5.0. For details, see 5.9.2 PCIe Slot Locations and 5.9.4 PCIe Slot Description.

Item	Description

Port	• Front:
	  - 1 × USB type-C port
	• Rear:
	  - 2 × USB 3.0 port
	  - 1 × VGA port
	  - 1 × system/BMC serial port
	  - 1 × BMC management network port
	Note: OS installation on the USB storage media is not recommended.

Display	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 Notes: • The integrated VGA can support a maximum resolution of 1,920 × 1,200 only when the video driver matching the OS version is installed; otherwise, only the default resolution of the OS is supported. • When the front and rear VGA ports are both connected to monitors, only the monitor connected to the front VGA port works.
System Management	• UEFI • BMC • NC-SI • KSManage
Security	• Intel Platform Firmware Resilience (PFR) • Trusted Platform Module (TPM) 2.0 and Trusted Cryptography Module (TCM) • Intel Trusted Execution Technology • Firmware update mechanism based on digital signatures • UEFI Secure Boot • Hierarchical BIOS password protection • BIOS Secure Flash and BIOS Lock Enable (BLE) • BMC and BIOS dual-image mechanism • Chassis intrusion detection

6.2 Environmental Specifications

Table 6-2 Environmental Specifications

Item	Description
Temperature[1,2,3]	• Operating: 5°C to 45°C (41°F to 113°F) • Storage (packed): -40°C to 70°C (-40°F to 158°F) • Storage (unpacked): -40°C to 55°C (-40°F to 131°F)
Relative Humidity (RH, non-condensing)	• Operating: 10% to 90% RH • Storage (packed): 10% to 93% RH • Storage (unpacked): 10% to 93% RH
Operating Altitude	≤3,050 m (10,007 ft)
Corrosive Gaseous Contaminants	Maximum growth rate of corrosion film thickness: • Copper coupon: 300 Å/month (compliant with the gaseous corrosivity level of G1 defined in ANSI/ISA-71.04-2013) • Silver coupon: 200 Å/month (compliant with the gaseous corrosivity level of G1 defined in ANSI/ISA-71.04-2013)
Acoustic Noise[4,5,6]	Noise emissions are measured in accordance with ISO 7779 (ECMA 74) and declared in accordance with ISO 9296 (ECMA 109). Listed are the declared A-weighted sound power levels (LWAd) and the declared average bystander position A-weighted sound pressure levels (LpAm) at a server operating temperature of 23°C (73.4°F): • Idle: - LWAd: 6.9 B - LpAm: 60.7 dBA • Operating: - LWAd: 7.7 B - LpAm: 64.5 dBA

Notes:

1. Not all configurations support the operating temperature range of 5°C to 45°C (41°F to 113°F). The 1U heatsink configuration supports an operating temperature range of 10°C to 40°C (50°F to 104°F).
2. Standard operating temperature
   - 10°C to 35°C (50°F to 95°F) is the standard operating temperature range at sea level. At the altitude of 0 to 3,050 m (0 to 10,007 ft), derate the maximum allowable temperature by 1°C per 305 m (1°F per 556 ft). The maximum temperature gradient is 20°C/h (36°F/h), varying

with server configuration.

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

3. Expanded operating temperature:

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

   - For some configurations, the supported system inlet ambient temperature can be expanded to 40°C to 45°C (104°F to 113°F) at sea level. At an altitude of 0 to 950 m (0 to 3,117 ft), derate the maximum allowable operating temperature by 1°C per 305 m (1°F per 556 ft). At an altitude of 950 to 3,050 m (3,117 to 10,007 ft), derate the maximum allowable operating temperature by 1°C per 125 m (1°F per 228 ft).

   - Any fan failure or operations under 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 by server configurations, loads and ambient temperature. These values are for reference only and subject to change without notice.
6. Product conformance to cited normative standards is based on sample testing, evaluation, or assessment. This product or family of products is eligible to bear the appropriate compliance logos and statements.

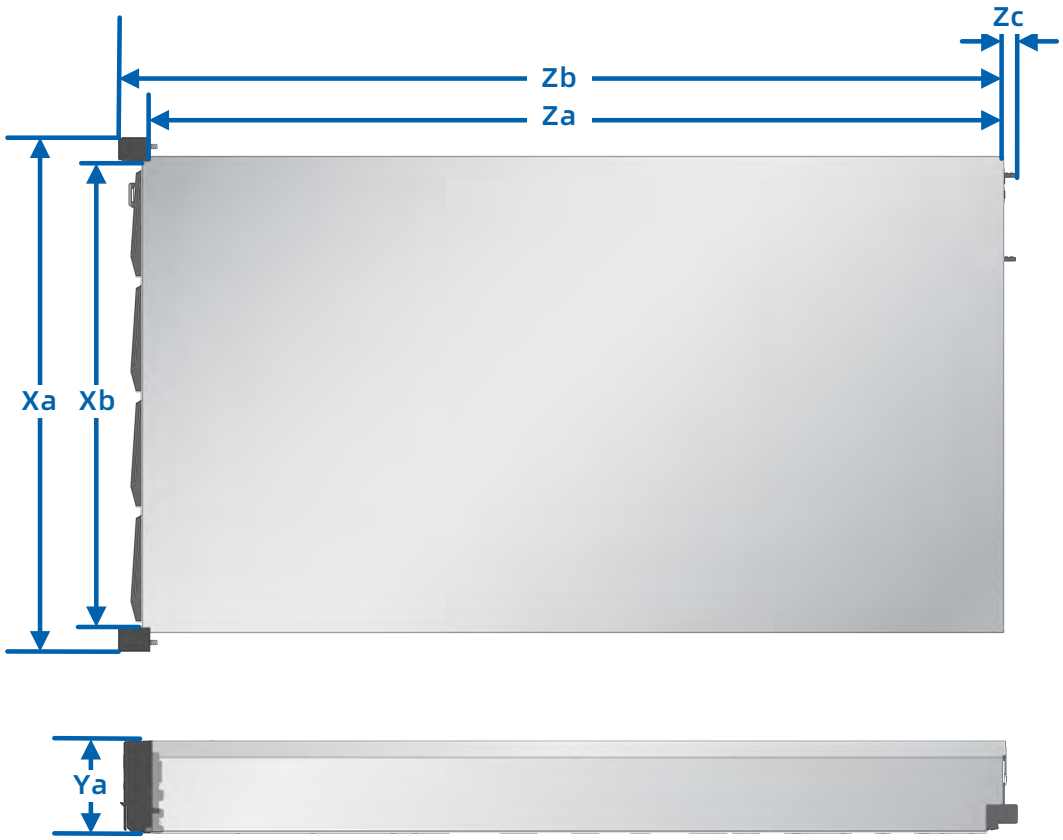
6.3 Physical Specifications

Table 6-3 Physical Specifications

Item	Description
Outer Packaging Dimensions (L × W × H)	1,168 × 721 × 279 mm (45.98 × 28.39 × 10.98 in.)
Installation Dimension Requirements	• Installation requirements for the cabinet are as follows: - General cabinet compliant with the International Electrotechnical Commission 297 (IEC 297) standard - Width: 482.6 mm (19 in.) - Depth: Above 1,000 mm (39.37 in.) • Installation requirements for the server rails are as follows: - Static rail kit: The distance between the front and rear mounting flanges ranges from 650 to 910 mm (25.59 to 35.83 in.)

Item	Description
	- Ball-bearing rail kit: The distance between the front and rear mounting flanges ranges from 650 to 910 mm (25.59 to 35.83 in.)
Weight	24 × 3.5-inch drive configuration: • Net weight: 49.2 kg (108.47 lbs) • Gross weight: 58 kg (127.87 lbs) (including server, packaging box, rails and accessory box) Note: The server weight varies by configuration.

Figure 6-1 Chassis Dimensions



Model	Za	Zb	Zc	Xa	Xb	Ya
KR2266-X2-A0-R0-00	866 mm (34.09 in.)	892.6 mm (35.14 in.)	29 mm (1.14 in.)	482 mm (18.98 in.)	447 mm (17.60 in.)	87 mm (3.43 in.)

7 Operating System and Hardware Compatibility

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

IMPORTANT

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

7.1 Supported Operating Systems

Table 7-1 Supported Operating Systems

OS Version
Windows Server 2019
Windows Server 2022
SUSE Linux Enterprise Server 15 SP4
Red Hat Enterprise Linux 8.6
Red Hat Enterprise Linux 9.0
Ubuntu 20.04
UOS V20
ICS 6.5.3

OS Version
Oracle 8.6
Oracle 9.0
KOS V5.8

7.2 Hardware Compatibility

7.2.1 CPU Specifications

Table 7-2 CPU Specifications

Model	Cores	Threads	Base Frequency (GHz)	Max. Turbo Frequency (GHz)	Cache (MB)	TDP (W)
4410Y	12	24	2.00	3.90	30	150
4410T	10	20	2.70	4.00	26.25	150
4416+	20	40	2.00	3.90	37.5	165
4510	12	24	2.40	4.10	30	150
4514Y	16	32	2.00	3.40	30	150
5415+	8	16	2.90	4.10	22.5	150
5416S	16	32	2.00	4.00	30	150
5418Y	24	48	2.00	3.80	45	185
5420+	28	56	2.00	4.10	52.5	205
5520+	28	56	2.20	4.00	52.5	205
6414U	32	64	2.00	3.40	60	250
6426Y	16	32	2.50	4.10	37.5	185
6430	32	64	2.10	3.40	60	270
6434	8	16	3.70	4.10	22.5	195
6438N	32	64	2.00	3.60	60	205
6438Y+	32	64	2.00	4.00	60	205
6438M	32	64	2.20	3.90	60	205
6442Y	24	48	2.60	4.00	60	225
6448Y	32	64	2.10	4.10	60	225
6448H	32	64	2.40	4.10	60	250
6454S	32	64	2.20	3.40	60	270

Model	Cores	Threads	Base Frequency (GHz)	Max. Turbo Frequency (GHz)	Cache (MB)	TDP (W)
6542Y	24	48	2.90	4.10	60	250
8444H	16	32	2.90	4.00	45	270
8450H	28	56	2.00	3.50	75	250
8452Y	36	72	2.00	3.20	67.5	300
8460Y+	40	80	2.00	3.70	105	300
8462Y+	32	64	2.80	4.10	60	300
8468	48	96	2.10	3.80	105	350
8468H	48	96	2.10	3.80	105	330
8470N	52	104	1.70	3.60	97.5	300
8471N	52	104	1.80	3.60	97.5	300
8480+	56	112	2.00	3.80	105	350
8490H	60	120	1.90	3.50	112.5	350

7.2.2 DIMM Specifications

Table 7-3 DIMM Specifications

Type	Capacity (GB)	Speed (MT/s)	Organization
RDIMM	16	4,800	1R x8
	32	4,800	1R x4/2R x8
	64	4,800	2R x4
	16	5,600	1R x8
	32	5,600	1R x4/2R x8
	64	5,600	2R x4

7.2.3 Drive Specifications

Table 7-4 SAS/SATA HDD Specifications

Type	Speed in rpm	Capacity (TB)	Max. Qty.
3.5-Inch SAS HDD	7.2k	2/4/6/8/10/12/14/16/18/20	28

Type	Speed in rpm	Capacity (TB)	Max. Qty.
3.5-Inch SATA HDD	7.2k	2/4/6/8/10/12/14/16/18/20/22	28

Table 7-5 SATA/SAS SSD Specifications

Type	Capacity	Max. Qty.
SATA SSD	240 GB/480 GB/960 GB/1.92 TB/3.84 TB/7.68 TB	4
SAS SSD	960 GB/1.92 TB/3.84 TB/7.68 TB/15.36 TB	4

Table 7-6 U.2 NVMe SSD Specifications

Type	Capacity	Max. Qty.
U.2 NVMe SSD	960 GB/1.92 TB/3.84 TB/7.68 TB/15.36 TB	8

Table 7-7 M.2 SSD Specifications

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

7.2.4 SAS/RAID Card Specifications

Table 7-8 SAS/RAID Card Specifications

Type	Description
SAS Card	BRCM_8R0_9500-8i_SMSAS3_PCIE4
	8222_HBA_8R0_SAS3_PCIE3_MCTP
	8222_S-HBA_8R0_SAS3_PCIE3_M
	ZQ_8238HBA_16R0_12G_PCIE3_M
	ZQ_8238SHBA_16R0_12G_PCIE3_M
RAID Card	BRCM_8R0_9540-8i_0_SMSAS3_PCIE4
	BRCM_8R0_9560-8i_4G_SMSAS3_PCIE4_7
	BRCM_16R_9560-16i_8_SMSAS3_PCIE4_7
	PM8204_RA_8_2GB_SAS3_PCIE3

Type	Description
	PM8204_RA_8_4GB_SAS3_PCIE3
	ZQ_8236_16R0_4G_12G_PCIE3_M
	DW_PM8254_8R0_4G_SAS4_PCIE4

7.2.5 NIC Specifications

Table 7-9 OCP Card Specifications

Type	Description	Speed (Gbps)	Port Qty.
OCP 3.0 Card	M_I350_1G_RJ_PCIex4-G2_4_OCP	1	4
	SND_10G_X550_RJ_OCP3x4_2_XR	10	2
	I_10G_X710DA2_LC_OCP3x8_2_XR_M7	10	2
	IAG_10G_X710_LC_OCP3x8_2_XR	10	2
	M_25G_MCX631432AN_LC_OCP3x8_2_XR	25	2
	M_25G_MCX631432AN_LC_OCP3x8_2_XR	25	2
	I_25G_E810XXVDA2_LC_OCP3x8_2_XR_M7	25	2
	BROADCM_100G_57508_LC_OCP3x16_2_XR	100	2
	I_100G_E810CQDA2_LC_OCP3x16_2_XR_M7	100	2
	M_100G_MCX623436AN_LC_OCP3x16_2_XR	100	2

Table 7-10 PCIe NIC Specifications

Type	Description	Speed (Gbps)	Port Qty.
PCIe NIC	Intel_W_I350-T4V2_RJ_PCI-E4X_1KM	1	4
	IAG_1G_I350_RJ_PCIEx4_4_XR	1	4
	I_10G_EX710DA2_LC_PCIEx8_2_XR_M7	10	2
	Vostok_82599_10G_LC_PCIEx8_2	10	2
	Pyxis_X550_10G_RJ_P4-G3_2	10	2
	I_10G_X710T2L_RJ_PCIEx8_2_XR_M7	10	2
	I_10G_EX710DA4FH_LC_PCIEx8_4_XR_M7	10	4
	IAG_10G_X710_LC_PCIEx8_2_XR	10	2
	M_25G_MCX512A-ACAT_LC_PCIEx8_2_XR	25	2
	M_25G_MCX631102AN_LC_PCIEx8_2_XR	25	2
	A-M6_E810_25G_LC_P8-G4_2_M7	25	2
	I_25G_E810XXVDA2_LC_PCIEx8_2_XR_M7	25	2
	IAG_25G_BCM57414_LC_PCIEx8_2_XR	25	2
	SOLARFL_25G_9250_LC_PCIEx8_2_XR_PlUS	25	2
	M_25G_MCX512A-ACAT_LC_PCIEx8_2_XR_MT	25	2
	BRCM_25G_57414_LC_PCIEx8_2_XR_MT	25	2
	M_100G_MCX623106AN_LC_PCIEx16_2_XR	100	2
	I_100G_E810CQDA2_LC_PCIEx16_2_XR_M7	100	2
	BROADCM_100G_508_LC_PCIEx16_2_XR	100	2
	M_200G_MCX755106AS_LC_PCIEx16_2_XR	200	2
	M_200G_MCX623105AN_LC_PCIEx16_XR	200	1

7.2.6 HBA/HCA Card Specifications

Table 7-11 HBA Card Specifications

Type	Description	Speed (Gbps)	Port Qty.
HBA Card	QL_0R2_QLE2692-ISR-BK_FC16G_PCIE	16	2
	E_0R1_LPE31000-AP_FC16G_PCIE	16	1
	E_0R2_LPE31002_FC16G_PCIE	16	2
	E_0R2_LPE35002_FC32G_PCIE	32	2

Type	Description	Speed (Gbps)	Port Qty.
	Marvell_0R2_QLE2772_FC32G_PCIE_4.0	32	2
	E_0R2_LPE36002_FC64G_PCIE	64	2

Table 7-12 HCA Card Specifications

Type	Description	Speed (Gbps)	Port Qty.
HCA Card	M_2-HDR100_MCX653106A-ECAT_PCIE	100	2
	M_1-HDR200_MCX653105A-HDAT_PCIE	200	1
	M_2-QSFP_MCX653106A-HDAT_PCIE	200	2
	NV_1-NDR200_MCX75310AAS-HEAT_PCIE	200	1
	NV_1-NDR_MCX75310AAS-NEAT_PCIE	400	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 PSUs in 1+1 redundancy are supported:

- Output power:
  - 800 W Platinum PSU: 800 W (110 Vac), 800 W (230 Vac)
  - 1,300 W Platinum PSU: 1,000 W (110 Vac), 1,300 W (230 Vac)
  - 1,600 W Platinum PSU: 1,000 W (110 Vac), 1,600 W (230 Vac)
  - 2,000 W Platinum PSU: 1,000 W (110 Vac), 2,000 W (230 Vac)
  - 800 W Titanium PSU: 800 W (110 Vac), 800 W (230 Vac)
  - 1,300 W Titanium PSU: 1,000 W (110 Vac), 1,300 W (230 Vac)
  - 1,600 W Titanium PSU: 1,000 W (110 Vac), 1,600 W (230 Vac)
  - 2,000 W Titanium PSU: 1,000 W (110 Vac), 2,000 W (230 Vac)
- Operating voltage range:

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

The following rated -48 Vdc PSUs in 1+1 redundancy are supported:

- Output power:
  - 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.

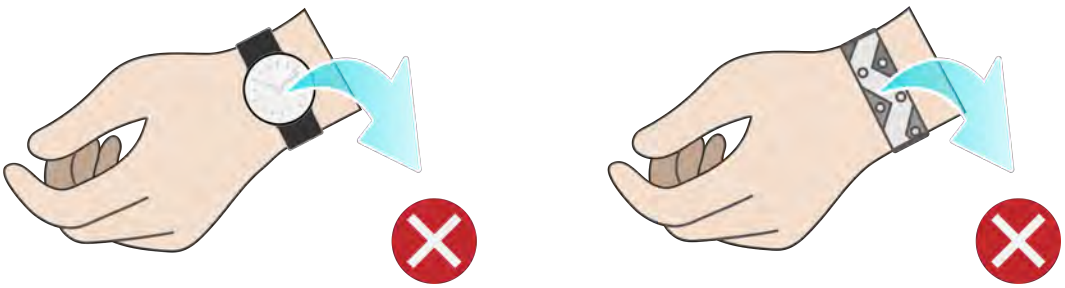
8.1.2 Personal Safety

- 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.

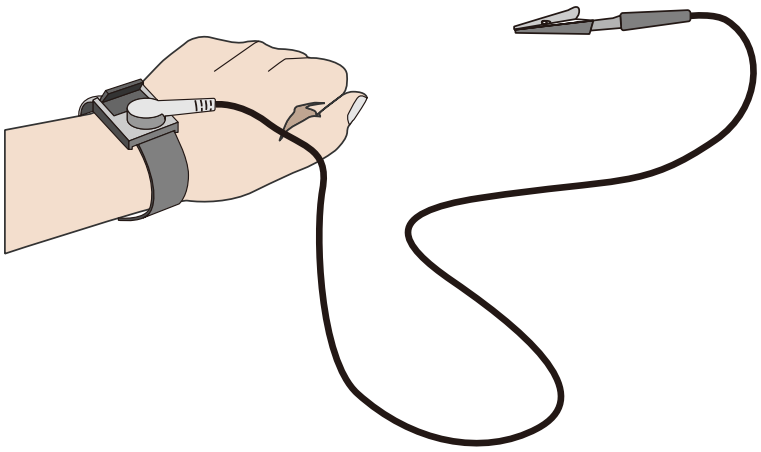
Figure 8-2 Removing Conductive Objects



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

 CAUTION

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

Table 8-1 lists the manual handling weight limits per person specified by some organizations.

Table 8-1 Manual Handling Weight Limits per Person

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

9 Limited Warranty

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

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

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

9.1 Warranty Service

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

9.1.1 Remote Technical Support

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

Information needed when requesting support:

- Contact name, phone number, e-mail address
- System serial number, part number, model and location (address) of the product needing service
- Detailed description of problem, logs (SELs and blackbox logs, and any other related logs from OS), screenshot of issue, pictures of damaged/faulty parts, etc.

9.1.2 RMA Service

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

NOTE

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

9.1.3 ARMA Service

Advanced Replacement: If a problem with our hardware products cannot be resolved via hotline or e-mail support and replacement part(s) are required, we will ship out replacement part(s) in advance within one (1) business day. Customer should return defective part(s) within five (5) business days after receiving the replacement(s). The shipping cost coverage varies by region. Contact your sales representative for details.

NOTE

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

9.1.4 9 × 5 × NBD Onsite Service

When we ultimately determine that an onsite service call is required to repair or replace a defect, the call will be scheduled in accordance with the Response Time

Commitment. The response time is measured from the time when the remote troubleshooting is completed and logged to the arrival of a service engineer and parts to Customer location for repair.

 NOTE

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

9.1.5 24 × 7 × 4 Onsite Service

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

 NOTE

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

9.2 Our Service SLA

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

- RMA Service
- ARMA Service
- 9 × 5 × NBD Onsite Service
- 24 × 7 × 4 Onsite Service

9.3 Warranty Exclusions

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

Products.

The Limited Warranty does not apply to

- expendable or consumable parts, such as, but not limited to, batteries or protective coatings that are designed to diminish over time, unless failure has occurred during DOA period due to a defect in material or workmanship;
- any cosmetic damage, such as, but not limited to, scratches, dents, broken plastics, metal corrosion, or mechanical damage, unless failure has occurred during DOA period due to a defect in material or workmanship;
- damage or defects caused by accident, misuse, abuse, contamination, improper or inadequate maintenance or calibration or other external causes;
- damage or defects caused by operation beyond the parameters as stipulated in the user documentation;
- damage or defects by software, interfacing, parts or supplies not provided by us;
- damage or defects by improper storage, usage, or maintenance;
- damage or defects by virus infection;
- loss or damage in transit which is not arranged by us;
- Hardware Products that have been modified or serviced by non-authorized personnel;
- any damage to or loss of any personal data, programs, or removable storage media;
- the restoration or reinstallation of any data or programs except the software installed by us when the product is manufactured;
- any engineering sample, evaluation unit, or non-mass production product that is not covered under warranty service;
- any solid-state drive (SSD) which has reached its write endurance limit.

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

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

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

10 System Management

10.1 Intelligent Management System BMC

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

BMC supports:

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

Table 10-1 BMC Features

Feature	Description
Management Interface	Supports extensive remote management interfaces for various server O&M scenarios. The supported interfaces include: • IPMI • SMASH CLP • SNMP • HTTPS • Web GUI • Redfish • RESTful • Syslog

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

Feature	Description
	ensure that the fan operates at safe speeds to avoid system overheating. • Supports self-diagnosis of processors, memory modules, and storage devices of 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	• Supports firmware update based on secure digital signatures, and mismatch prevention mechanism for firmware from different manufacturers and firmware for different models • Supports firmware update of BMC/BIOS/CPLD/PSU.
Serial Port Redirection	Supports remote redirection of the system serial port, BMC serial port and other serial ports, and directs the server-side serial port output to the local administrator via the network for server debugging.
Storage Information Display	Displays RAID logical array information and drive information, and supports remote RAID creation for improved deployment efficiency.
User Role Management	Supports user detail management based on user roles and flexible creation of user roles with different privileges, provides more user roles to allow administrators to grant different privileges to O&M personnel.
Security Features	Adopts the industry-leading server security baseline standard V3.0. SSH, HTTPS, SNMP and IPMI use secure and reliable algorithms. 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, hard drive, network adapter, and security chip.
Fan Management	Displays the status, current speed, duty ratio, and other information of a fan module. You can select the fan control mode and preset the speed for each fan module in the Manual Fan Control mode.
Power Policy	To set how the server operating system reacts under the BMC's control when AC power is reconnected to the server.
One-Key Erasing	To perform non-recoverable erasing on all storage devices of the server, preventing data leakage when the server is to be retired.
System Lockdown	After this feature is enabled, some parameters of the server cannot be set and some operations cannot be performed on the server.

10.2 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	• Batch asset import, automatic asset discovery, and full lifecycle management of assets • Management of the full range of our server family, including general-purpose rack servers, AI servers, multi-node servers, edge servers and all-in-one servers • Management of our general-purpose disk arrays and distributed storage devices • Management of network devices (switches, routers, etc.), security devices (firewalls, load balancers, etc.), cabinets and clouds • Management of data centers • Asset warranty information management, asset inventory reports for server acceptance, asset attribute expansion, etc.
Monitor	• Display of real-time alerts, history alerts, blocked alerts and events • Fault prediction of drives and memories • Custom inspection plan and inspection result management • Notification record viewing • Intelligent fault diagnosis and analysis, automatic fault reporting and repair ticket viewing • Trap management and Redfish management • Management of monitoring rules, such as alert rules, notification rules, blocking rules, alert noise reduction rules, compression rules and fault reporting rules, and redefinition of above rules
Control	• Quick start of firmware update, OS installation, power management, drive data erasing and stress test

Feature	Description
	• Batch firmware update (BMC/BIOS/RAID Card/NIC/Drive/HBA Card/MB CPLD/BP CPLD/PSU) • Batch firmware configuration (BMC/BIOS) • Batch RAID configuration and OS deployment for servers • Secure and quick drive data erasing • CPU and memory stress test • Automatic firmware baseline management • BMC and BIOS snapshot management • Repositories for update files
Energy Efficiency	• Overview of data center power consumption trend chart and carbon emission trend chart • Setting of server dynamic power consumption policies and minimum power consumption policies • Server temperature optimization, utilization optimization, power consumption characteristics analysis, power consumption prediction, load distribution, etc. • Carbon asset and carbon emission management
Log	• Fault log record management • Diagnosis record and diagnosis rule management
Topologies	• Centralized management of multiple data centers and panoramic 3D views, including dynamic display of power consumption, temperature, alerts and cabinet capacity of the data center • Network topologies
Reports	• Management of warranty information reports, alert reports, asset reports, hardware reports and performance reports • Export of reports in .xlsx format
System	• Password management, alert forwarding and data dump • Customized KSManage parameters
Security	Security control of KSManage via a set of security policies such as user management, role management, authentication management (local authentication and LDAP authentication) and certificate management

10.3 KSManage Tools

Table 10-3 Features of KSManage Tools

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

12 Appendix A

12.1 Operating Temperature Specification Limits

- 4th Gen Intel Xeon Scalable Processor (SPR) Configuration

Table 12-1 Operating Temperature Specification Limits

Config.	Max. Operating Temperature: 30°C (86°F)	Max. Operating Temperature: 35°C (95°F)	Max. Operating Temperature: 40°C (104°F)	Max. Operating Temperature: 45°C (113°F)
2 × 2.5-Inch Drive + 6 × PCIe Expansion Card Config. (with 6056 fans and 2U heatsinks)	• CPU TDP ≤350 W • Rear drive power consumption ≤20 W	• CPU TDP ≤300 W • Rear drive power consumption ≤15 W	• CPU TDP ≤220 W • Rear drive power consumption ≤10 W • CX6 NICs and 100 Gb or above NICs not supported	• CPU TDP ≤165 W • Rear drive power consumption ≤5 W • CX6 NICs and 100 Gb or above NICs not supported
2 × 2.5-Inch Drive + 6 × PCIe Expansion Card Config. (with 6056 fans and 1U heatsinks)	• CPU TDP ≤185 W • Rear drive power consumption ≤25 W	• CPU TDP ≤165 W • Rear drive power consumption ≤20 W	• CPU TDP ≤120 W • Rear drive power consumption ≤20 W	Not supported
4 × 2.5-Inch Drive + 4 × PCIe Expansion Card Config.	• CPU TDP ≤350 W • Rear drive power	• CPU TDP ≤350 W • Rear drive power	• CPU TDP ≤220 W • Rear drive power	• CPU TDP ≤165 W • Rear drive power

Config.	Max. Operating Temperature: 30°C (86°F)	Max. Operating Temperature: 35°C (95°F)	Max. Operating Temperature: 40°C (104°F)	Max. Operating Temperature: 45°C (113°F)
(with 6056 fans and 2U heatsinks)	consumption ≤20 W	consumption ≤15 W	consumption ≤10 W • CX6 NICs and 100 Gb or above NICs not supported	consumption ≤5 W • CX6 NICs and 100 Gb or above NICs not supported
4 × 2.5-Inch Drive + 4 × PCIe Expansion Card Config. (with 6056 fans and 1U heatsinks)	• CPU TDP ≤185 W • Rear drive power consumption ≤25 W	• CPU TDP ≤165 W • Rear drive power consumption ≤20 W	• CPU TDP ≤120 W • Rear drive power consumption ≤15 W • CX6 NICs and 100 Gb or above NICs not supported	Not supported
4 × 2.5-Inch Drive + 4 × PCIe Expansion Card Config. (with 6038 fans and 2U heatsinks)	• CPU TDP ≤225 W • Rear drive power consumption ≤20 W	• CPU TDP ≤225 W • Rear drive power consumption ≤15 W • CX6 NICs and 100 Gb or above NICs not supported	• CPU TDP ≤120 W • Rear drive power consumption ≤10 W • CX6 NICs and 100 Gb or above NICs not supported	Not supported
8 × 2.5-Inch Drive Config. (with 6056 fans and 2U heatsinks)	• CPU TDP ≤350 W • Rear drive power consumption ≤20 W	• CPU TDP ≤350 W • Rear drive power consumption ≤15 W	• CPU TDP ≤220 W • Rear drive power consumption ≤10 W • CX6 NICs and 100 Gb or	• CPU TDP ≤165 W • Rear drive power consumption ≤5 W • CX6 NICs and 100 Gb or

Config.	Max. Operating Temperature: 30°C (86°F)	Max. Operating Temperature: 35°C (95°F)	Max. Operating Temperature: 40°C (104°F)	Max. Operating Temperature: 45°C (113°F)
			above NICs not supported	above NICs not supported
8 × 2.5-Inch Drive Config. (with 6056 fans and 1U heatsinks)	• CPU TDP ≤185 W • Rear drive power consumption ≤25 W	• CPU TDP ≤165 W • Rear drive power consumption ≤20 W	• CPU TDP ≤120 W • Rear drive power consumption ≤15 W • CX6 NICs and 100 Gb or above NICs not supported	Not supported
4 × 2.5-Inch Drive + 4 × PCIe Expansion Card + 8 × 2.5-Inch Internal Drive Config. (with 6056 fans and 1U heatsinks)	• CPU TDP ≤185 W • Rear drive power consumption ≤25 W	• CPU TDP ≤165 W • Rear drive power consumption ≤20 W	• CPU TDP ≤120 W • Rear drive power consumption ≤15 W • CX6 NICs and 100 Gb or above NICs not supported	Not supported

NOTE

- The maximum operating temperature is 5°C (9°F) lower than the rated value if a single fan fails.
- Single fan failure may affect system performance.
- If the server is configured with 100 Gb or above OCP/PCIe NICs, or CX6 NICs, the maximum operating temperature is 3°C (5.4°F) lower than the rated value.

- 5th Gen Intel Xeon Scalable Processor (EMR) Configuration

Table 12-2 Operating Temperature Specification Limits

Config.	Max. Operating Temperature: 30°C (86°F)	Max. Operating Temperature: 35°C (95°F)	Max. Operating Temperature: 40°C (104°F)	Max. Operating Temperature: 45°C (113°F)
2 × 2.5-Inch Drive + 6 × PCIe Expansion Card Config. (with 6056 fans and 2U heatsinks)	• CPU TDP ≤300 W • Rear drive power consumption ≤20 W	• CPU TDP ≤270 W • Rear drive power consumption ≤15 W	• CPU TDP ≤205 W • Rear drive power consumption ≤10 W • CX6 NICs and 100 Gb or above NICs not supported	• CPU TDP ≤165 W • Rear drive power consumption ≤5 W • CX6 NICs and 100 Gb or above NICs not supported
2 × 2.5-Inch Drive + 6 × PCIe Expansion Card Config. (with 6056 fans and 1U heatsinks)	• CPU TDP ≤185 W • Rear drive power consumption ≤25 W	• CPU TDP ≤165 W • Rear drive power consumption ≤20 W	• CPU TDP ≤120 W • Rear drive power consumption ≤20 W	Not supported
4 × 2.5-Inch Drive + 4 × PCIe Expansion Card Config. (with 6056 fans and 2U heatsinks)	• CPU TDP ≤300 W • Rear drive power consumption ≤20 W	• CPU TDP ≤270 W • Rear drive power consumption ≤15 W	• CPU TDP ≤205 W • Rear drive power consumption ≤10 W • CX6 NICs and 100 Gb or above NICs not supported	• CPU TDP ≤165 W • Rear drive power consumption ≤5 W • CX6 NICs and 100 Gb or above NICs not supported
4 × 2.5-Inch Drive	• CPU TDP ≤185 W	• CPU TDP ≤165 W	• CPU TDP ≤120 W	Not supported

Config.	Max. Operating Temperature: 30°C (86°F)	Max. Operating Temperature: 35°C (95°F)	Max. Operating Temperature: 40°C (104°F)	Max. Operating Temperature: 45°C (113°F)
+ 4 × PCIe Expansion Card Config. (with 6056 fans and 1U heatsinks)	• Rear drive power consumption ≤25 W	• Rear drive power consumption ≤20 W	• Rear drive power consumption ≤15 W • CX6 NICs and 100 Gb or above NICs not supported	
4 × 2.5-Inch Drive + 4 × PCIe Expansion Card Config. (with 6038 fans and 2U heatsinks)	• CPU TDP ≤185 W • Rear drive power consumption ≤20 W	• CPU TDP ≤165 W • Rear drive power consumption ≤15 W • CX6 NICs and 100 Gb or above NICs not supported	• CPU TDP ≤120 W • Rear drive power consumption ≤10 W • CX6 NICs and 100 Gb or above NICs not supported	Not supported
8 × 2.5-Inch Drive Config. (with 6056 fans and 2U heatsinks)	• CPU TDP ≤300 W • Rear drive power consumption ≤20 W	• CPU TDP ≤270 W • Rear drive power consumption ≤15 W	• CPU TDP ≤205 W • Rear drive power consumption ≤10 W • CX6 NICs and 100 Gb or above NICs not supported	• CPU TDP ≤165 W • Rear drive power consumption ≤5 W • CX6 NICs and 100 Gb or above NICs not supported
8 × 2.5-Inch Drive Config. (with 6056 fans and	• CPU TDP ≤185 W • Rear drive power consumption ≤25 W	• CPU TDP ≤165 W • Rear drive power consumption ≤20 W	• CPU TDP ≤120 W • Rear drive power consumption ≤15 W	Not supported

Config.	Max. Operating Temperature: 30°C (86°F)	Max. Operating Temperature: 35°C (95°F)	Max. Operating Temperature: 40°C (104°F)	Max. Operating Temperature: 45°C (113°F)
1U heatsinks)			• CX6 NICs and 100 Gb or above NICs not supported	
4 × 2.5-Inch Drive + 4 × PCIe Expansion Card + 8 × 2.5-Inch Internal Drive Config. (with 6056 fans and 1U heatsinks)	• CPU TDP ≤185 W • Rear drive power consumption ≤25 W	• CPU TDP ≤165 W • Rear drive power consumption ≤20 W	• CPU TDP ≤120 W • Rear drive power consumption ≤15 W • CX6 NICs and 100 Gb or above NICs not supported	Not supported

NOTE

- The maximum operating temperature is 5°C (9°F) lower than the rated value if a single fan fails.
- Single fan failure may affect system performance.
- If the server is configured with 100 Gb or above OCP/PCIe NICs, or CX6 NICs, the maximum operating temperature is 3°C (5.4°F) lower than the rated value.

12.2 Model

Certified Model	Description
KR2266-X2-A0-R0-00	Global

12.3 RAS Features

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

12.4 Sensor List

Table 12-3 Sensor List

Sensor	Description	Sensor Location
Inlet_Temp	Air inlet temperature	Left mounting ear
Outlet_Temp	Air outlet temperature	Motherboard
CPUx_Temp	CPUx core temperature	CPUx x indicates the CPU number with a value of 0 - 1
CPUx_DTS	CPUx DTS temperature, CPU margin temperature before it reaches the throttling frequency	CPUx x indicates the CPU number with a value of 0 - 1
CPUx_DIMM_T	The maximum temperature among DDR5 DIMMs of CPUx	CPUx x indicates the CPU number with a value of 0 - 1
PCH_Temp	PCH temperature	Motherboard
PSU_Inlet_Temp	The maximum PSU temperature	PSUs
CPUx_VR_Temp	CPUx VR temperature	CPUx x indicates the CPU number with a value of 0 - 1
NVMe_Temp	The maximum temperature among all NVMe drives connected to the backplane	NVMe drives connected to the backplane
HBA_Temp	HBA card temperature	HBA card
FPGA_Card_Temp	FPGA card temperature	FPGA card
RAID_Temp	PCIe RAID card temperature (The maximum temperature will be taken in case of multiple RAID cards,	RAID cards

Sensor	Description	Sensor Location
	including SAS card and RAID card)	
HDD_MAX_Temp	The maximum temperature among all drives	Drives
M.2_Max_Temp	The maximum temperature among all internal M.2 NVMe SSDs	Internal M.2 NVMe SSDs
M.2_Zone_Temp	Air inlet temperature of the internal M.2 SSD zone	Motherboard
OCP_NIC_Temp	OCP card temperature (The maximum temp. will be taken in case of multiple OCP cards)	OCP cards
OCP_NIC_SFP_Temp	The maximum temperature among all OCP card SFP modules	Optical modules
PCIe_NIC_Temp	PCIe NIC temperature (The maximum temp. will be taken in case of multiple PCIe NICs)	PCIe NICs
PCIe_NIC_SFP_T	The maximum temperature among all PCIe NIC SFP modules	Optical modules
PSUx_VIN	PSUx input voltage	PSUx x indicates the PSU number with a value of 0 - 1
PSUx_VOUT	PSUx output voltage	PSUx x indicates the PSU number with a value of 0 - 1
SYS_12V	System 12 V voltage	Motherboard
SYS_5V	System 5 V voltage	Motherboard
SYS_3V3	System 3.3 V voltage	Motherboard
RTC_Battery	Motherboard RTC battery voltage	Motherboard
PVCCIN_CPUx	CPUx core voltage	CPUx x indicates the CPU number with a value of 0 - 1
PVCCFA_FIVR_CPUx	UPI IIO voltage	CPUx x indicates the CPU number with a value of 0 - 1

Sensor	Description	Sensor Location
PVCCINFAON_CPUx	CPUx start voltage	CPUx x indicates the CPU number with a value of 0 - 1
PVCCFA_EHV_CPUx	Controller voltage	CPUx x indicates the CPU number with a value of 0 - 1
PVCCD_HV_CPUx	Memory controller voltage	CPUx x indicates the CPU number with a value of 0 - 1
PVNN_MAIN_CPUx	CPUx voltage	CPUx x indicates the CPU number with a value of 0 - 1
BMC_RGM_STBY3V3	BMC 3.3 V voltage	Motherboard
PVNN_PCH_STBY	PCH core voltage	Motherboard
P1V_BMC_STBY_SEN	BMC 1 V voltage	Motherboard
P1V05_PCH_STBY	PCH logic voltage	Motherboard
P2V5_BMC_STBY	BMC standby voltage	Motherboard
P1V2_STBY_SENSOR	Motherboard 1.2 V voltage	Motherboard
P1V8_STBY_SENSOR	Motherboard 1.8 V voltage	Motherboard
P3V3_STBY_SCALED	Motherboard 3.3 V voltage	Motherboard
P12V_CPUx_DIMM	CPUx DIMM voltage	CPUx x indicates the CPU number with a value of 0 - 1
P12V_STBY_OCP0	OCP0 12 V voltage	Motherboard
P3V3_STBY_OCP0	OCP0 3.3 V voltage	Motherboard
P12V_STBY_OCP1	OCP1 12 V voltage	Motherboard
P3V3_STBY_OCP1	OCP1 3.3 V voltage	Motherboard
P12V_HDD	Drive 12 V voltage	Motherboard
P5V_HDD	Drive 5 V voltage	Motherboard
P5V_STBY_USB1	USB voltage	Motherboard
P5V_STBY_USB2	USB voltage	Motherboard
P3V3_PCIe	PCIe riser card 3.3 V voltage	Motherboard
P12V_PCIe	PCIe riser card 12 V voltage	Motherboard

Sensor	Description	Sensor Location
P12V_FAN	Fan voltage	Motherboard
FANx_k_Speed	Fan rotor speed	FANx • x indicates the fan number with a value of 0 – 5; • k denotes front rotor and rear rotor, with a value of F/R respectively
Total_Power	Total power	PSUs
PSUx_PIN	PSUx input power	PSUx x indicates the PSU number with a value of 0 - 1
PSUx_POUT	PSUx output power	PSUx x indicates the PSU number with a value of 0 - 1
CPU_Power	Total CPU power (obtained through ME)	Motherboard
Memory_Power	Total memory power (obtained through ME)	Motherboard
FAN_Power	Total fan power	Fans
MEM_ResourceRate	Memory utilization rate	-
CPU_ResourceRate	CPU utilization rate	-
Air_Press	Air pressure	Left mounting ear
CPUx_Status	CPUx status	CPUx x indicates the CPU number with a value of 0 - 1
SEL_Status	SEL status	-
PSU_Mismatch	PSU models mismatch	-
PSU_Redundant	PSU redundancy status	-
FANx_Status	FANx health status	FANx x indicates the fan number with a value of 0 - 5
FAN_Redundant	Fan redundancy status	-

Sensor	Description	Sensor Location
PCIe_Status	The status of PCIe device (including PCIe bus, slots and cards)	-
POST_Status	System firmware and POST status	-
PWR_CAP_Fail	Power capping failure	-
CPUx_CnDm	DIMM health status	• CPUx - x indicates the CPU number with a value of 0 – 1; • CnDm - n indicates the channel number with a value of 0 – 7; - m indicates the DIMM slot number with a value of 0
CPU_Config	CPU configuration status (mixing of CPUs, or primary CPU not installed)	-
PSUx_Status	PSUx status	PSUx x indicates the PSU number with a value of 0 - 1
k_HDDx	Drive health status	Drive k denotes front, internal and rear, with a value of F/I/R respectively; x indicates the drive number, with a value of 0 – 23
ACPI_PWR	ACPI power status	-
Sys_Health	System health status	-
BMC_Boot_Up	BMC boot up complete	-
BIOS_Boot_Up	BIOS boot up complete	-
Intrusion	Chassis-opening activity	Top cover
ME_FW_Status	ME health status	-

Sensor	Description	Sensor Location
TPM_Verify	TPM verification status	-
HDD_k__Drawer	Drive drawer status	Drive drawer k k denotes the top/middle/bottom drive drawer, with a value of U/M/L respectively
Sys_Health	System health status	-
PWR_On_TMOUT	Power-on timeout	-
System_Error	Emergency system errors (The sensor indicates IERR, Error0, Error1, and Error2. In the case of an alarm triggered by an IERR, the faulty component can be located based on the MCA register analysis log, IDL, and SEL). IERR and Error2 will trigger crash screen recording.	-
BMC_Status	BMC status (including chip status, hardware status, and self-test status)	-

13 Appendix B Acronyms and Abbreviations

A

AC	Alternating Current
ACPI	Advanced Configuration and Power Interface
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

C

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

CRPS	Common Redundant Power Supply

D

DC	Direct Current
DDP	Dual Die Package
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
DTS	Digital Thermal Sensor
DWPD	Drive Writes Per Day

E

ECC	Error-Correcting Code
ECMA	European Computer Manufacturers Association
EMR	Emerald Rapids
ESD	Electrostatic Discharge

F

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

G

GPU	Graphics Processing Unit
GUI	Graphical User Interface

H

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

I

I^2C	Inter-Integrated Circuit
IEC	International Electrotechnical Commission
IERR	Internal Error
IIO	Integrated Input/Output controller
IIPC	Intel Intelligent Power Capability
I/O	Input/Output
IOPS	Input/Output Operations Per Second
IP	Internet Protocol
IPMI	Intelligent Platform Management Interface
ISA	International Society of Automation
ISO	International Organization for Standardization

K

KC	Korea Certification
KVM	Keyboard, Video, Mouse

L

LDAP	Lightweight Directory Access Protocol
LED	Light Emitting Diode
LP	Low Profile

M

MCA	Machine Check Architecture
MCIO	Mini Cool Edge Input/Output
ME	Management Engine

N

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

O

OCP	Open Compute Project
OS	Operating System

P

PC	Personal Computer
PCH	Platform Controller Hub
PCIe	Peripheral Component Interconnect Express
PDB	Power Distribution Board
PDU	Power Distribution Unit
PFR	Platform Firmware Resilience
PID	Proportional, Integral, Derivative
POST	Power-On Self-Test
PSU	Power Supply Unit
PXE	Preboot Execution Environment

R

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

S

SAS	Serial Attached SCSI
SATA	Serial Advanced Technology Attachment
SCSI	Small Computer System Interface
SDP	Single Die Package
SEL	System Event Log
SFF	Small Form Factor
SFP	Small Form-factor Pluggable
SGX	Software Guard Extensions
SLA	Service Level Agreements
SLES	SUSE Linux Enterprise Server
SNMP	Simple Network Management Protocol
SPR	Sapphire Rapids
SSD	Solid State Drive
SSH	Secure Shell

T

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

U

UART	Universal Asynchronous Receiver Transmitter
UEFI	Unified Extensible Firmware Interface
UID	Unit Identification
UL	Underwriters Laboratories
UPI	Ultra Path Interconnect
USB	Universal Serial Bus

V

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

X

XDP	eXtend Debug Port