White Paper for KR2280V2 Series Servers

Powered by AMD Processors

For KR2280-E2-A0-R0-00, KR2280-E2-C0-R0-00, and KR2280-E2-A0-F0-00

Document Version: V1.0
Release Date: April 24, 2025

Copyright © 2025 AIVRES SYSTEMS INC. All rights reserved.

No part of this document may be reproduced or transmitted in any form or by any means without our prior written consent.

Applicable Model

Model	Maintenance	Cooling
KR2280-E2-A0-R0-00	Rear access	Air cooling
KR2280-E2-C0-R0-00	Rear access	Cold-plate liquid cooling
KR2280-E2-A0-F0-00	Front 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

Environmental Protection

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

Trademarks

All the trademarks or registered trademarks mentioned herein may be the property of their respective holders. This document does not mark any product or brand with the symbol ® or ™.

Security Statement

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

- When servers are to be repurposed or retired, we recommend that you restore their firmware factory settings, delete information and clear logs from BIOS and BMC to protect data privacy. Meanwhile, we recommend that you wipe the drive data thoroughly and securely with trusted erasing tools. You can use KSManage Server Provisioning. Contact us for specific server models to which KSManage Server Provisioning is applicable.
- For server open source software statements, please contact us.
- Some interfaces and commands for production, assembly and return-to-depot, and advanced commands for locating faults, if used improperly, may cause equipment abnormality or business interruption. This is not described herein. Please contact us for such information.
- External ports of our servers do not use private protocols for communication.
- Our products will not initiatively obtain or use your personal data. Only when you consent to use certain functions or services, some personal data such as IP address and email address for alerts may be obtained or used during business operation or fault location. We have implemented necessary measures on product functions to ensure personal data security throughout the data lifecycle, including but not limited to data collection, storage, use, transmission, and destruction. Meanwhile, you are obligated to establish necessary user privacy policies in accordance with applicable national/regional laws and regulations to fully protect user personal data.
- Committed to product data security, we have implemented necessary measures on product functions to protect system operation and security data throughout its lifecycle in strict accordance with relevant laws, regulations and supervision

requirements. As the owner of system operation and security data, you are obligated to establish necessary data security policies and take adequate measures in accordance with applicable national/regional laws and regulations to fully protect system operation and security data.

- We will remain committed to the safety of our products and solutions to achieve better customer satisfaction. We have established emergency response procedures and action plans for security vulnerabilities, so that product safety issues can be dealt with in a timely manner. Please contact us for any safety problems found or necessary support on security vulnerabilities when using our products.

Disclaimer

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

Preface

Abstract

This document describes the KR2280V2 AMD-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	2025/04/24	Initial release

Table of Contents

1 Product Overview

The KR2280V2 is a high-end 2-socket rack server powered by the AMD EPYC 9004 series processors. With a high core count, ultra-high memory bandwidth, and ultra-large I/O throughput, the server offers enhanced computing resources and performance for compute-intensive applications, and maintains superior performance and quality. The product boasts flexible scalability, efficient operation, and intelligent management features, making it suitable for cloud services, cloud computing, and enterprise markets. In addition, it supports front I/O maintenance and liquid cooling, departing from the conventional rear I/O maintenance approach in data centers. This innovation significantly reduces the power usage effectiveness (PUE) of data centers.

Figure 1-1 12 × 3.5-Inch Drive Configuration (KR2280-E2-A0-R0-00 and KR2280-E2-C0-R0-00)

Figure 1-2 24 × 2.5-Inch Drive Configuration (KR2280-E2-A0-R0-00 and KR2280-E2-C0-R0-00)

Figure 1-3 25 × 2.5-Inch Drive Configuration (KR2280-E2-A0-R0-00)

Figure 1-4 16 × 2.5-Inch Drive Configuration (KR2280-E2-A0-F0-00)

2 Features

2.1 Scalability and Performance

Table 2-1 Scalability and Performance

Technical Feature	Description
AMD EPYC 9004 Series Processors	Supports AMD EPYC 9004 series processors with up to 128 cores per processor, a TDP of up to 400 W, a max. boost frequency of up to 4.40 GHz, an L3 cache of up to 1,152 MB, and 4 xGMI links at up to 32 GT/s per link, delivering unrivaled processing performance. • Supports up to 2 processors with 256 cores and 512 threads, maximizing the concurrent execution of multi-threaded applications. • Provides a larger L2 cache of private 1 MB per core. • Supports AMD Turbo Core technology that automatically scales CPU speeds up to the maximum boost frequency at peak workloads, allowing processor cores to exceed the thermal design power (TDP) for a limited time. • Supports AMD Simultaneous Multi-Threading (SMT) technology that allows up to 2 threads to run on each core to improve the performance of multi-threaded applications. • Supports AMD Virtualization (AMD-V) technology that provides hardware assist to the virtualization software, allowing the operating system to better use hardware to handle virtualized workloads. • Supports Advanced Vector Extensions 512 (AVX-512) that significantly accelerates the workloads that are strongly floating point compute intensive.
DIMM Form Factor	Up to 24 DDR5 ECC DIMMs (4,800 or 5,600 MT/s, RDIMMs), delivering superior speed, high availability, and a memory capacity of up to 6 TB.
Flexible Drive Configurations	Provides elastic and expandable storage solutions to meet different capacity and upgrade requirements.

Technical Feature	Description
NVMe SSD Configuration	Delivers all-SSD configuration (up to 24 hot-swap NVMe SSDs), bringing higher I/O performance over all-HDD or HDD-SSD mixing configurations. An SSD can handle nearly hundredfold I/O operations per second (IOPS) compared to a typical HDD.
12 Gbps Serial Attached SCSI (SAS)	Doubles the internal storage data transfer rate of the 6 Gbps SAS solution, maximizing the performance of storage I/O-intensive applications.
Infinity Fabric Technology	Supports Infinity Fabric technology, integrating I/O dies (IODs) and PCIe 5.0 controllers with the processors to significantly reduce I/O latency and enhance overall system performance.
PCIe Expansion	Supports up to 8 PCIe 5.0 expansion slots.
OCP Expansion	Supports up to 2 OCP 3.0 slots that can flexibly support 1/10/25/100 Gb hot-plug OCP 3.0 cards.
Rear M.2/E1.S SSDs	Optional rear M.2 or E1.S SSDs, satisfying diverse storage demands.

2.2 Availability and Serviceability

Table 2-2 Availability and Serviceability

Technical Feature	Description
Hot-Swap SAS/SATA/NVMe Drives	The RAID card supports RAID levels 0/1/1E/10/5/50/6/60 and provides RAID cache, with data protection enabled by the super-capacitor in case of power failures.
Reliability	• SSDs are much more reliable than traditional HDDs, increasing system uptime. • Our intelligent control technology combined with the cutting-edge air-cooling and cold-plate liquid cooling systems creates an optimum working environment to ensure stable running of the server. • 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.

Technical Feature	Description
Availability	• The LEDs on the 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 fan modules with N+1 redundancy (redundancy not supported by 6038 fans), improving overall system availability. • Provides a CPU cold plate module, improving overall system availability.
Maintenance Efficiency	• Provides a BMC management network port that enables remote BMC O&M, improving O&M efficiency. • Based on humanization design, the server allows tool-less maintenance. With enhanced and optimized structural parts, the system allows quick component installation and removal, greatly reducing the O&M time.

2.3 Manageability and Security

Table 2-3 Manageability and Security

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

Technical Feature	Description
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.
AMD Secure Processor	AMD Secure Processor (ASP), a microcontroller within the AMD processor, provides enhanced security through hardware-based resistance to malicious software attacks.
AMD SEV	AMD Secure Encrypted Virtualization (SEV) technology protects Linux KVM virtual machines by transparently encrypting the memory of each VM with a unique key.
Firmware Update Mechanism	The firmware update mechanism based on digital signatures prevents unauthorized firmware updates.
UEFI Secure Boot	Protects the system from malicious bootloaders.
Hierarchical Password Protection in BIOS	Ensures system boot and management security.
BIOS Secure Flash and BIOS Lock Enable (BLE)	Reduce attacks from malicious software on the BIOS flash region.
Dual-Image Mechanism for BMC and BIOS	Recovers firmware upon detection of corrupted firmware.
BMC Secure Boot	Protects BMC from malicious tampering.
BMC Access Control Policies	Flexible BMC access control policies improve BMC management security.
Chassis Intrusion Detection	Enhances physical security.

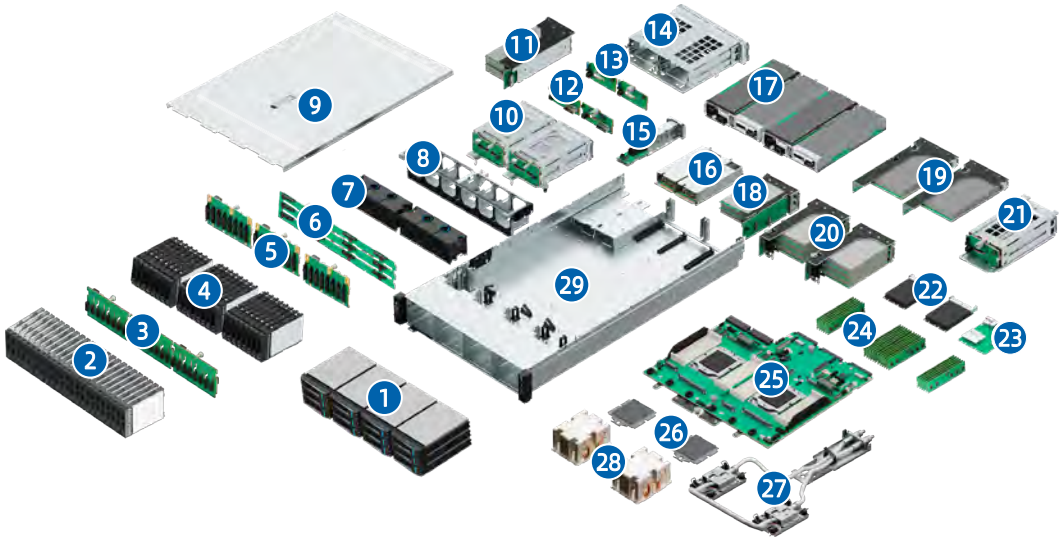
2.4 Energy Efficiency

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 94% 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 and a CPU cold plate structure, lowering energy consumption of 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.
Low Power Consumption	SSDs consume 80% less power than HDDs.

3 System Parts Breakdown

Figure 3-1 Exploded View

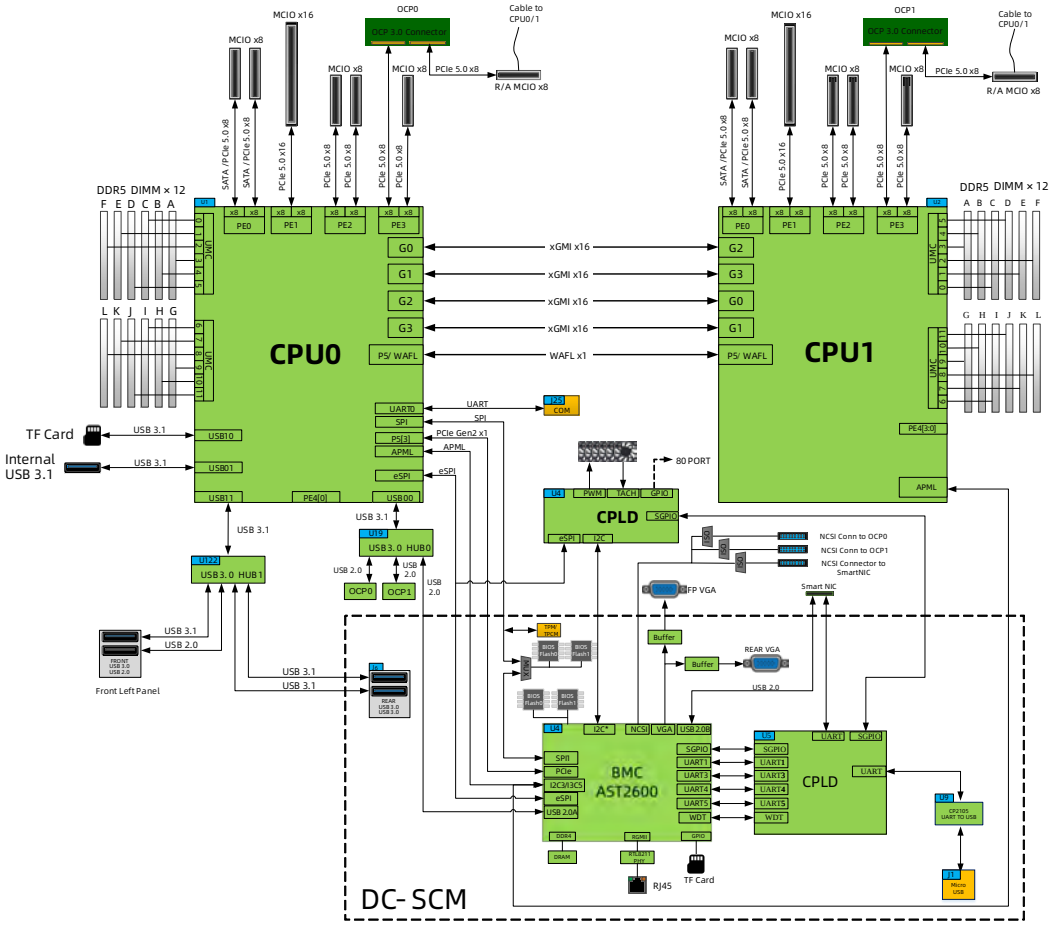


Item	Feature	Item	Feature
1	Front 3.5-Inch Drive	16	PSU
2	Front 2.5-Inch Drive	17	GPU
3	Front 8 × 2.5-Inch Drive Backplane	18	PCIe Riser Module
4	Front 2.5-Inch Drive	19	PCIe Riser Module
5	Front 8 × 2.5-Inch Drive Backplane	20	PCIe Riser Module
6	Front 4 × 3.5-Inch Drive Backplane	21	Rear 2.5-Inch Drive Module
7	Fan Module	22	OCP 3.0 Card
8	Fan Cage	23	DC-SCM Board
9	Top Cover	24	DIMM
10	Rear 3.5-Inch Drive Module	25	Motherboard
11	PCIe Riser Module	26	CPU
12	Rear 2 × 2.5-Inch Drive Backplane	27	Cold Plate Module

Item	Feature	Item	Feature
13	Rear 2 × 2.5-Inch Drive Backplane	28	Heatsink
14	Rear 2.5-Inch Drive Cage	29	Chassis
15	Rear M.2/E1.S SSD Module	-	-

4 System Logical Diagram

Figure 4-1 System Logical Diagram



- One or two AMD EPYC 9004 series processors.
- Up to 24 DIMMs.
- 4 xGMI links per CPU at up to 32 GT/s per link.
- Up to 8 PCIe 5.0 expansion slots and 2 OCP 3.0 cards.
- The DC-SCM board integrates an AST2600 management chip and supports 1 VGA port, 1 BMC management network port, 1 system/BMC serial port, 1 TF card slot, and other connectors.

5 Hardware Description

5.1 Front Panel

5.1.1 12 × 3.5-Inch Drive Configuration

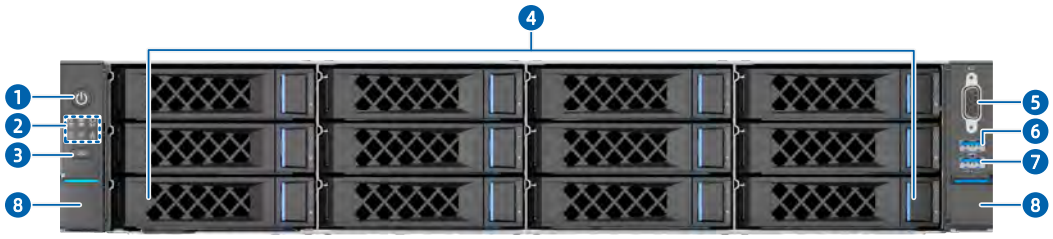
IMPORTANT

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

NOTE

Applicable model: KR2280-E2-A0-R0-00 and KR2280-E2-C0-R0-00.

Figure 5-1 Front View



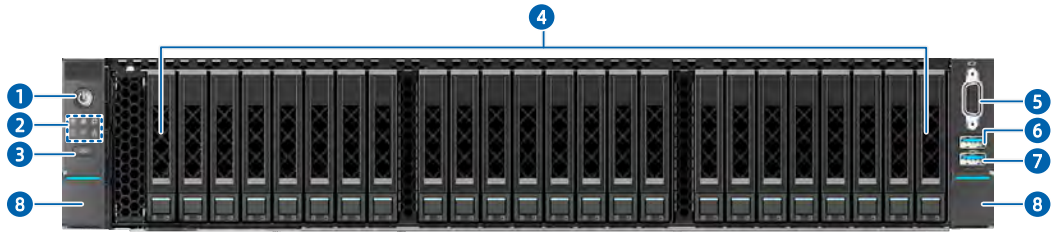
Item	Feature	Item	Feature
1	Power Button and LED	5	VGA Port
2	LEDs	6	USB 3.0 Port
3	UID/BMC RST Button and LED	7	USB 2.0 Port
4	3.5-Inch Drive Bay	8	Ear Latch

5.1.2 24 × 2.5-Inch Drive Configuration

NOTE

Applicable model: KR2280-E2-A0-R0-00 and KR2280-E2-C0-R0-00.

Figure 5-2 Front View



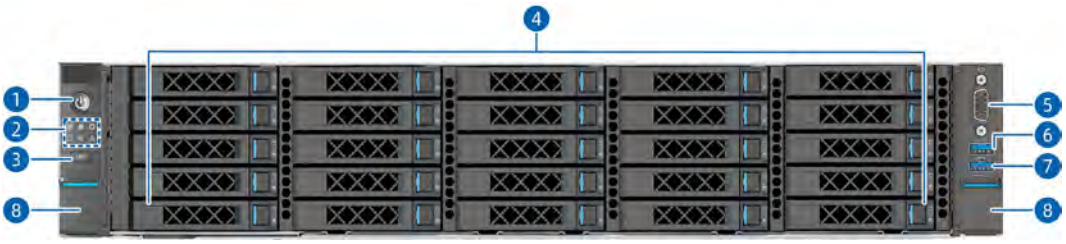
Item	Feature	Item	Feature
1	Power Button and LED	5	VGA Port
2	LEDs	6	USB 3.0 Port
3	UID/BMC RST Button and LED	7	USB 2.0 Port
4	2.5-Inch Drive Bay	8	Ear Latch

5.1.3 25 × 2.5-Inch Drive Configuration

NOTE

Applicable model: KR2280-E2-A0-R0-00.

Figure 5-3 Front View



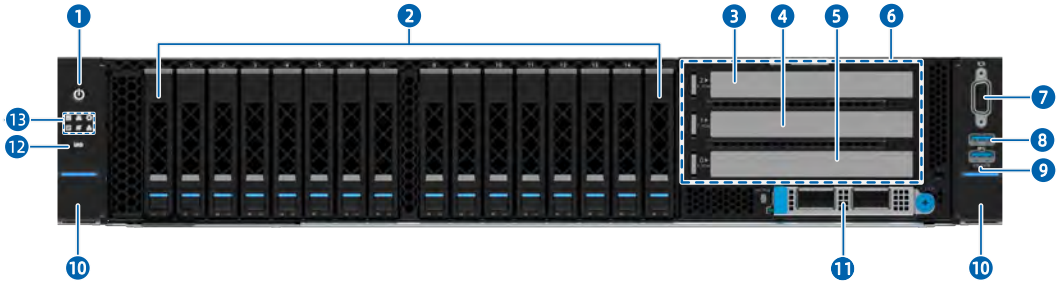
Item	Feature	Item	Feature
1	Power Button and LED	5	VGA Port
2	LEDs	6	USB 3.0 Port
3	UID/BMC RST Button and LED	7	USB 2.0 Port
4	2.5-Inch Drive Bay	8	Ear Latch

5.1.4 16 × 2.5-Inch Drive Configuration

NOTE

Applicable model: KR2280-E2-A0-F0-00.

Figure 5-4 Front View

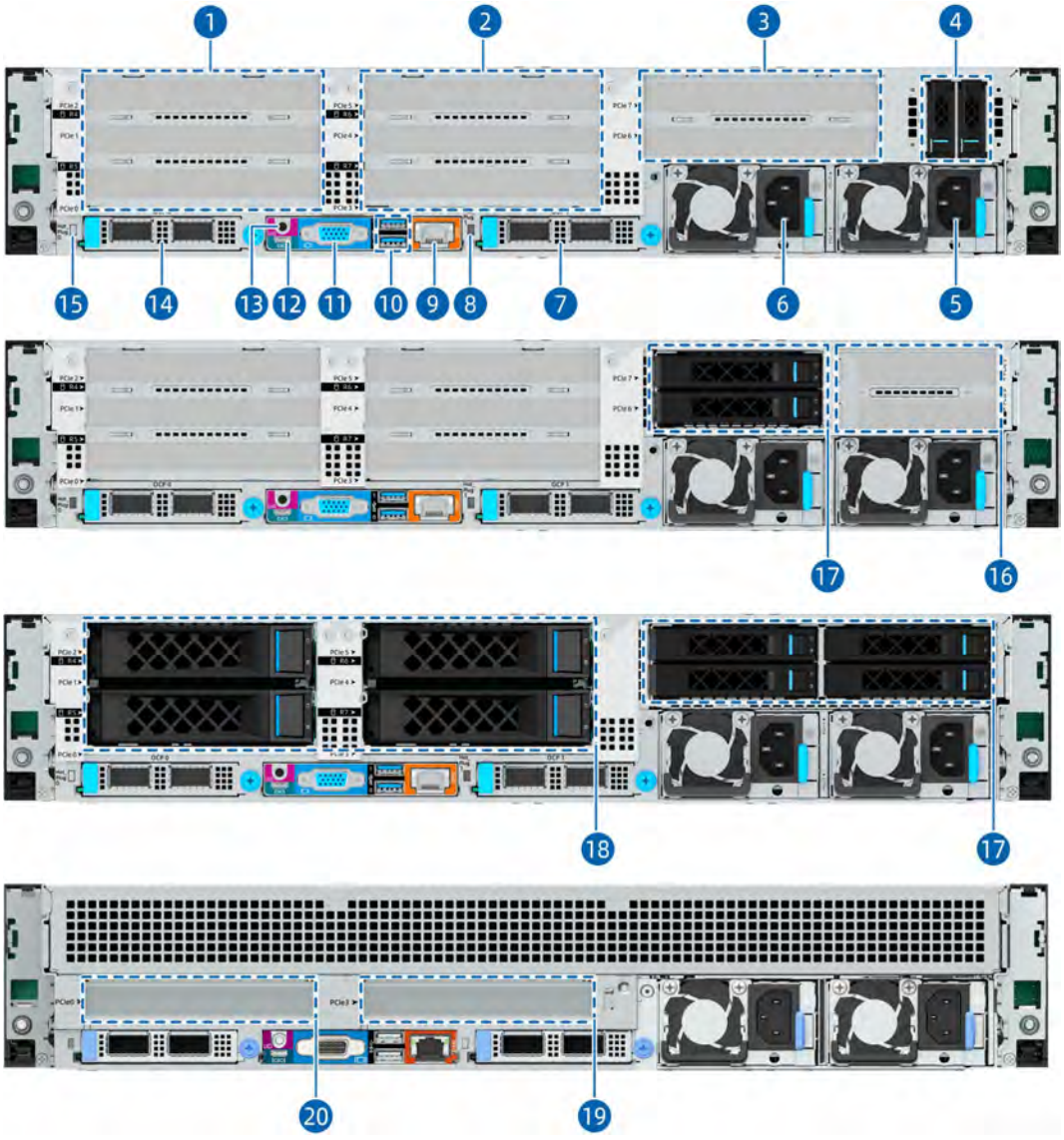


Item	Feature	Item	Feature
1	Power Button and LED	8	USB 3.0 Port
2	2.5-Inch Drive Bay	9	USB 2.0 Port
3	F_Slot 2	10	Ear Latch
4	F_Slot 1 (unavailable)	11	OCP 3.0 Card
5	F_Slot 0 (unavailable)	12	UID/BMC RST Button and LED
6	PCIe Riser Module	13	LEDs
7	VGA Port	-	-

5.2 Rear Panel

5.2.1 KR2280-E2-A0-R0-00

Figure 5-5 Rear View

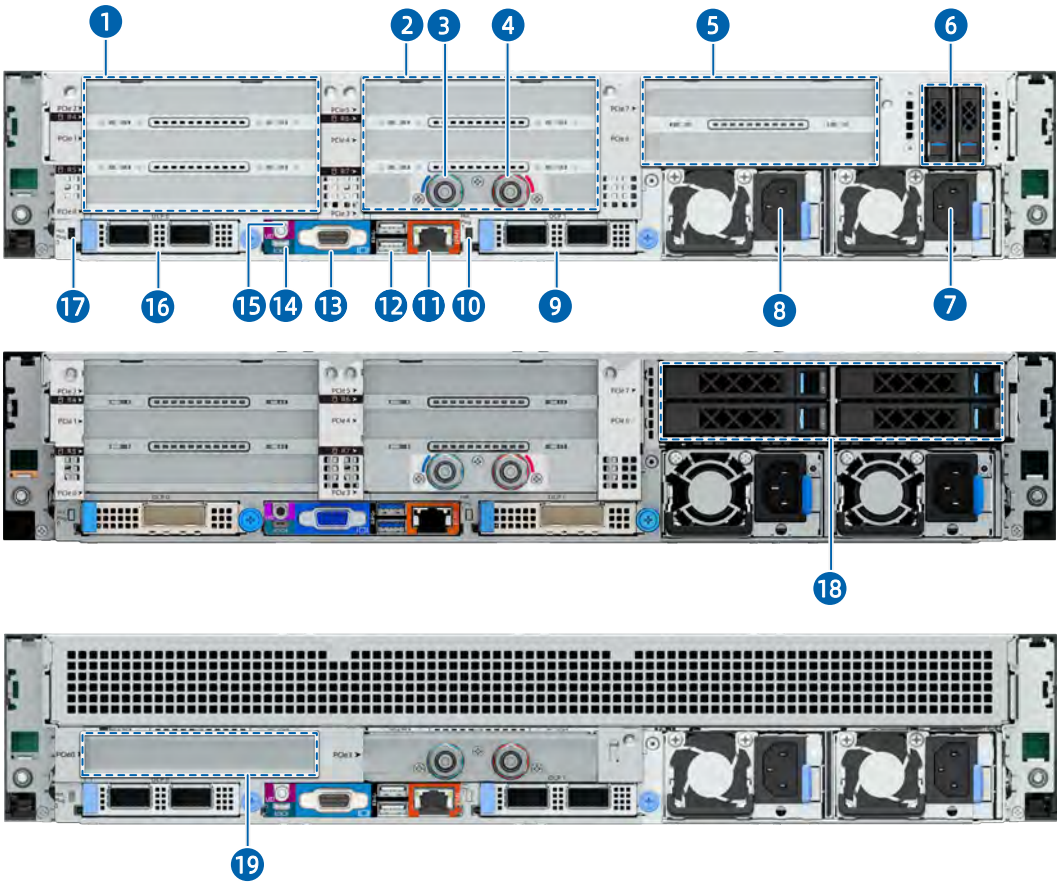


Item	Feature	Item	Feature
1	PCIe Riser Module 0	11	VGA Port
2	PCIe Riser Module 1	12	System/BMC Serial Port
3	PCIe Riser Module 2	13	UID/BMC RST Button and LED
4	M.2/E1.S Drive Bay	14	OCP 3.0 Card (CPU1)
5	PSU1	15	OCP 3.0 Card (CPU1) Hot-Plug Button and LED

Item	Feature	Item	Feature
6	PSU0	16	PCIe Riser Module 3
7	OCP 3.0 Card (CPU0)	17	2.5-Inch Drive Bay
8	OCP 3.0 Card (CPU0) Hot-Plug Button and LED	18	3.5-Inch Drive Bay
9	BMC Management Network Port	19	PCIe Riser Module 5
10	USB 3.0 Port	20	PCIe Riser Module 4

5.2.2 KR2280-E2-C0-R0-00

Figure 5-6 Rear View

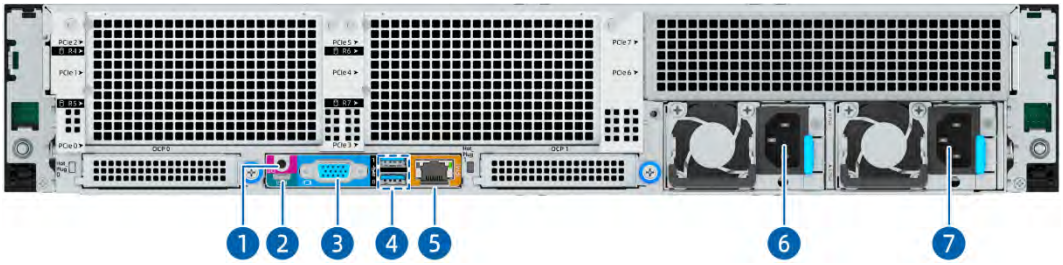


Item	Feature	Item	Feature
1	PCIe Riser Module 0	11	BMC Management Network Port
2	PCIe Riser Module 1	12	USB 3.0 Port
3	Quick Disconnect (inlet)	13	VGA Port

Item	Feature	Item	Feature
4	Quick Disconnect (outlet)	14	System/BMC Serial Port
5	PCIe Riser Module 2	15	UID/BMC RST Button and LED
6	M.2/E1.S Drive Bay	16	OCP 3.0 Card (CPU1)
7	PSU1	17	OCP 3.0 Card (CPU1) Hot-Plug Button and LED
8	PSU0	18	2.5-Inch Drive Bay
9	OCP 3.0 Card (CPU0)	19	PCIe Riser Module 4
10	OCP 3.0 Card (CPU0) Hot-Plug Button and LED	-	-

5.2.3 KR2280-E2-A0-F0-00

Figure 5-7 Rear View

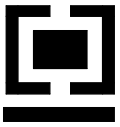


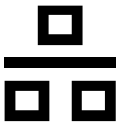
Item	Feature	Item	Feature
1	UID/BMC RST Button and LED	5	BMC Management Network Port
2	System/BMC Serial Port	6	PSU1
3	VGA Port	7	PSU0
4	USB 3.0 Port	-	-

5.3 LEDs and Buttons

Table 5-1 LED and Button Description

Item	Icon	Feature	Description
1		Power Button and LED	• Power LED: - Off = No power

Item	Icon	Feature	Description
			- 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		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 • 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.
3		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.
4		Memory Status LED	• Off = Normal • Blinking red (1 Hz) = A warning error occurs • Solid red = A critical error occurs
5		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
6		Power Status LED	• Off = Normal • Blinking red (1 Hz) = A warning error occurs • Solid red = A critical error occurs
7		System Overheat LED	• Off = Normal • Blinking red (1 Hz) = A warning error occurs, including Proc Hot, resulting in CPU throttling • Solid red = A critical error occurs, including CPU Thermal Trip/PCH Hot/MEM Hot
8		Network Status LED	• Off = No network connection • Blinking green = Network connected with data being transmitted • Solid green = Network connected without data being transmitted Note: It only indicates the status of the self-developed OCP card.
9	-	OCP 3.0 Card Hot-Plug Button and LED[1]	• 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 being 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 3.0 card. - With the LED off and the OCP 3.0 card installed, press and release the button to power on the OCP 3.0 card.

Note:

1. The server supports hot-plug OCP 3.0 cards. However, if the server is installed with the RHEL 8.x OS, the OCP 3.0 card hot-plug LED will illuminate orange (for about a few seconds) when you hot-insert an

OCP 3.0 card. This is due to a conflict between the OCP 3.0 specification and the PCIe specification, but it does not affect the normal usage of the OCP 3.0 cards.

NOTE

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

5.4 Port Description

Table 5-2 Port Description

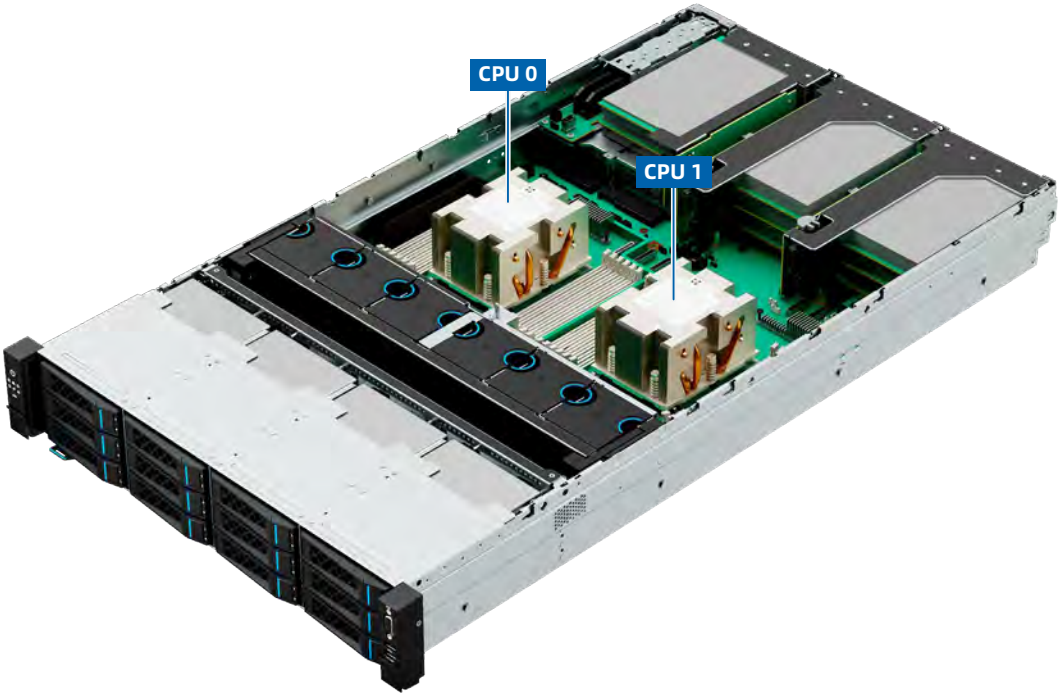
Item	Port	Description
1	VGA Port	Enables you to connect a display terminal to the system.
2	USB 3.0 Port	Enables you to connect a USB 2.0/3.0 device to the system.
3	USB 2.0 Port	Enables you to connect a USB 2.0 device to the system.
4	System/BMC Serial Port	• Enables you to debug and monitor the system. • Enables you to debug and monitor the BMC. Note: It is a micro USB serial port with a default baud rate of 115,200 bit/s.
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	PSU Socket	Enables you to connect a power cord. You can select the PSUs as needed. Note: Make sure that the rated power of each PSU is greater than that of the server.

Item	Port	Description
7	OCP 3.0 Network Port	Enables you to connect the system to the network.
8	PCIe NIC Port	Enables you to connect the system to the network.

5.5 Processors

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

Figure 5-8 Processor Locations



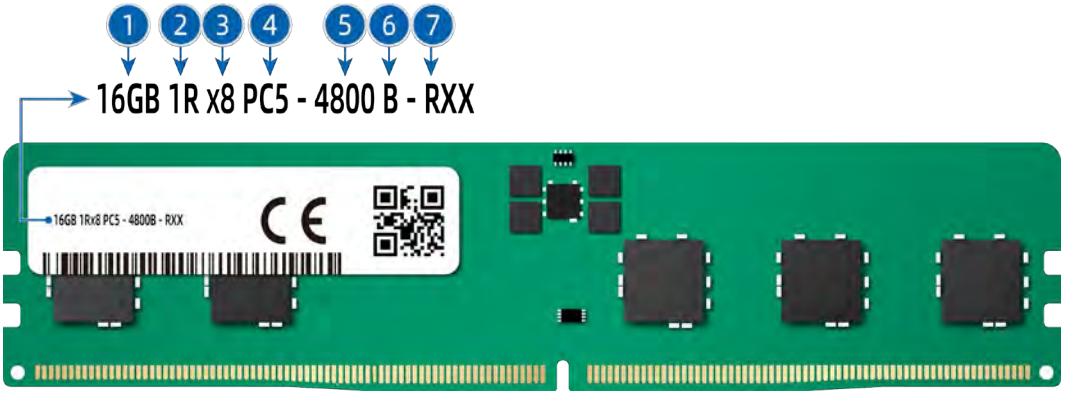
5.6 Memory

5.6.1 DDR5 DIMMs

1. Identification

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

Figure 5-9 DIMM Identification



Item	Description	Example
1	Capacity	• 16 GB • 32 GB • 64 GB • 128 GB • 256 GB
2	Rank(s)	• 1R = Single rank • 2R = Dual rank • 2S2R = Two ranks of two high stacked 3DS DRAM • 2S4R = Four ranks of two high stacked 3DS DRAM • 4R = Quad rank
3	Data width of DRAM	• x4 = 4 bits • x8 = 8 bits
4	DIMM slot type	PC5 = DDR5
5	Maximum memory speed	4,800 MT/s
6	CAS latency	• SDP 4800B = 40-39-39

Item	Description	Example
		• 3DS 4800B = 46-39-39 • SDP 5600B = 46-45-45 • 3DS 5600B = 52-45-45
7	DIMM type	R = RDIMM

2. Memory Subsystem Architecture

The server supports 24 DIMM slots and 12 memory channels per CPU.

Table 5-3 DIMM Slot List

CPU	Channel ID	Silk Screen
CPU0	Channel A	CPU0_CAD0
	Channel B	CPU0_CBD0
	Channel C	CPU0_CCD0
	Channel D	CPU0_CDD0
	Channel E	CPU0_CED0
	Channel F	CPU0_CFD0
	Channel G	CPU0_CGD0
	Channel H	CPU0_CHD0
	Channel I	CPU0_CID0
	Channel J	CPU0_CJD0
	Channel K	CPU0_CKD0
	Channel L	CPU0_CLD0
CPU1	Channel A	CPU1_CAD0
	Channel B	CPU1_CBD0
	Channel C	CPU1_CCD0
	Channel D	CPU1_CDD0
	Channel E	CPU1_CED0
	Channel F	CPU1_CFD0
	Channel G	CPU1_CGD0
	Channel H	CPU1_CHD0

CPU	Channel ID	Silk Screen
	Channel I	CPU1_CID0
	Channel J	CPU1_CJD0
	Channel K	CPU1_CKD0
	Channel L	CPU1_CLD0

3. Compatibility

Refer to the following rules to select the DDR5 DIMMs.

IMPORTANT

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

- DDR5 DIMMs can be used with the AMD EPYC 9004 series processors. The maximum memory capacity supported is identical for different CPU models.
- The total memory capacity supported is the sum of the capacities of all DDR5 DIMMs.

NOTE

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

Table 5-4 DDR5 DIMM Specifications

Item	Value			
Capacity per DDR5 DIMM (GB)	16	32	64	128
Type	RDIMM	RDIMM	RDIMM	RDIMM
Rated speed (MT/s)	4,800/5,600	4,800/5,600	4,800/5,600	4,800/5,600

Item		Value			
Operating voltage (V)		1.1	1.1	1.1	1.1
Maximum number of DDR5 DIMMs supported in a server[a]		24	24	24	24
Maximum capacity of DDR5 DIMMs supported in a server (GB)[b]		384	768	1,536	3,072
Actual speed (MT/s)	1 DPC[c]	4,800	4,800	4,800	4,800
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. 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.					

4. Population Rules

General population rules for DDR5 DIMMs:

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

5. DIMM Slot Layout

Up to 24 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 5-10 DIMM Slot Layout

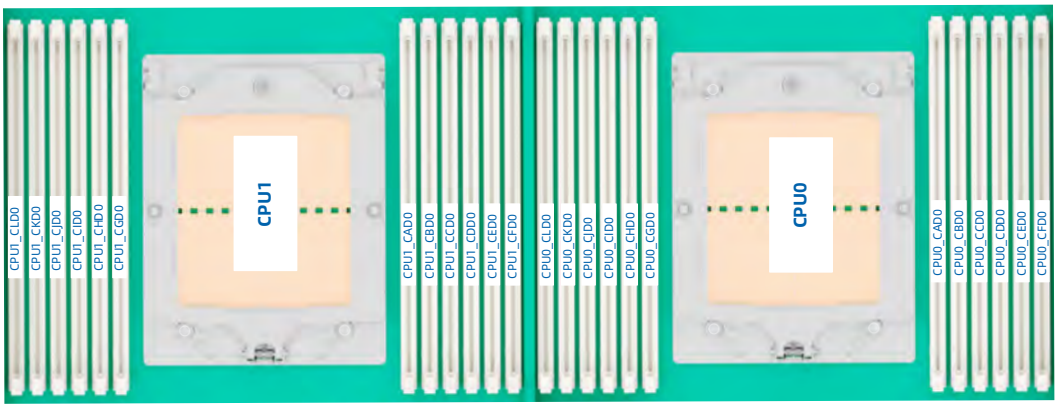


Table 5-5 DDR5 DIMM Population Rules (Single-CPU Configuration)

DDR QTY	CPU0											
	CLD0	CKD0	CJD0	CID0	CHD0	CGD0	CAD0	CBD0	CCD0	CDD0	CED0	CFD0
1							●					
2						●	●					
4				●		●	●		●			
6				●	●	●	●	●	●			
8		●		●	●	●	●	●	●		●	
10		●	●	●	●	●	●	●	●	●	●	
12	●	●	●	●	●	●	●	●	●	●	●	●

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

DDR QTY	CPU0												CPU1											
	CLD0	CKD0	CJD0	CID0	CHD0	CGD0	CAD0	CBD0	CCD0	CDD0	CED0	CFD0	CLD0	CKD0	CJD0	CID0	CHD0	CGD0	CAD0	CBD0	CCD0	CDD0	CED0	CFD0
2							●												●					
4						●	●											●	●					
8				●		●	●		●							●		●	●		●			
12				●	●	●	●	●	●							●	●	●	●	●	●			
16		●		●	●	●	●	●	●		●			●		●	●	●	●	●	●		●	
20		●	●	●	●	●	●	●	●	●	●			●	●	●	●	●	●	●	●	●	●	
24	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

5.7 Storage

5.7.1 Drive Configurations

NOTE

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

1. KR2280-E2-A0-R0-00

Table 5-7 Drive Configurations

Configuration	Front Drives	Rear Drives	Internal Drives	Drive Management Mode
12 × 3.5-Inch Drive Configuration	12 × 3.5-inch drive (drive bays with physical drive No. 0 to 11 support SAS/SATA drives)	4 × 3.5-inch SAS/SATA drive or 2 × M.2/E1.S SSD	2 × SATA/PCIe M.2 SSD or 4 × 3.5-inch SAS/SATA drive	• SAS/SATA drive or rear M.2 SSD: RAID card/CPU • Internal M.2 SSD or rear E1.S SSD: CPU
	12 × 3.5-inch drive (drive bays with physical drive No. 0 to 11 support NVMe drives)	4 × 2.5-inch SAS/SATA drive	2 × SATA/PCIe M.2 SSD	• SAS/SATA drive: RAID card • NVMe drive or internal M.2 SSD: CPU
24 × 2.5-Inch Drive Configuration	24 × 2.5-inch drive (drive bays with physical drive No. 0 to 23 support SAS/SATA drives)	4 × 2.5-inch SAS/SATA drive	2 × SATA/PCIe M.2 SSD	• SAS/SATA drive: RAID card • Internal M.2 SSD: CPU
	24 × 2.5-inch drive (drive bays with physical drive No. 0 to 23 support NVMe drives)	/	/	NVMe drive: CPU
25 × 2.5-Inch Drive Configuration	25 × 2.5-inch drive (drive bays with	4 × 2.5-inch SAS/SATA drive	2 × SATA/PCIe M.2 SSD	• SAS/SATA drive: RAID card

Configuration	Front Drives	Rear Drives	Internal Drives	Drive Management Mode
	physical drive No. 0 to 20 support SAS/SATA drives, and drive bays with physical drive No. 21 to 24 support SAS/SATA/NVMe drives)			• NVMe drive or internal M.2 SSD: CPU

2. KR2280-E2-C0-R0-00

Table 5-8 Drive Configurations

Configuration	Front Drives	Rear Drives	Internal Drives	Drive Management Mode
12 × 3.5-Inch Drive Configuration	12 × 3.5-inch drive (drive bays with physical drive No. 0 to 11 support SAS/SATA drives)	2 × M.2/E1.S SSD	2 × SATA/PCIe M.2 SSD	• SAS/SATA drive or rear M.2 SSD: RAID card/CPU • Internal M.2 SSD or rear E1.S SSD: CPU
	12 × 3.5-inch drive (drive bays with physical drive No. 0 to 11 support NVMe drives)	4 × 2.5-inch SAS/SATA drive	2 × SATA/PCIe M.2 SSD	• SAS/SATA drive: RAID card • NVMe drive or internal M.2 SSD: CPU

Configuration	Front Drives	Rear Drives	Internal Drives	Drive Management Mode
24 × 2.5-Inch Drive Configuration	24 × 2.5-inch drive (drive bays with physical drive No. 0 to 23 support SAS/SATA drives)	4 × 2.5-inch SAS/SATA drive	2 × SATA/PCIe M.2 SSD	• SAS/SATA drive: RAID card • NVMe drive or internal M.2 SSD: CPU
	24 × 2.5-inch drive (drive bays with physical drive No. 0 to 23 support NVMe drives)	/	/	NVMe drive: CPU

3. KR2280-E2-A0-F0-00

Configuration	Front Drives	Rear Drives	Internal Drives	Drive Management Mode
16 × 2.5-Inch Drive Configuration	16 × 2.5-inch drive (drive bays with physical drive No. 0 to 15 support SAS/SATA/NVMe drives)	/	2 × SATA/PCIe M.2 SSD	• SAS/SATA drive: RAID card • NVMe drive: CPU

5.7.2 Drive Numbering

NOTE

- The server adopts a cascaded mode. The RAID card is connected to the front drive backplane via SAS cables, and the front drive backplane is connected to the rear drive backplane via SAS cables.

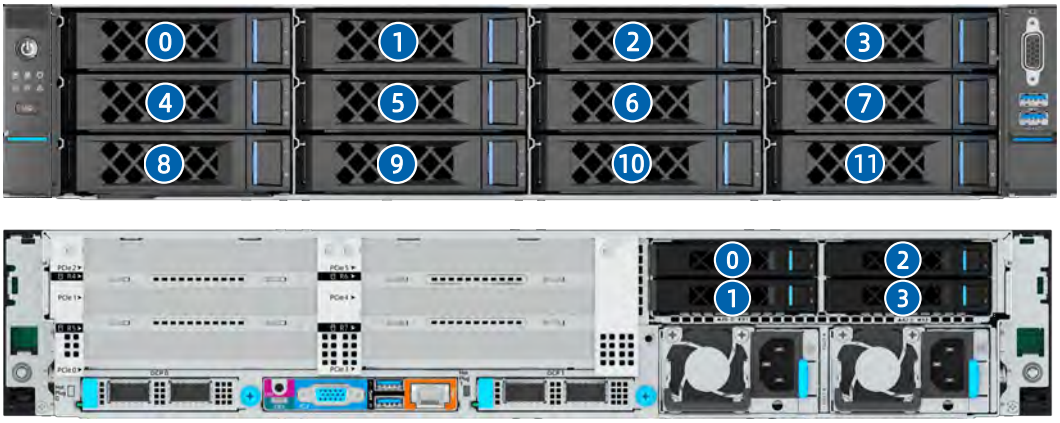
- The cascaded mode is illustrated in the format “a+b+c”. The value of “b” (12 in this document) is the number of drives that are connected to the front drive backplane; the values of “a” (0, 2 or 4 in this document) and “c” (0, 2 or 4 in this document) are the numbers of drives that are cascaded.

1. 12 × 3.5-Inch Drive Configuration

NOTE

Applicable model: KR2280-E2-A0-R0-00 and KR2280-E2-C0-R0-00.

Figure 5-11 Drive Numbering



Configuration	Physical Drive No.	Drive No. Identified by the BMC	Front/ Rear	Drive Number Identified by the 8i RAID Card	Drive Number Identified by the 16i RAID Card
12 × SAS/ SATA[1]	0 - 7	0 - 7	Front	0 - 7	0 - 15
	8 - 11	8 - 11	Front	0 - 3	
	0 - 3	0 - 3	Rear	4 - 7	
12 × SAS/ SATA[2]	0 - 1	0 - 1	Rear	0 - 1	0 - 15
	0 - 11	0 - 11	Front	2 - 13	
	2 - 3	2 - 3	Rear	14 - 15	
12 × SAS/ SATA[3]	0 - 3	0 - 3	Rear	0 - 3	0 - 15
	0 - 11	0 - 11	Front	4 - 15	
12 × NVMe	0 - 11	0 - 11	Front	-	-

Notes:

1. This configuration uses the non-cascaded 12-drive expander backplane, or cascaded 12-drive expander backplane (0+12+4), or 4-drive backplanes.

2. This configuration uses the cascaded 12-drive expander backplane (2+12+2).

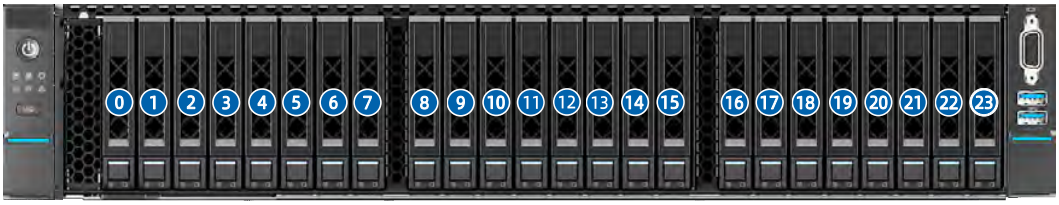
3. This configuration uses the cascaded 12-drive expander backplane (4+12+0).

2. 24 × 2.5-Inch Drive Configuration

NOTE

Applicable model: KR2280-E2-A0-R0-00 and KR2280-E2-C0-R0-00.

Figure 5-12 Drive Numbering



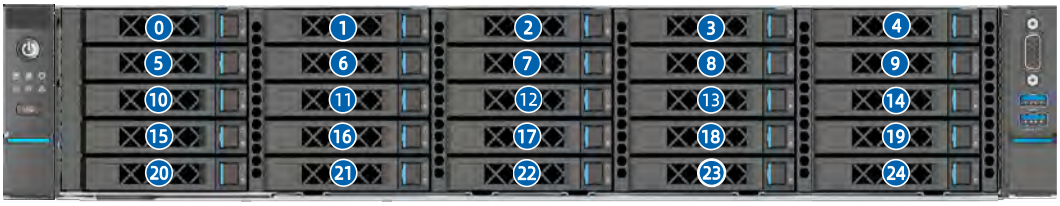
Configuration	Physical Drive No.	Drive No. Identified by the BMC	Front/Rear	Drive Number Identified by the 8i RAID Card	Drive Number Identified by the 16i RAID Card
24 × SAS/SATA	0 - 7	0 - 7	Front	0 - 7	0 - 15
	8 - 15	8 - 15	Front	0 - 7	
	16 - 23	16 - 23	Front	0 - 7	0 - 7
24 × NVMe	0 - 23	0 - 23	Front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

3. 25 × 2.5-Inch Drive Configuration

NOTE

Applicable model: KR2280-E2-A0-R0-00.

Figure 5-13 Drive Numbering



Configuration	Physical Drive No.	Drive No. Identified by the BMC	Front/Rear	Drive Number Identified by the 8i/16i RAID Card
25 × SAS/SATA	0 - 24	0 - 24	Front	0 - 24
21 × SAS/SATA + 4 × NVMe	0 - 20	0 - 20	Front	0 - 20
	21 - 24	21 - 24	Front	-

4. 16 × 2.5-Inch Drive Configuration

NOTE

Applicable model: KR2280-E2-A0-F0-00.

Figure 5-14 Drive Numbering

Configuration	Physical Drive No.	Drive No. Identified by the BMC	Front/Rear	Drive Number Identified by the 8i RAID Card	Drive Number Identified by the 16i RAID Card
16 × SAS/SATA	0 - 7	0 - 7	Front	0 - 7	0 - 15
	8 - 15	8 - 15	Front	0 - 7	
16 × NVMe	0 - 15	0 - 15	Front	-	-

5.7.3 Drive LEDs

1. SAS/SATA Drive LEDs

Figure 5-15 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 5-16 NVMe Drive LEDs

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

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

5.8 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

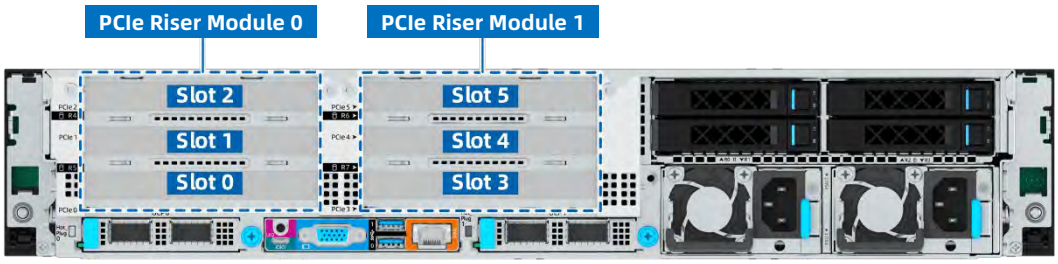
5.9.1 PCIe Expansion Cards

PCIe expansion cards provide network expansion capabilities.

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

5.9.2 PCIe Slot Locations

Figure 5-17 PCIe Slots - 6 × Rear PCIe Slot

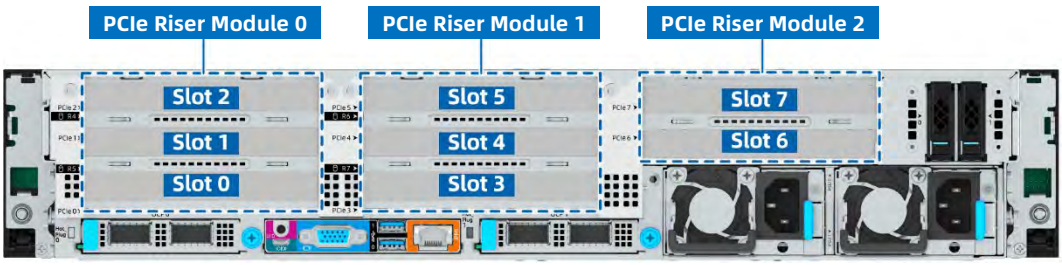


NOTE

Applicable model: KR2280-E2-A0-R0-00.

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

Figure 5-18 PCIe Slots - 8 × Rear PCIe Slot (1)

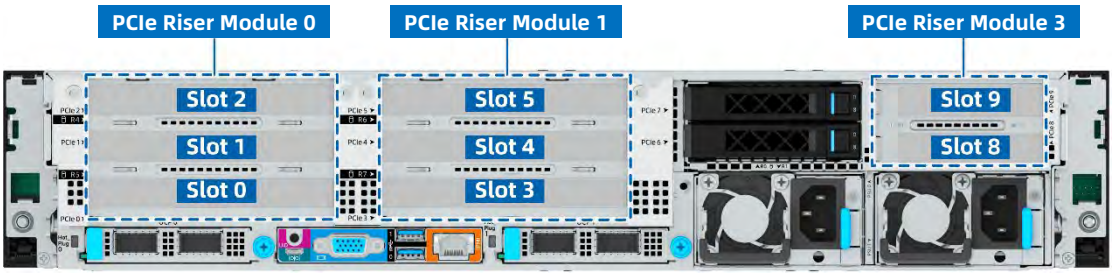


NOTE

Applicable model: KR2280-E2-A0-R0-00.

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

Figure 5-19 PCIe Slots - 8 × Rear PCIe Slot (2)

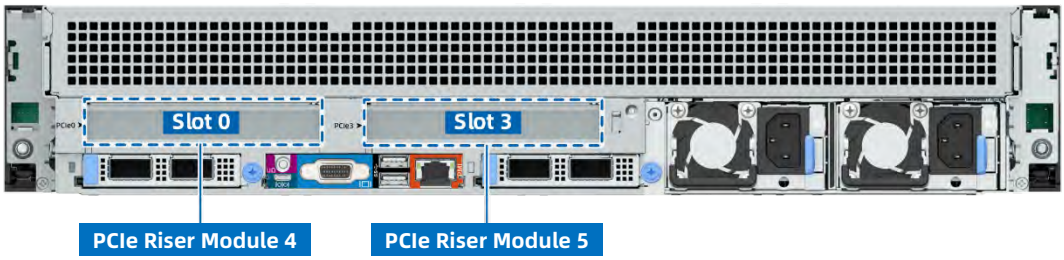


NOTE

Applicable model: KR2280-E2-A0-R0-00.

- Slot 2, slot 1, and slot 0 reside in PCIe riser module 0.
- Slot 5, slot 4, and slot 3 reside in PCIe riser module 1.
- Slot 9 and slot 8 reside in PCIe riser module 3.

Figure 5-20 PCIe Slots - GPU Configuration (1)

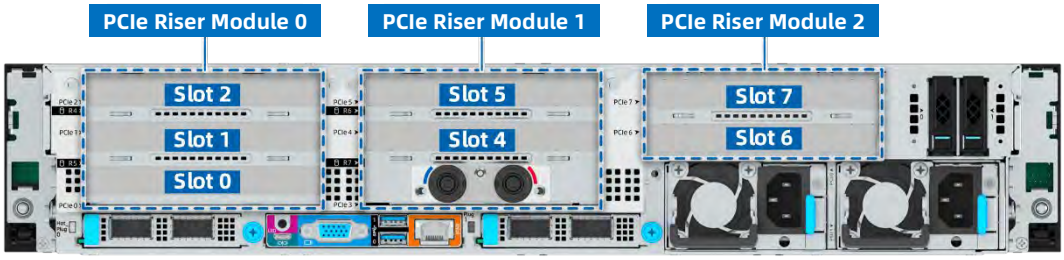


NOTE

Applicable model: KR2280-E2-A0-R0-00.

- The upper 1U space can accommodate 4 dual-slot GPUs.
- Slot 0 resides in PCIe riser module 4.
- Slot 3 resides in PCIe riser module 5.

Figure 5-21 PCIe Slots - 7 × Rear PCIe Slot (1)

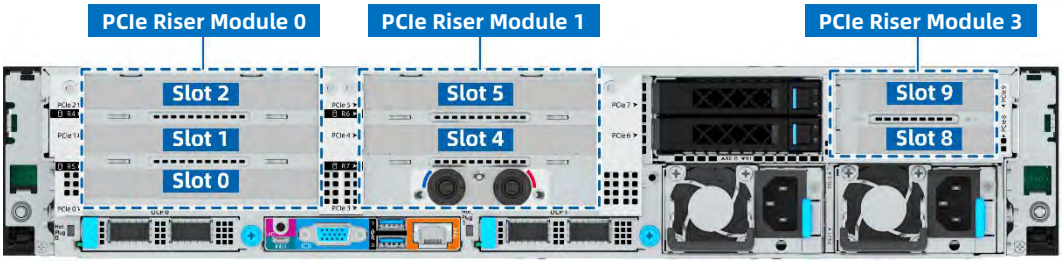


NOTE

Applicable model: KR2280-E2-C0-R0-00.

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

Figure 5-22 PCIe Slots - 7 × Rear PCIe Slot (2)



NOTE

Applicable model: KR2280-E2-C0-R0-00.

- Slot 2, slot 1, and slot 0 reside in PCIe riser module 0.
- Slot 5 and slot 4 reside in PCIe riser module 1.
- Slot 9 and slot 8 reside in PCIe riser module 3.

Figure 5-23 PCIe Slots - GPU Configuration (2)

NOTE

Applicable model: KR2280-E2-C0-R0-00.

- The upper 1U space can accommodate 4 dual-slot GPUs.
- Slot 0 resides in PCIe riser module 4.

Figure 5-24 Front PCIe Slots

NOTE

Applicable model: KR2280-E2-A0-F0-00.

F_Slot 2 resides in the front PCIe riser module (F_Slot 0 and F_Slot 1 are unavailable).

5.9.3 PCIe Riser Module

- PCIe Riser Module 0

Figure 5-25 PCIe Riser Module 0 (3 × PCIe x16 Slot)

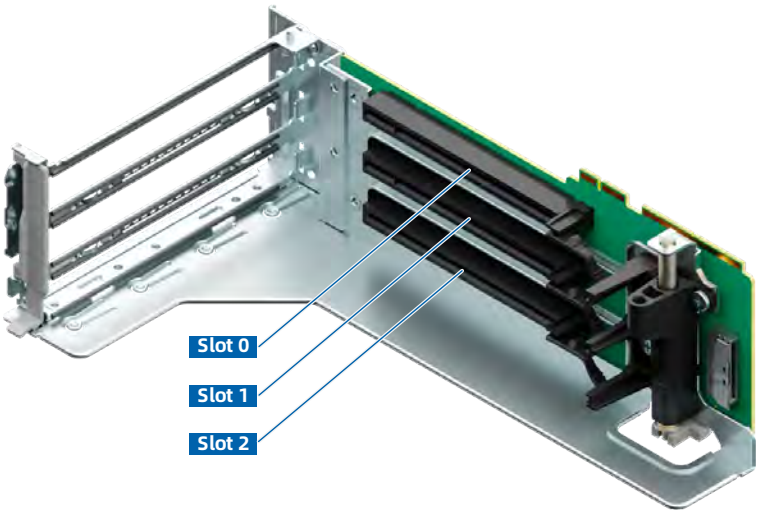
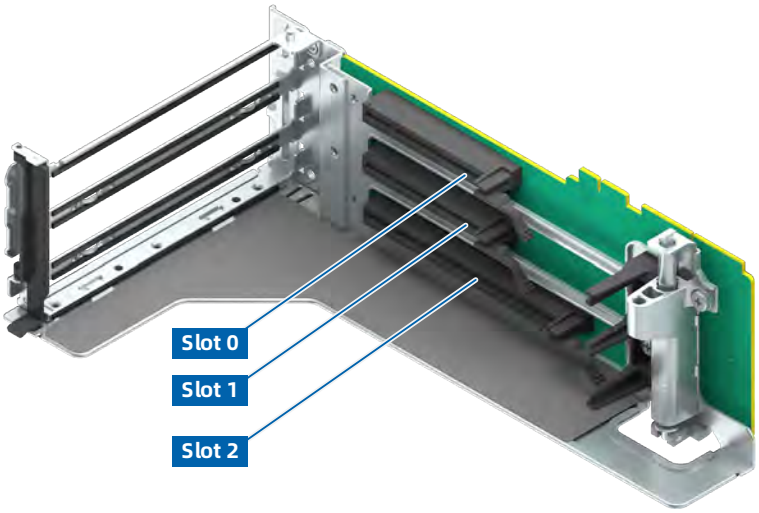


Figure 5-26 PCIe Riser Module 0 (2 × PCIe x8 Slot + 1 × PCIe x16 Slot)



- PCIe Riser Module 1

Figure 5-27 PCIe Riser Module 1 (3 × PCIe x16 Slot)

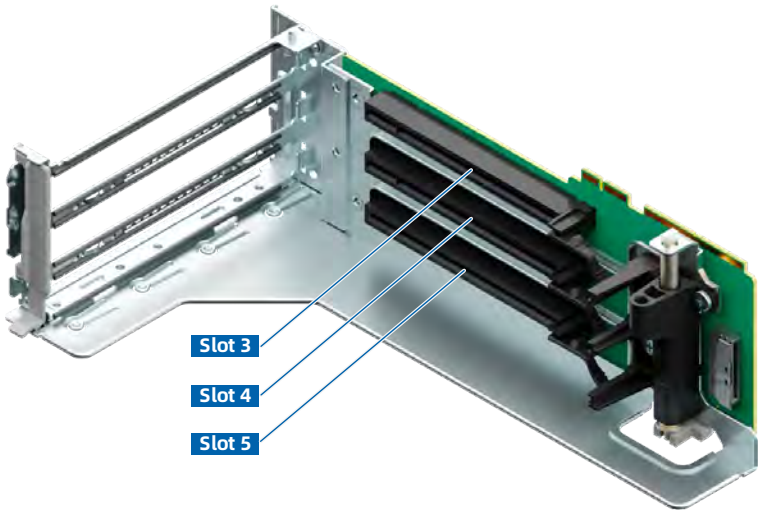
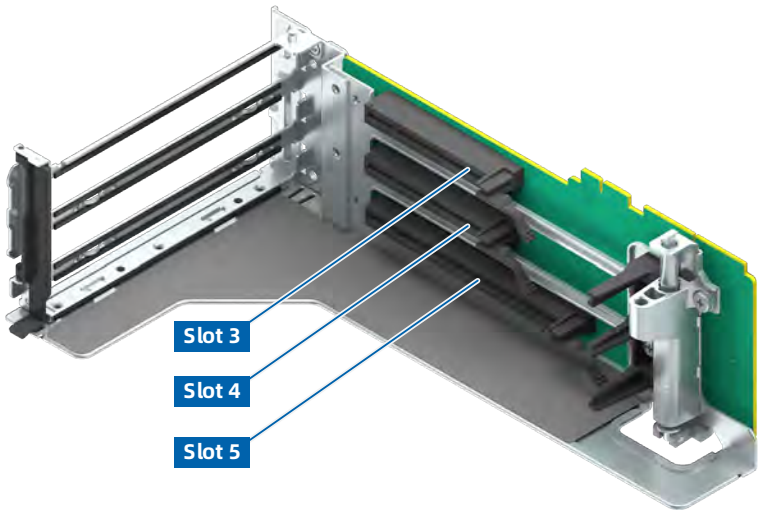


Figure 5-28 PCIe Riser Module 1 (2 × PCIe x8 Slot + 1 × PCIe x16 Slot)

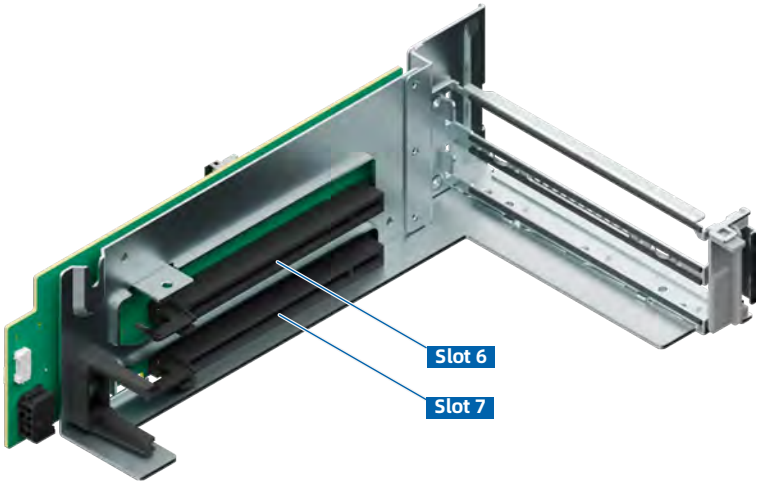


NOTE

Slot 3 is unavailable for KR2280-E2-C0-A0-00.

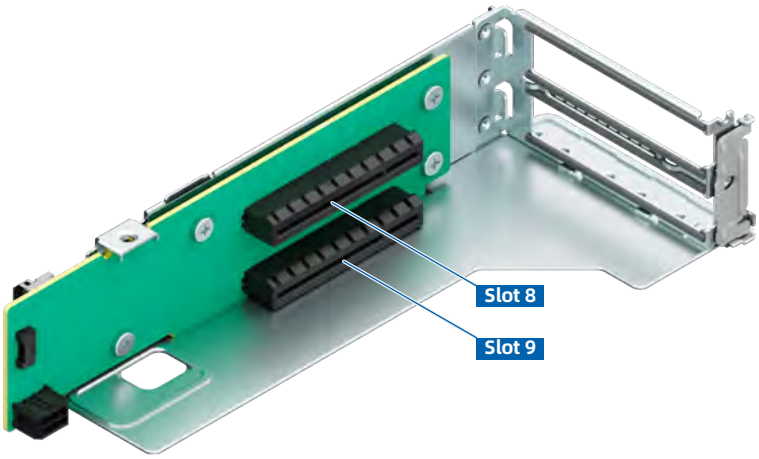
- PCIe Riser Module 2 (2 × PCIe x16 Slot)

Figure 5-29 PCIe Riser Module 2



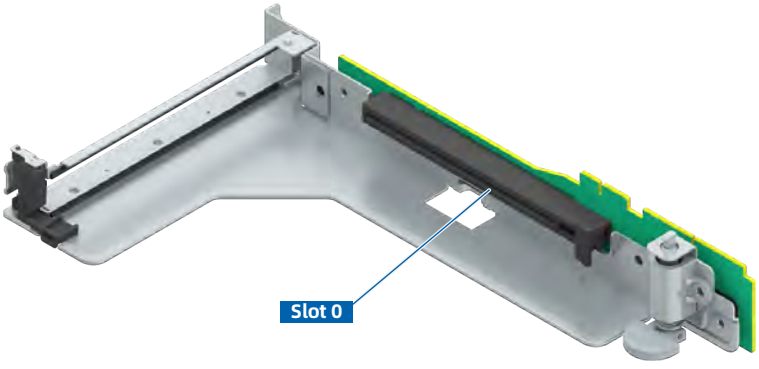
- PCIe Riser Module 3 (2 × PCIe x8 Slot)

Figure 5-30 PCIe Riser Module 3



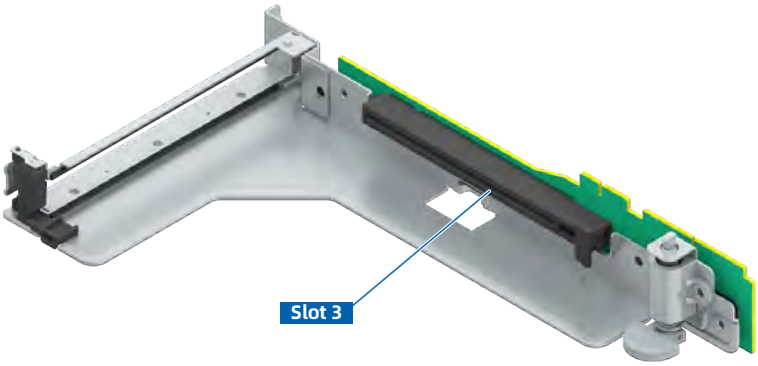
- PCIe Riser Module 4 (1 × PCIe x16 Slot)

Figure 5-31 PCIe Riser Module 4



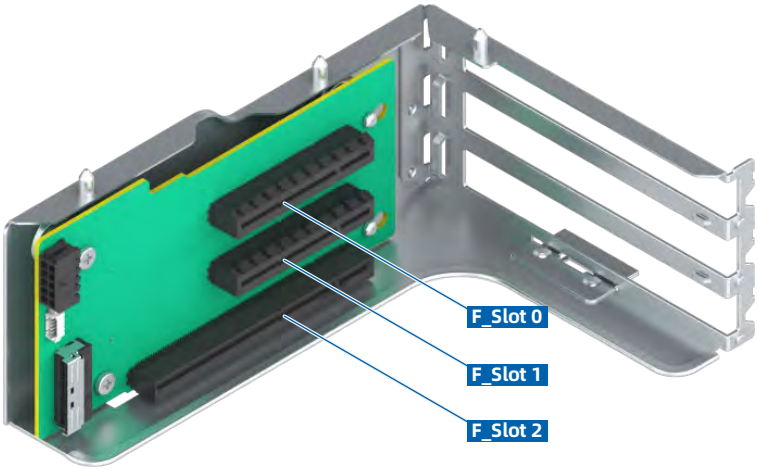
- PCIe Riser Module 5 (1 × PCIe x16 Slot)

Figure 5-32 PCIe Riser Module 5



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

Figure 5-33 Front PCIe Riser Module



NOTE

F_Slot 0 and F_Slot 1 are unavailable.

5.9.4 PCIe Slot Description

1. Models with Rear PCIe Riser Modules

Table 5-9 PCIe Slot Description - 6 × PCIe Expansion Slot

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
Slot 0	CPU1	PCIe 4.0/5.0	x16	x16	PE1	FHHL
Slot 1	CPU1	PCIe 4.0/5.0	x16	x16	PE2	FH3/4L
Slot 2	CPU1	PCIe 4.0/5.0	x16	x8	PE0AB	FH3/4L
Slot 3	CPU0	PCIe 4.0/5.0	x16	x16	PE1	FHHL
Slot 4	CPU0	PCIe 4.0/5.0	x16	x16	PE2	FH3/4L
Slot 5	CPU0	PCIe 4.0/5.0	x16	x8	PE0CD	FH3/4L
OCP 3.0 Slot	CPU0	PCIe 5.0	x16	x8/x16	PE3AB/PE3ABCD	SFF OCP 3.0
OCP 3.0 Slot	CPU1	PCIe 5.0	x16	x8/x16	PE3AB/PE3ABCD	SFF OCP 3.0

Table 5-10 PCIe Slot Description - 8 × PCIe Expansion Slot (1)

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
Slot 0	CPU1	PCIe 4.0/5.0	x8	x8	PE1CD	FHHL
Slot 1	CPU1	PCIe 4.0/5.0	x8	x8	PE1AB	FH3/4L
Slot 2	CPU1	PCIe 4.0/5.0	x16	x16	PE2	FH3/4L
Slot 3	CPU0	PCIe 4.0/5.0	x8	x8	PE1CD	FHHL

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
Slot 4	CPU0	PCIe 4.0/5.0	x8	x8	PE1AB	FH3/4L
Slot 5	CPU0	PCIe 4.0/5.0	x16	x16	PE2	FH3/4L
Slot 6	CPU0	PCIe 4.0/5.0	x16	x16	PE0	FH3/4L
Slot 7	CPU1	PCIe 4.0/5.0	x16	x16	PE0	FH3/4L
OCP 3.0 Slot	CPU1	PCIe 5.0	x16	x8/x16	PE3AB/PE3ABCD	SFF OCP 3.0
OCP 3.0 Slot	CPU0	PCIe 5.0	x16	x8/x16	PE3AB/PE3ABCD	SFF OCP 3.0

Table 5-11 PCIe Slot Description - 8 × PCIe Expansion Slot (2)

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
Slot 0	CPU1	PCIe 4.0/5.0	x16	x16	PE1	FHHL
Slot 1	CPU1	PCIe 4.0/5.0	x16	x16	PE2	FH3/4L
Slot 2	CPU1	PCIe 4.0/5.0	x16	x8	PE0AB	FH3/4L
Slot 3	CPU0	PCIe 4.0/5.0	x16	x16	PE1	FHHL
Slot 4	CPU0	PCIe 4.0/5.0	x16	x16	PE2	FH3/4L
Slot 5	CPU0	PCIe 4.0/5.0	x16	x8	PE0CD	FH3/4L
Slot 6	CPU1	PCIe 4.0/5.0	x16	x8	PE3CD	FH3/4L
Slot 7	CPU0	PCIe 4.0/5.0	x16	x8	PE3CD	FH3/4L

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
OCP 3.0 Slot	CPU1	PCIe 5.0	x16	x8	PE3AB	SFF OCP 3.0
OCP 3.0 Slot	CPU0	PCIe 5.0	x16	x8	PE3AB	SFF OCP 3.0

Table 5-12 PCIe Slot Description - 8 × PCIe Expansion Slot (3)

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
Slot 0	CPU1	PCIe 4.0/5.0	x16	x8	PE1CD	FHHL
Slot 1	CPU1	PCIe 4.0/5.0	x16	x8	PE1AB	FH3/4L
Slot 2	CPU1	PCIe 4.0/5.0	x16	x16	PE2	FH3/4L
Slot 3	CPU0	PCIe 4.0/5.0	x16	x8	PE1CD	FHHL
Slot 4	CPU0	PCIe 4.0/5.0	x16	x8	PE1AB	FH3/4L
Slot 5	CPU0	PCIe 4.0/5.0	x16	x16	PE2	FH3/4L
Slot 8	CPU1	PCIe 4.0/5.0	x8	x8	PE0AB	HHHL
Slot 9	CPU0	PCIe 4.0/5.0	x8	x8	PE0AB	HHHL
OCP 3.0 Slot	CPU1	PCIe 5.0	x16	x8/x16	PE3AB/PE3ABCD	SFF OCP 3.0
OCP 3.0 Slot	CPU0	PCIe 5.0	x16	x8/x16	PE3AB/PE3ABCD	SFF OCP 3.0

Table 5-13 PCIe Slot Description - 8 × PCIe Expansion Slot (4)

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
Slot 0	CPU1	PCIe 4.0/5.0	x16	x16	PE1	FHHL
Slot 1	CPU1	PCIe 4.0/5.0	x16	x16	PE2	FH3/4L
Slot 2	CPU1	PCIe 4.0/5.0	x16	x8	PE0AB	FH3/4L
Slot 3	CPU0	PCIe 4.0/5.0	x16	x16	PE1	FHHL
Slot 4	CPU0	PCIe 4.0/5.0	x16	x16	PE2	FH3/4L
Slot 5	CPU0	PCIe 4.0/5.0	x16	x8	PE0CD	FH3/4L
Slot 8	CPU1	PCIe 4.0/5.0	x8	x8	PE3CD	HHHL
Slot 9	CPU0	PCIe 4.0/5.0	x8	x8	PE3CD	HHHL
OCP 3.0 Slot	CPU1	PCIe 5.0	x16	x8	PE3AB	SFF OCP 3.0
OCP 3.0 Slot	CPU0	PCIe 5.0	x16	x8	PE3AB	SFF OCP 3.0

Table 5-14 PCIe Slot Description - GPU Configuration

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
Slot 0	CPU1	PCIe 4.0/5.0	x16	x16	PE1	FHHL
Slot 3	CPU0	PCIe 4.0/5.0	x16	x16	PE1	FHHL
OCP 3.0 Slot	CPU1	PCIe 5.0	x16	x8/x16	PE3AB/PE3ABCD	SFF OCP 3.0
OCP 3.0 Slot	CPU0	PCIe 5.0	x16	x8/x16	PE3AB/PE3ABCD	SFF OCP 3.0

2. Models with Front PCIe Riser Modules

Table 5-15 PCIe Slot Description

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
F_Slot 0	Not supported	-	-	-	-	-
F_Slot 1	Not supported	-	-	-	-	-
F_Slot 2	CPU0	PCIe 5.0	x16	x16	PE1	FH3/4L
OCP 3.0 Slot	CPU0	PCIe 5.0	x16	x16	PE2	SFF OCP 3.0

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 5-34 PSU Locations

5.10.1 PSU LED

Figure 5-35 PSU LED Description

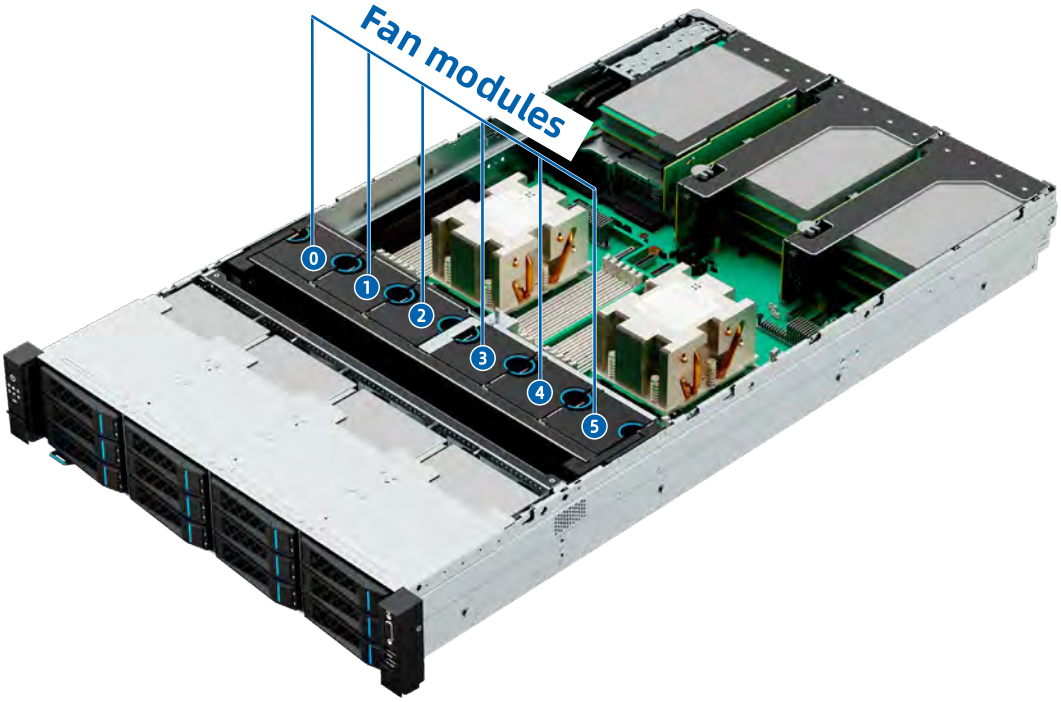
PSU LED (①) Status	Description
Solid green	Normal
Off	No AC/DC input to the PSU
Solid amber	PSU critical event causing a shutdown (possible causes: PSU overtemperature protection, PSU overcurrent protection, PSU overvoltage protection, short circuit protection)
Blinking amber (1 Hz)	PSU warning event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

5.11 Fan Modules

- The server supports 6 fan modules. Users can select 6056 and 6038 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).

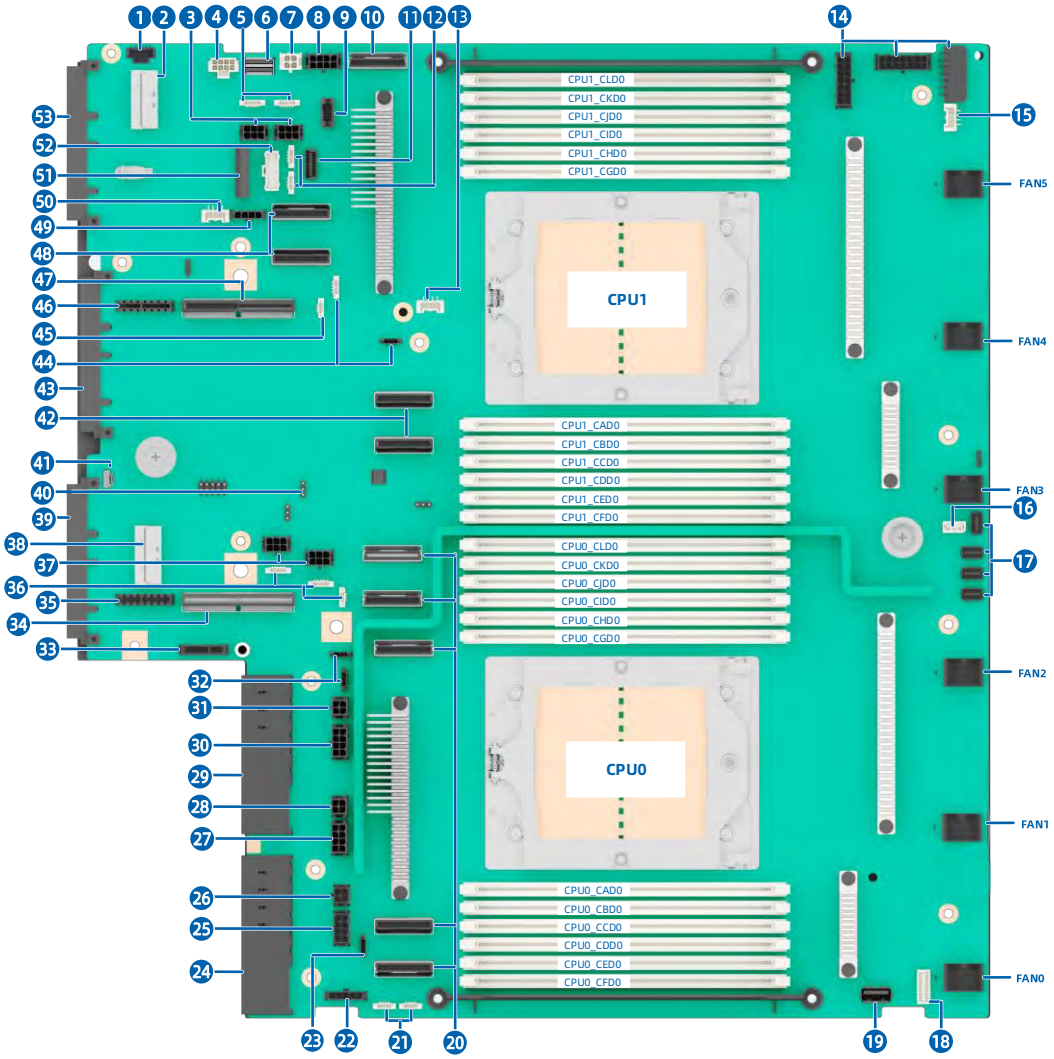
Figure 5-36 Fan Module Locations



5.12 Boards

5.12.1 Motherboard

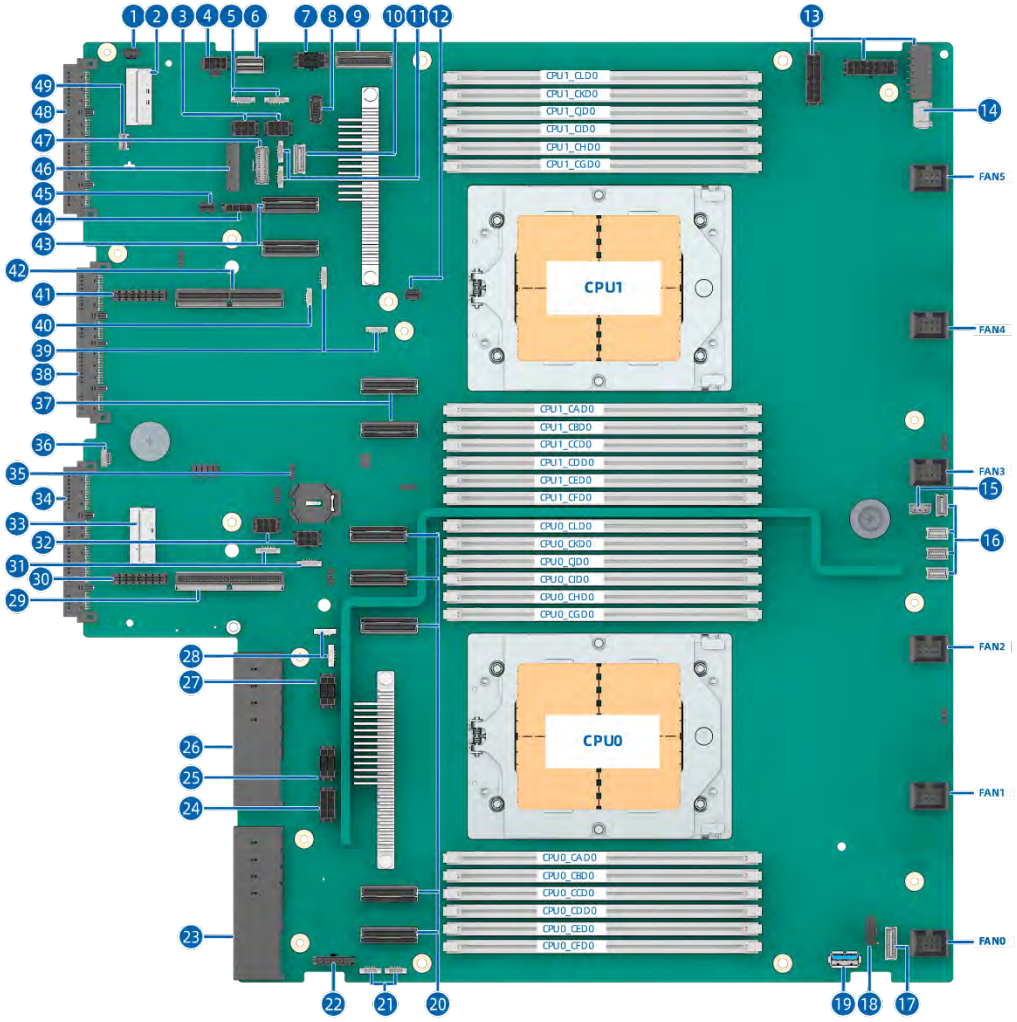
Figure 5-37 Motherboard 1



Item	Feature	Item	Feature
1	OCP 3.0 Card Hot-Plug Button and LED Connector	28	GPU2 Power Connector
2	OCP 3.0 MCIO Connector	29	PSU0 Connector
3	GPU Riser/Rear Drive BP Power Connector	30	GPU1 Power Connector
4	Mid-Drive Power Connector	31	GPU1 Power Connector
5	I²C Connector	32	I²C Connector
6	Right Control Panel Connector	33	PCIe Riser Power Connector

Item	Feature	Item	Feature
7	GPU0 Connector	34	MCIO x16 Slot (CPU0)
8	GPU0 Power Connector	35	Riser Power Connector
9	VPP Connector	36	I²C Connector
10	MCIO x8 Connector (CPU1)	37	GPU Riser/Rear Drive BP Power Connector
11	M.2_SB Connector	38	OCP 3.0 MCIO Connector
12	I²C Connector	39	OCP 3.0 Card Connector
13	Leak Detection Connector	40	CMOS Jumper
14	Front Drive BP Power Connector	41	OCP 3.0 Card Hot-Plug Button and LED Connector
15	Inlet Temperature Sensor Connector	42	MCIO x8 Connector (CPU1)
16	Intrusion Detection Connector	43	DC-SCM Connector
17	SGPIO Connector	44	I²C Connector
18	Left Control Panel Connector	45	NIC_COM Connector
19	USB 3.0 Port	46	PCIe_CPU1 Power Connector
20	MCIO x8 Connector (CPU0)	47	MCIO x16 Connector (CPU1)
21	I²C Connector	48	MCIO x8 Connector (CPU1)
22	Capacitor Board Power Connector	49	Smart_LAN Power Connector
23	I²C Connector	50	Leak Detection Connector
24	PSU1 Connector	51	System TF Card Adapter Connector
25	GPU3 Power Connector	52	NC-SI Connector
26	GPU3 Power Connector	53	OCP 3.0 Card Connector
27	GPU2 Power Connector	-	-

Figure 5-38 Motherboard 2

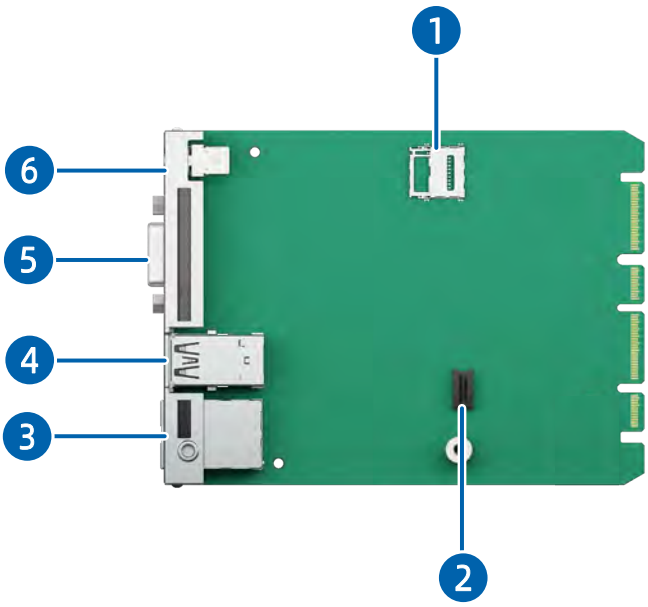


Item	Feature	Item	Feature
1	OCP 3.0 Card Hot-Plug Button and LED Connector	26	PSU0 Connector
2	OCP 3.0 MCIO Connector	27	GPU1 Power Connector
3	GPU Riser/Rear Drive BP Power Connector	28	I^2C Connector
4	Mid-Drive Power Connector	29	MCIO x16 Connector (CPU0)
5	I^2C Connector	30	PCIe Riser Power Connector
6	Right Control Panel Connector	31	I^2C Connector
7	GPU0 Power Connector	32	GPU Riser/Rear Drive BP Power Connector
8	VPP Connector	33	OCP 3.0 MCIO Connector

Item	Feature	Item	Feature
9	MCIO x8 Connector (CPU1)	34	OCP 3.0 Card Connector
10	M.2_SB Connector	35	CMOS Jumper
11	I²C Connector	36	OCP 3.0 Card Hot-Plug Button and LED Connector
12	Leak Detection Connector	37	MCIO x8 Connector (CPU1)
13	Front Drive BP Power Connector	38	DC-SCM Connector
14	Inlet Temperature Sensor Connector	39	I²C Connector
15	Intrusion Detection Connector	40	NIC_COM Connector
16	SGPIO Connector	41	Riser Power Connector
17	Left Control Panel Connector	42	MCIO x16 Connector (CPU1)
18	HDT Connector	43	MCIO x8 Connector (CPU1)
19	USB 3.0 Port	44	Smart_LAN Power Connector
20	MCIO x8 Connector (CPU0)	45	Leak Detection Connector
21	I²C Connector	46	System TF Card Adapter Connector
22	Capacitor Board Power Connector	47	NC-SI Connector
23	PSU1 Connector	48	OCP 3.0 Card Connector
24	GPU3 Power Connector	49	IPMB Connector
25	GPU2 Power Connector	-	-

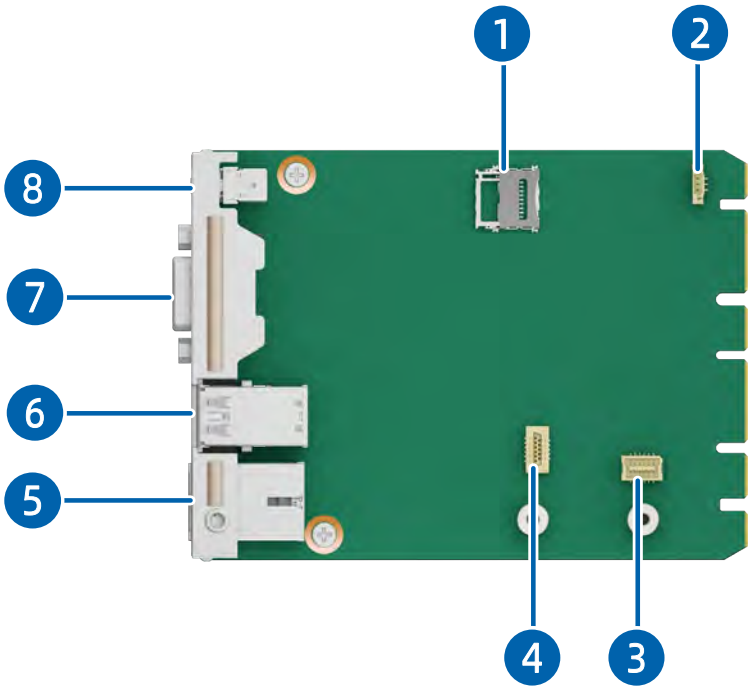
5.12.2 DC-SCM Board

Figure 5-39 DC-SCM Board - 1



Item	Feature	Item	Feature
1	BMC TF Card Slot	4	USB 3.0 Port
2	TCM/TPM Connector	5	VGA Port
3	BMC Management Network Port	6	System/BMC Serial Port

Figure 5-40 DC-SCM Board - 2

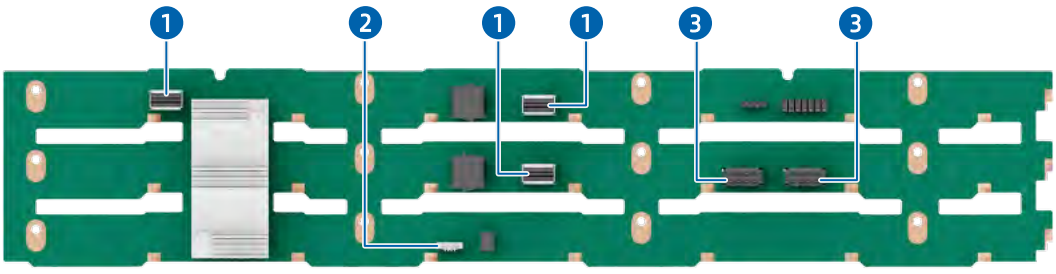


Item	Feature	Item	Feature
1	BMC TF Card Slot	5	BMC Management Network Port
2	BMC RTC Battery Power Connector	6	USB 3.0 Port
3	Front Panel USB Type-C Port Connector	7	VGA Port
4	TCM/TPM Connector	8	System/BMC Serial Port

5.12.3 Drive Backplanes

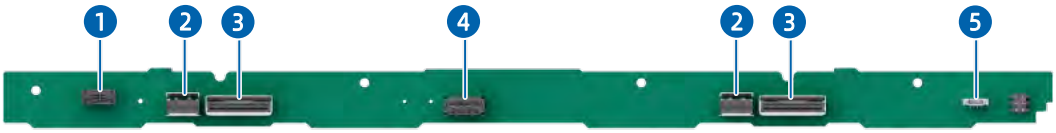
1. Front Drive Backplanes

Figure 5-41 12 × 3.5-Inch SAS/SATA Drive Backplane



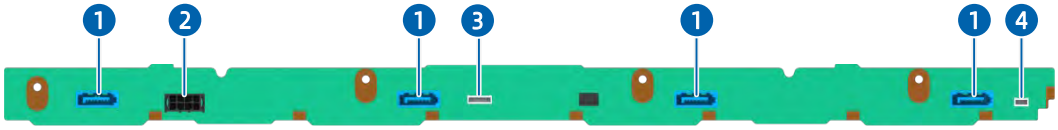
Item	Feature	Item	Feature
1	Slimline x4 Connector	3	Power Connector
2	BMC_I²C Connector	-	-

Figure 5-42 4 × 3.5-Inch SAS/SATA/NVMe Drive Backplane



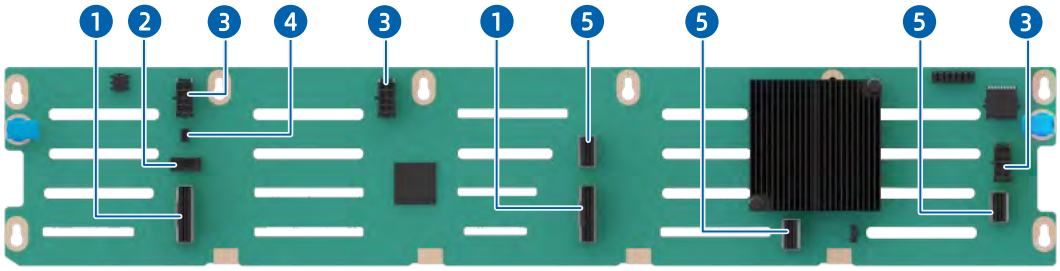
Item	Feature	Item	Feature
1	VPP Connector	4	Power Connector
2	Slimline x4 Connector	5	BMC_I²C Connector
3	MCIO x8 Connector	-	-

Figure 5-43 4 × 3.5-Inch SAS/SATA Drive Backplane



Item	Feature	Item	Feature
1	SATA Connector	3	SGPIO Connector
2	Power Connector	4	BMC_I²C Connector

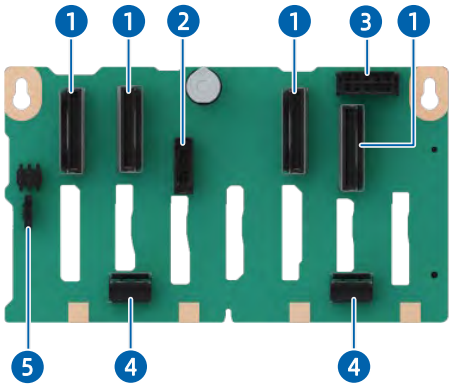
Figure 5-44 21 × 2.5-Inch SAS/SATA Drive + 4 × 2.5-Inch SAS/SATA/NVMe Drive Backplane



Item	Feature	Item	Feature
1	Slimline x8 Connector	4	BMC_I²C Connector

Item	Feature	Item	Feature
2	VPP Connector	5	Slimline x4 Connector
3	Power Connector	-	-

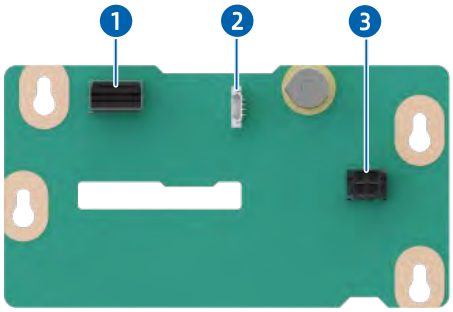
Figure 5-45 8 × 2.5-Inch SAS/SATA/NVMe Drive Backplane



Item	Feature	Item	Feature
1	MCIO x8 Connector	4	Slimline x4 Connector
2	VPP Connector	5	BMC_I²C Connector
3	Power Connector	-	-

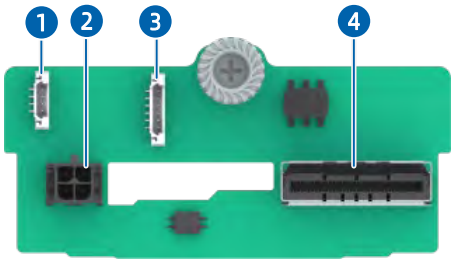
2. Rear Drive Backplanes

Figure 5-46 2 × 3.5-Inch SAS/SATA Drive Backplane



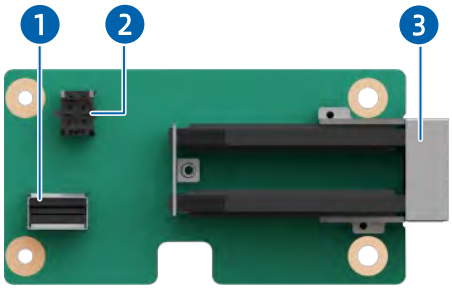
Item	Feature	Item	Feature
1	Slimline x4 Connector	3	Power Connector
2	BMC_I²C Connector	-	-

Figure 5-47 2 × 2.5-Inch NVMe Drive Backplane



Item	Feature	Item	Feature
1	BMC_I²C Connector	3	SGPIO Connector
2	Power Connector	4	Slimline x8 Connector

Figure 5-48 2 × M.2 Drive Backplane



Item	Feature	Item	Feature
1	Slimline x4 Connector	3	M.2 Connector
2	Power Connector	-	-

6 Product Specifications

6.1 KR2280-E2-A0-R0-00

6.1.1 Technical Specifications

Table 6-1 Technical Specifications

Item	Description
Form Factor	2U rack server
Processor	Supports 1 or 2 processors. • AMD EPYC 9004 series processor • Integrated memory controllers and 12 memory channels per processor • Integrated PCIe 5.0 controllers and 128 PCIe lanes per processor • 4 xGMI links per CPU at up to 32 GT/s per link • Up to 128 cores per processor • Max. boost frequency of 4.40 GHz • L3 cache up to 1,152 MB • TDP up to 400 W Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.
Memory	Supports 24 DIMM slots. • Up to 24 DDR5 DIMMs • 12 memory channels per processor and 1 DIMM per channel • Actual speed up to 4,800 MT/s • RDIMMs supported • 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). • ECC memory protection Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.

Item	Description
Storage	• Front: - Up to 24 × 2.5-inch SATA/SAS/NVMe drive (hot-swap) or - Up to 12 × 3.5-inch SATA/SAS/NVMe drive (hot-swap) or - Up to 25 × 2.5-inch SATA/SAS/NVMe drive (hot-swap), including up to 4 NVMe drives (hot-swap) • Rear: - 4 × 2.5-inch SATA/SAS/NVMe drive (hot-swap) or - 4 × 3.5-inch SATA/SAS drive (hot-swap) or - 2 × SATA M.2 SSD or 2 × E1.S SSD (hot-swap) • Internal: - Up to 2 TF cards, one each for BIOS and BMC - 2 × SATA/PCIe M.2 SSD - 4 × 3.5-inch SATA/SAS drive
Network	• 2 optional OCP 3.0 cards: 1/10/25/40/100/200 Gb • 1/10/25/40/100/200 Gb PCIe NICs
I/O Expansion	Supports PCIe expansion slots. • Up to 8 × PCIe slot (4 × PCIe x8 slot + 4 × PCIe x16 slot) • 4 × dual-slot GPU or 8 × single-slot GPU/graphics card • 2 × OCP 3.0 x16 card Note: The information above is for reference only. See 5.9.2 PCIe Slot Locations and 5.9.4 PCIe Slot Description for details.
Port	Supports multiple kinds of ports. • Front: - 1 × USB 2.0 port - 1 × USB 3.0 port - 1 × VGA port • Rear: - 2 × USB 3.0 port - 1 × VGA port - 1 × system/BMC serial port - 1 × BMC management network port • Internal: 1 × USB 3.0 port Note: OS installation on the USB storage media is not recommended.

Item	Description
Display	Integrated VGA on the DC-SCM board with a video memory of 64 MB and a maximum 16M color resolution of 1,920 × 1,200 at 60 Hz Notes: • The integrated VGA can support a maximum resolution of 1,920 × 1,200 only when the video driver matching the OS version is installed; otherwise, only the default resolution of the OS is supported. • When both the front and rear VGA ports are connected to monitors, only the monitor connected to the front VGA port works.
System Management	• UEFI • BMC • NC-SI • KSManage • KSManage Tools
Security Features	• Trusted Platform Module (TPM) 2.0 and Trusted Cryptography Module (TCM) • Firmware update mechanism based on digital signatures • UEFI Secure Boot • Hierarchical BIOS password protection • BIOS Secure Flash and BIOS Lock Enable (BLE) • BMC and BIOS dual-image mechanism • Chassis intrusion detection

6.1.2 Environmental Specifications

Table 6-2 Environmental Specifications

Item	Description
Temperature[1,2,3]	• Operating: 5°C to 45°C (41°F to 113°F) • Storage (packed): -40°C to 70°C (-40°F to 158°F) • Storage (unpacked): -40°C to 55°C (-40°F to 131°F)
Relative Humidity (non-condensing)	• Operating: 5% to 90% RH • Storage (packed): 5% to 95% RH • Storage (unpacked): 5% to 95% RH
Operating Altitude	≤3,050 m (10,007 ft)

Item	Description
Corrosive Gaseous Contaminants	Maximum growth rate of corrosion film thickness: • Copper coupon: 300 Å/month (compliant with the gaseous corrosivity level of G1 defined in ANSI/ISA-71.04-2013) • Silver coupon: 200 Å/month (compliant with the gaseous corrosivity level of G1 defined in ANSI/ISA-71.04-2013)
Acoustic Noise[4,5,6]	Noise emissions are measured in accordance with ISO 7779 (ECMA 74) and declared in accordance with ISO 9296 (ECMA 109). Listed are the declared A-weighted sound power levels (LWAd) and the declared average bystander position A-weighted sound pressure levels (LpAm) at a server operating temperature of 23°C (73.4°F): • Idle: - LWAd: 7.0 B - LpAm: 49.4 dBA • Operating: - LWAd: 8.2 B - LpAm: 61.8 dBA

Notes:

1. Not all configurations support an operating temperature range of 5°C to 45°C (41°F to 113°F). The GPU configuration supports an operating temperature range of 10°C to 30°C (50°F to 86°F), and some high-TDP CPU configurations support an operating temperature range of 10°C to 35°C (50°F to 95°F).

2. Standard operating temperature:

- 10°C to 35°C (50°F to 95°F) is the standard operating temperature range at sea level. At the altitude of 0 to 3,050 m (0 to 10,007 ft), derate the maximum allowable temperature by 1°C per 305 m (1°F per 556 ft). No direct sustained sunlight is permitted. The maximum temperature gradient is 20°C/h (36°F/h). Both the altitude and the maximum temperature gradient vary with server configurations.
- Any fan failure or operations above 30°C (86°F) may lead to system performance degradation.

3. Expanded operating temperature:

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

4. This document lists the LWAd and LpAm of the product at a 23°C (73.4°F) ambient environment. All measurements are conducted in conformance with ISO 7779 (ECMA 74) and declared in conformance with ISO 9296 (ECMA 109). Contact your sales representative for more information.

5. The sound levels shown here were measured based on the specific configurations of a server. Sound levels vary with server configurations, workloads, ambient temperatures, and other factors. These values are for reference only and subject to change without further notice.

6. Product conformance to cited normative standards is based on sample testing, evaluation, or assessment. This product or family of products is eligible to bear the appropriate compliance logos and statements.

6.1.3 Physical Specifications

Table 6-3 Physical Specifications

Item	Description
Chassis Dimensions (W × H × D)	• With mounting ears: 482.4 × 87 × 828.4 mm (18.99 × 3.43 × 32.61 in.) • Without mounting ears: 435 (upper section: 447) × 87 × 800 mm [17.13 (upper section: 17.60) × 3.43 × 31.50 in.]
Outer Packaging Dimensions (L × W × H)	1,090 × 600 × 295 mm (42.91 × 23.62 × 11.61 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: - L-bracket rails: only available for our cabinets - Static rail kit: The distance between the front and rear mounting flanges ranges from 609 to 914 mm (23.98 to 35.98 in.). - Ball-bearing pull-out rail kit: The distance between the front and rear mounting flanges ranges from 609 to 914 mm (23.98 to 35.98 in.). - When cable management arms (CMAs) are used, the cabinet depth should be 1,200 mm (47.24 in.) or above.
Weight	• 12 × 3.5-inch drive configuration: - Net weight: 32 kg (70.55 lbs)

Item	Description
	- Gross weight: 41 kg (90.39 lbs) (including server, packaging box, rails and accessory box) • 24 × 2.5-inch drive configuration: - Net weight: 30.2 kg (66.58 lbs) - Gross weight: 40.2 kg (88.63 lbs) (including server, packaging box, rails and accessory box) • 25 × 2.5-inch drive configuration: - Net weight: 31 kg (68.34 lbs) - Gross weight: 41 kg (90.39 lbs) (including server, packaging box, rails and accessory box) Note: The server weight varies by configuration.

6.2 KR2280-E2-C0-R0-00

6.2.1 Technical Specifications

Table 6-4 Technical Specifications

Item	Description
Form Factor	2U rack server
Processor	Supports 1 or 2 processors. • AMD EPYC 9004 series processor • Integrated memory controllers and 12 memory channels per processor • Integrated PCIe 5.0 controllers and 128 PCIe lanes per processor • 4 xGMI links per CPU at up to 32 GT/s per link • Up to 128 cores per processor • Max. boost frequency of 4.40 GHz • L3 cache up to 1,152 MB • TDP up to 400 W Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.
Memory	Supports 24 DIMM slots.

Item	Description
	• Up to 24 DDR5 DIMMs • 12 memory channels per processor and 1 DIMM per channel • Actual speed up to 4,800 MT/s • RDIMMs supported • 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). • ECC memory protection Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.
Storage	• Front: - Up to 24 × 2.5-inch SATA/SAS/NVMe drive (hot-swap) or - Up to 12 × 3.5-inch SATA/SAS/NVMe drive (hot-swap) • Rear: - 4 × 2.5-inch SATA/SAS/NVMe drive (hot-swap) or - 2 × SATA M.2 SSD or 2 × E1.S SSD (hot-swap) • Internal: - Up to 2 TF cards, one each for BIOS and BMC - 2 × SATA/PCIe M.2 SSD
Network	• 2 optional OCP 3.0 cards: 1/10/25/40/100/200 Gb • 1/10/25/40/100/200 Gb PCIe NICs
I/O Expansion	Supports PCIe expansion slots. • Up to 7 × PCIe slot (3 × PCIe x8 slot + 4 × PCIe x16 slot) • 4 × dual-slot GPU or 7 × single-slot GPU/graphics card • 2 × OCP 3.0 x16 card Note: The information above is for reference only. See 5.9.2 PCIe Slot Locations and 5.9.4 PCIe Slot Description for details.
Port	Supports multiple kinds of ports. • Front: - 1 × USB 2.0 port - 1 × USB 3.0 port - 1 × VGA port

Item	Description
	• Rear: - 2 × USB 3.0 port - 1 × VGA port - 1 × system/BMC serial port - 1 × BMC management network port - 1 × quick disconnect (inlet) - 1 × quick disconnect (outlet) • Internal: 1 × USB 3.0 port Note: OS installation on the USB storage media is not recommended.
Display	Integrated VGA on the DC-SCM board with a video memory of 64 MB and a maximum 16M color resolution of 1,920 × 1,200 at 60 Hz Notes: • The integrated VGA can support a maximum resolution of 1,920 × 1,200 only when the video driver matching the OS version is installed; otherwise, only the default resolution of the OS is supported. • When both the front and rear VGA ports are connected to monitors, only the monitor connected to the front VGA port works.
Cold Plate	• Material: copper • Coolant: deionized water, PG25, etc. • Coolant particle diameter: ≤50 μm • Flow rate: 1 to 1.4 L/min per node • Inlet liquid temperature: <50°C (122°F) • Outlet liquid temperature: varying by configuration • Operating pressure: <50 psi • Maximum transient pressure: 100 psi • Quick disconnect: TSC/D-4Z02BSSJE and DAG03-8000117216A
System Management	• UEFI • BMC • NC-SI • KSManage • KSManage Tools
Security Features	• Trusted Platform Module (TPM) 2.0 and Trusted Cryptography Module (TCM) • Firmware update mechanism based on digital signatures

Item	Description
	• UEFI Secure Boot • Hierarchical BIOS password protection • BIOS Secure Flash and BIOS Lock Enable (BLE) • BMC and BIOS dual-image mechanism • Chassis intrusion detection

6.2.2 Environmental Specifications

Table 6-5 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 (non-condensing)	• Operating: 5% to 90% RH • Storage (packed): 5% to 95% RH • Storage (unpacked): 5% to 95% RH
Operating Altitude	≤3,050 m (10,007 ft)
Corrosive Gaseous Contaminants	Maximum growth rate of corrosion film thickness: • Copper coupon: 300 Å/month (compliant with the gaseous corrosivity level of G1 defined in ANSI/ISA-71.04-2013) • Silver coupon: 200 Å/month (compliant with the gaseous corrosivity level of G1 defined in ANSI/ISA-71.04-2013)
Acoustic Noise[4,5,6]	Noise emissions are measured in accordance with ISO 7779 (ECMA 74) and declared in accordance with ISO 9296 (ECMA 109). Listed are the declared A-weighted sound power levels (LWAd) and the declared average bystander position A-weighted sound pressure levels (LpAm) at a server operating temperature of 23°C (73.4°F): • Idle: - LWAd: 7.0 B - LpAm: 49.4 dBA

Item	Description
	• Operating: - LWAd: 7.5 B - LpAm: 51.9 dBA

Notes:

1. Not all configurations support an operating temperature range of 5°C to 45°C (41°F to 113°F). The GPU configuration supports an operating temperature range of 10°C to 30°C (50°F to 86°F), and some high-TDP CPU configurations support an operating temperature range of 10°C to 35°C (50°F to 95°F).

2. Standard operating temperature:

- 10°C to 35°C (50°F to 95°F) is the standard operating temperature range at sea level. At the altitude of 0 to 3,050 m (0 to 10,007 ft), derate the maximum allowable temperature by 1°C per 305 m (1°F per 556 ft). No direct sustained sunlight is permitted. The maximum temperature gradient is 20°C/h (36°F/h). Both the altitude and the maximum temperature gradient vary with server configurations.
- Any fan failure or operations above 30°C (86°F) may lead to system performance degradation.

3. Expanded operating temperature:

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

4. This document lists the LWAd and LpAm of the product at a 23°C (73.4°F) ambient environment. All measurements are conducted in conformance with ISO 7779 (ECMA 74) and declared in conformance with ISO 9296 (ECMA 109). Contact your sales representative for more information.

5. The sound levels shown here were measured based on the specific configurations of a server. Sound levels vary with server configurations, workloads, ambient temperatures, and other factors. These values are for reference only and subject to change without further notice.

6. Product conformance to cited normative standards is based on sample testing, evaluation, or assessment. This product or family of products is eligible to bear the appropriate compliance logos and statements.

6.2.3 Physical Specifications

Table 6-6 Physical Specifications

Item	Description
Chassis Dimensions (W × H × D)	• With mounting ears: 482.4 × 87 × 828.4 mm (18.99 × 3.43 × 32.61 in.)

Item	Description
	• Without mounting ears: 435 (upper section: 447) × 87 × 800 mm [17.13 (upper section: 17.60) × 3.43 × 31.50 in.] Note: The length by which the quick disconnect protrudes from the chassis varies by configuration.
Outer Packaging Dimensions (L × W × H)	1,090 × 600 × 295 mm (42.91 × 23.62 × 11.61 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: - L-bracket rails: only available for our cabinets - Static rail kit: The distance between the front and rear mounting flanges ranges from 609 to 914 mm (23.98 to 35.98 in.). - Ball-bearing pull-out rail kit: The distance between the front and rear mounting flanges ranges from 609 to 914 mm (23.98 to 35.98 in.). - When cable management arms (CMAs) are used, the cabinet depth should be 1,200 mm (47.24 in.) or above.
Weight	• 12 × 3.5-inch drive configuration: - Net weight: 32 kg (70.55 lbs) - Gross weight: 41 kg (90.39 lbs) (including server, packaging box, rails and accessory box) • 24 × 2.5-inch drive configuration: - Net weight: 30.2 kg (66.58 lbs) - Gross weight: 41 kg (90.39 lbs) (including server, packaging box, rails and accessory box) Note: The server weight varies by configuration.

6.3 KR2280-E2-A0-F0-00

6.3.1 Technical Specifications

Table 6-7 Technical Specifications

Item	Description
Form Factor	2U rack server
Processor	Supports 1 or 2 processors. • AMD EPYC 9004 series processor • Integrated memory controllers and 12 memory channels per processor • Integrated PCIe 5.0 controllers and 128 PCIe lanes per processor • 4 xGMI links per CPU at up to 32 GT/s per link • Up to 128 cores per processor • Max. boost frequency of 4.40 GHz • L3 cache up to 1,152 MB • TDP up to 400 W Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.
Memory	Supports 24 DIMM slots. • Up to 24 DDR5 DIMMs • 12 memory channels per processor and 1 DIMM per channel • Actual speed up to 4,800 MT/s • RDIMMs supported • 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). • ECC memory protection Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.
Storage	• Front: - Up to 16 × 2.5-inch SAS/SATA/NVMe drive (hot-swap) • Internal: - Up to 2 TF cards, one each for BIOS and BMC

Item	Description
	- 2 × SATA/PCIe M.2 SSD
Network	• 1 front OCP 3.0 card: 1/10/25/40/100/200 Gb • 1/10/25/40/100/200 Gb PCIe NICs
I/O Expansion	Supports PCIe expansion slots. • 1 × front PCIe x16 slot • 4 × rear PCIe x16 slot Note: The 4 rear PCIe slots (slot 0, slot 1, slot 2 and slot 3) can only support retimer cards. • 1 × front OCP 3.0 x16 card Note: For details, see 5.9.2 PCIe Slot Locations and 5.9.4 PCIe Slot Description.
Port	Supports multiple kinds of ports. • Front: - 1 × USB 2.0 port - 1 × USB 3.0 port - 1 × VGA port • Rear: - 2 × USB 3.0 port - 1 × VGA port - 1 × system/BMC serial port - 1 × BMC management network port • Internal: 1 × USB 3.0 port Note: OS installation on the USB storage media is not recommended.
Display	Integrated VGA on the DC-SCM board with a video memory of 64 MB and a maximum 16M color resolution of 1,920 × 1,200 at 60 Hz Notes: • The integrated VGA can support a maximum resolution of 1,920 × 1,200 only when the video driver matching the OS version is installed; otherwise, only the default resolution of the OS is supported. • 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

Item	Description
	• KSManage • KSManage Tools
Security Features	• Trusted Platform Module (TPM) 2.0 and Trusted Cryptography Module (TCM) • 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

6.3.2 Environmental Specifications

Table 6-8 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 (non-condensing)	• Operating: 5% to 90% RH • Storage (packed): 5% to 95% RH • Storage (unpacked): 5% to 95% 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

Item	Description
	(LpAm) at a server operating temperature of 23°C (73.4°F): • Idle: - LWAd: 7.0 B - LpAm: 49.4 dBA • Operating: - LWAd: 7.9 B - LpAm: 55.6 dBA

Notes:

1. Not all configurations support an operating temperature range of 5°C to 45°C (41°F to 113°F). The GPU configuration supports an operating temperature range of 10°C to 30°C (50°F to 86°F), and some high-TDP CPU configurations support an operating temperature range of 10°C to 35°C (50°F to 95°F).

2. Standard operating temperature:

- 10°C to 35°C (50°F to 95°F) is the standard operating temperature range at sea level. At the altitude of 0 to 3,050 m (0 to 10,007 ft), derate the maximum allowable temperature by 1°C per 305 m (1°F per 556 ft). No direct sustained sunlight is permitted. The maximum temperature gradient is 20°C/h (36°F/h). Both the altitude and the maximum temperature gradient vary with server configurations.
- Any fan failure or operations above 30°C (86°F) may lead to system performance degradation.

3. Expanded operating temperature:

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

4. This document lists the LWAd and LpAm of the product at a 23°C (73.4°F) ambient environment. All measurements are conducted in conformance with ISO 7779 (ECMA 74) and declared in conformance with ISO 9296 (ECMA 109). Contact your sales representative for more information.

5. The sound levels shown here were measured based on the specific configurations of a server. Sound levels vary with server configurations, workloads, ambient temperatures, and other factors. These values are for reference only and subject to change without further notice.

6. Product conformance to cited normative standards is based on sample testing, evaluation, or assessment. This product or family of products is eligible to bear the appropriate compliance logos and statements.

6.3.3 Physical Specifications

Table 6-9 Physical Specifications

Item	Description
Chassis Dimensions (W × H × D)	• With mounting ears: 482.4 × 87 × 828.4 mm (18.99 × 3.43 × 32.61 in.) • Without mounting ears: 435 (upper section: 447) × 87 × 800 mm [17.13 (upper section: 17.60) × 3.43 × 31.50 in.]
Outer Packaging Dimensions (L × W × H)	1,090 × 600 × 295 mm (42.91 × 23.62 × 11.61 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: - L-bracket rails: only available for our cabinets - Static rail kit: The distance between the front and rear mounting flanges ranges from 609 to 914 mm (23.98 to 35.98 in.). - Ball-bearing pull-out rail kit: The distance between the front and rear mounting flanges ranges from 609 to 914 mm (23.98 to 35.98 in.). - When cable management arms (CMAs) are used, the cabinet depth should be 1,200 mm (47.24 in.) or above.
Weight	16 × 2.5-inch drive configuration: • Net weight: 30 kg (66.14 lbs) • Gross weight: 40 kg (88.18 lbs) (including server, packaging box, rails and accessory box) Note: The server weight varies by configuration.

7 Operating System and Hardware Compatibility

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

IMPORTANT

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

7.1 Supported Operating Systems

Table 7-1 Supported Operating Systems

OS Version
Windows Server 2019
Windows Server 2022
Red Hat Enterprise Linux 8.6
Red Hat Enterprise Linux 9.0
VMware ESXi 7.0 P06
VMware-VCSA-703
VMware ESXi 8.0

NOTE

After installing Linux OS, add **iommu=pt** in the OS. See the OS installation guide on our website for details.

7.2 Hardware Compatibility

7.2.1 CPU Specifications

Table 7-2 CPU Specifications

Model	Cores	Threads	Base Frequency (GHz)	Max. Boost Frequency (GHz)	Cache (MB)	TDP (W)
9684X	96	192	2.55	3.40	1,152	400
9124	16	32	3.00	3.70	64	200
9224	24	48	2.50	3.70	64	200
9254	24	48	2.90	4.15	128	200
9334	32	64	2.70	3.85	128	210
9354	32	64	3.25	3.80	256	280
9454	48	96	2.75	3.80	256	290
9534	64	128	2.45	3.70	256	280
9554	64	128	3.10	3.75	256	360
9634	84	168	2.25	3.10	384	290
9654	96	192	2.40	3.70	384	360
9734	112	224	2.40	3.00	256	340
9754	128	256	2.40	3.10	256	360
9174F	16	32	4.10	4.15	256	320
9184X	16	32	3.55	3.85	768	320
9274F	24	48	4.05	4.10	256	320
9374F	32	64	3.85	4.10	256	320
9474F	48	96	3.60	3.95	256	360

7.2.2 DIMM Specifications

Table 7-3 DIMM Specifications

Type	Capacity (GB)	Speed (MT/s)	Data Width	Organization
RDIMM	16	4,800	x72	1R x8
RDIMM	32	4,800	x72	2R x8
RDIMM	64	4,800	x72	2R x4
RDIMM	16	5,600	x72	1R x8
RDIMM	32	5,600	x72	2R x8
RDIMM	64	5,600	x72	2R x4

7.2.3 Drive Specifications

Table 7-4 SATA HDD Specifications

Type	Speed in rpm	Capacity (TB)	Max. Qty.
SATA HDD	7.2k	10	12
		12	12
		14	12
		16	12
		18	12
		20	12

Table 7-5 SATA SSD Specifications

Type	Capacity	Max. Qty.
SATA SSD	240 GB	28
SATA SSD	480 GB	28
SATA SSD	960 GB	28
SATA SSD	1.92 TB	28
SATA SSD	3.84 TB	28
SATA SSD	7.68 TB	28

Table 7-6 U.2 NVMe SSD Specifications

Type	Capacity (TB)	Max. Qty.
U.2 NVMe SSD	3.84	28
	7.68	28

7.2.4 SAS/RAID Card Specifications

Table 7-7 SAS/RAID Card Specifications

Type	Description
SAS Card	SAS_PM8222_PM8222_8_SAS3_PCIE
	SAS_BRCM_8R0_9500-8i_SMSAS3_PCIE4
	SAS_BRCM_16R0_9500-16i_SMSAS3_PCIE4
	SAS_BRCM_24R0_9600-24i_SMSAS4_PCIE4
	SAS_I_PM8222_PM8222_8_SAS3_PCIE
	SAS_I_PM8222_SmartHBA_8_SAS3_PCIE3
	SAS_I_ZQ_8238SHBA_16R0_12G_PCIE3_M
RAID Card	RAID_PM8204_RA_8_2GB_SAS3_PCIE3
	RAID_L_8R0_9560-8i_4G_HDM12G_PCIE4
	RAID_L_16R0_9560-16i_8GB_SMSAS3_PCIE4
	RAID_I_PM8204_RA_8_2GB_SAS3_PCIE3
	RAID_I_PM8204_RA_8_4GB_SAS3_PCIE3
	RAID_I_ZQ_8236_16R0_4G_12G_PCIE3_M

NOTE

- Mixing SAS/RAID cards from different manufacturers may cause drive letter confusion.
- When the front drives are connected to SAS/RAID cards and internal/rear M.2 drives are directly connected to CPUs, the drive letter confusion may occur.
- When more than one drive controller (including storage controllers such as onboard controllers and RAID cards) is configured, the drive letter confusion may occur in the OS.

- The async discovery probing feature added in newer versions of some operating systems may increase the likelihood of drive letter confusion.

7.2.5 NIC Specifications

Table 7-8 OCP Card Specifications

Type	Description	Speed (Gbps)	Port Qty.
OCP 3.0 Card	NIC_Andes-M6_X710_10G_LC_OCP3x8_2	10	2
	NIC_Andes-M6_E810_25G_LC_OCP3x8_2	25	2
	NIC_I_M_I350_1G_RJ_PCIEx4-G2_4_OCP	1	4
	NIC_M_25G_MCX562A-ACAB_LC_OCP3x16_2_XR	25	2
	NIC_M_25G_MCX623432AN_LC_OCP3x16_2_XR	25	2
	NIC_M_25G_MCX631432AN_LC_OCP3x8_2_XR	25	2
	NIC_I_Andes-M6_E810_25G_LC_O3x8_2_M7	25	2
	NIC_M_100G_MCX623436AN_LC_OCP3x16_2_XR	100	2
	NIC_M_200G_MCX753436MS_LC_OCP3x16_2_XR	200	2

Table 7-9 PCIe NIC Specifications

Type	Description	Speed (Gbps)	Port Qty.
PCIe NIC	NIC_Andes-M6_E810_25G_LC_PCIex8_2	25	2
	NIC_Vostok_X710_10G_LC_PCIEx8_2	10	2
	NIC_X550_10G_RJ45_PCIEX8_dual	10	2
	NIC_Andes-M6_E810_25G_LC_PCIEx8_2	25	2
	NIC_I_Vostok_I350_1G_RJ_PCIEx4_4	1	4
	NIC_M_25G_MCX512A-ACAT_LC_PCIEx8_2_XR	25	2
	NIC_M_25G_MCX631102AN_LC_PCIEx8_2_XR	25	2
	NIC_I_Haydn_BCM_25G_LC_PCIEx8-G3_2	25	2

7.2.6 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 and 230 Vac PSUs in 1+1 redundancy are supported:
  - 550 W Platinum PSU: 550 W (110 Vac), 550 W (230 Vac)
  - 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)
  - 2,700 W Platinum PSU: 1,200 W (110 Vac), 2,700 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)
  - 2,700 W Titanium PSU: 1,200 W (110 Vac), 2,700 W (230 Vac)
  - 3,200 W Titanium PSU: 1,200 W (110 Vac), 3,200 W (230 Vac)

CAUTION

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

  Operating voltage range:
  - 110 Vac: 90 Vac to 132 Vac
  - 230 Vac: 180 Vac to 264 Vac
- The following rated -48 Vdc PSUs in 1+1 redundancy are supported:
  - 800 W PSU: 800 W (-48 Vdc)
  - 1,300 W PSU: 1,300 W (-48 Vdc)

Operating voltage range:

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

8 Regulatory Information

8.1 Safety

8.1.1 General

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

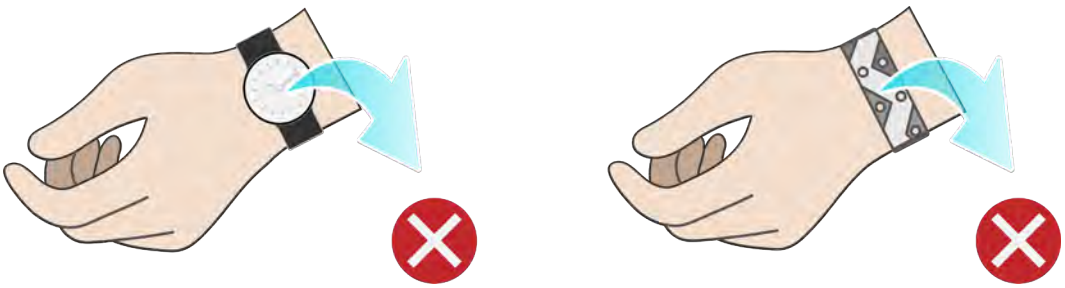
8.1.2 Personal Safety

- Only personnel certified or authorized by us are allowed to perform the installation procedures.
- Stop any operation that could cause personal injury or equipment damage. Report to the project manager and take effective protective measures.
- Working during thunderstorms, including but not limited to handling equipment, installing cabinets and installing power cords, is forbidden.
- Do not carry the weight over the maximum load per person allowed by local laws or regulations. Arrange appropriate installation personnel and do not overburden them.
- Installation personnel must wear clean work clothes, work gloves, safety helmets and safety shoes, as shown in Figure 8-1.

Figure 8-1 Protective Clothing

- Before touching the equipment, put on ESD clothes and ESD gloves or an ESD wrist strap, and remove any conductive objects such as wrist watches or metal jewelry, as shown in Figure 8-2, in order to avoid electric shock or burns.

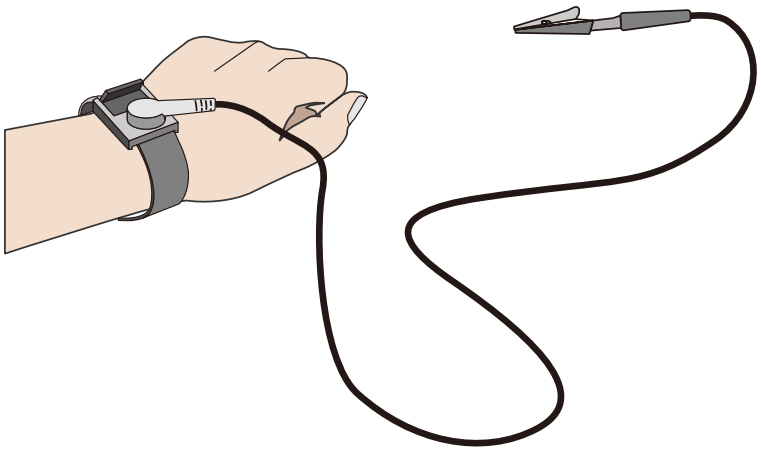
Figure 8-2 Removing Conductive Objects



How to put on an ESD strap (Figure 8-3).

1. Put your hand through an ESD wrist strap.
2. Tighten the strap buckle to ensure a snug fit.
3. Plug the alligator clip of the ESD wrist strap into the corresponding jack on the grounded cabinet or grounded chassis.

Figure 8-3 Wearing an ESD Wrist Strap



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

8.1.3 Equipment Safety

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

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

8.1.4 Transportation Precautions

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

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

8.1.5 Manual Handling Weight Limits


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

Organization	Weight Limit (kg/lbs)
	• 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
Accurate and Intelligent Fault Location	IDL, a fault diagnosis system, offers accurate and comprehensive hardware fault location capabilities, and outputs detailed fault causes and handling suggestions.

Feature	Description
Alert Management	Supports rich automatic remote alert capabilities, including proactive alerting mechanisms such as SNMP Trap (v1/v2c/v3), email alerts and syslog remote alerts to ensure 24 × 7 reliability.
Remote Console KVM	Supports HTML5- and Java-based remote console to remotely control and operate the monitor/mouse/keyboard of the server, providing highly available remote management capabilities without on-site operation.
Virtual Network Console (VNC)	Supports mainstream third-party VNC clients without relying on Java, improving management flexibility.
Remote Virtual Media	Supports virtualizing local images, USB devices, and folders as media devices of remote servers, simplifying OS installation, file sharing, and other O&M tasks.
Web GUI	Supports the visual management interface developed by us, displaying abundant information of the server and components, and offers easy-to-use Web GUIs.
Crash Screenshot and Crash Video Recording	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, and provides more user roles to allow administrators to grant different privileges to O&M personnel.
Security Features	Adopts the industry-leading server security baseline standard V3.0. SSH, HTTPS, SNMP and IPMI use secure and reliable algorithms. BMC offers capabilities including secure update and boot and security reinforcement mechanisms such as anti-replay, anti-injection, and anti-brute force.
Double Factor Authentication	Supports double factor authentication for local BMC users. Users need to log in to the BMC with both password and certificate, thus to prevent attacks caused by password leakage.
Configuration Exporting and Importing	To import and export the existing system configurations.

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

Feature	Description
	rules, compression rules and fault reporting rules, and redefinition of above rules
Control	• Quick start of firmware update, OS installation, power management, drive data erasing and stress test • Batch firmware update (BMC/BIOS/RAID Card/NIC/Drive/HBA Card/MB CPLD/BP CPLD/PSU) • Batch firmware configuration (BMC/BIOS) • Batch RAID configuration and OS deployment for servers • Secure and quick drive data erasing • CPU and memory stress test • Automatic firmware baseline management • BMC and BIOS snapshot management • Repositories for update files
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 • 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

11.1 KR2280-E2-A0-R0-00

Table 11-1 Certifications

Country/Region	Certification	Mandatory/Voluntary
International	CB	Voluntary
EU	CE	Mandatory
US	FCC	Mandatory
	UL	Voluntary
	Energy Star	Voluntary
Korea	E-Standby	Mandatory
	KC	Mandatory
Eurasian Economic Union	EAC	Mandatory
	EAC RoHS	Mandatory
	FSS	Mandatory
Canada	IC	Mandatory

11.2 KR2280-E2-C0-R0-00

Table 11-2 Certifications

Country/Region	Certification	Mandatory/Voluntary
International	CB	Voluntary
EU	CE	Mandatory
US	FCC	Mandatory
	UL	Voluntary
	Energy Star	Voluntary
Korea	E-Standby	Mandatory
	KC	Mandatory
Eurasian Economic Union	EAC	Mandatory

Country/Region	Certification	Mandatory/Voluntary
	EAC RoHS	Mandatory
Canada	IC	Mandatory

11.3 KR2280-E2-A0-F0-00

Table 11-3 Certifications

Country/Region	Certification	Mandatory/Voluntary
International	CB	Voluntary
EU	CE	Mandatory
US	FCC	Mandatory
	UL	Voluntary
	Energy Star	Voluntary
Korea	E-Standby	Mandatory
	KC	Mandatory
Eurasian Economic Union	EAC	Mandatory
	EAC RoHS	Mandatory
Canada	IC	Mandatory

12 Appendix A

12.1 Operating Temperature Specification Limits

12.1.1 KR2280-E2-A0-R0-00

Table 12-1 Operating Temperature Specification Limits

Config.	Max. Operating Temp.: 30°C (86°F)	Max. Operating Temp.: 35°C (95°F)	Max. Operating Temp.: 40°C (104°F)	Max. Operating Temp.: 45°C (113°F)
12 × 3.5-Inch Drive Config./25 × 2.5-Inch Drive Config./24 × 2.5-Inch Drive Config. (Perforated Chassis)	• CPU TDP ≤400 W • OCP card ≤100 Gb • PCIe NIC ≤100 Gb • Rear NVMe drives supported • GPUs not supported • N+1 fan redundancy supported	• CPU TDP ≤400 W • OCP card ≤50 Gb • PCIe NIC ≤50 Gb • Third-party NVMe drives supported • Self-developed NVMe drives not supported • GPUs not supported • N+1 fan redundancy not supported	• CPU TDP ≤320 W • OCP card ≤50 Gb • PCIe NIC ≤50 Gb • Rear NVMe drives not supported • GPUs not supported • N+1 fan redundancy not supported	• CPU TDP ≤280 W • OCP card ≤25 Gb • PCIe NIC ≤25 Gb • Rear NVMe drives not supported • GPUs not supported • N+1 fan redundancy not supported
12 × 3.5-Inch Drive Config. (Perforated Chassis)	• CPU TDP ≤400 W • OCP card ≤100 Gb	• CPU TDP ≤360 W • OCP card ≤50 Gb	• CPU TDP ≤320 W • OCP card ≤50 Gb	• CPU TDP ≤280 W • OCP card ≤25 Gb

Config.	Max. Operating Temp.: 30°C (86°F)	Max. Operating Temp.: 35°C (95°F)	Max. Operating Temp.: 40°C (104°F)	Max. Operating Temp.: 45°C (113°F)
	• PCIe NIC ≤100 Gb • Rear NVMe drives supported • GPUs not supported • N+1 fan redundancy supported	• PCIe NIC ≤50 Gb • Rear NVMe drives not supported • GPUs not supported • N+1 fan redundancy not supported	• PCIe NIC ≤50 Gb • Rear NVMe drives not supported • GPUs not supported • N+1 fan redundancy not supported	• PCIe NIC ≤25 Gb • Rear NVMe drives not supported • GPUs not supported • N+1 fan redundancy not supported
8 × 3.5-Inch Drive Config./16 × 2.5-Inch Drive Config.	• CPU TDP ≤400 W • OCP card ≤100 Gb • PCIe NIC ≤100 Gb • Rear NVMe drives supported • GPUs supported • N+1 fan redundancy supported	• CPU TDP ≤360 W • OCP card ≤50 Gb • PCIe NIC ≤50 Gb • Rear NVMe drives not supported • GPUs supported • N+1 fan redundancy not supported	• CPU TDP ≤320 W • OCP card ≤50 Gb • PCIe NIC ≤50 Gb • Rear NVMe drives not supported • GPUs not supported • N+1 fan redundancy not supported	• CPU TDP ≤280 W • OCP card ≤25 Gb • PCIe NIC ≤25 Gb • Rear NVMe drives not supported • GPUs not supported • N+1 fan redundancy 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.
- When the front bezel is used with 100 Gb OCP cards, 9174F CPUs, 12 front 3.5-inch drives, 25 front 2.5-inch drives, or GPUs, the maximum operating temperature is 3°C (5.4°F) lower than the rated value.
- It is advised to deploy servers at 1U intervals to minimize noise and enhance

energy efficiency.

12.1.2 KR2280-E2-C0-R0-00

Table 12-2 Operating Temperature Specification Limits

Config.	Max. Operating Temp.: 30°C (86°F)	Max. Operating Temp.: 35°C (95°F)	Max. Operating Temp.: 40°C (104°F)	Max. Operating Temp.: 45°C (113°F)
12 × 3.5-Inch Drive Config./24 × 2.5-Inch Drive Config. (Perforated Chassis)	• CPU TDP ≤400 W • OCP card ≤100 Gb • PCIe NIC ≤100 Gb • Rear NVMe drives supported • GPUs not supported • N+1 fan redundancy supported	• CPU TDP ≤400 W • OCP card ≤50 Gb • PCIe NIC ≤50 Gb • Rear third-party NVMe drives supported • Self-developed NVMe drives not supported • GPUs not supported • N+1 fan redundancy not supported	• CPU TDP ≤400 W • OCP card ≤50 Gb • PCIe NIC ≤50 Gb • Rear NVMe drives not supported • GPUs not supported • N+1 fan redundancy not supported	• CPU TDP ≤400 W • OCP card ≤25 Gb • PCIe NIC ≤25 Gb • Rear NVMe drives not supported • GPUs not supported • N+1 fan redundancy not supported
12 × 3.5-Inch Drive Config. (Perforated Chassis)	• CPU TDP ≤400 W • OCP card ≤100 Gb • PCIe NIC ≤100 Gb • Rear NVMe drives supported	• CPU TDP ≤400 W • OCP card ≤50 Gb • PCIe NIC ≤50 Gb • Rear NVMe drives not supported	• CPU TDP ≤400 W • OCP card ≤50 Gb • PCIe NIC ≤50 Gb • Rear NVMe drives not supported	• CPU TDP ≤400 W • OCP card ≤25 Gb • PCIe NIC ≤25 Gb • Rear NVMe drives not supported

Config.	Max. Operating Temp.: 30°C (86°F)	Max. Operating Temp.: 35°C (95°F)	Max. Operating Temp.: 40°C (104°F)	Max. Operating Temp.: 45°C (113°F)
	• GPUs not supported • N+1 fan redundancy supported	• GPUs not supported • N+1 fan redundancy not supported	• GPUs not supported • N+1 fan redundancy not supported	• GPUs not supported • N+1 fan redundancy not supported
8 × 3.5-Inch Drive Config./16 × 2.5-Inch Drive Config.	• CPU TDP ≤400 W • OCP card ≤100 Gb • PCIe NIC ≤100 Gb • Rear NVMe drives supported • GPUs supported • N+1 fan redundancy supported	• CPU TDP ≤400 W • OCP card ≤50 Gb • PCIe NIC ≤50 Gb • Rear NVMe drives not supported • GPUs supported • N+1 fan redundancy not supported	• CPU TDP ≤400 W • OCP card ≤50 Gb • PCIe NIC ≤50 Gb • Rear NVMe drives not supported • GPUs not supported • N+1 fan redundancy not supported	• CPU TDP ≤400 W • OCP card ≤25 Gb • PCIe NIC ≤25 Gb • Rear NVMe drives not supported • GPUs not supported • N+1 fan redundancy 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.
- When the front bezel is used with 100 Gb OCP cards, 12 front 3.5-inch drives, or GPUs, the maximum operating temperature is 3°C (5.4°F) lower than the rated value.
- It is advised to deploy servers at 1U intervals to minimize noise and enhance energy efficiency.

12.1.3 KR2280-E2-A0-F0-00

Table 12-3 Operating Temperature Specification Limits

Config.	Max. Operating Temp.: 30°C (86°F)	Max. Operating Temp.: 35°C (95°F)	Max. Operating Temp.: 40°C (104°F)	Max. Operating Temp.: 45°C (113°F)
16 × 2.5-Inch Drive Config.	• CPU TDP ≤400 W • OCP card ≤100 Gb • PCIe NIC ≤100 Gb • N+1 fan redundancy supported	• CPU TDP ≤360 W • OCP card ≤50 Gb • PCIe NIC ≤50 Gb • N+1 fan redundancy not supported	• CPU TDP ≤320 W • OCP card ≤50 Gb • PCIe NIC ≤50 Gb • N+1 fan redundancy not supported	• CPU TDP ≤280 W • OCP card ≤25 Gb • PCIe NIC ≤25 Gb • N+1 fan redundancy 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.
- When the front bezel is used with 100 Gb OCP cards, the maximum operating temperature is 3°C (5.4°F) lower than the rated value.
- It is advised to deploy servers at 1U intervals to minimize noise and enhance energy efficiency.

12.2 Models

Table 12-4 Models

Model	Description
KR2280-E2-A0-R0-00	Global
KR2280-E2-C0-R0-00	Global
KR2280-E2-A0-F0-00	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 12-5 Sensor List

Sensor	Description	Sensor Location	Remarks
Inlet_Temp	Air inlet temperature	Right mounting ear	-
Outlet_Temp	Air outlet temperature	DC-SCM board	-
CPUx_Temp	CPUx core temperature	CPUx	x indicates the CPU number with a value of 0 - 1
CPUN_VR_Temp	VR chip temperature of CPUx	CPUx	x indicates the CPU number with a value of 0 - 1
CPUx_DIMM_T	The maximum temperature among DDR5 DIMMs of CPUx	DIMMs of CPUx	x indicates the CPU number with a value of 0 - 1
PSUx_Inlet_Temp	Air inlet temperature of PSUx	PSUx	x indicates the PSU number with a value of 0 - 1
HDD_MAX_Temp	The maximum temperature among all drives	Drives	-
NVMe_Temp	The maximum temperature among all NVMe drives	NVMe drives	-
OCP_NIC_Temp	OCP card temperature	OCP cards	-
OCP_NIC_SFP_Temp	Optical module temperature of OCP card	Optical module of OCP card	-

Sensor	Description	Sensor Location	Remarks
OCP_RAID_Temp	OCP RAID card temperature	OCP RAID card	-
PCIe_NIC_Temp	The maximum temperature among all PCIe NICs	PCIe NICs	-
PCIe_NIC_SFP_Temp	Optical module temperature of PCIe NIC	Optical module of PCIe NIC	-
RAID_Temp	The maximum temperature among all PCIe RAID cards	PCIe RAID cards	-
GPUx_Temp	GPUx temperature	GPUx	x indicates the GPU number with a value of 0 - 7
Retimer_Temp	Retimer card temperature	Retimer card	-
SYS_12V	12 V voltage supplied by the motherboard to CPUs	Motherboard	-
SYS_5V	5 V voltage supplied by the motherboard to the BMC	Motherboard	-
SYS_3V3	3.3 V voltage supplied by the motherboard to the BMC	Motherboard	-
P12V_STBY	P12V standby voltage of the motherboard	Motherboard	-
P5V_STBY	P5V standby voltage of the motherboard	Motherboard	-
P3V3_STBY	P3V3 standby voltage of the motherboard	Motherboard	-
P1V8_STBY	P1V8 standby voltage of the motherboard	Motherboard	-
P1V05_USB	P1V05 USB voltage of the motherboard	Motherboard	-

Sensor	Description	Sensor Location	Remarks
PVDD33_S5	PVDD33_S5 voltage of the motherboard	Motherboard	-
PVDDCR_CPU0_P0	CPU0-P0-PVDDCR voltage of the motherboard	Motherboard	-
PVDDCR_CPU0_P1	CPU0-P1-PVDDCR voltage of the motherboard	Motherboard	-
PVDDCR_CPU1_P0	CPU1-P0-PVDDCR voltage of the motherboard	Motherboard	-
PVDDCR_CPU1_P1	CPU1-P1-PVDDCR voltage of the motherboard	Motherboard	-
PVDDIO_Px	CPUx_PVDDIO voltage of the motherboard	Motherboard	x indicates the CPU number with a value of 0 - 1
P12V_CPUx_DIMM1	CPUx_DIMM1_P12V voltage of the motherboard	Motherboard	x indicates the CPU number with a value of 0 - 1
PSUx_VIN	PSUx input voltage	PSUx	x indicates the PSU number with a value of 0 - 1
PSUx_VOUT	PSUx output voltage	PSUx	x indicates the PSU number with a value of 0 - 1
RTC_Battery	RTC battery voltage	Motherboard RTC battery	-
FANx_Speed	FANx speed	FANx	x indicates the fan module number with a value of 0 - 5
FANx_F_Speed			
FANx_R_Speed			
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

Sensor	Description	Sensor Location	Remarks
FAN_Power	Total fan power	Fan modules	-
CPU_Power	Total CPU power	Motherboard	-
Memory_Power	Total memory power	Motherboard	-
Disk_Power	Total drive power	Motherboard	-
CPUx_Status	CPUx status	CPUx	x indicates the CPU number with a value of 0 - 1
CPUx_CmDn	DIMM health status of CPUx	DIMM of CPUx	x indicates the CPU number with a value of 0 - 1, m indicates the memory channel number with a value of A - L, and n indicates the DIMM number with a value of 0
FANx_Status	FANx status	FANx	x indicates the fan number with a value of 0 - 5
FAN_Redundant	Fan redundancy status	Fan modules	-
PCIe_Status	The status of PCIe device (including PCIe buses, slots and expansion cards)	PCIe expansion cards	-
Power_Button	The power button is pressed	Motherboard and power button	-
Watchdog2	Watchdog 2	Motherboard	-
Sys_Health	System health status	Management module	-
UID_Button	UID button status	Motherboard	-
k_HDD_x	HDDx status	Drive backplane	k denotes front, internal and rear, with a value of F/I/R

Sensor	Description	Sensor Location	Remarks
			respectively, and x indicates the drive number
PSU_Redundant	PSU redundancy status	PSUs	-
PSU_Mismatch	PSU model mismatch	PSUs	-
PSUx_Status	PSUx status	PSUx	x indicates the PSU number with a value of 0 - 1
Intrusion	Chassis-opening activity	Motherboard	-
SysShutdown	System shutdown cause	-	-
ACPI_PWR	ACPI power		
SysRestart	System restart cause		
BIOS_Boot_Up	BIOS boot up complete		
System_Error	Emergency system errors		
POST_Status	POST status		
BMC_Boot_Up	BMC boot up complete		
SEL_Status	SEL status		

13 Appendix B Acronyms and Abbreviations

A

AC	Alternating Current
ACPI	Advanced Configuration and Power Interface
AI	Artificial Intelligence
AMD-V	AMD Virtualization
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
ASP	AMD Secure Processor
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
CE	Conformite Europeenne
CECP	China Energy Conservation Program

CEN	European Committee for Standardization
CLI	Command-Line Interface
CLP	Command Line Protocol
CMOS	Complementary Metal-Oxide-Semiconductor
CPLD	Complex Programmable Logic Device
CPU	Central Processing Unit
CRPS	Common Redundant Power Supply

D

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

E

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

F

FCC	Federal Communications Commission
FHHL	Full-Height Half-Length

G

GPU	Graphics Processing Unit
GUI	Graphical User Interface

H

HBA	Host Bus Adapter
HDD	Hard Disk Drive
HDT	Hardware Debug Tool
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
I/O	Input/Output
IOD	I/O Die
IOPS	Input/Output Operations Per Second
IP	Internet Protocol
IPMB	Intelligent Platform Management Bus
IPMI	Intelligent Platform Management Interface
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISA	International Society of Automation

ISO	International Organization for Standardization

K

KC	Korea Certification
KVM	Keyboard, Video, Mouse

L

LAN	LAN on Motherboard
LC	Lucent Connector
LDAP	Lightweight Directory Access Protocol
LED	Light Emitting Diode

M

MCIO	Mini Cool Edge Input/Output

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

PCH	Platform Controller Hub
PCIe	Peripheral Component Interconnect Express
PDU	Power Distribution Unit
PID	Proportional-Integral-Derivative
POST	Power-On Self-Test
PSU	Power Supply Unit
PUE	Power Usage Effectiveness
PXE	Pre-boot Execution Environment

R

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

S

SAS	Serial Attached SCSI
SATA	Serial Advanced Technology Attachment
SCSI	Small Computer System Interface
SDP	Single Die Package

SEL	System Event Log
SEV	Secure Encrypted Virtualization
SFF	Small Form Factor
SFP	Small Form-factor Pluggable
SLA	Service Level Agreement
SMASH	Systems Management Architecture for Server Hardware
SMT	Simultaneous Multi-Threading
SNMP	Simple Network Management Protocol
SSD	Solid State Drive
SSH	Secure Shell
Syslog	System Log

T

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

U

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
VM	Virtual Machine
VNC	Virtual Network Console
VPP	Virtual Pin Port
VR	Voltage Regulator
VRD	Voltage Regulator-Down

X

xGMI	External Global Memory Interface