KAYTUS

White Paper for
KAYTUS KR1280V2 Series Servers

Powered by Intel Processors

For KR1280-X2-A0-R0-00, KR1280-X2-A0-F0-00
and KR1280-X2-C0-R0-00

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Applicable Model

Model	Maintenance	Cooling
KR1280-X2-A0-R0-00	Rear access	Air cooling
KR1280-X2-A0-F0-00	Front access	Air cooling
KR1280-X2-C0-R0-00	Rear access	Cold-plate liquid cooling

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- 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.

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Abstract

This document describes the KR1280V2 Intel-based server's appearance, features, performance parameters, and software and hardware compatibility, providing in-depth information of the server.

Intended Audience

This document is intended for pre-sales engineers.

Symbol Conventions

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

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

Revision History

Version	Date	Description of Changes
V1.0	2023/11/07	Initial release
V1.1	2024/03/06	• Updated 6.3.1 Technical Specifications
V1.2	2024/04/12	• Updated 5.14.3 Drive Backplanes

Version	Date	Description of Changes
V1.3	2024/08/23	Optimized the content
V1.4	2024/09/30	• Added the information about Intel Emerald Rapids (EMR) CPU • Updated Section 5.6.3 Compatibility • Updated Section 5.6.5 DIMM Slot Layout • Added Section 5.13.3 Mobile Management Software ISMM • Updated Chapter 7 Operating System and Hardware Compatibility • Updated Chapter 11 Certifications • Updated Section 12.4 Sensor List

Table of Contents

1 Product Overview

The KR1280V2 Intel-based system is a 1U 2-socket high-density computing rack server powered by the 4th/5th Gen Intel Xeon Scalable processors (Sapphire Rapids/Emerald Rapids). It is designed for high-end IT applications such as cloud computing, big data, and deep learning. It fully supports PCIe 5.0/4.0 and realizes the optimized design that maximizes system performance, storage and computing density, and PCIe expandability. With the optimized air cooling channels, the KR1280V2 improves the heat dissipation efficiency while maintaining ultimate storage and computing density. Meanwhile, it supports multiple cooling options such as EVAC heatsink air cooling and cold-plate liquid cooling. Thus, it is ideal for more compute-intensive services such as virtualization, and online services and meets the deployment demands of new high-density data centers.

Figure 1-1 4 × 3.5-Inch Drive + 2 × E1.S SSD + 2 × M.2 SSD Configuration
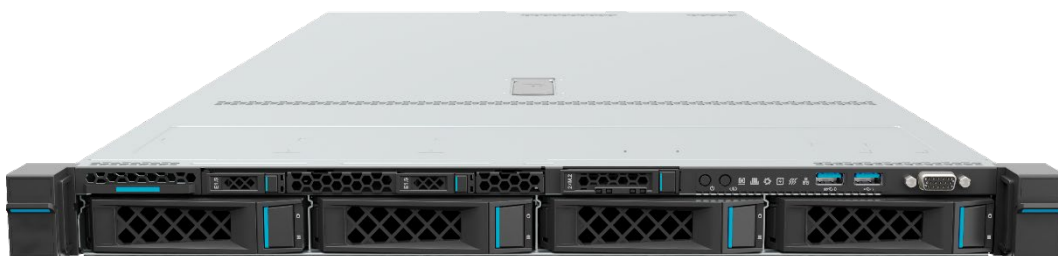
Figure 1-2 4 × 3.5-Inch Drive + 4 × 2.5-Inch Drive Configuration
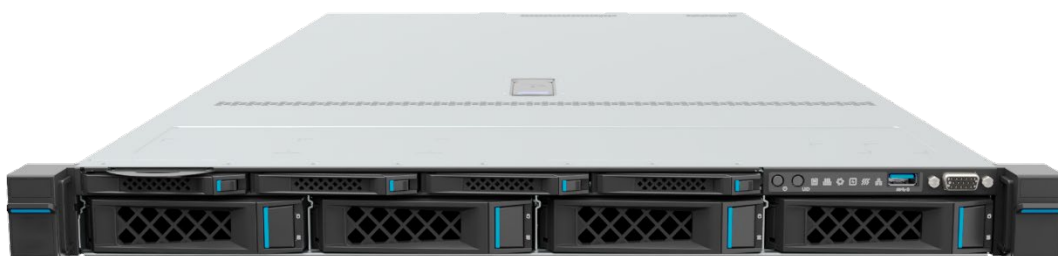
Figure 1-3 10 × 2.5-Inch Drive Configuration
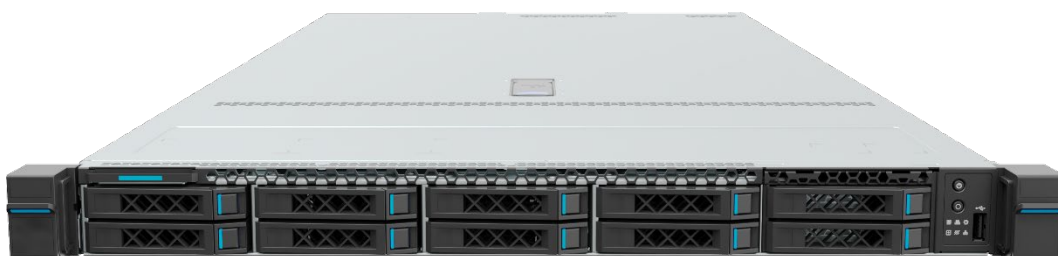
Figure 1-4 12 × 2.5-Inch Drive Configuration
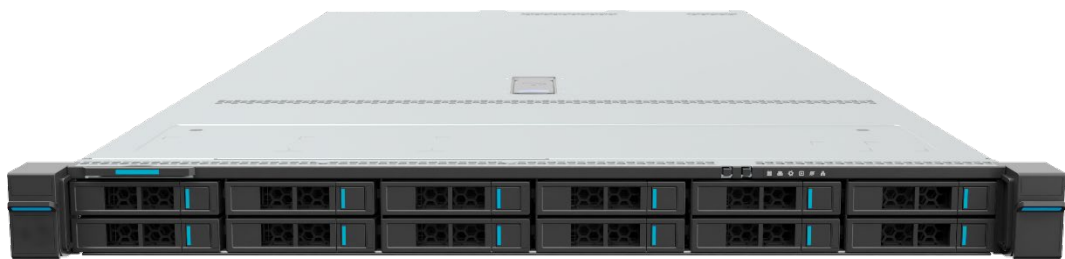
Figure 1-5 8 × 2.5-Inch Drive + 2 × E1.S SSD + 2 × M.2 SSD Configuration

Figure 1-6 12 × E1.S SSD + 2 × M.2 SSD + 2 × PCIe Slot Configuration

Figure 1-7 4 × 2.5-Inch Drive/E3.S SSD + 2 × PCIe Slot Configuration

2 Features

2.1 Scalability and Performance

Table 2-1 Scalability and Performance

Technical Feature	Description
4th/5th Gen Intel Xeon Scalable processors (Sapphire Rapids/Emerald Rapids)	• Features 4th/5th Gen Intel Xeon Scalable processors (Sapphire Rapids/Emerald Rapids), with up to 64 cores per processor, a maximum TDP of 385 W, a max. Turbo frequency of 4.2 GHz, an L3 cache of 5 MB per core, and up to 4 UPI links per CPU at up to 20 GT/s per link, delivering unrivaled processing performance. - Up to 2 processors with up to 128 cores and 256 threads, maximizing the concurrent execution of multi-threaded applications. - With the processor cache hierarchy optimization, a larger L2 cache of private 1 MB per core is provided, so that memory data can be put and processed directly in L2 cache, improving the memory access performance and reducing the demand for L3 cache capacity. - Supports Intel Turbo Boost Technology 2.0 and automatically scales CPU speeds up to the max Turbo frequency at peak workloads, allowing processor cores to exceed the thermal design power (TDP) for a limited time. - Supports Intel Hyper-Threading Technology, allowing up to 2 threads to run on each core to improve the performance of multi-threaded applications. - Supports Intel Virtualization Technology that provides hardware assist to the virtualization software, allowing the operating system to better use hardware to handle virtualization work. - Supports Intel Advanced Vector Extensions 512 (Intel AVX-512), significantly improving floating-point performance for compute-intensive applications.

Technical Feature	Description
	- Supports Intel Deep Learning Boost (Intel DL Boost) that uses Vector Neural Network Instructions (VNNI), improving the performance for deep learning applications.
DDR5 DIMMs	Up to 32 DDR5 ECC DIMMs (5,600 MT/s, RDIMMs), delivering superior speed, high availability, and a memory capacity of up to 4 TB.
Flexible Drive Configurations	Provides elastic and scalable storage solutions to meet different capacity and upgrade requirements.
Support for All-SSD Configuration	Brings significantly higher I/O performance over all-HDD configuration or HDD-SSD mixing configuration.
24 Gbps Serial Attached SCSI (SAS)	Quadruples the data transfer rate of internal storage of the 6 Gbps SAS solution, maximizing the performance of storage I/O-intensive applications.
Intel Integrated I/O Technology	The processors integrate the PCIe 5.0 controller to reduce I/O latency and enhance overall system performance.
PCIe Expansion	Up to 8 PCIe 5.0 expansion slots (for 4 standard PCIe x16 expansion cards + 3 OCP 3.0 cards + 1 RAID mezz card).
OCP Expansion	Up to 3 OCP slots that can flexibly support 1/10/25/100/200 Gb hot-plug OCP 3.0 cards.

2.2 Availability and Serviceability

Table 2-2 Availability and Serviceability

Technical Feature	Description
Hot-Swap SAS/SATA/NVMe Drive	Supports hot-swap SAS/SATA/NVMe drives and RAID cards with RAID levels 0/1/1E/10/5/50/6/60, RAID cache and data protection enabled by the super-capacitor in case of power failures. Supported RAID levels vary by RAID card.
Reliability	• SSDs are much more reliable than traditional HDDs, increasing the system uptime. • The ISBMC monitors system parameters in real time and sends alerts in advance, enabling technicians to take appropriate measures in time to minimize system downtime.
Availability	• The LEDs on front and rear panels, the LCD module, and

Technical Feature	Description
	the ISBMC 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 and 8 hot-swap fan modules with N+1 redundancy.
Maintenance Efficiency	• The BMC management network ports on the front and rear panels enable remote ISBMC O&M, improving O&M efficiency. • Memory online diagnosis helps technicians to quickly identify the DIMM needing maintenance.

2.3 Manageability and Security

Table 2-3 Manageability and Security

Technical Feature	Description
Remote Management	The ISBMC monitors 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 ISBMC. Notes: The NC-SI port supports the following features: • The NC-SI port can be bonded to any network port of the OCP card or of PCIe NIC that supports NC-SI. • Supports the enablement/disablement and configuration of Virtual Local Area Network (VLAN). VLAN is disabled by default. • Supports both IPv6 and IPv4 addresses. The subnet mask of IPv4 or prefix length of IPv6 subnet mask, IP addresses, and default gateways can be configured.
Intel PFR	Intel Platform Firmware Resilience (PFR) is a security technology that follows NIST SP 800-193 guidelines. Intel PFR helps protect platform assets, detects corrupted firmware as well as other malicious or erroneous traffic, and even restores platform firmware to a good state.
Unified Extensible Firmware Interface (UEFI)	The industry-standard UEFI improves the efficiency of setup, configuration and update, and simplifies the error handling process.

Technical Feature	Description
TPM & TCM	Trusted Platform Module (TPM) 2.0 and Trusted Cryptography Module (TCM) provide advanced encryption.
Intel Trusted Execution Technology	Intel Trusted Execution Technology provides enhanced security through hardware-based resistance to malicious software attacks.
Firmware Update Mechanism	The firmware update mechanism based on digital signatures prevents unauthorized firmware updates.
UEFI Secure Boot	Protects the system from malicious bootloaders.
Hierarchical Password Protection in BIOS	Ensures system boot and management security.
BIOS Secure Flash and BIOS Lock Enable (BLE)	Reduces attacks from malicious software on the BIOS flash region.
Dual-Image Mechanism for BMC and BIOS	Recovers firmware upon detection of corrupted firmware.
BMC Secure Boot	Protects BMC from malicious tampering.
BMC Access Control Policies	Flexible BMC access control policies improve BMC management security.
Chassis Intrusion Detection	Enhances physical security.
BMC Management Security	Supports flexible BMC access control policies and double factor authentication.
Intel SGX Technology	Intel Software Guard Extensions (SGX) technology allows applications to run in its own isolated space, helping prevent malicious theft and modification of critical codes and data.
System Secure Erase	(Optional) System secure erase function can wipe data on the storage device with just one click.
Front Bezel with a Lock	(Optional) Prevents unauthorized users from removing or installing drives, thus ensuring the security of local data.

2.4 Energy Efficiency

Table 2-4 Energy Efficiency

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

3 System Parts Breakdown

📄 NOTE

Applicable model: KR1280-X2-A0-R0-00 and KR1280-X2-C0-R0-00.

Figure 3-1 Exploded View 1
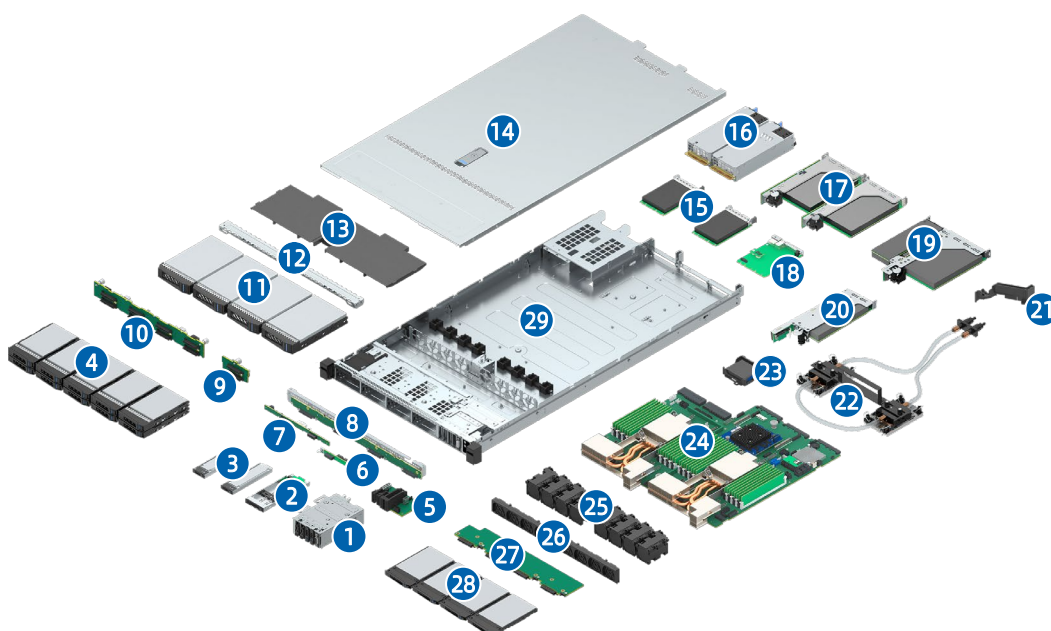
Item	Feature	Item	Feature
1	E1.S SSD + M.2 SSD Module	16	PSU
2	M.2 SSD	17	FHHL PCIe Riser Module
3	E1.S SSD	18	DC-SCM Board
4	2.5-Inch Drive Module	19	PCIe Butterfly Riser Module
5	E1.S + M.2 Drive Backplane	20	HHHL PCIe Riser Module
6	M.2 Drive Backplane	21	PSU Air Duct
7	E1.S Drive Backplane	22	Cold Plate Module
8	3.5-Inch Drive Backplane	23	Super-Capacitor
9	2 × 2.5-Inch Drive Backplane	24	Motherboard (configured with EVAC heatsinks)
10	8 × 2.5-Inch Drive Backplane	25	Fan Module
11	3.5-Inch Drive Module	26	Honeycomb Panel

Item	Feature	Item	Feature
12	Reinforcement Crossbar	27	4 × 2.5-Inch Drive Backplane
13	System Air Duct	28	2.5-Inch Drive Module
14	Top Cover	29	Chassis
15	OCP 3.0 Card	-	-

📄 NOTE

Applicable model: KR1280-X2-A0-F0-00.

Figure 3-2 Exploded View 2
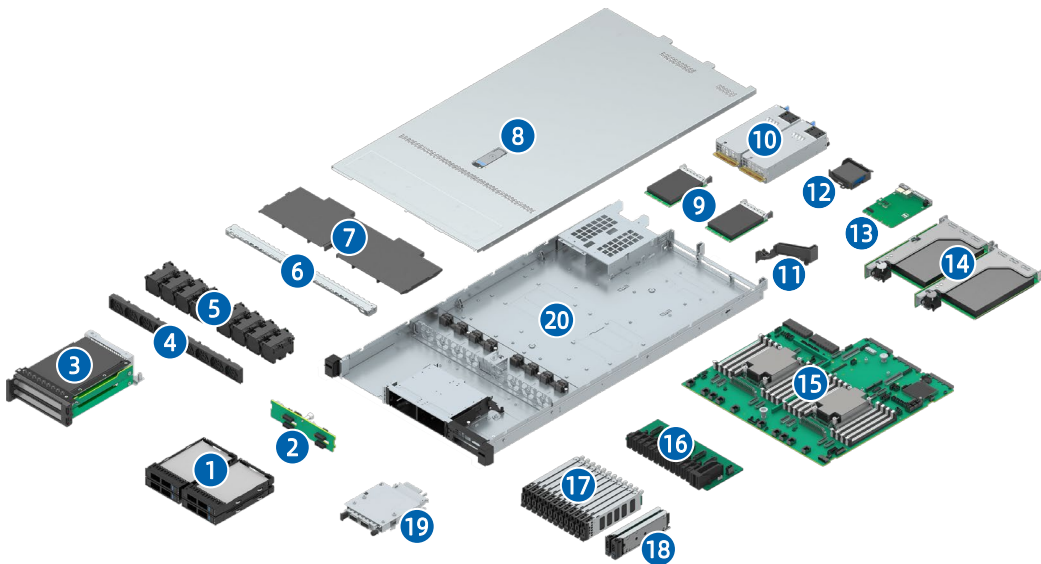
Item	Feature	Item	Feature
1	E3.S SSD	11	PSU Air Duct
2	E3.S Drive Backplane	12	Super-Capacitor
3	Front FHHL PCIe Riser Module	13	DC-SCM Board
4	Honeycomb Panel	14	Rear FHHL PCIe Riser Module
5	Fan Module	15	Motherboard (configured with standard heatsinks)
6	Reinforcement Crossbar	16	E1.S + M.2 Drive Backplane
7	System Air Duct	17	E1.S SSD
8	Top Cover	18	M.2 SSD

Item	Feature	Item	Feature
9	Rear OCP 3.0 Card	19	Front OCP 3.0 Card
10	PSU	20	Chassis

4 System Logical Diagram

Figure 4-1 System Logical Diagram
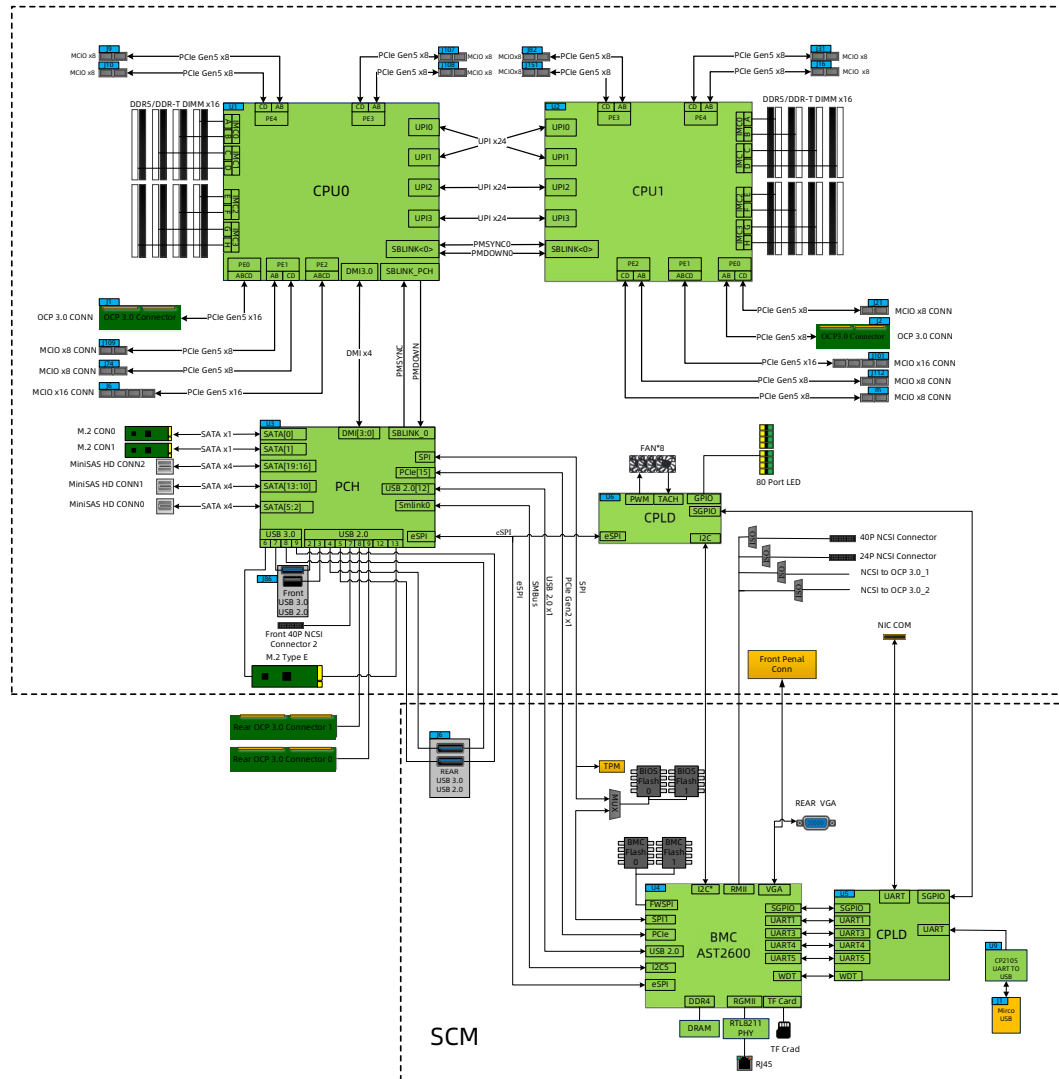
- Up to two Intel Xeon Scalable processors (Sapphire Rapids/Emerald Rapids).

- Up to 32 DIMMs.

- 4 UPI links per CPU at up to 20 GT/s per link.

- Up to 8 PCIe 5.0 expansion slots, with up to 2 OCP 3.0 cards supported by CPU0, up to 1 OCP 3.0 card by CPU1 and 1 RAID mezz card by CPU0.

- The RAID mezz card is connected to CPU0 through the PCIe bus, and is connected to the drive backplane through the SAS signal cable. Multiple local storage specifications are supported through different drive backplanes.

- The motherboard integrates the Emmitsburg (EBG) Platform Controller Hub (PCH) to support 3 USB 3.0 ports, 14 SATA 3.0 drive connectors, and 1 TF card adapter slot.

- The DC-SCM board integrates a BMC management chip and supports a Video Graphic Array (VGA) port, a BMC management network port, a system/BMC serial port, a TF card slot, and other connectors.

5 Hardware Description

5.1 Front Panel

5.1.1 4 × 3.5-Inch Drive + 2 × E1.S SSD + 2 × M.2 SSD Configuration

📄 NOTE

Applicable model: KR1280-X2-A0-R0-00 and KR1280-X2-C0-R0-00.

Figure 5-1 Front View
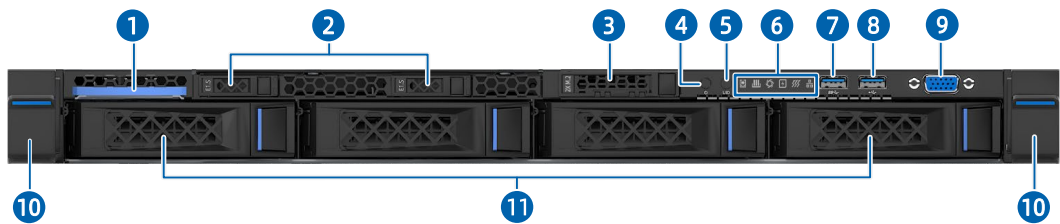
Item	Feature	Item	Feature
1	Serial Label Pull Tag (with an SN label)	7	USB 3.0 Port
2	E1.S Drive Bay	8	USB 2.0/LCD Port
3	M.2 Drive Bay	9	VGA Port
4	Power Button and LED	10	Ear Latch
5	UID/BMC RST Button and LED	11	3.5-Inch Drive Bay
6	LEDs	–	–

5.1.2 4 × 3.5-Inch Drive + 4 × 2.5-Inch Drive Configuration

📄 NOTE

Applicable model: KR1280-X2-A0-R0-00.

Figure 5-2 Front View
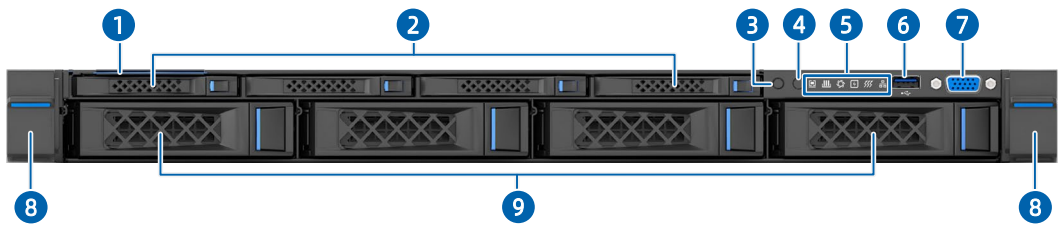
Item	Feature	Item	Feature
1	Serial Label Pull Tag (with an SN label)	6	USB 3.0 Port
2	2.5-Inch Drive Bay	7	VGA Port
3	Power Button and LED	8	Ear Latch
4	UID/BMC RST Button and LED	9	3.5-Inch Drive Bay
5	LEDs	-	-

5.1.3 10 × 2.5-Inch Drive Configuration

📄 NOTE

Applicable model: KR1280-X2-A0-R0-00 and KR1280-X2-C0-R0-00.

Figure 5-3 Front View
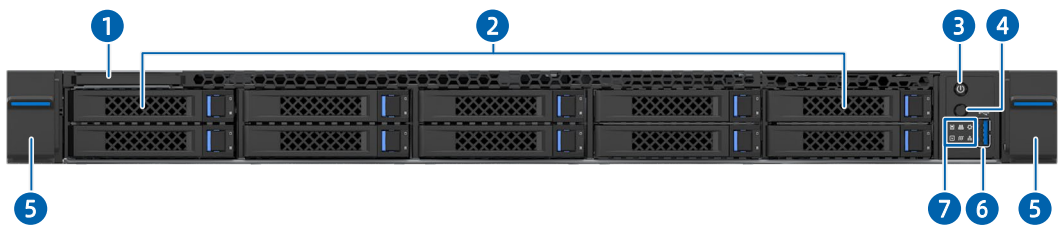
Item	Feature	Item	Feature
1	Serial Label Pull Tag (with an SN label)	5	Ear Latch
2	2.5-Inch Drive Bay	6	USB 2.0/LCD Port
3	Power Button and LED	7	LEDs
4	UID/BMC RST Button and LED	-	-

5.1.4 12 × 2.5-Inch Drive Configuration

📄 NOTE

Applicable model: KR1280-X2-A0-R0-00 and KR1280-X2-C0-R0-00.

Figure 5-4 Front View
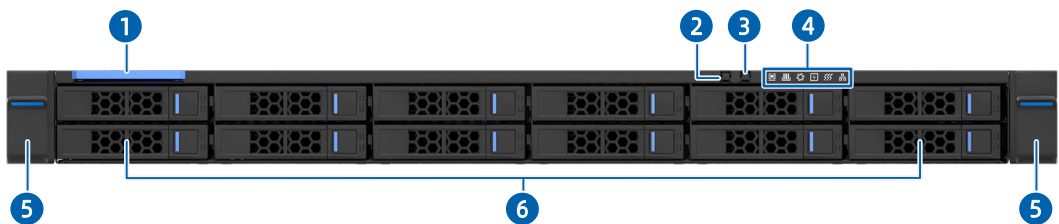
Item	Feature	Item	Feature
1	Serial Label Pull Tag (with an SN label)	4	LEDs
2	Power Button and LED	5	Ear Latch
3	UID/BMC RST Button and LED	6	2.5-Inch Drive Bay

5.1.5 8 × 2.5-Inch Drive + 2 × E1.S SSD + 2 × M.2 SSD Configuration

📄 NOTE

Applicable model: KR1280-X2-A0-R0-00 and KR1280-X2-C0-R0-00.

Figure 5-5 Front View
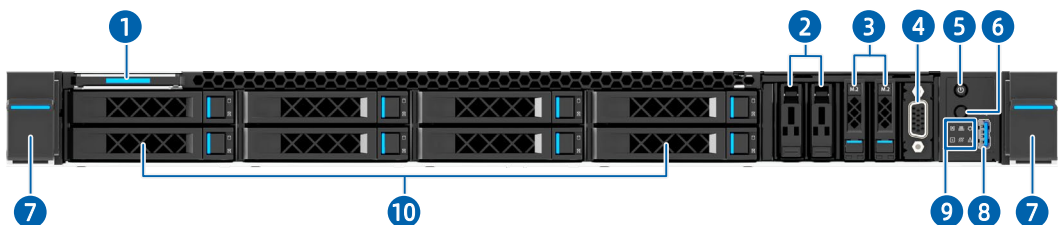
Item	Feature	Item	Feature
1	Serial Label Pull Tag (with an SN label)	6	UID/BMC RST Button and LED
2	E1.S Drive Bay	7	Ear Latch

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Item	Feature	Item	Feature
3	M.2 Drive Bay	8	USB 2.0/LCD Port
4	VGA Port	9	LEDs
5	Power Button and LED	10	2.5-Inch Drive Bay

5.1.6 4 × 2.5-Inch Drive/E3.S SSD + 2 × PCIe Slot Configuration

📄 NOTE

Applicable model: KR1280-X2-A0-F0-00.

Figure 5-6 Front View
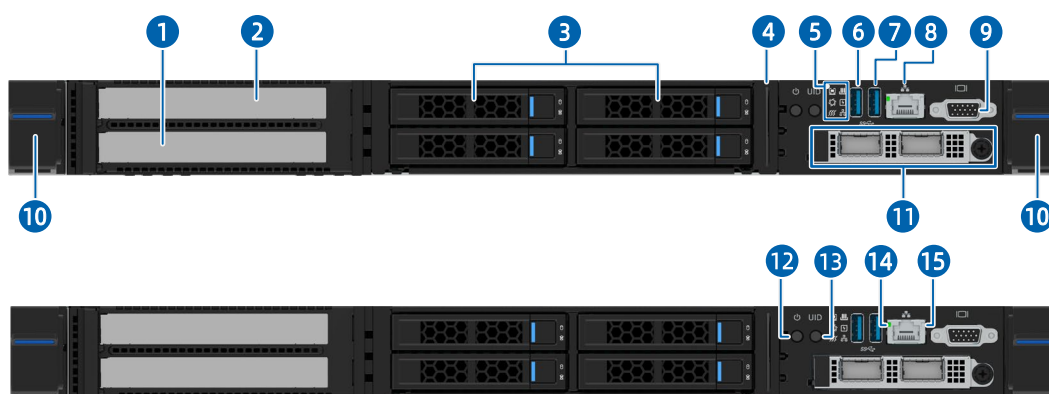
Item	Feature	Item	Feature
1	PCIe Slot 2	9	VGA Port
2	PCIe Slot 3	10	Ear Latch
3	E3.S Drive Bay/2.5-Inch Drive Bay	11	OCP 3.0 Card 0
4	Serial Label Pull Tag (with an SN label)	12	Power Button and LED
5	LEDs	13	UID/BMC RST Button and LED
6	USB 3.0 Port	14	Management Network Port Link Activity LED
7	USB 2.0/LCD Port	15	Management Network Port Link Speed LED
8	BMC Management Network Port	-	-

5.1.7 12 × E1.S SSD + 2 × M.2 SSD + 2 × PCIe Slot Configuration

📄 NOTE

Applicable model: KR1280-X2-A0-F0-00.

Figure 5-7 Front View
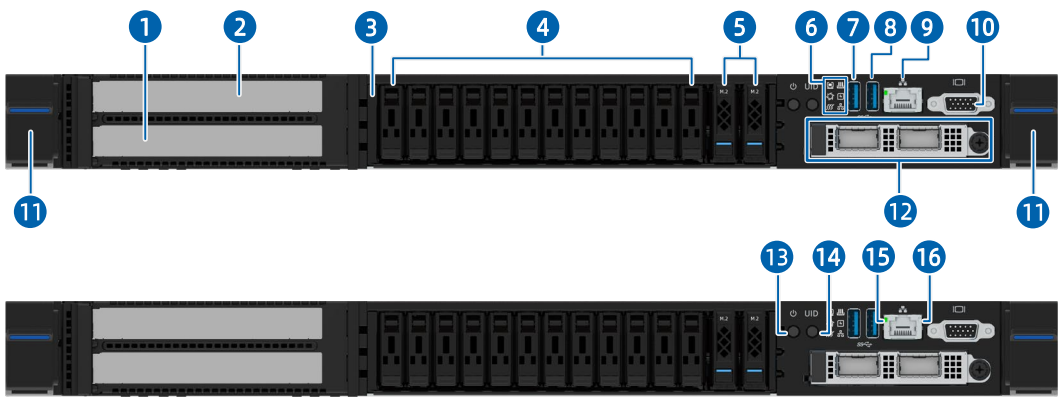
Item	Feature	Item	Feature
1	PCIe Slot 2	9	BMC Management Network Port
2	PCIe Slot 3	10	VGA Port
3	Serial Label Pull Tag (with an SN label)	11	Ear Latch
4	E1.S Drive Bay	12	OCP 3.0 Card 0
5	M.2 Drive Bay	13	Power Button and LED
6	LEDs	14	UID/BMC RST Button and LED
7	USB 3.0 Port	15	Management Network Port Link Activity LED
8	USB 2.0/LCD Port	16	Management Network Port Link Speed LED

5.2 Rear Panel

5.2.1 3 × PCIe Slot Configuration

📄 NOTE

Applicable model: KR1280-X2-A0-R0-00.

Figure 5-8 Rear View
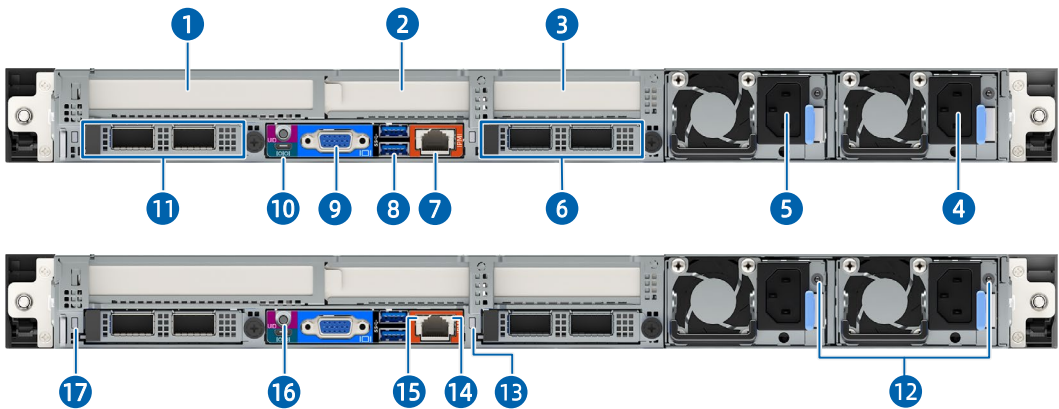
Item	Feature	Item	Feature
1	PCIe Slot 0	10	System/BMC Serial Port (micro USB)
2	PCIe Slot 1	11	OCP 3.0 Card 0
3	PCIe Slot 2	12	PSU LED
4	PSU1	13	OCP 3.0 Card 1 Hot-Plug Button and LED
5	PSU0	14	Management Network Port Link Speed LED
6	OCP 3.0 Card 1	15	Management Network Port Link Activity LED
7	BMC Management Network Port	16	UID/BMC RST Button and LED
8	USB 3.0 Port	17	OCP 3.0 Card 0 Hot-Plug Button and LED
9	VGA Port	-	-

5.2.2 2 × PCIe Slot Configuration

📄 NOTE

Applicable model: KR1280-X2-A0-R0-00 and KR1280-X2-A0-F0-00.

Figure 5-9 Rear View
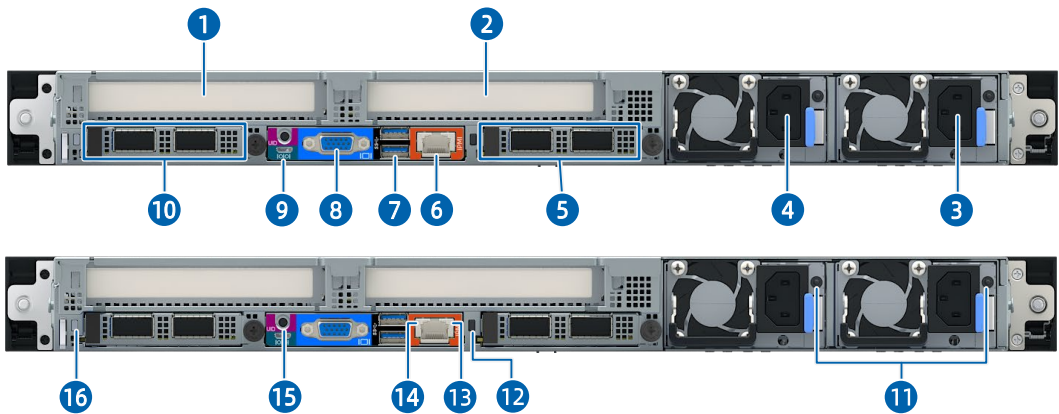
Item	Feature	Item	Feature
1	PCIe Slot 0	9	System/BMC Serial Port (micro USB)
2	PCIe Slot 1	10	OCP 3.0 Card 0
3	PSU1	11	PSU LED
4	PSU0	12	OCP 3.0 Card 1 Hot-Plug Button and LED
5	OCP 3.0 Card 1	13	Management Network Port Link Speed LED
6	BMC Management Network Port	14	Management Network Port Link Activity LED
7	USB 3.0 Port	15	UID/BMC RST Button and LED
8	VGA Port	16	OCP 3.0 Card 0 Hot-Plug Button and LED

5.2.3 1 × PCIe Slot + 2 × 2.5-Inch Drive Configuration

📄 NOTE

Applicable model: KR1280-X2-A0-R0-00.

Figure 5-10 Rear View
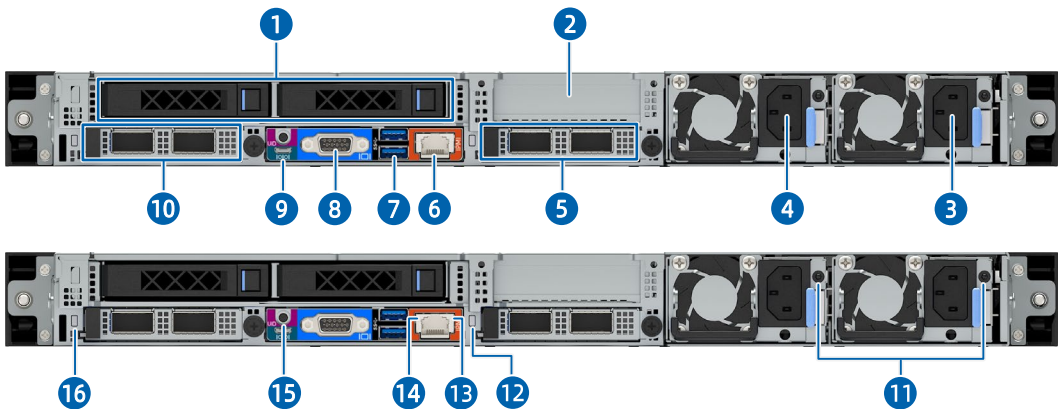
Item	Feature	Item	Feature
1	2.5-Inch Drive Bay	9	System/BMC Serial Port (micro USB)
2	PCIe Slot 2	10	OCP 3.0 Card 0
3	PSU1	11	PSU LED
4	PSU0	12	OCP 3.0 Card 1 Hot-Plug Button and LED
5	OCP 3.0 Card 1	13	Management Network Port Link Speed LED
6	BMC Management Network Port	14	Management Network Port Link Activity LED
7	USB 3.0 Port	15	UID/BMC RST Button and LED
8	VGA Port	16	OCP 3.0 Card 0 Hot-Plug Button and LED

5.2.4 2 × PCIe Slot - Cold Plate Configuration

📄 NOTE

Applicable model: KR1280-X2-C0-R0-00.

Figure 5-11 Rear View
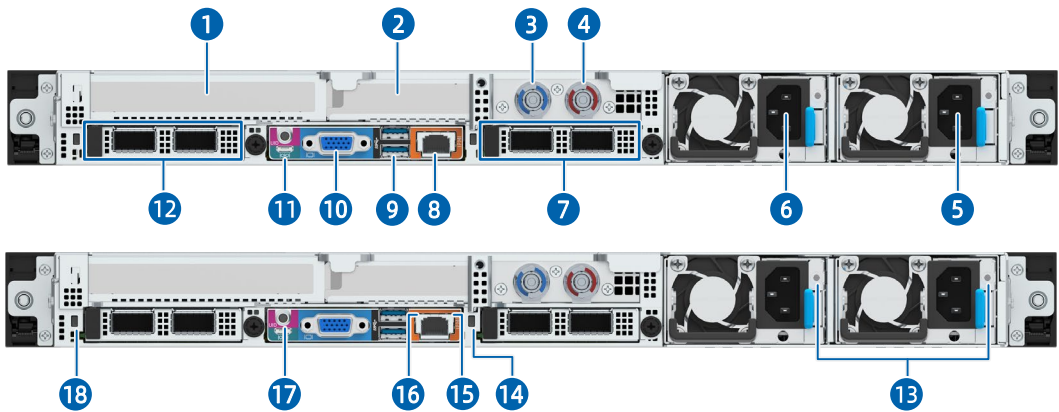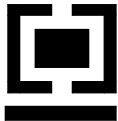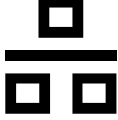
Item	Feature	Item	Feature
1	PCIe Slot 0	10	VGA Port
2	PCIe Slot 1	11	System/BMC Serial Port (micro USB)
3	Quick Disconnect (inlet)	12	OCP 3.0 Card 0
4	Quick Disconnect (outlet)	13	PSU LED
5	PSU1	14	OCP 3.0 Card 1 Hot-Plug Button and LED
6	PSU0	15	Management Network Port Link Speed LED
7	OCP 3.0 Card 1	16	Management Network Port Link Activity LED
8	BMC Management Network Port	17	UID/BMC RST Button and LED
9	USB 3.0 Port	18	OCP 3.0 Card 0 Hot-Plug Button and LED

5.3 LEDs and Buttons

Table 5-1 LED and Button Description

Icon	Feature	Description
	Power Button and LED	• Power LED: - Off = No power - Solid green = Power-on state - Solid orange = Standby state • Power button:

Icon	Feature	Description
		- Press and release the button to power on the system from the standby state - Press and hold the button for 6 seconds to force a shutdown from the power-on state
UID	UID/BMC RST Button and LED	• Solid blue = The UID LED is activated by the UID button or via the BMC • Gradually turning blue within 2 seconds and then gradually turning off within 2 seconds = PFR authentication in progress (Note: The server can be powered on only after this LED turns off.) • Press and hold the button for 6 seconds to force BMC to reset.
	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.
	Memory Status LED	• Off = Normal • Blinking red (1 Hz) = A warning error occurs • Solid red = A critical error occurs
	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
	Power Status LED	• Off = Normal • Blinking red (1 Hz) = A warning error occurs • Solid red = A critical error occurs
	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,

Icon	Feature	Description
		including CPU Thermal Trip/PCH Hot/MEM Hot.
	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.
-	OCP 3.0 Card Hot-Plug Button and LED	This button is used for hot-plugging the OCP 3.0 card. LED: • Solid yellow-green = OCP card is powered on • Blinking orange (1 Hz) = OCP card is getting ready for hot-plugging or OCP card is being identified after being inserted • Off = OCP card is powered off
-	Management Network Port Link Speed LED	• Off = No network connection • Solid green = Network connected with link speed at 1,000 Mbps • Solid orange = Network connected with link speed at 10 Mbps or 100 Mbps
-	Management Network Port Link Activity LED	• Off = No network connection • Solid green = Network connected without data being transmitted • Blinking green = Network connected with data being transmitted

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 3.0/2.0 device to the system.

Item	Port	Description
3	USB 2.0/LCD Port	Enables you to connect a USB 2.0 device or an LCD module to the system.
4	System/BMC Serial Port	• Enables you to debug and monitor the BMC. • Enables you to debug and monitor the system.
5	BMC Management Network Port	Enables you to manage the server. Note: It is a Gigabit Ethernet port that supports 100/1,000 Mbps auto-negotiation.
6	OCP 3.0 Network 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 be the same model.

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

Figure 5-12 Processor Locations
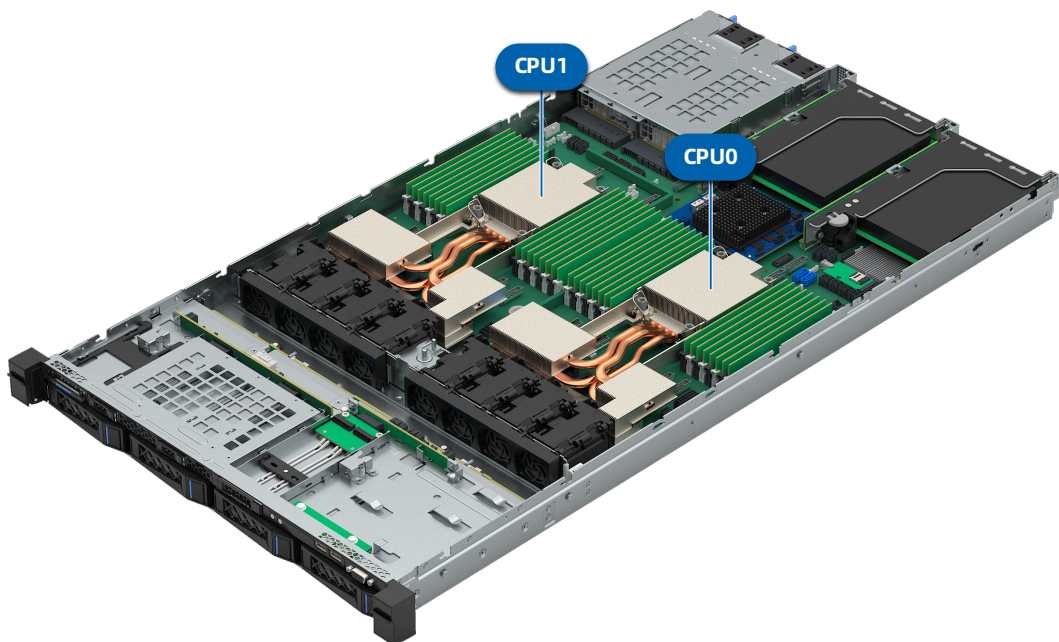
5.6 Memory

5.6.1 Identification

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

Figure 5-13 DIMM Identification
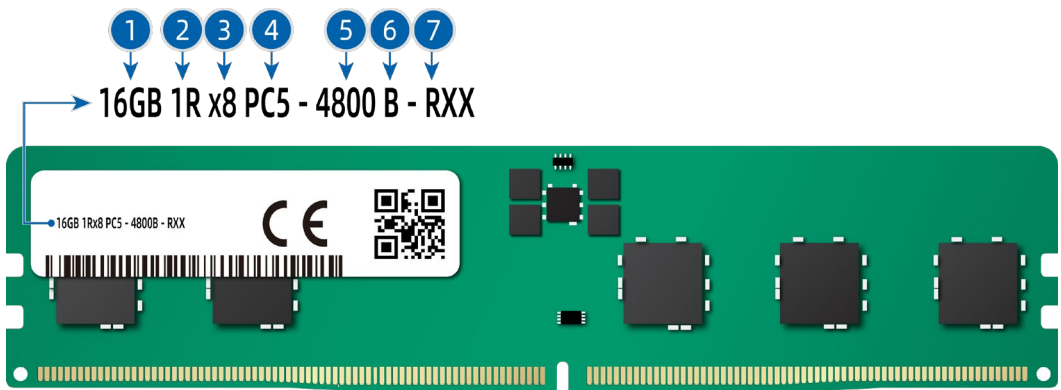
Item	Description	Example
1	Capacity	• 16 GB • 32 GB • 64 GB • 128 GB • 256 GB
2	Rank(s)	• 1R = Single rank • 2R = Dual rank • 2S2R = Two ranks of two high stacked 3DS DRAM • 4DR = DDP (Dual Die Package) 4 rank • 4R = Quad rank
3	Data width of DRAM	• x4 = 4 bits • x8 = 8 bits
4	DIMM slot type	PC5 = DDR5
5	Maximum memory speed	• 4,800 MT/s • 5,600 MT/s
6	CAS latency	• SDP 4800B = 40-39-39 • 3DS 4800B = 46-39-39 • SDP 5600B = 46-45-45 • 3DS 5600B = 52-45-45
7	DIMM type	R = RDIMM

5.6.2 Memory Subsystem Architecture

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

Table 5-3 DIMM Slot List

CPU	Channel ID	Silk Screen
CPU0	Channel 0	CPU0_C0D0
		CPU0_C0D1
	Channel 1	CPU0_C1D0
		CPU0_C1D1
	Channel 2	CPU0_C2D0
		CPU0_C2D1
	Channel 3	CPU0_C3D0
		CPU0_C3D1
	Channel 4	CPU0_C4D0
		CPU0_C4D1
	Channel 5	CPU0_C5D0
		CPU0_C5D1
	Channel 6	CPU0_C6D0
		CPU0_C6D1
	Channel 7	CPU0_C7D0
		CPU0_C7D1
CPU1	Channel 0	CPU1_C0D0
		CPU1_C0D1
	Channel 1	CPU1_C1D0
		CPU1_C1D1
	Channel 2	CPU1_C2D0
		CPU1_C2D1
	Channel 3	CPU1_C3D0
		CPU1_C3D1
	Channel 4	CPU1_C4D0
		CPU1_C4D1
	Channel 5	CPU1_C5D0
		CPU1_C5D1
	Channel 6	CPU1_C6D0
		CPU1_C6D1
	Channel 7	CPU1_C7D0
		CPU1_C7D1

5.6.3 Compatibility

Refer to the following rules to configure the DDR5 DIMMs.

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

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

- The maximum number of DIMMs supported varies by CPU type, DIMM type and rank quantity.

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

Table 5-4 DDR5 DIMM (4,800 MT/s) Specifications

Item		Value				
Capacity per DDR5 DIMM (GB)		16	32	64	96	128
Type		RDIMM	RDIMM	RDIMM	RDIMM	RDIMM
Rated speed (MT/s)		4,800	4,800	4,800	4,800	4,800
Operating voltage (V)		1.1	1.1	1.1	1.1	1.1
Maximum number of DDR5 DIMMs supported in a server[a]		32	32	32	32	32
Maximum capacity of DDR5 DIMMs supported in a server (GB)[b]		512	1,024	2,048	3,072	4,096
Actual speed (MT/s)	1 DPC[c]	4,800	4,800	4,800	4,800	4,800
	2 DPC	4,400	4,400	4,400	4,400	4,400

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

Table 5-5 DDR5 DIMM (5,600 MT/s) Specifications

Item		Value			
Capacity per DDR5 DIMM (GB)		16	32	64	128
Type		RDIMM	RDIMM	RDIMM	RDIMM
Rated speed (MT/s)		5,600	5,600	5,600	5,600
Operating voltage (V)		1.1	1.1	1.1	1.1
Maximum number of DDR5 DIMMs supported in a server[a]		32	32	32	32
Maximum capacity of DDR5 DIMMs supported in a server (GB)[b]		512	1,024	2,048	4,096
Actual speed (MT/s)	1 DPC[c]	5,600	5,600	5,600	5,600
	2 DPC	4,400	4,400	4,400	4,400
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. When DDR5 DIMMs are used with the Sapphire Rapids CPU, the actual speed is 4,800 MT/s at 1 DPC. When DDR5 DIMMs are used with the Emerald Rapids CPU, the actual speed is 5,600 MT/s at 1 DPC. The information above is for reference only. Consult your local sales representative for details.					

5.6.4 DIMM Population Rules

General population rules for DDR5 DIMMs:

- Install DIMMs only when the corresponding processor is installed.

- Install dummies in the empty DIMM slots.

Population rules for DDR5 DIMMs in specific modes:

- Memory sparing mode

    - Follow the general population rules.

    - Each channel must have a valid online spare configuration.

    - Each channel can have a different online spare configuration.

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

- Memory mirroring mode

    - Follow the general population rules.

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

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

5.6.5 DIMM Slot Layout

Up to 32 DDR5 DIMMs can be installed in a server, and a balanced DIMM configuration is recommended for optimal memory performance. DIMM configuration must be compliant with the DIMM population rules.

Figure 5-14 DIMM Slot Layout
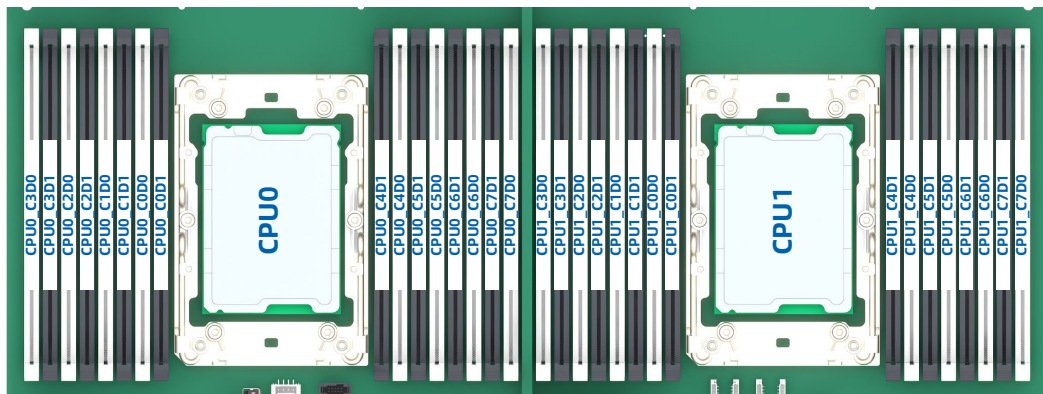
Detailed DIMM population rules are as follows:

- Single-CPU (Sapphire Rapids/Emerald Rapids) Configuration

📄 NOTE

For 24 Gb DRAM chip-based DIMMs used with Sapphire Rapids CPUs, follow Table

for installation.

Table 5-6 DDR5 DIMM Population Rules

DDR QTY	CPU0															
	C0D0	C0D1	C1D0	C1D1	C2D0	C2D1	C3D0	C3D1	C4D0	C4D1	C5D0	C5D1	C6D0	C6D1	C7D0	C7D1
1	●															
2	●												●			
4	●				●				●				●			
6	●				●		●		●		●		●			
8	●		●		●		●		●		●		●		●	
12	●	●	●		●	●	●		●	●	●		●	●	●	
16	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

- Dual-CPU (Sapphire Rapids/Emerald Rapids) Configuration

📄 **NOTE**

For 24 Gb DRAM chip-based DIMMs used with Sapphire Rapids CPUs, follow for installation.

Table 5-7 DDR5 DIMM Population Rules

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

- Single-CPU (HBM CPU) Configuration

Table 5-8 DDR5 DIMM Population Rules

DDR QTY	CPU0															
	C0D0	C0D1	C1D0	C1D1	C2D0	C2D1	C3D0	C3D1	C4D0	C4D1	C5D0	C5D1	C6D0	C6D1	C7D0	C7D1
0																
1	●															
2	●												●			
4	●				●				●				●			
8	●		●		●		●		●		●		●		●	
16	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

- Dual-CPU (HBM CPU) Configuration

Table 5-9 DDR5 DIMM Population Rules

DDR QTY	CPU0																CPU1															
	C0D0	C0D1	C1D0	C1D1	C2D0	C2D1	C3D0	C3D1	C4D0	C4D1	C5D0	C5D1	C6D0	C6D1	C7D0	C7D1	C0D0	C0D1	C1D0	C1D1	C2D0	C2D1	C3D0	C3D1	C4D0	C4D1	C5D0	C5D1	C6D0	C6D1	C7D0	C7D1
0																																
2	●																●															
4	●								●								●												●			
8	●				●				●				●				●				●				●				●			
16	●		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●	
32	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

- Single-CPU (Sapphire Rapids) and 24 Gb DRAM Chip-Based DIMM Configuration

Table 5-10 DDR5 DIMM Population Rules

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

- Dual-CPU (Sapphire Rapids) and 24 Gb DRAM Chip-Based DIMM Configuration

Table 5-11 DDR5 DIMM Population Rules

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

🗎 NOTE

In Table 5-10 and Table 5-11, 24 Gb DRAM chip-based DIMMs indicate 24/48/96 GB DIMMs only. These 24/48/96 GB DIMMs feature 24 Gb DRAM chips only.

5.7 Storage

5.7.1 Drive Configurations

🗎 NOTE

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

1. KR1280-X2-A0-R0-00

Table 5-12 Drive Configurations

Configuration	Front Drives	Rear Drives	Internal Drives	Drive Management Mode
4 × 3.5-Inch Drive + 2 × E1.S SSD + 2 × M.2 SSD Config.	• 4 × 3.5-inch drive: Drive bays with physical drive No. 4 to 7 support SAS/SATA/ NVMe drives • 2 × E1.S SSD: Drive bays with physical drive No. 0 to 1 support NVMe drives • 2 × M.2 SSD: Drive bays with physical drive No. 2 to 3 support SATA drives	2 × 2.5-inch SAS/ SATA drive	2 × SATA/ PCIe M.2 SSD	• SAS/SATA drive or front M.2 SSD: RAID mezz card, PCIe RAID card or directly connected to the PCH • Internal SATA/PCIe M.2 SSD: directly connected to the PCH • NVMe drive/E1.S SSD: tri-mode PCIe RAID card or directly connected to CPUs

Configuration	Front Drives	Rear Drives	Internal Drives	Drive Management Mode
4 × 3.5-Inch Drive + 4 × 2.5-Inch Drive Config.	• 4 × 3.5-inch drive: Drive bays with physical drive No. 4 to 7 support SAS/SATA/NVMe drives • 4 × 2.5-inch drive: Drive bays with physical drive No. 0 to 3 support SAS/SATA/NVMe drives	2 × 2.5-inch SAS/SATA drive	2 × SATA/PCIe M.2 SSD	• SAS/SATA drive: RAID mezz card, PCIe RAID card or directly connected to the PCH • Internal SATA/PCIe M.2 SSD: directly connected to the PCH • NVMe drive: tri-mode PCIe RAID card or directly connected to CPUs
10 × 2.5-Inch Drive Config.	10 × 2.5-inch drive: Drive bays with physical drive No. 0 to 9 support SAS/SATA/NVMe drives	2 × 2.5-inch SAS/SATA drive	2 × SATA/PCIe M.2 SSD	• SAS/SATA drive: PCIe RAID card, RAID mezz card or directly connected to the PCH • Internal SATA/PCIe M.2 SSD: directly connected to the PCH • NVMe drive: tri-mode PCIe RAID card or directly connected to CPUs

Configuration	Front Drives	Rear Drives	Internal Drives	Drive Management Mode
12 × 2.5-Inch Drive Config.	12 × 2.5-inch drive: Drive bays with physical drive No. 0 to 11 support SAS/SATA/NVMe drives	2 × 2.5-inch SAS/ SATA drive	2 × SATA/ PCIe M.2 SSD	• SAS/SATA drive: PCIe RAID card, RAID mezz card or directly connected to the PCH • Internal SATA/PCIe M.2 SSD: directly connected to the PCH • NVMe drive: tri-mode PCIe RAID card or directly connected to CPUs
8 × 2.5-Inch Drive + 2 × E1.S SSD + 2 × M.2 SSD Config.	• 8 × 2.5-inch drive: Drive bays with physical drive No. 0 to 7 support SAS/SATA/ NVMe drives • 2 × E1.S SSD: Drive bays with physical drive No. 8 to 9 support NVMe drives • 2 × M.2 SSD: Drive bays with physical drive No. 10 to 11 support SATA drives	2 × 2.5-inch SAS/ SATA drive	2 × SATA/ PCIe M.2 SSD	• SAS/SATA drive or front M.2 SSD: PCIe RAID card, RAID mezz card or directly connected to the PCH • Internal SATA/PCIe M.2 SSD: directly connected to the PCH • NVMe drive/E1.S SSD: tri-mode PCIe RAID card or directly

Configuration	Front Drives	Rear Drives	Internal Drives	Drive Management Mode
				connected to CPUs

2. KR1280-X2-A0-F0-00

Table 5-13 Drive Configurations

Configuration	Front Drives	Drive Management Mode
4 × E3.S SSD Config.	4 × E3.S SSD: Drive bays with physical drive No. 0 to 3 support NVMe drives	E3.S SSD: tri-mode PCIe RAID card or directly connected to CPUs
4 × 2.5-Inch Drive Config.	4 × 2.5-inch drive: Drive bays with physical drive No. 0 to 3 support SAS/SATA/NVMe drives	• SAS/SATA drive: RAID mezz card, PCIe RAID card or directly connected to the PCH • NVMe drive: tri-mode PCIe RAID card or directly connected to CPUs
12 × E1.S SSD + 2 × M.2 SSD Config.	• 12 × E1.S SSD: Drive bays with physical drive No. 0 to 11 support NVMe drives • 2 × M.2 SSD: Drive bays with physical drive No. 12 to 13 support SATA drives	• E1.S SSD: tri-mode PCIe RAID card or directly connected to CPUs • M.2 SSD: RAID mezz card, PCIe RAID card or directly connected to the PCH

3. KR1280-X2-C0-R0-00

Table 5-14 Drive Configurations

Configuration	Front Drives	Drive Management Mode
4 × 3.5-Inch Drive + 2 × E1.S SSD + 2 × M.2 SSD Config.	• 4 × 3.5-inch drive: Drive bays with physical drive No. 4 to 7 support SAS/SATA/NVMe drives • 2 × E1.S SSD: Drive bays with physical drive No. 0 to 1 support NVMe drives • 2 × M.2 SSD: Drive bays with physical drive No. 2 to 3 support SATA drives	• SAS/SATA drive or front M.2 SSD: PCIe RAID card or directly connected to the PCH • NVMe drive/E1.S SSD: tri-mode PCIe RAID card or directly connected to CPUs
8 × 2.5-Inch Drive + 2 × E1.S SSD + 2 × M.2 SSD Config.	• 8 × 2.5-inch drive: Drive bays with physical drive No. 0 to 7 support SAS/SATA/NVMe drives • 2 × E1.S SSD: Drive bays with physical drive No. 8 to 9 support NVMe drives • 2 × M.2 SSD: Drive bays with physical drive No. 10 to 11 support SATA drives	• SAS/SATA drive or front M.2 SSD: PCIe RAID card or directly connected to the PCH • NVMe drive/E1.S SSD: tri-mode PCIe RAID card or directly connected to CPUs
10 × 2.5-Inch Drive Config.	10 × 2.5-inch drive: Drive bays with physical drive No. 0 to 9 support SAS/SATA/NVMe drives	• SAS/SATA drive: PCIe RAID card or directly connected to the PCH • NVMe drive: tri-mode PCIe RAID card or

Configuration	Front Drives	Drive Management Mode
		directly connected to CPUs
12 × 2.5-Inch Drive Config.	12 × 2.5-inch drive: Drive bays with physical drive No. 0 to 11 support NVMe drives	• NVMe drive: tri-mode PCIe RAID card or directly connected to CPUs

5.7.2 Drive Numbering

1. 4 × 3.5-Inch Drive + 2 × E1.S SSD + 2 × M.2 SSD Configuration

📄 NOTE

Applicable model: KR1280-X2-A0-R0-00 and KR1280-X2-C0-R0-00.

Figure 5-15 Drive Numbering

Configuration	Physical Drive No.	Drive No. Identified by the ISBMC	Front/Rear	Drive No. Identified by the RAID Card
2 × E1.S SSD	0 to 1	0 to 1	Front	8i tri-mode RAID card: 0 to 1
2 × M.2 SSD	2 to 3	2 to 3	Front	8i RAID card: 0 to 1
4 × SAS/SATA Drive	4 to 7	4 to 7	Front	8i RAID card: 4 to 7
4 × NVMe Drive	4 to 7	4 to 7	Front	16i tri-mode RAID card: 0 to 3

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

📄 NOTE

Applicable model: KR1280-X2-A0-R0-00.

Figure 5-16 Drive Numbering

Configuration	Physical Drive No.	Drive No. Identified by the ISBMC	Front/Rear	Drive No. Identified by the RAID Card
8 × SAS/SATA Drive	0 to 7	0 to 7	Front	8i RAID card: 0 to 7
8 × NVMe Drive	0 to 3	0 to 3	Front	-
	4 to 7	4 to 7	Front	16i tri-mode RAID card: 0 to 3

3. 10 × 2.5-Inch Drive Configuration

📄 NOTE

Applicable model: KR1280-X2-A0-R0-00 and KR1280-X2-C0-R0-00

Figure 5-17 Drive Numbering

Configuration	Physical Drive No.	Drive No. Identified by the ISBMC	Front/Rear	Drive No. Identified by the RAID Card
10 × SAS/SATA Drive	0 to 9	0 to 9	Front	16i RAID card: 0 to 9
10 × NVMe Drive	0 to 1	0 to 1	Front	8i tri-mode RAID card: 0 to 1
	2 to 7	2 to 7	Front	-
	8 to 9	8 to 9	Front	8i tri-mode RAID card: 0 to 1

4. 12 × 2.5-Inch Drive Configuration

📄 NOTE

Applicable model: KR1280-X2-A0-R0-00 and KR1280-X2-C0-R0-00

Figure 5-18 Drive Numbering

Configuration	Physical Drive No.	Drive No. Identified by the ISBMC	Front/Rear	Drive No. Identified by the RAID Card
12 × SAS/SATA Drive	0 to 11	0 to 11	Front	16i RAID card: 0 to 11
12 × NVMe Drive	0 to 1	0 to 1	Front	8i tri-mode RAID card: 0 to 1
	2 to 11	2 to 11	Front	-

5. 8 × 2.5-Inch Drive + 2 × E1.S SSD + 2 × M.2 SSD Configuration

📄 NOTE

Applicable model: KR1280-X2-A0-R0-00 and KR1280-X2-C0-R0-00

Figure 5-19 Drive Numbering

Configuration	Physical Drive No.	Drive No. Identified by the ISBMC	Front/Rear	Drive No. Identified by the RAID Card
8 × SAS/SATA Drive	0 to 7	0 to 7	Front	8i RAID card: 0 to 7
8 × NVMe Drive	0 to 1	0 to 1	Front	8i tri-mode RAID card: 0 to 1
	2 to 7	2 to 7	Front	-

Configuration	Physical Drive No.	Drive No. Identified by the ISBMC	Front/Rear	Drive No. Identified by the RAID Card
2 × E1.S SSD	8 to 9	8 to 9	Front	-
2 × M.2 SSD	10 to 11	10 to 11	Front	8i RAID card: 0 to 1

6. 12 × E1.S SSD + 2 × M.2 SSD + 2 × PCIe Slot Configuration

📄 NOTE

Applicable model: KR1280-X2-A0-F0-00.

Figure 5-20 Drive Numbering

Configuration	Physical Drive No.	Drive No. Identified by the ISBMC	Front/Rear	Drive No. Identified by the RAID Card
12 × E1.S SSD	0 to 11	0 to 11	Front	-
2 × M.2 SSD	12 to 13	12 to 13	Front	8i RAID card: 0 to 1

7. 4 × 2.5-Inch Drive/E3.S SSD + 2 × PCIe Slot Configuration

📄 NOTE

Applicable model: KR1280-X2-A0-F0-00.

Figure 5-21 Drive Numbering

Configuration	Physical Drive No.	Drive No. Identified by the ISBMC	Front/Rear	Drive No. Identified by the RAID Card
4 × SAS/SATA Drive	0 to 3	0 to 3	Front	8i RAID card: 0 to 3
4 × NVMe Drive	0 to 3	0 to 3	Front	-
4 × E3.S SSD	0 to 3	0 to 3	Front	-

5.7.3 Drive LEDs

1. SAS/SATA Drive LEDs

Figure 5-22 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	Off	Off		Drive present and in use
Blinking	Solid pink			Copyback/Rebuild in progress
Solid on	Solid on	Off		Drive selected but not in use
Blinking	Solid on	Off		Drive selected and in use
Off	Solid on	Off		Drive is selected but fails
Any status	Off	Solid on		Drive fails

2. NVMe Drive LEDs

Figure 5-23 NVMe Drive LEDs
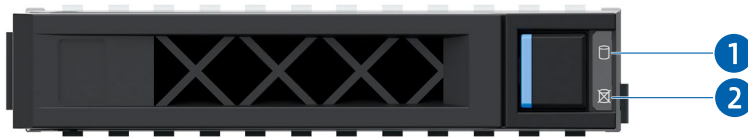
When the VMD function is enabled and the latest VMD driver is installed, the NVMe drives support surprise hot swap.

Table 5-15 NVMe Drive LED Description

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

5.7.4 RAID Cards

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

5.8 Network

NICs provide network expansion capabilities.

● The OCP slots support OCP 3.0 cards. Users can select the OCP 3.0 cards as needed.

● The PCIe slots support PCIe NICs. Users can select the PCIe cards as needed.

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

5.9 I/O Expansion

5.9.1 PCIe Expansion Cards

PCIe expansion cards provide system expansion capabilities.

- Up to 8 PCIe 5.0 expansion slots, with up to 2 OCP 3.0 cards supported by CPU0, up to 1 OCP 3.0 card by CPU1 and 1 RAID mezz card by CPU0.

- 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 5-24 Front PCIe Slots

📄 NOTE

Applicable model: KR1280-X2-A0-F0-00.

- Slot 2 and Slot 3 reside in the left PCIe riser module.

Figure 5-25 Rear PCIe Slots - 2 × PCIe

📄 NOTE

Applicable model: KR1280-X2-A0-R0-00 and KR1280-X2-A0-F0-00.

- Slot 0 resides in the left PCIe riser module.

- Slot 1 resides in the right PCIe riser module.

Figure 5-26 Rear PCIe Slots - 3 × PCIe

📄 NOTE

Applicable model: KR1280-X2-A0-R0-00.

- Slot 0 and Slot 1 reside in the left PCIe riser module.

- Slot 2 resides in the right PCIe riser module.

Figure 5-27 Rear PCIe Slot - 1 × PCIe

📄 NOTE

Applicable model: KR1280-X2-A0-R0-00.

- Slot 2 resides in the right PCIe riser module.

Figure 5-28 Rear PCIe Slots - 2 × PCIe (Cold Plate Configuration)

📄 NOTE

Applicable model: KR1280-X2-C0-R0-00.

- Slot 0 and Slot 1 reside in the left PCIe riser module.

5.9.3 PCIe Riser Modules

- Butterfly PCIe riser module: This module houses 2 slots (Slot 0 and Slot 1).

Figure 5-29 Butterfly PCIe Riser Module
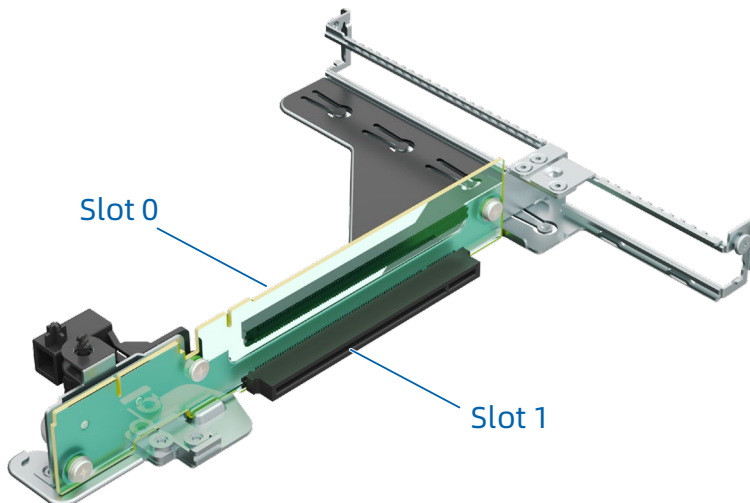
- HHHL PCIe riser module: This module houses 1 slot (Slot 2).

Figure 5-30 HHHL PCIe Riser Module
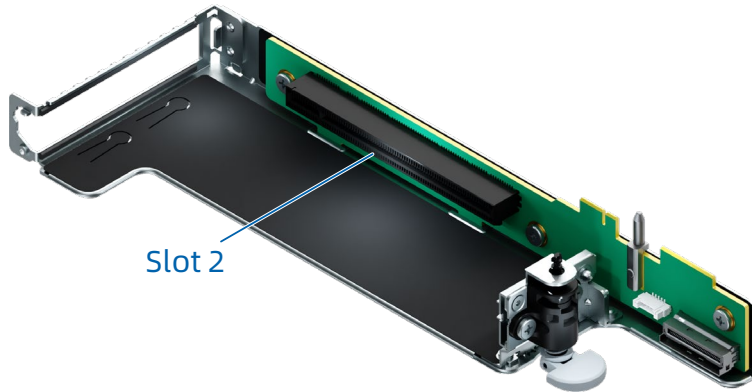
- Front FHHL PCIe riser module: This module houses 2 slots (Slot 2 and Slot 3).

Figure 5-31 Front FHHL PCIe Riser Module
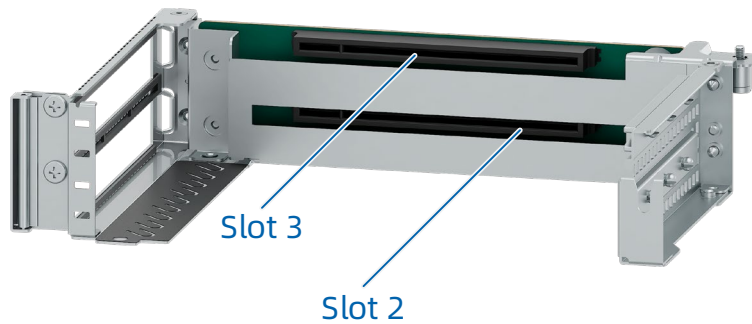
- Rear FHHL PCIe Riser Module

  - This module houses 1 slot (Slot 0) when it is installed on the left.

  - This module houses 1 slot (Slot 1) when it is installed on the right.

Figure 5-32 Rear FHHL PCIe Riser Module

Slot 0 or Slot 1
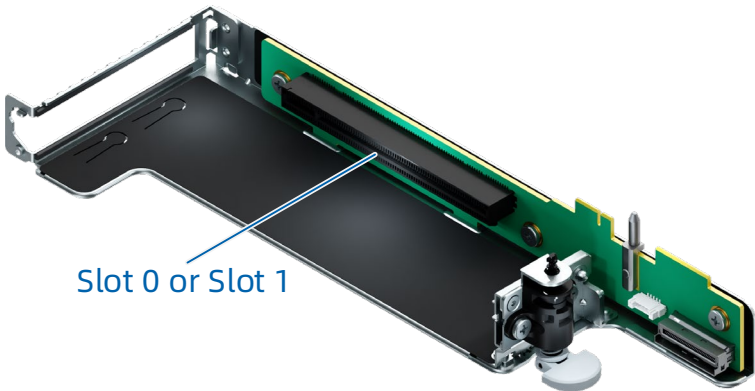
5.9.4 PCIe Slot Description

NOTE

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

● Models with 2 Front PCIe Slots

Table 5-16 PCIe Slot Description

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
Slot 2	CPU1	PCIe 5.0	x16	x16	PE3	FHHL
Slot 3	CPU1	PCIe 5.0	x16	x16	PE4	FHHL
OCP 3.0 Slot	CPU0	PCIe 5.0	x16	x16	PE4	Standard OCP 3.0

● Models with 2 Rear PCIe Slots

Table 5-17 PCIe Slot Description

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
Slot 0	CPU0	PCIe 5.0	x16	x16	PE1	FHHL
Slot 1	CPU1	PCIe 5.0	x16	x16	PE2	HHHL
OCP 3.0 Slot	CPU0	PCIe 5.0	x8	x8	PE0	Standard OCP 3.0

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
OCP 3.0 Slot	CPU1	PCIe 5.0	x8/x16	x8/x16	PE0	Standard OCP 3.0
OCPA Slot	CPU0	PCIe 5.0	x8	x8	PE0	-

- Models with 3 Rear PCIe Slots

Table 5-18 PCIe Slot Description

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
Slot 0	CPU0	PCIe 5.0	x16	x16	PE1	FHHL
Slot 1	CPU0	PCIe 5.0	x16	x16	PE4	HHHL
Slot 2	CPU1	PCIe 5.0	x16	x16	PE2	HHHL
OCP 3.0 Slot	CPU0	PCIe 5.0	x8	x8	PE0	Standard OCP 3.0
OCP 3.0 Slot	CPU1	PCIe 5.0	x8/x16	x8/x16	PE0	Standard OCP 3.0
OCPA Slot	CPU0	PCIe 5.0	x8	x8	PE0	-

- Models with 1 Rear PCIe Slot

Table 5-19 PCIe Slot Description

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
Slot 2	CPU1	PCIe 5.0	x16	x16	PE2	HHHL
OCP 3.0 Slot	CPU0	PCIe 5.0	x8	x8	PE0	Standard OCP 3.0
OCP 3.0 Slot	CPU1	PCIe 5.0	x8/x16	x8/x16	PE0	Standard OCP 3.0
OCPA Slot	CPU0	PCIe 5.0	x8	x8	PE0	-

5.10 PSUs

- Supports 1 or 2 PSUs.

- Supports AC or DC input.

- The PSUs are hot-swappable.

- When 2 PSUs are configured, the PSUs offer 1+1 redundancy.

- The server must use PSUs bearing the same part number (P/N code).

- The PSUs feature short-circuit protection.

Figure 5-33 PSU Locations

PSU 0   PSU 1
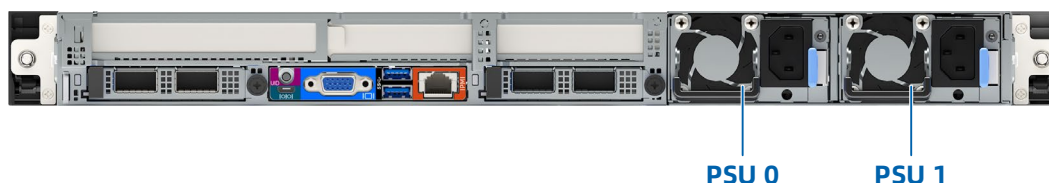
5.10.1 PSU LED

Figure 5-34 PSU LED Description

Solid Green

Off

Solid Amber
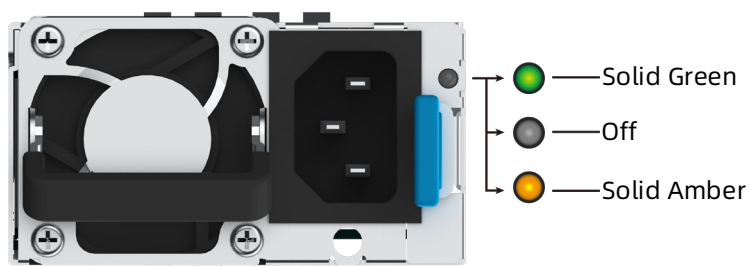
Item	PSU LED Status	Description
1	Solid green	Normal
2	Off	No AC/DC input to the PSU
3	Solid amber	PSU critical event causing a shutdown (possible causes: PSU overtemperature protection, PSU overcurrent protection, PSU overvoltage protection, short circuit protection)
4	Blinking amber (1 Hz)	PSU warning event where the PSU continues to operate (possible causes: PSU overtemperature warning, PSU overcurrent warning, excessively low fan speed warning)
5	Blinking green (1 Hz)	PSU operating in standby state with normal input

Item	PSU LED Status	Description
6	Blinking green (on for 2 seconds, and off for 1 second)	PSU in cold redundant state
7	Blinking green (2 Hz)	PSU firmware updating

5.11 Fan Modules

- The server supports 8 fan modules. Users can select low- or high-speed 4056 fans based on the configuration.

- The fan modules are hot-swappable.

- The server supports fan modules in 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 bearing the same part number (P/N code).

Figure 5-35 Fan Module Locations
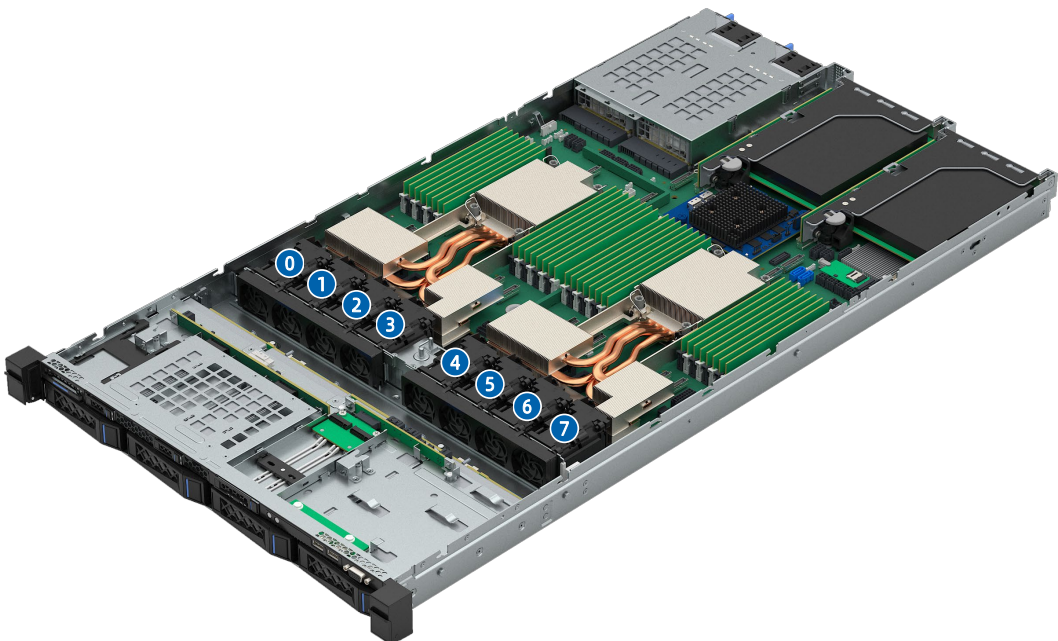
5.12 Cold Plate Module

For the KR1280-X2-C0-R0-00, the CPUs use cold plate heatsinks. The PCH heatsink is the same as those of other models of the KR1280V2 series server.

Figure 5-36 Cold Plate Heatsink
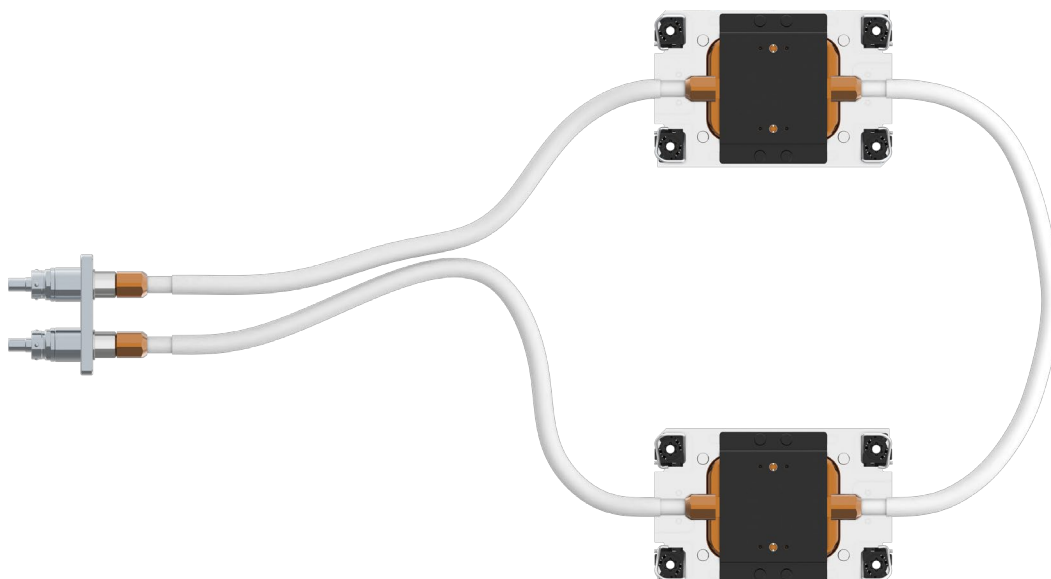
5.13 LCD Module

5.13.1 Function

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

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

Figure 5-37 How LCD Subsystem Works
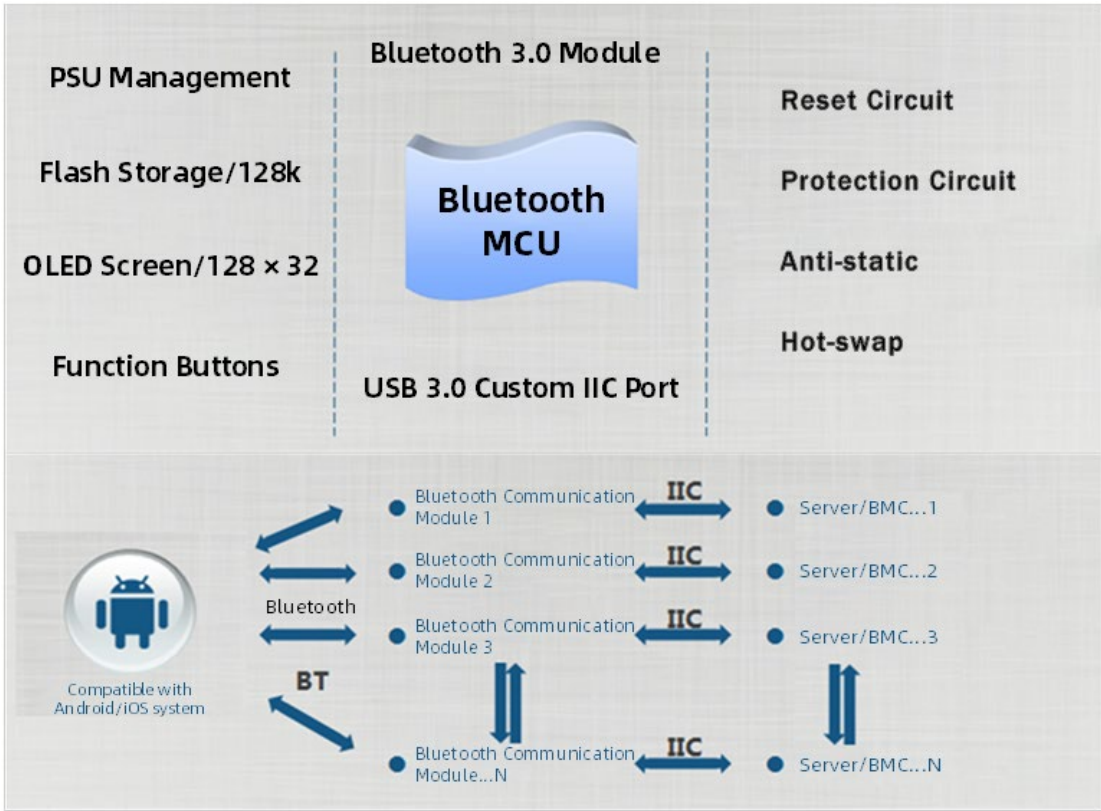
5.13.2 Interface

Figure 5-38 App Home Screen
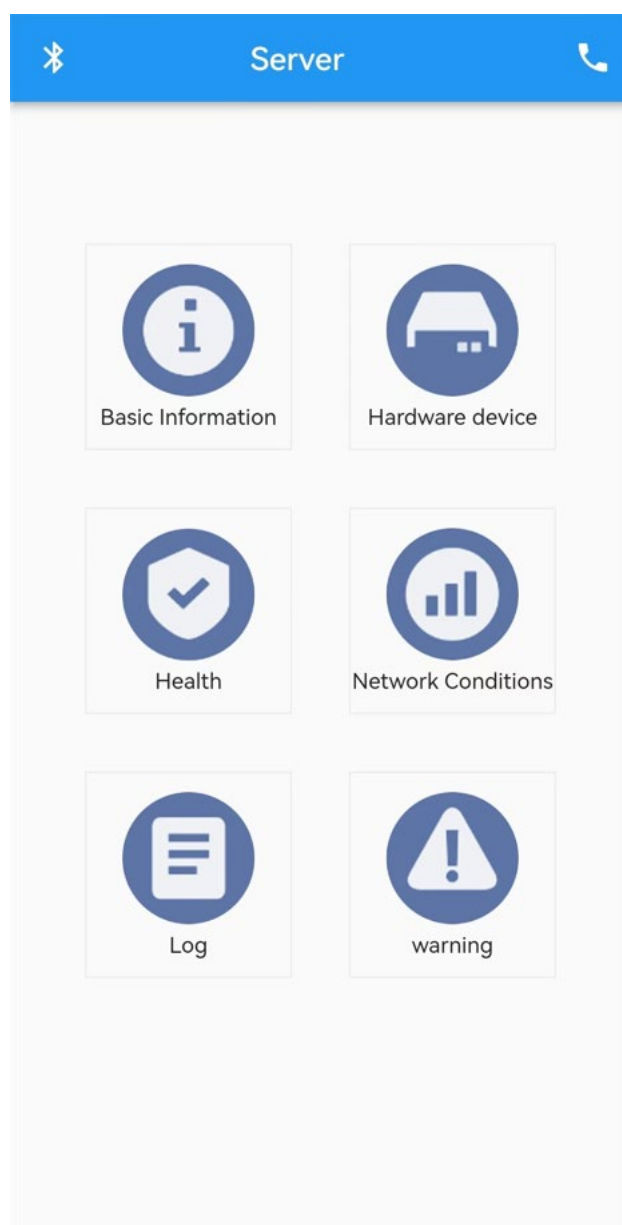
5.13.3 Mobile Management Software ISMM

As mobile management software, ISMM reads server-related information from the BMC via the LCD module, including the operating status of processors and memories, network status, logs, and alerts, and transmits the information to client mobile terminals via Bluetooth. ISMM facilitates the O&M personnel to inspect and maintain the server and delivers more comprehensive server management capabilities.

Table 5-20 Basic Features of ISMM

Feature	Item
Basic Information	Host name
	IP address
	Asset label
	Product serial number
	Product model
	All CPU models
	Total memory capacity (GB)
	Firmware version Note: BMC/BIOS/ME/CPLD version
	Status (Power-on/power-off/processor/memory/hard disk/fan/power/network)
Hardware Device	Processor
	Memory
	Device list
	Power
Health	Processor
	Memory
	Hard disk
	Network
	Power consumption
	Power
	Fan
	Temperature
	Voltage
	GPU
Warning	No.
	Item
	Status
	Time
Network Conditions	LAN interface type
	MAC address

Feature	Item	
	IPv4 configuration	IPv4 address
		Subnet mask
		IPv4 default gateway
	IPv6 configuration	IPv6 address
		Subnet mask
		IPv6 default gateway
Log	Logs	
Service Support	Service support (hotline and official website)	

5.14 Boards

📄 NOTE

The figures below may differ from the actual configuration.

5.14.1 Motherboard

Figure 5-39 Motherboard Layout
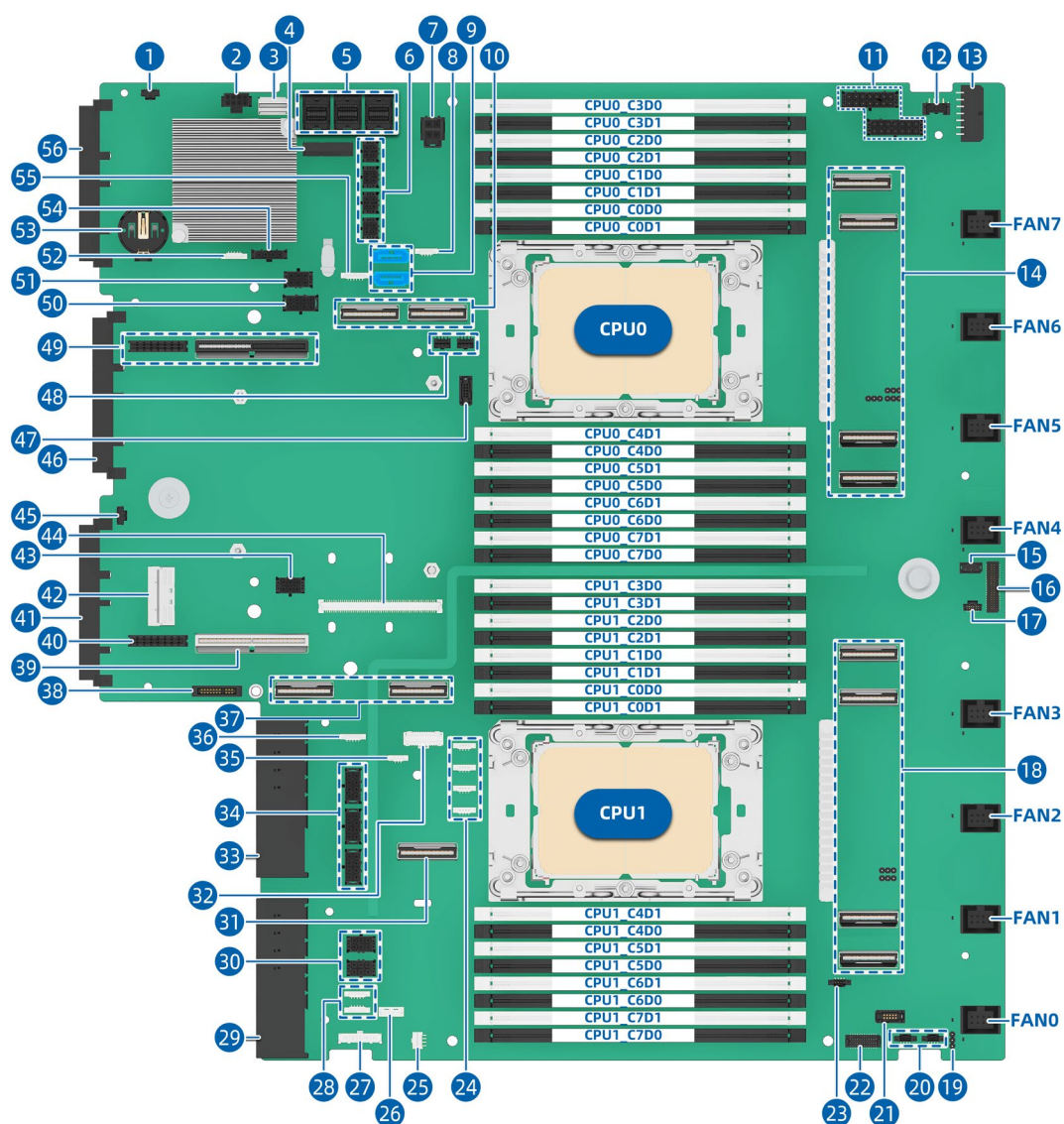
Item	Feature	Item	Feature
1	OCP 3.0 Card 0 Hot-Plug Button and LED Connector	29	PSU1 Connector
2	Mid-Drive Power Connector	30	GPU Riser Power Connector
3	Right Control Panel Connector	31	MCIO x8 Connector
4	System TF Card Adapter Connector	32	NC-SI Connector
5	Mini-SAS HD Connector	33	PSU0 Connector
6	Rear Drive BP Power Connector	34	GPU Power Connector
7	OCP 3.0 Card 2 Power Connector	35	Smart NIC UART Connector

Item	Feature	Item	Feature
8	Drive BP I^{2}C Connector	36	Riser I^{2}C Connector
9	SATA 7-Pin Connector	37	MCIO x8 Connector
10	MCIO x8 Connector	38	Riser 0 Power Connector
11	Front Drive BP Power Connector	39	MCIO x16 Connector
12	Inlet Temperature Sensor Connector	40	Riser 1 Power Connector
13	Front Drive BP Power Connector	41	OCP 3.0 Card 1 Connector
14	MCIO x8 Connector	42	OCP 3.0 Card 1 MCIO Connector
15	Intrusion Detection Connector	43	GPU Riser 2 Power Connector
16	OCP 3.0 Card 2 Sideband Connector	44	OCPA Connector
17	OCP 3.0 Card 2 Hot-Plug Button and LED Connector	45	OCP 3.0 Card 1 Hot-Plug Button and LED Connector
18	MCIO x8 Connector	46	DC-SCM Connector
19	CMOS Jumper	47	VPP Connector
20	Drive BP I^{2}C Connector	48	Leak Detection Connector
21	VPP Connector	49	Riser 0 Connector
22	Left Control Panel Connector	50	GPU0 Power Connector
23	Rear Drive BP I^{2}C Connector	51	GPU Riser 0 Power Connector
24	Drive BP I^{2}C Connector	52	Riser I^{2}C Connector
25	IPMB Connector	53	Button Cell Battery Socket
26	RAID Key Connector	54	Smart NIC Power Connector
27	Capacitor Board Power Connector	55	Drive BP SGPIO Connector
28	Riser I^{2}C Connector	56	OCP 3.0 Card 0 Connector

5.14.2 DC-SCM Board

Figure 5-40 DC-SCM Board Layout
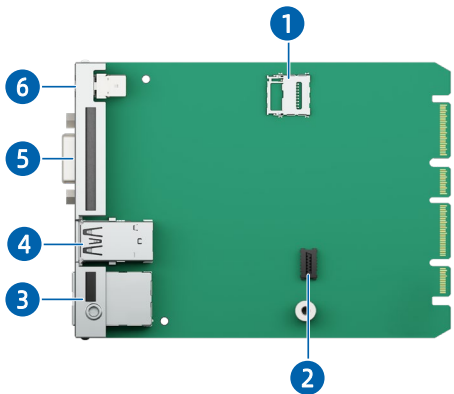
Item	Feature	Item	Feature
1	BMC TF Card Slot	4	USB 3.0 Port
2	TCM/TPM Connector	5	VGA Port
3	BMC Management Network Port	6	System/BMC Serial Port

5.14.3 Drive Backplanes

1. Front Drive Backplanes

● 4 × 3.5-Inch SAS/SATA Drive Backplane

Figure 5-41 4 × 3.5-Inch SAS/SATA Drive Backplane
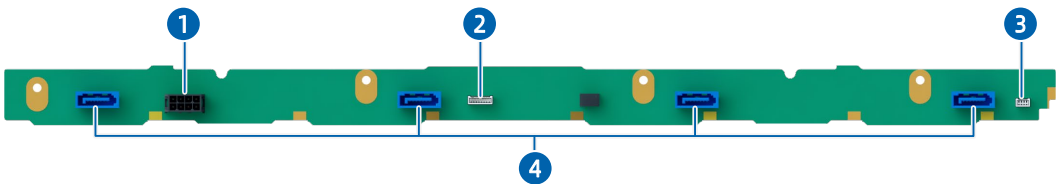
Item	Feature	Item	Feature
1	Power Connector	3	BMC_I^{2}C Connector
2	SGPIO Connector	4	SATA 7-Pin Connector

- 2 × M.2 Drive Backplane

Figure 5-42 2 × M.2 Drive Backplane
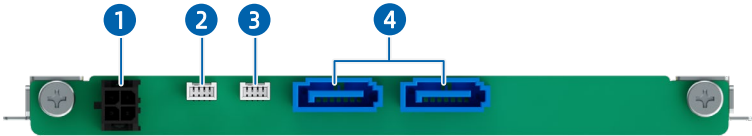
Item	Feature	Item	Feature
1	Power Connector	3	BMC_I^{2}C Connector
2	SGPIO Connector	4	SATA 7-Pin Connector

- 8 × 2.5-Inch SAS/SATA Drive Backplane

Figure 5-43 8 × 2.5-Inch SAS/SATA Drive Backplane
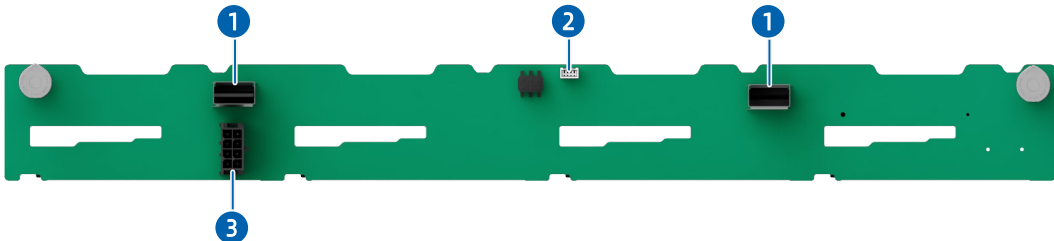
Item	Feature	Item	Feature
1	Slimline x4 Connector	3	Power Connector
2	BMC_I^{2}C Connector	-	-

- 2 × 2.5-Inch NVMe Drive Backplane

Figure 5-44 2 × 2.5-Inch NVMe Drive Backplane
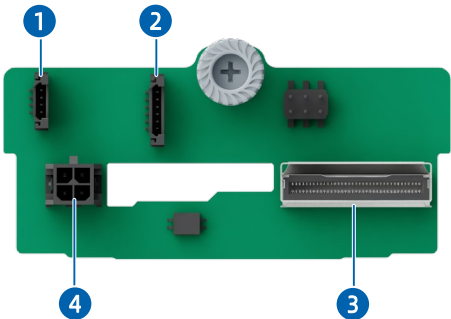
Item	Feature	Item	Feature
1	BMC_I^{2}C Connector	3	MCIO x8 Connector
2	VPP Connector	4	Power Connector

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

Figure 5-45 4 × 3.5-Inch SAS/SATA/NVMe Drive Backplane
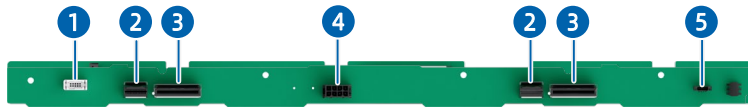
Item	Feature	Item	Feature
1	VPP Connector	4	Power Connector
2	Slimline x4 Connector	5	BMC_I^{2}C Connector
3	MCIO x8 Connector	-	-

- 4 × 2.5-Inch SAS/SATA/NVMe Drive Backplane

Figure 5-46 4 × 2.5-Inch SAS/SATA/NVMe Drive Backplane
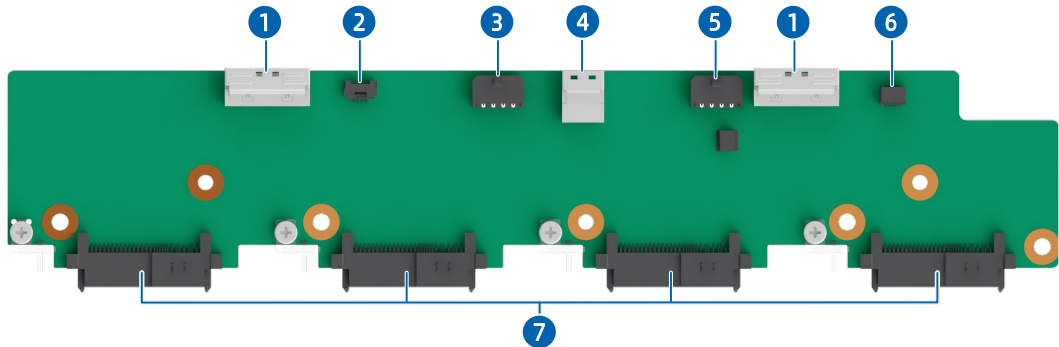
Item	Feature	Item	Feature
1	MCIO x8 Connector	5	Power Connector 1
2	BMC_I^{2}C Connector	6	VPP Connector
3	Power Connector 0	7	Drive Connector
4	Slimline x4 Connector	-	-

- 2 × 2.5-Inch SAS/SATA Drive Backplane

Figure 5-47 2 × 2.5-Inch SAS/SATA Drive Backplane
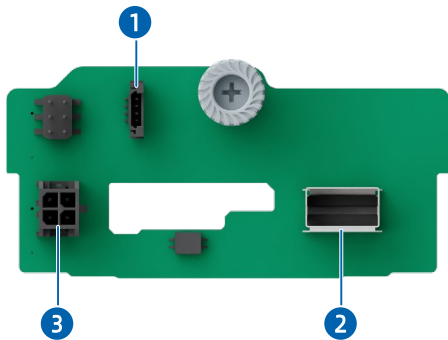
Item	Feature	Item	Feature
1	BMC_I²C Connector	3	Power Connector
2	Slimline x4 Connector	-	-

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

Figure 5-48 8 × 2.5-Inch SAS/SATA/NVMe Drive Backplane
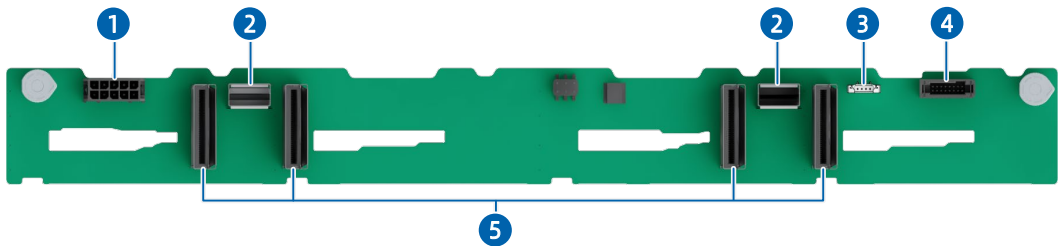
Item	Feature	Item	Feature
1	Power Connector	4	VPP Connector
2	Slimline x4 Connector	5	MCIO x8 Connector
3	BMC_I²C Connector	-	-

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

Figure 5-49 12 × 2.5-Inch SAS/SATA/NVMe Drive Backplane
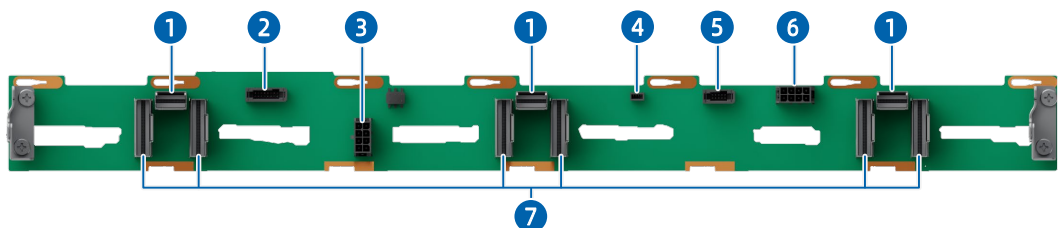
Item	Feature	Item	Feature
1	Slimline x4 Connector	5	VPP Connector
2	Control Panel Connector	6	Power Connector 0
3	Power Connector 1	7	MCIO x8 Connector
4	BMC_I^{2}C Connector	-	-

- 2 × E1.S Drive Backplane

Figure 5-50 2 × E1.S Drive Backplane
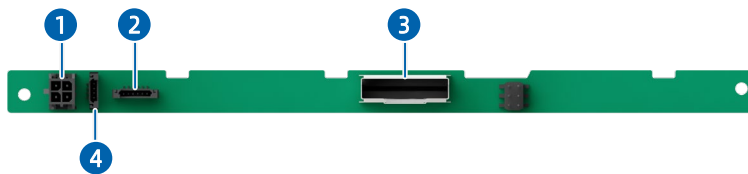
Item	Feature	Item	Feature
1	Power Connector	3	Slimline x8 Connector
2	VPP Connector	4	BMC_I^{2}C Connector

- 2 × E1.S + 2 × M.2 Drive Backplane

Figure 5-51 2 × E1.S + 2 × M.2 Drive Backplane
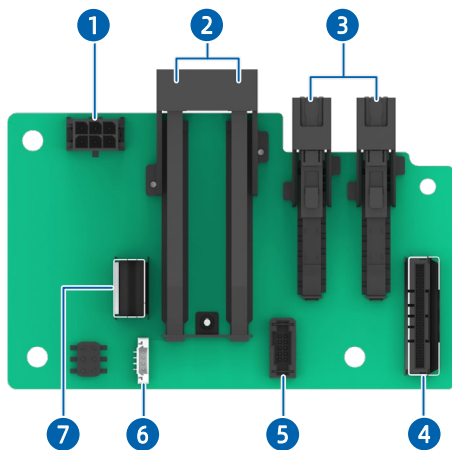
Item	Feature	Item	Feature
1	Power Connector	5	VPP Connector
2	SATA M.2 SSD Connector	6	BMC_I^{2}C Connector
3	E1.S SSD Connector	7	Slimline x4 Connector
4	MCIO x8 Connector	-	-

- 12 × E1.S + 2 × M.2 Drive Backplane

Figure 5-52 12 × E1.S + 2 × M.2 Drive Backplane
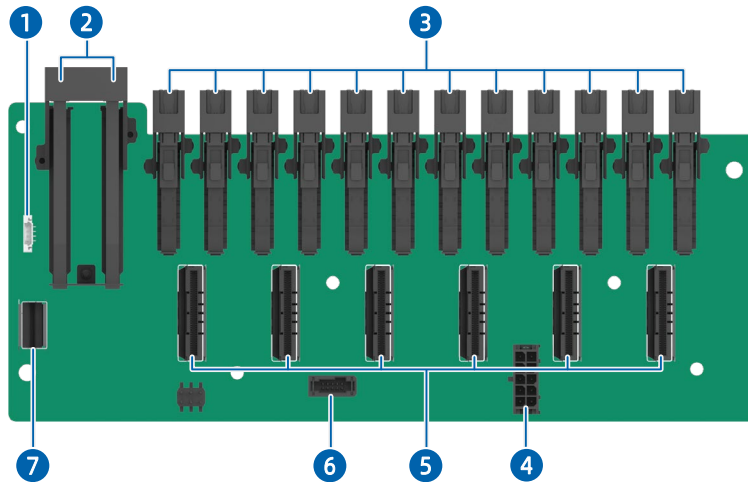
Item	Feature	Item	Feature
1	BMC_I^{2}C Connector	5	MCIO x8 Connector
2	SATA M.2 SSD Connector	6	VPP Connector
3	E1.S SSD Connector	7	Slimline x4 Connector
4	Power Connector	-	-

- 4 × 2.5-Inch SAS/SATA/NVMe Drive Backplane

Figure 5-53 4 × 2.5-Inch SAS/SATA/NVMe Drive Backplane
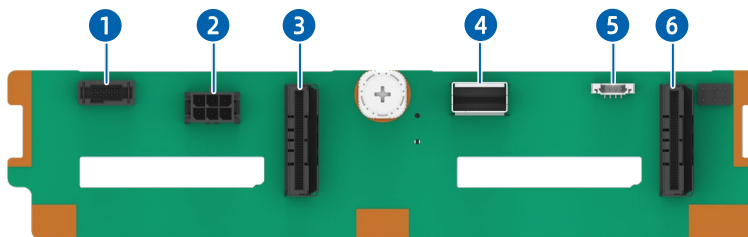
Item	Feature	Item	Feature
1	VPP Connector	4	Slimline x4 Connector
2	Power Connector	5	BMC_I^{2}C Connector
3	MCIO x8 Connector	6	MCIO x8 Connector

- 4 × E3.S Drive Backplane

Figure 5-54 4 × E3.S Drive Backplane
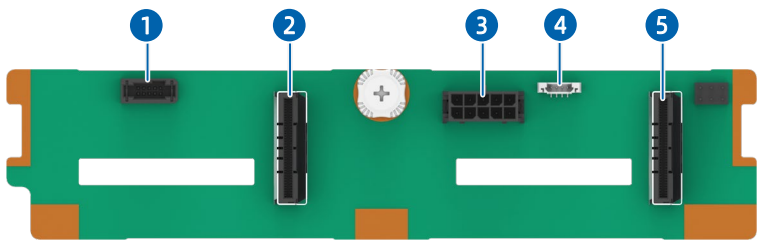
Item	Feature	Item	Feature
1	VPP Connector	4	BMC_I^{2}C Connector
2	MCIO x8 Connector	5	MCIO x8 Connector
3	Power Connector	-	-

2. Rear Drive Backplanes

- 2 × 2.5-Inch SAS/SATA Drive Backplane

Figure 5-55 2 × 2.5-Inch SAS/SATA Drive Backplane
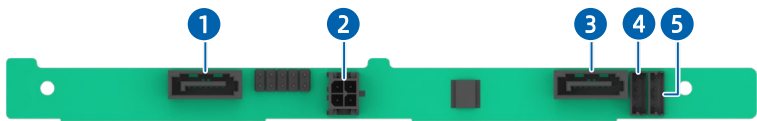
Item	Feature	Item	Feature
1	SATA 7-Pin Connector	4	BMC_I^{2}C Connector
2	Power Connector	5	SGPIO Connector
3	SATA 7-Pin Connector	-	-

6 Product Specifications

6.1 KR1280-X2-A0-R0-00

6.1.1 Technical Specifications

Table 6-1 Technical Specifications

Item	Description
Form Factor	1U rack server
Chipset	Intel C741 chipset
Processor	Supports 1 or 2 processors. • Intel Xeon Scalable processors (SPR/EMR) • Integrated memory controllers and 8 memory channels per processor • Integrated PCIe controllers and 80 PCIe 5.0 lanes per processor • Up to 64 cores per CPU • Max. Turbo frequency of 4.2 GHz • 4 UPI links per CPU at up to 20 GT/s per link • L3 cache up to 5 MB per core • TDP up to 385 W Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.
Memory	Supports up to 32 DDR5 DIMMs. • RDIMMs supported • ECC, memory mirroring and memory sparing supported • 8 memory channels per processor with up to 2 DIMMs per channel • Up to 5,600 MT/s at 1 DPC and 4,400 MT/s at 2 DPC • Mixing DDR5 DIMMs of different specifications (capacity, bit width, rank, height, etc.) is not supported. • A server must use DDR5 DIMMs with the same part number (P/N code). Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.
Storage	Supports multiple drive configurations. See 5.7.1 Drive Configurations for details. • Front (one of the following configurations):

Item	Description
	- Up to 12 × 2.5-inch SAS/SATA/NVMe drive, hot-swappable - Up to 10 × 2.5-inch SAS/SATA/NVMe drive, hot-swappable - Up to 4 × 3.5-inch SAS/SATA/NVMe drive + 2 × M.2 SSD + 2 × E1.S SSD, the 3.5-inch drives and E1.S SSDs are hot-swappable, and the M.2 SSDs are not hot-swappable - Up to 4 × 3.5-inch SAS/SATA/NVMe drive + 4 × 2.5-inch SAS/SATA/NVMe drive, hot-swappable - Up to 8 × 2.5-inch SAS/SATA/NVMe drive + 2 × M.2 SSD + 2 × E1.S SSD, the 2.5-inch drives and E1.S SSDs are hot-swappable, and the M.2 SSDs are not hot-swappable • Rear: Up to 2 × 2.5-inch SAS/SATA drive, hot-swappable • Internal: Up to 2 × SATA/PCIe M.2 SSD
Network	• Up to two 1/10/25/100/200 Gb hot-plug OCP 3.0 cards, with balanced mode supported for the dual-CPU configuration and NC-SI feature • Standard 1/10/25/40/100/200 Gb PCIe NICs • 1 BMC management network port of 100/1,000 Mbps auto-negotiation
I/O Expansion	• Up to 3 standard PCIe expansion cards • Up to two 1/10/25/100/200 Gb OCP 3.0 cards For details, see [5.9.2 PCIe Slot Locations](#) and [5.9.4 PCIe Slot Description](#).
Port	• Front: - 1 × USB 2.0/LCD port - 1 × USB 3.0 port - 1 × VGA port • Rear: - 2 × USB 3.0 port - 1 × VGA port - 1 × system/BMC serial port (micro USB) - 1 × BMC management network 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

Item	Description
	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 • ISBMC • NC-SI • KSManage • KSManage Tools
Security Feature	• Intel Platform Firmware Resilience (PFR) • Trusted Platform Module (TPM) 2.0 and Trusted Cryptography Module (TCM) • Intel Trusted Execution Technology • Firmware update mechanism based on digital signatures • UEFI Secure Boot • Double factor authentication • Single sign-on • BIOS secure boot based on TPM • BMC secure boot based on hardware • BIOS Secure Flash and BIOS Lock Enable (BLE) • BMC and BIOS dual-image mechanism • Chassis intrusion detection • Optional system secure wiping

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 +65°C (-40°F to +149°F) • Storage (unpacked): -40°C to +70°C (-40°F to +158°F)
Relative Humidity (RH, non-condensing)	• Operating: 5% to 90% RH • Storage (packed): 5% to 95% RH • Storage (unpacked): 5% to 95% RH
Operating Altitude	• Operating: 0 to 3,050 m (0 to 10,007 ft) • Shipping (storage): 0 to 12,000 m (0 to 39,370 ft)
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

Item	Description

	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: 5.92 Bels
	   - LpAm: 42.3 dBA
	• Operating:
	   - LWAd: 6.14 Bels
	   - LpAm: 46.3 dBA

Notes:

1. Not all configurations support an operating temperature range of 5°C to 45°C (41°F to 113°F). See 12.1 Thermal Restrictions for details.

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), varying by server configuration.

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

3. Expanded operating temperature:

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

- For certain configurations, the supported system inlet ambient temperature can be expanded to 40°C to 45°C (104°F to 113°F) at sea level. At an altitude of 0 to 950 m (0 to 3,117 ft), derate the maximum allowable temperature by 1°C per 305 m (1°F per 319 ft). At an altitude of 950 to 3,050 m (3,117 to 10,007 ft), derate the maximum allowable 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 specific configurations of a server. Sound levels vary by server configuration, loads and ambient temperature. These values are for reference only and subject to change without notice.

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

6.1.3 Physical Specifications

Table 6-3 Physical Specifications

Item	Description
Outer Packaging Dimensions (L × W × H)	1,090 × 600 × 240 mm (42.91 × 23.62 × 9.45 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.) for the chassis with a depth of 800 mm (31.50 in.), and above 1,100 mm (43.31 in.) for the chassis with a depth of 850 mm (33.46 in.)
	• Installation requirements for the server rails are as follows:
	  - L-bracket static rails: The distance between the front and rear mounting flanges ranges from 609 to 914 mm (23.98 to 35.98 in.).
	  - Ball-bearing rail kit: The distance between the front and rear mounting flanges ranges from 609 to 914 mm (23.98 to 35.98 in.).

Weight	• 12 × 2.5-inch drive configuration:
	  - Net weight: 19.96 kg (44.00 lbs)
	  - Gross weight: 28.16 kg (62.08 lbs, including the server, packaging box, rails and accessory box)
	• 10 × 2.5-inch drive configuration (ten 2.5-inch drives and 3 GPUs loaded):
	  - Net weight: 19.59 kg (43.19 lbs)
	  - Gross weight: 27.98 kg (61.69 lbs, including the server, packaging box, rails and accessory box)
	• 4 × 3.5-inch drive + 4 × 2.5-inch drive configuration:
	  - Net weight: 20.33 kg (44.82 lbs)
	  - Gross weight: 29.27 kg (64.53 lbs, including the server, packaging box, rails and accessory box)

Item	Description

	• 4 × 3.5-inch drive + 2 × E1.S SSD + 2 × M.2 SSD configuration:
	
	  - Net weight: 19.83 kg (43.72 lbs)
	
	  - Gross weight: 28.77 kg (63.43 lbs, including the server, packaging box, rails and accessory box)
	
	• 8 × 2.5-inch drive + 2 × M.2 SSD + 2 × E1.S SSD configuration:
	
	  - Net weight: 18.57 kg (40.94 lbs)
	
	  - Gross weight: 27.41 kg (60.43 lbs, including the server, packaging box, rails and accessory box)
	
	Note:
	
	The server weight varies by configuration.

Figure 6-1 Chassis Dimensions
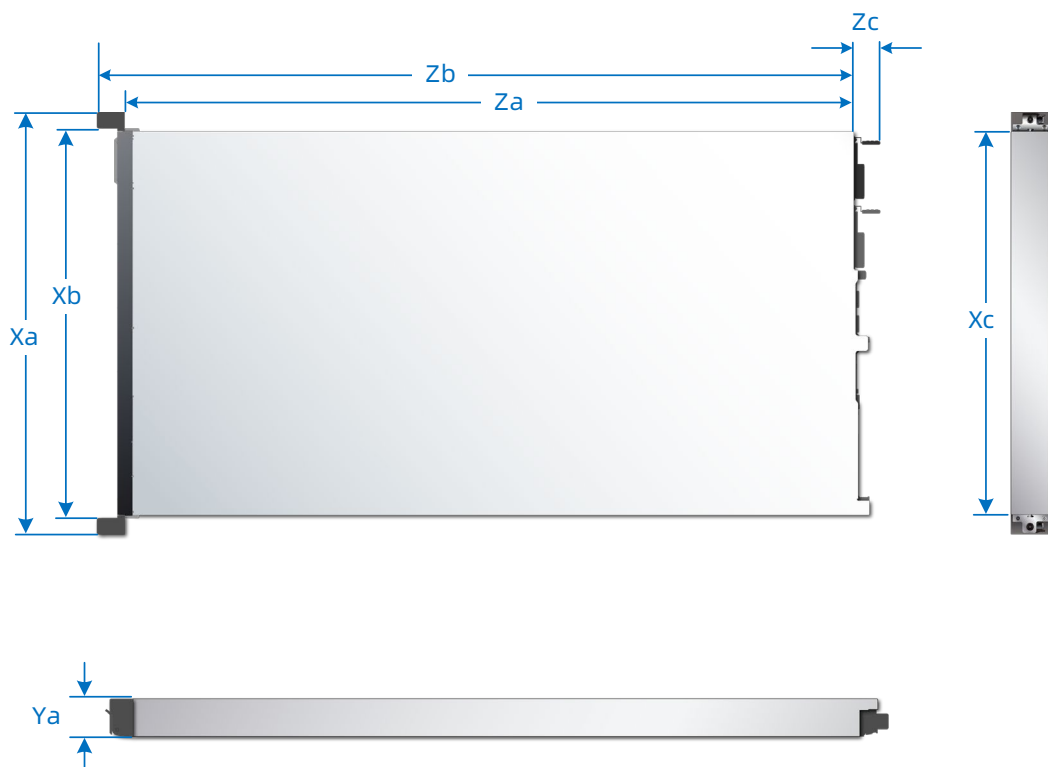
Configuration	Za	Zb	Zc	Xa	Xb	Xc	Ya
10 × 2.5-Inch Drive Configuration (configured with standard heatsinks)	800 mm (31.50 in.)	830 mm (32.68 in.)	30.18 mm (1.19 in.)	482 mm (18.98 in.)	438 mm (17.24 in.)	438 mm (17.24 in.)	43.05 mm (1.69 in.)
12 × 2.5-Inch Drive Configuration	850 mm (33.46 in.)	880 mm (34.65 in.)	30.18 mm (1.19 in.)	482.1 mm (18.98 in.)	438 mm (17.24 in.)	438 mm (17.24 in.)	43.05 mm (1.69 in.)
Other Configurations	850 mm (33.46 in.)	880 mm (34.65 in.)	30.18 mm (1.19 in.)	482 mm (18.98 in.)	438 mm (17.24 in.)	438 mm (17.24 in.)	43.05 mm (1.69 in.)

6.2 KR1280-X2-A0-F0-00

6.2.1 Technical Specifications

Table 6-4 Technical Specifications

Item	Description
Form Factor	1U rack server
Chipset	Intel C741 chipset
Processor	Supports 1 or 2 processors. • Intel Xeon Scalable processors (SPR/EMR) • Integrated memory controllers and 8 memory channels per processor • Integrated PCIe controllers and 80 PCIe 5.0 lanes per processor • Up to 64 cores per CPU • Max. Turbo frequency of 4.2 GHz • 4 UPI links per CPU at up to 20 GT/s per link • L3 cache up to 5 MB per core • TDP up to 385 W Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.
Memory	Supports up to 32 DDR5 DIMMs.

Item	Description
	• RDIMMs supported • ECC, memory mirroring and memory sparing supported • 8 memory channels per processor with up to 2 DIMMs per channel • Up to 5,600 MT/s at 1 DPC and 4,400 MT/s at 2 DPC • Mixing DDR5 DIMMs of different specifications (capacity, bit width, rank, height, etc.) is not supported. • A server must use DDR5 DIMMs with the same part number (P/N code). Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.

Storage	Supports multiple drive configurations. See 5.7.1 Drive Configurations for details.
	• Front (one of the following configurations):
	  - Up to 12 × E1.S SSD + 2 × M.2 SSD, the E1.S SSDs are hot-swappable, and the M.2 SSDs are not hot-swappable
	  - Up to 4 × E3.S SSD or 4 × 2.5-inch SAS/SATA/NVMe drive, hot-swappable

Network	• Up to three 1/10/25/100/200 Gb hot-plug OCP 3.0 cards, with NC-SI feature • Standard 1/10/25/40/100/200 Gb PCIe NICs • 1 BMC management network port of 100/1,000 Mbps auto-negotiation
I/O Expansion	• Up to 4 standard PCIe expansion cards • Up to 2 rear and 1 front 1/10/25/100/200 Gb OCP 3.0 cards • For details, see 5.9.2 PCIe Slot Locations and 5.9.4 PCIe Slot Description.

Port	• Front:
	  - 1 × USB 2.0/LCD port
	  - 1 × USB 3.0 port
	  - 1 × VGA port
	  - 1 × BMC management network port
	• Rear:
	  - 2 × USB 3.0 port
	  - 1 × VGA port
	  - 1 × system/BMC serial port (micro USB)

Item	Description
	- 1 × BMC management network 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.
System Management	• UEFI • ISBMC • NC-SI • KSManage • KSManage Tools
Security Feature	• Intel Platform Firmware Resilience (PFR) • Trusted Platform Module (TPM) 2.0 and Trusted Cryptography Module (TCM) • Intel Trusted Execution Technology • Firmware update mechanism based on digital signatures • UEFI Secure Boot • Double factor authentication • Single sign-on • BIOS secure boot based on TPM • BMC secure boot based on hardware • BIOS Secure Flash and BIOS Lock Enable (BLE) • BMC and BIOS dual-image mechanism • Chassis intrusion detection • Optional system secure wiping

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 +65°C (–40°F to +149°F) • Storage (unpacked): –40°C to +70°C (–40°F to +158°F)

Item	Description
Relative Humidity (RH, non-condensing)	• Operating: 5% to 90% RH • Storage (packed): 5% to 95% RH • Storage (unpacked): 5% to 95% RH
Operating Altitude	• Operating: 0 to 3,050 m (0 to 10,007 ft) • Shipping (storage): 0 to 12,000 m (0 to 39,370 ft)

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: 5.92 Bels
	  - LpAm: 42.3 dBA
	• Operating:
	  - LWAd: 6.14 Bels
	  - LpAm: 46.3 dBA

Notes:

1. Not all configurations support an operating temperature range of 5°C to 45°C (41°F to 113°F). See 12.1 Thermal Restrictions for details.

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), varying by server configuration.

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

3. Expanded operating temperature:

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

- For certain configurations, the supported system inlet ambient temperature can be expanded to 40°C to 45°C (104°F to 113°F) at sea level. At an altitude of 0 to 950 m (0 to 3,117 ft), derate the maximum allowable temperature by 1°C per 305 m (1°F per 319 ft). At an altitude of 950 to 3,050 m (3,117 to 10,007 ft), derate the maximum allowable 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 specific configurations of a server. Sound levels vary by server configuration, loads and ambient temperature. These values are for reference only and subject to change without notice.

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

6.2.3 Physical Specifications

Table 6-6 Physical Specifications

Item	Description
Outer Packaging Dimensions (L × W × H)	1,090 × 600 × 240 mm (42.91 × 23.62 × 9.45 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.) for the chassis with a depth of 800 mm (31.50 in.), and above 1,100 mm (43.31 in.) for the chassis with a depth of 850 mm (33.46 in.)
	
	• Installation requirements for the server rails are as follows:
	
	  - L-bracket static rails: The distance between the front and rear mounting flanges ranges from 609 to 914 mm (23.98 to 35.98 in.).
	
	  - Ball-bearing rail kit: The distance between the front and rear mounting flanges ranges from 609 to 914 mm (23.98 to 35.98 in.).

Weight	• 12 × E1.S SSD configuration:
	
	  - Net weight: 18.13 kg (39.97 lbs)
	
	  - Gross weight: 26.69 kg (58.84 lbs, including the server, packaging box, rails and accessory box)
	
	• 4 × E3.SSD configuration:
	
	  - Net weight: 16.1 kg (35.49 lbs)
	
	  - Gross weight: 25.1 kg (55.34 lbs, including the server, packaging box, rails and accessory box)
	
	• 4 × 2.5-inch drive configuration:

Item	Description
	- Net weight: 17.0 kg (37.48 lbs)
	- Gross weight: 25.4 kg (56.00 lbs, including the server, packaging box, rails and accessory box)
	Note:
	The server weight varies by configuration.

Figure 6-2 Chassis Dimensions
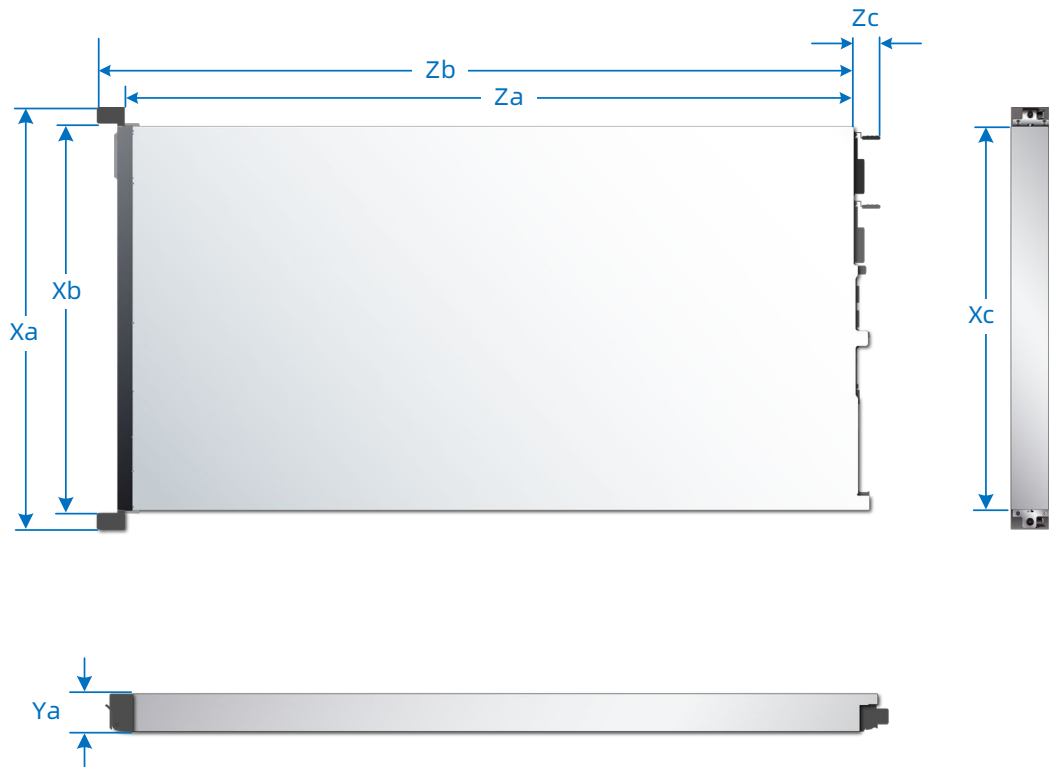
Configuration	Za	Zb	Zc	Xa	Xb	Xc	Ya
4 × E3.S SSD/2.5-Inch Drive Configuration	850 mm (33.46 in.)	880 mm (34.65 in.)	30.18 mm (1.19 in.)	482 mm (18.98 in.)	438 mm (17.24 in.)	438 mm (17.24 in.)	43.05 mm (1.69 in.)
12 × E1.S SSD + 2 × M.2 SSD Configuration							

6.3 KR1280-X2-C0-R0-00

6.3.1 Technical Specifications

Table 6-7 Technical Specifications

Item	Description
Form Factor	1U rack server
Chipset	Intel C741 chipset
Processor	Supports 1 or 2 processors. • Intel Xeon Scalable processors (SPR/EMR) • Integrated memory controllers and 8 memory channels per processor • Integrated PCIe controllers and 80 PCIe 5.0 lanes per processor • Up to 64 cores per CPU • Max. Turbo frequency of 4.2 GHz • 4 UPI links per CPU at up to 20 GT/s per link • L3 cache up to 5 MB per core • TDP up to 385 W Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.
Memory	Supports up to 32 DDR5 DIMMs. • RDIMMs supported • ECC, memory mirroring and memory sparing supported • 8 memory channels per processor with up to 2 DIMMs per channel • Up to 5,600 MT/s at 1 DPC and 4,400 MT/s at 2 DPC • Mixing DDR5 DIMMs of different specifications (capacity, bit width, rank, height, etc.) is not supported. • A server must use DDR5 DIMMs with the same part number (P/N code). Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.
Storage	Supports multiple drive configurations. See 5.7.1 Drive Configurations for details. • Front (one of the following configurations):

Item	Description
	- Up to 12 × 2.5-inch NVMe drive, hot-swappable - Up to 10 × 2.5-inch SAS/SATA/NVMe drive, hot-swappable - Up to 4 × 3.5-inch SAS/SATA/NVMe drive + 2 × M.2 SSD + 2 × E1.S SSD, the 3.5-inch drives and E1.S SSDs are hot-swappable, and the M.2 SSDs are not hot-swappable - Up to 8 × 2.5-inch SAS/SATA/NVMe drive + 2 × M.2 SSD + 2 × E1.S SSD, the 2.5-inch drives and E1.S SSDs are hot-swappable, and the M.2 SSDs are not hot-swappable
Network	• Up to two 1/10/25/100/200 Gb hot-plug OCP 3.0 cards, with balanced mode supported for the dual-CPU configuration and NC-SI feature • Standard 1/10/25/40/100/200 Gb PCIe NICs • 1 BMC management network port of 100/1,000 Mbps auto-negotiation
I/O Expansion	• Up to 2 standard PCIe expansion cards • Up to two 1/10/25/100/200 Gb OCP 3.0 cards For details, see 5.9.2 PCIe Slot Locations and 5.9.4 PCIe Slot Description.
Cold Plate	• Material: copper • Liquid coolant: deionized water, PG25, etc. • Filtered particle size (diameter) ≤5µm • Flow rate: 1 to 1.4 L/min per node. The flow rate may vary by configuration • Inlet liquid temperature: below 50℃ (122°F) • Outlet liquid temperature: varies by configuration • Operating pressure: below 50 psi • Maximum transient pressure: 100 psi • Quick disconnects: TSC/D-4Z02BSSJE

Port	• Front:
	
	  - 1 × USB 2.0/LCD port
	
	  - 1 × USB 3.0 port
	
	  - 1 × VGA port
	
	• Rear:

Item	Description
	- 2 × USB 3.0 port - 1 × VGA port - 1 × system/BMC serial port (micro USB) - 1 × BMC management network 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.
System Management	• UEFI • ISBMC • NC-SI • KSManage • KSManage Tools
Security Feature	• Intel Platform Firmware Resilience (PFR) • Trusted Platform Module (TPM) 2.0 and Trusted Cryptography Module (TCM) • Intel Trusted Execution Technology • Firmware update mechanism based on digital signatures • UEFI Secure Boot • Double factor authentication • Single sign-on • BIOS secure boot based on TPM • BMC secure boot based on hardware • BIOS Secure Flash and BIOS Lock Enable (BLE) • BMC and BIOS dual-image mechanism • Chassis intrusion detection • Optional system secure wiping

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 +65°C (-40°F to +149°F) • Storage (unpacked): -40°C to +70°C (-40°F to +158°F)
Relative Humidity (RH, non-condensing)	• Operating: 5% to 90% RH • Storage (packed): 5% to 95% RH • Storage (unpacked): 5% to 95% RH
Operating Altitude	• Operating: 0 to 3,050 m (0 to 10,007 ft) • Shipping (storage): 0 to 12,000 m (0 to 39,370 ft)
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: 5.92 Bel - LpAm: 42.3 dBA • Operating: - LWAd: 6.14 Bel - LpAm: 46.3 dBA

Notes:

1. Not all configurations support an operating temperature range of 5°C to 45°C (41°F to 113°F). See 12.1 Thermal Restrictions for details.

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), varying by server configuration.

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

3. Expanded operating temperature:

- For certain configurations, the supported system inlet ambient temperature can be expanded to 5°C to 10°C (41°F to 50°F) and 35°C to 40°C (95°F to 104°F) at sea level. At an altitude of 0 to 950 m (0 to 3,117 ft), derate the maximum allowable 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 temperature by 1°C per 175 m (1°F per 319 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 specific configurations of a server. Sound levels vary by server configuration, loads and ambient temperature. These values are for reference only and subject to change without notice.

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

6.3.3 Physical Specifications

Table 6-9 Physical Specifications

Item	Description
Outer Packaging Dimensions (L × W × H)	1,090 × 600 × 240 mm (42.91 × 23.62 × 9.45 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.) for the chassis with a depth of 800 mm (31.50 in.), and above 1,100 mm (43.31 in.) for the chassis with a depth of 850 mm (33.46 in.)
	
	• Installation requirements for the server rails are as follows:
	
	  - L-bracket static rails: The distance between the front and rear mounting flanges ranges from 609 to 914 mm (23.98 to 35.98 in.).
	  - Ball-bearing rail kit: The distance between the front and rear mounting flanges ranges from 609 to 914 mm (23.98 to 35.98 in.).

Figure 6-3 Chassis Dimensions
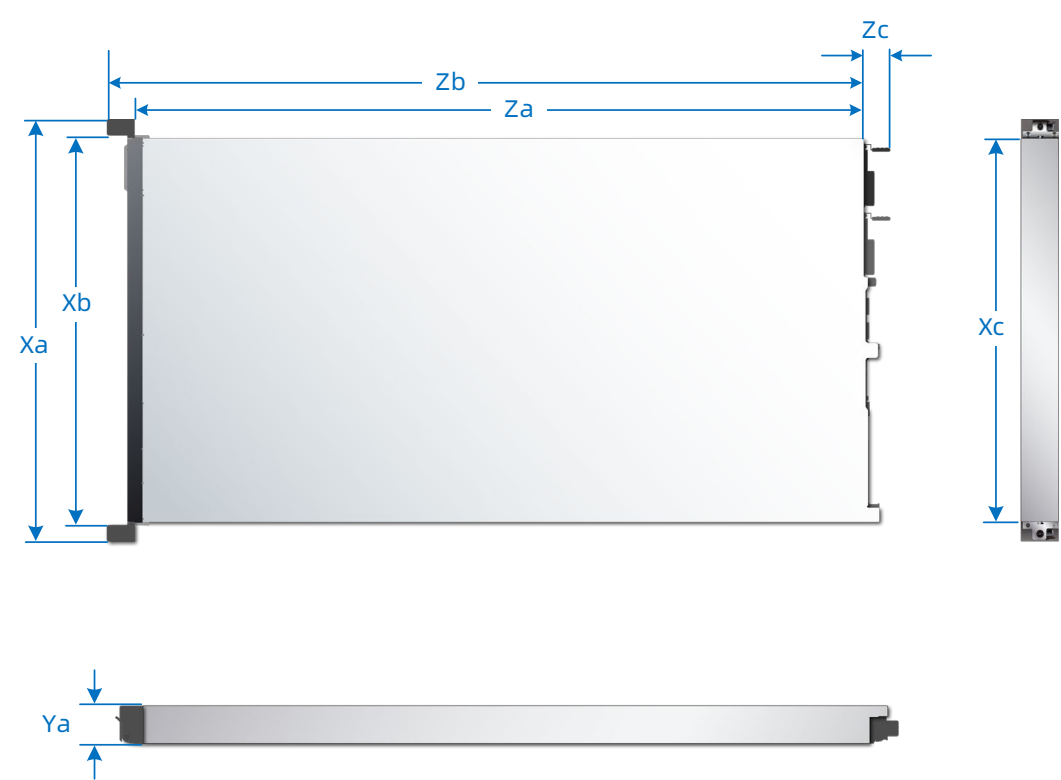
Configuration	Za	Zb	Zc	Xa	Xb	Xb	Ya
10 × 2.5-Inch Drive Configuration	800 mm (31.50 in.)	830 mm (32.68 in.)	30.18 mm (1.19 in.)	482 mm (18.98 in.)	438 mm (17.24 in.)	438 mm (17.24 in.)	43.05 mm (1.69 in.)
12 × 2.5-Inch Drive Configuration	850 mm (33.46 in.)	880 mm (34.65 in.)	30.18 mm (1.19 in.)	482.1 mm (18.98 in.)	438 mm (17.24 in.)	438 mm (17.24 in.)	43.05 mm (1.69 in.)
Other Configurations	850 mm (33.46 in.)	880 mm (34.65 in.)	30.18 mm (1.19 in.)	482 mm (18.98 in.)	438 mm (17.24 in.)	438 mm (17.24 in.)	43.05 mm (1.69 in.)

7 Operating System and Hardware Compatibility

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

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

7.1 Supported Operating System

Table 7-1 Supported Operating Systems

OS Version
Windows Server 2019
Windows Server 2022
Red Hat Enterprise Linux 8.6
Red Hat Enterprise Linux 8.9
Red Hat Enterprise Linux 9.0
Red Hat Enterprise Linux 9.3
Red Hat Enterprise Linux 9.4

OS Version
SLES 15.4
SLES 12.5
Oracle Linux 7.9
Oracle Linux 8.2
Oracle Linux 8.9
Oracle Linux 9.3
Ubuntu 22.04

7.2 Hardware Compatibility

7.2.1 CPU Specifications

The server supports up to two Intel Xeon Scalable processors (Sapphire Rapids/Emerald Rapids) of the Eagle Stream platform.

Table 7-2 CPU Specifications

Model	Cores	Threads	Base Frequency (GHz)	Max. Turbo Frequency (GHz)	Cache (MB)	TDP (W)
8480+	56	112	2.00	3.80	105	350
8470	52	104	2.00	3.80	105	350
8468	48	96	2.10	3.80	105	350
8462Y+	32	64	2.80	4.10	60	300
6442Y	24	48	2.60	4.00	60	225
6438M	32	64	2.20	3.90	60	205
6426Y	16	32	2.50	4.10	37.5	185
6430	32	64	2.10	3.40	60	270
6454S	32	64	2.20	3.40	60	270
6418H	24	48	2.10	4.00	60	185
6416H	18	36	2.20	4.20	45	165
5418Y	24	48	2.00	3.80	45	185
4410T	10	20	2.70	4.00	26.25	150
8592+	64	128	1.9	3.90	320	350
8580	60	120	2.00	4.00	300	350
8570	56	112	2.10	4.00	300	350
8568Y+	48	96	2.30	4.00	300	350
8592V	64	128	2.00	3.90	320	330
8581V	60	120	2.00	3.90	300	270

Model	Cores	Threads	Base Frequency (GHz)	Max. Turbo Frequency (GHz)	Cache (MB)	TDP (W)
8562Y+	32	64	2.80	4.10	60	300
6548Y+	32	64	2.50	4.10	60	250
6544Y	16	32	3.60	4.10	45	270
6534	8	16	3.90	4.20	22.5	195
6526Y	16	32	2.80	3.90	37.5	195
6538Y+	32	64	2.20	4.00	60	225
6548N	32	64	2.80	4.10	60	250
6542Y	24	48	2.90	4.10	60	250
5520+	28	56	2.20	4.00	52.5	205
5515 +	8	16	3.20	4.10	22.5	165
5512U	28	56	2.10	3.70	52.5	185
4516Y+	24	48	2.20	3.70	45	185

7.2.2 DIMM Specifications

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

Table 7-3 DIMM Specifications

Type	Capacity (GB)	Speed (MT/s)	Data Width	Organization
RDIMM	16	4,800	x80	1R x8
RDIMM	32	4,800	x80	1R x4/2R x8
RDIMM	64	4,800	x80	2R x4
RDIMM	96	4,800	x80	2R x4
RDIMM	128	4,800	x80	4R x4
RDIMM	16	5,600	x80	1R x8
RDIMM	32	5,600	x80	2R x8
RDIMM	64	5,600	x80	2R x4

7.2.3 Drive Specifications

Table 7-4 HDD Specifications

Type	Speed (RPM)	Capacity	Max. Qty.
SAS HDD	10K	600 GB/1.2 TB/1.8 TB/2.4 TB	12

Type	Speed (RPM)	Capacity	Max. Qty.
SATA HDD	7.2K	4 TB/6 TB/8 TB/10 TB/12 TB/14 TB/16 TB/18 TB	4

Table 7-5 SAS/SATA SSD Specifications

Type	Capacity	Max. Qty.
SATA SSD	240 GB	12
SATA SSD	480 GB	12
SATA SSD	960 GB	12
SATA SSD	1.92 TB	12
SATA SSD	3.84 TB	12
SATA SSD	7.68 TB	12
SAS SSD	960 GB	12
SAS SSD	1.92 TB	12
SAS SSD	3.84 TB	12

Table 7-6 U.2 NVMe SSD Specifications

Type	Capacity	Max. Qty.
U.2 NVMe SSD	960 GB	12
U.2 NVMe SSD	1.6 TB	12
U.2 NVMe SSD	1.92 TB	12
U.2 NVMe SSD	3.2 TB	12
U.2 NVMe SSD	3.8 TB	12
U.2 NVMe SSD	6.4 TB	12
U.2 NVMe SSD	7.68 TB	12
U.2 NVMe SSD	8 TB	12
U.2 NVMe SSD	12.8 TB	12
U.2 NVMe SSD	15.36 TB	12

Table 7-7 M.2 SSD Specifications

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

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

7.2.4 SAS/RAID Card Specifications

Table 7-8 SAS/RAID Card Specifications

Type	Description
SAS Card	SAS Card_ME_PM8222_HBA_8R0_SAS3_PCIE3_M
	SAS Card_ME_PM8222_SHBA_8R0_SAS3_PCIE3_MCTP
	SAS Card_MT0801M6E_SHBA_8_SAS4_P4E
	SAS Card_MT0800M6H_HBA_8_SAS4_P4E
	SAS Card_BRCM_8R0_9500-8i_SMSAS3_PCIE4
	SAS Card_BRCM_16R0_9500-16i_SMSAS3_PCIE4
RAID Card	RAID Card_ME_P_PM8204_8R0_2GB_SAS3_PCIE3_M
	RAID Card_ME_P_PM8204_8R0_4GB_SAS3_PCIE3_M
	RAID Card_MT0804M6R_RA_8_4GB_SAS4_P4E
	RAID Card_MT0808M6R_RA_8_8GB_SAS4_P4E
	RAID Card_BRCM_8R0_9540-8i_0_SMSAS3_PCIE4
	RAID Card_BRCM_8R0_9560-8i_4G_SS3_P4_7
	RAID Card_BRCM_16R0_9560-16i_8G_SS3_P4_7
	RAID Card_SND_2R0_9230_N_M.2_PCIE2_v1

7.2.5 NIC Specifications

Table 7-9 OCP Card Specifications

Type	Description	Speed (Gbps)	Port Qty.
OCP 3.0 Card	NIC_SND_1G_I350_RJ_OCP3x4_2_XR	1	2
	NIC_Andes-M6_X710_10G_LC_OCP3x8_2	10	2
	NIC_I_10G_X710-DA2_LC_OCP3x16_2_XR	10	2
	NIC_I_10G_X710T4L_RJ_OCP3x8_4_XR	10	4
	NIC_SND_10G_X550_RJ_OCP3x4_2_XR	10	2
	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_Andes-M6_E810_25G_LC_OCP3x8_2	25	2
	NIC_M_100G_MCX623436AN_LC_OCP3x16_2_XR	100	2
	NIC_BRCM_100G_57508_LC_OCP3x16_2_XR	100	2
	NIC_I_100G_E810CQDA2_LC_OCP3x16_2_XR	100	2
	NIC_M_200G_MCX623435AN_LC_OCP3x16_XR	200	1

Table 7-10 PCIe NIC Specifications

Type	Description	Speed (Gbps)	Port Qty.
PCIe NIC	NIC_SND_W_I350-AM2_RJ_PCI-E4X_1KM_Dual	1	2
	NIC_Vostok_I350_1G_RJ_PCIEx4_4	1	2
	NIC_Intel_W_I350-T2V2_RJ_PCI-E4X_1KM_Dual	1	2
	NIC_I_10G_X710DA2_LC_PCIEx8_2_XR	10	2
	NIC_I_10G_EX710DA2_LC_PCIEx8_2_XR_Lmt	10	2
	NIC_Vostok_X710_10G_LC_PCIEx8_2	10	2
	NIC_SOLARFL_25G_9250_LC_PCIEx8_2_XR_PlUS	10	2
	NIC_Sbt_X722_10G_LC_PCIEx8-G3_2	10	2
	NIC_X550_10G_RJ45_PCIEX8_Dual	10	2
	NIC_I_10G_X710T2L_RJ_PCIEx8_2_XR	10	2
	NIC_M_25G_MCX512A-ACAT_LC_PCIEx8_2_XR	25	2
	NIC_M_25G_MCX631102AN_LC_PCIEx8_2_XR	25	2
	NIC_Andes-M6_E810_25G_LC_PCIEx8_2	25	2
	NIC_I_25G_E810XXVDA2_LC_PCIEx8_2_XR	25	2
	NIC_BRCM_25G_57414_LC_PCIEx8_2_XR_42C	25	2
	NIC_I_25G_E810XXVDA4_LC_PCIEx16_4_XR	25	4
	NIC_I_40G_EXL710QDA2_LC_PCIEx8_2_XR	40	2
	NIC_M_100G_MCX623106AN_LC_PCIEx16_2_XR	100	2
	NIC_BRCM_100G_508_LC_PCIEx16_2_XR	100	2
	NIC_I_100G_E810CQDA2_LC_PCIEx16_2_XR	100	2
	NIC_M_200G_MCX623105AN_LC_PCIEx16_XR	200	1

7.2.6 HBA/HCA Card Specifications

Table 7-11 HBA Card Specifications

Type	Description	Speed (Gbps)	Port Qty.
HBA Card	HBA Card_E_0R1_LPE31000-AP_FC16G_PCIE	16	1
	HBA Card_E_0R2_LPE31002-AP_FC16G_PCIE	16	2
	HBA Card_QL_0R1_QLE2690-ISR-BK_FC16G_PCIE	16	1

Type	Description	Speed (Gbps)	Port Qty.
	HBA Card_QL_0R2_QLE2692-ISR-BK_FC16G_PCIE	16	2
	HBA Card_E_0R1_LPE32000-AP_FC32G_PCIE	32	1
	HBA Card_E_0R2_LPE32002-AP_FC32G_PCIE	32	2
	HBA Card_QL_0R1_QLE2740_FC32G_PCIE	32	1
	HBA Card_QL_0R2_QLE2742-ISR-BK_FC32G_PCIE	32	2
	HBA Card_E_0R1_LPE35000-AP_FC32G_PCIE	32	1
	HBA Card_E_0R2_LPE35002_FC32G_PCIE	32	2
	HBA Card_Marvell_0R1_QLE2770_FC32G_PCIE_4.0	32	1
	HBA Card_Marvell_0R2_QLE2772_FC32G_PCIE_4.0	32	2

Table 7-12 HCA Card Specifications

Type	Description	Speed (Gbps)	Port Qty.
HCA Card	MCX653105A-ECAT PCIe 3.0/4.0 X16	100	1
	MCX653106A-ECAT PCIe 3.0/4.0 X16	100	2
	MCX653105A-HDAT PCIe 3.0/4.0 X16	100	1
	MCX653106A-HDAT PCIe 3.0/4.0 x16	100	2
	HCA Card_NV_1-NDR_MCX75310AAS-NEAT_PCIE	200	1

7.2.7 GPU/Graphics Card Specifications

Table 7-13 GPU/Graphics Card Specifications

Type	Description	Max. Qty.
GPU	GPU_NV_16G_NVIDIA-A2-PCIe4_128b	3
Graphics Card	Graphics Card_NV_8G_T1000_128b_P	3
	Graphics Card_NV_4G_T400_64b_P	3

7.2.8 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-swapping and tool-less installation into

the server with the PSUs locking automatically after being inserted into the power bay. The CRPS PSUs are 80 Plus Platinum or Titanium rated with various output powers, allowing customers to choose as needed.

- The following rated 110 Vac, 230 Vac and 240 Vdc PSUs in 1+1 redundancy are supported:

  - 550 W Platinum PSU: 550 W (110 Vac), 550 W (230 Vac), 550 W (240 Vdc for China)

  - 800 W Platinum PSU: 800 W (110 Vac), 800 W (230 Vac), 800 W (240 Vdc for China)

  - 1,300 W Platinum PSU: 1,000 W (110 Vac), 1,300 W (230 Vac), 1,300 W (240 Vdc for China)

  - 1,600 W Platinum PSU: 1,000 W (110 Vac), 1,600 W (230 Vac), 1,600 W (240 Vdc for China)

  - 2,000 W Platinum PSU: 1,000 W (110 Vac), 2,000 W (230 Vac), 2,000 W (240 Vdc for China)

  - 800 W Titanium PSU: 800 W (230 Vac), 800 W (240 Vdc for China)

  - 1,300 W Titanium PSU: 1,000 W (110 Vac), 1,300 W (230 Vac), 1,300 W (240 Vdc for China)

  - 1,600 W Titanium PSU: 1,000 W (110 Vac), 1,600 W (230 Vac), 1,600 W (240 Vdc for China)

  - 2,000 W Titanium PSU: 1,000 W (110 Vac), 2,000 W (230 Vac), 2,000 W (240 Vdc for China)

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

  Operating voltage range:

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

  - 240 Vdc: 180 Vdc to 320 Vdc

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

  - 800 W –48 Vdc PSU: 800 W (–48 Vdc)

  - 1,300 W –48 Vdc 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
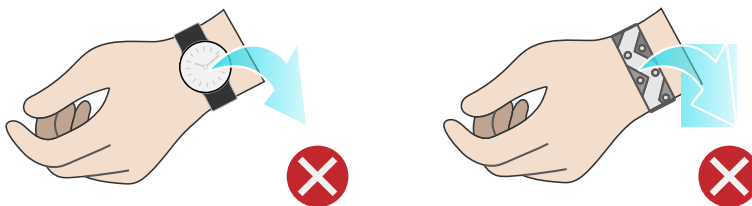
How to put on an ESD strap (Figure 8-3).

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
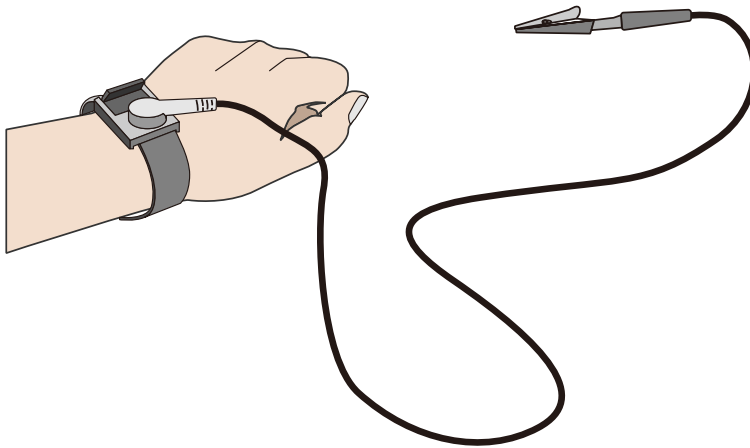
- Use tools correctly to avoid personal injury.

- 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 cards).

- Power off all equipment before shipping.

8.1.5 Manual Handling Weight Limits

⚠ CAUTION

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

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

Table 8-1 Manual Handling Weight Limits per Person

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

9 Limited Warranty

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

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

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

9.1 Warranty Service

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

9.1.1 Remote Technical Support

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

Information needed when requesting support:

- Contact name, phone number, e-mail address

- System serial number, part number, model and location (address) of the product needing service

- Detailed description of problem, logs (SELs and blackbox logs, and any other related logs from OS), screenshot of issue, pictures of damaged/faulty parts, etc.

9.1.2 RMA Service

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

📄 NOTE

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

9.1.4 9 × 5 × NBD Onsite Service

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

📄NOTE

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

9.1.5 24 × 7 × 4 Onsite Service

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

📄NOTE

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

9.2 Our Service SLA

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

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

9.3 Warranty Exclusions

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

The Limited Warranty does not apply to

- expendable or consumable parts, such as, but not limited to, batteries or protective coatings that are designed to diminish over time, unless failure has occurred during DOA period due to a defect in material or workmanship;

- any cosmetic damage, such as, but not limited to, scratches, dents, broken plastics, metal corrosion, or mechanical damage, unless failure has occurred during DOA period due to a defect in material or workmanship;

- damage or defects caused by accident, misuse, abuse, contamination, improper or inadequate maintenance or calibration or other external causes;

- damage or defects caused by operation beyond the parameters as stipulated in the user documentation;

- damage or defects by software, interfacing, parts or supplies not provided by us;

- damage or defects by improper storage, usage, or maintenance;

- damage or defects by virus infection;

- loss or damage in transit which is not arranged by us;

- Hardware Products that have been modified or serviced by non-authorized personnel;

- any damage to or loss of any personal data, programs, or removable storage media;

- the restoration or reinstallation of any data or programs except the software installed by us when the product is manufactured;

- any engineering sample, evaluation unit, or non-mass production product that is not covered under warranty service;

- any solid-state drive (SSD) which has reached its write endurance limit.

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

its essential purpose.

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

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

10 System Management

10.1 Intelligent Management System ISBMC

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

ISBMC supports:

- IPMI 2.0

- Redfish 1.13

- SNMP v1/v2c/v3

- HTML5/Java remote consoles (Keyboard, Video, Mouse)

- remote virtual media

- login via web browsers

- intelligent fault diagnosis

Table 10-1 ISBMC Features

Feature	Description
Management Interface	Supports extensive remote management interfaces for various server O&M scenarios. The supported interfaces include: • IPMI • SMASH CLP • SNMP • HTTPS • Web GUI • Redfish • Syslog
Accurate and Intelligent Fault Location	IDL, a fault diagnosis system, offers accurate and comprehensive hardware fault location capabilities, and outputs detailed fault causes and handling suggestions.
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.

Feature	Description
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, displaying abundant information of the server and components, and offers easy-to-use Web GUIs.
Crash Screenshot and Crash Video Recording	Supports automatic crash screenshot and crash video recording (video needs to be enabled manually) to capture the last screen and video before crash provides manual screenshot, which can quickly capture the screen for easy inspection at scheduled time.
Dual Flash and Dual Image	Supports dual flash and dual image, enabling automatic flash failover in case of software or flash corruption, improving operational reliability.
Power Capping	Supports power capping, increasing deployment density and reducing energy consumption.
IPv4/IPv6	Supports both IPv4 and IPv6, enhancing network deployment flexibility.
Auto-Switching of Management Network Port	Supports auto-switching between the dedicated management network port and shared management network port, providing customers with flexible network deployment solutions for different management network deployment scenarios.
ISBMC Self-Diagnosis and Self-Recovery System	• Supports the reliable dual watchdog mechanism for hardware and software, enabling automatic restoration of BMC in case of BMC abnormality. • Provides a thermal protection mechanism, which is automatically triggered when the BMC is abnormal to ensure that the fan operates at safe speeds to avoid system overheating. • Supports self-diagnosis of processors, memory modules, and storage devices of ISBMC, and automatically cleans the workload to restore to normal when the device usage rate is too high.
Power Control	Supports virtual power buttons for power on/off, power cycle and reset.

Feature	Description
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. ISBMC offers capabilities including secure update and boot and security reinforcement mechanisms such as anti-replay, anti-injection, and anti-brute force.
Double Factor Authentication	Supports double factor authentication for local BMC users. Users need to log in to the BMC with both password and certificate, thus to prevent attacks caused by password leakage.
Configuration Exporting and Importing	To import and export the existing system configurations.
System Information Display	Displays the server basic information such as the information and health status of key 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.

Feature	Description
One-Click 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 10-1 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	• Online asset management combined with offline asset management enabled by IoT solutions brings integrated digital asset management • Management of the full range of our server family, including general-purpose rack servers, AI servers, multi-node servers, edge servers and all-in-one servers • Management of our general-purpose disk arrays and distributed storage devices • Management of network devices (switches, routers, etc.), security devices (firewalls, load balancers, etc.), cabinets and clouds • Management of data centers • Asset warranty information management, asset inventory reports for server acceptance, asset attribute expansion, etc.
Monitor	• Display of real-time alerts, history alerts, blocked alerts and events • Fault prediction of drives and memories • Custom inspection plan and inspection result management • Notification record viewing • Intelligent fault diagnosis and analysis, automatic fault reporting and repair ticket viewing • Trap management and Redfish management • Management of monitoring rules, such as alert rules, notification rules, blocking rules, alert noise reduction rules, compression rules and fault reporting rules, and redefinition of the above rules.
Control	• Quick start of firmware update, OS installation, power management, drive data erasing and stress test • Batch firmware update (BMC/BIOS/RAID Card/NIC/Drive/HBA Card/MB CPLD/BP CPLD/PSU) • Batch firmware configuration (BMC/BIOS) • Batch RAID configuration and OS deployment for servers • Secure and quick drive data erasing • CPU and memory stress test • Automatic firmware baseline management • BMC and BIOS snapshot management

Feature	Description
	• 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 10-2 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)

Feature	Description
KSManage Driver	Operates under the OS and gets system asset and performance information via the in-band mode, providing users with more comprehensive server management capabilities
KSManage Server Provisioning	Offers users with RAID configuration, intelligent OS installation, firmware update, hardware diagnosis, secure erasing and software upgrade, using the TF card as the carrier

11 Certifications

Table 11-1 Certifications

Country/Region	Certification	Mandatory/Voluntary
International	CB	Voluntary
EU	CE	Mandatory
US	FCC	Mandatory
	UL	Voluntary
	Energy Star	Voluntary
EAEU	EAC	Mandatory
	EAC RoHS	
India	BIS	Mandatory
South Korea	E-Standby	Mandatory
	KC	
Australia	RCM	Mandatory
Taiwan (China)	BSMI	Mandatory
United Arab Emirates	ECAS RoHS	Mandatory
Mexico	NOM	Mandatory
Egypt	NTRA	Voluntary
Saudi Arabia	SABER	Mandatory

12 Appendix A

12.1 Thermal Restrictions

12.1.1 KR1280-X2-A0-R0-00

Table 12-1 Thermal Restrictions

Configuration		Max. Operating Temp. 30°C (86°F)	Max. Operating Temp. 35°C (95°F)	Max. Operating Temp. 40°C (104°F)	Max. Operating Temp. 45°C (113°F)
4 × 3.5-Inch Drive Config.	NIC Config.	All options supported	CPUs ≤300 W when NICs ≥200 Gb are configured	• CPUs ≥165 W not supported • NICs ≥100 Gb not supported	• CPUs ≥165 W not supported • NICs ≥100 Gb not supported
	GPU Config.	CPUs ≤300 W	CPUs ≤250 W	GPUs not supported	GPUs not supported
	Drive Config.	All options supported	CPUs ≤250 W	Rear drives not supported	Rear drives not supported
10 × 2.5-Inch Drive/8 × 2.5-Inch Drive Config.	NIC Config.	All options supported	CPUs ≤300 W when NICs ≥200 Gb are configured	• CPUs ≥165 W not supported • NICs ≥100 Gb not supported	• CPUs ≥165 W not supported • NICs ≥100 Gb not supported
	GPU Config.	CPUs ≤300 W	CPUs ≤250 W	GPUs not supported	GPUs not supported
	Drive Config.	All options supported	CPUs ≤250 W	Rear drives not supported	Rear drives not supported
12 × 2.5-Inch Drive Config.	NIC Config.	All options supported	CPUs ≤300 W when NICs ≥200 Gb are configured	• CPUs ≥165 W not supported • NICs ≥100 Gb not supported	• CPUs ≥165 W not supported • NICs ≥100 Gb not supported
	GPU Config.	CPUs ≤300 W	CPUs ≤250 W	GPUs not supported	GPUs not supported

Configuration		Max. Operating Temp. 30°C (86°F)	Max. Operating Temp. 35°C (95°F)	Max. Operating Temp. 40°C (104°F)	Max. Operating Temp. 45°C (113°F)
	Drive Config.	All options supported	CPUs ≤250 W	Rear drives not supported	Rear drives not supported

Note: The thermal restrictions of this model do not apply to the liquid-cooled CPUs recommended by Intel (8470Q/6458Q/9480/9470), which use the cold plate heat dissipation solution instead.

12.1.2 KR1280-X2-A0-F0-00

Table 12-2 Thermal Restrictions

Configuration		Max. Operating Temp. 30°C (86°F)	Max. Operating Temp. 35°C (95°F)	Max. Operating Temp. 40°C (104°F)	Max. Operating Temp. 45°C (113°F)
12 × E1.S SSD Config.	NIC Config.	All options supported	CPUs ≤300 W when NICs ≥200 Gb are configured	• CPUs ≥165 W not supported • NICs ≥100 Gb not supported	• CPUs ≥165 W not supported • NICs ≥100 Gb not supported
	GPU Config.	CPUs ≤300 W	• Front GPU: CPUs ≤225 W • Rear GPU: CPUs ≤250 W	GPUs not supported	GPUs not supported
	Drive Config.	All options supported	CPUs ≤250 W	Rear drives not supported	Rear drives not supported
4 × 2.5-Inch Drive/ E3.S SSD Config.	NIC Config.	All options supported	CPUs ≤300 W when NICs ≥200 Gb are configured	• CPUs ≥165 W not supported • NICs ≥100 Gb not supported	• CPUs ≥165 W not supported • NICs ≥100 Gb not supported

Configuration		Max. Operating Temp. 30ºC (86ºF)	Max. Operating Temp. 35ºC (95ºF)	Max. Operating Temp. 40ºC (104ºF)	Max. Operating Temp. 45ºC (113ºF)
	GPU Config.	CPUs ≤300 W	CPUs ≤250 W	GPUs not supported	GPUs not supported
	Drive Config.	All options supported	CPUs ≤270 W	Rear drives not supported	Rear drives not supported

Note: The thermal restrictions of this model do not apply to the liquid-cooled CPUs recommended by Intel (8470Q/6458Q/9480/9470), which use the cold plate heat dissipation solution instead.

12.1.3 KR1280-X2-C0-R0-00

Table 12-3 Thermal Restrictions

Configuration		Max. Operating Temp. 35ºC (95ºF)	Max. Operating Temp. 40ºC (104ºF)	Max. Operating Temp. 45ºC (113ºF)
All models	All configurations	All options supported	• NICs ≥100 Gb not supported • GPUs not supported • Rear drives not supported	• NICs ≥100 Gb not supported • GPUs not supported • Rear drives not supported

Note: The thermal restrictions of this model apply to all the 4th/5th Gen Intel Xeon Scalable processors (Sapphire Rapids/Emerald Rapids).

12.2 Model

Table 12-4 Model

Certified Model	Description
KR1280-X2-A0-R0-00	Global
KR1280-X2-A0-F0-00	Global
KR1280-X2-C0-R0-00	Global

12.3 RAS Features

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

12.4 Sensor List

Table 12-5 Sensor List

Sensor	Description	Sensor Location
Inlet_Temp	Air inlet temperature	Motherboard
Outlet_Temp	Air outlet temperature	Motherboard
PVCCIN_CPUx	CPUx core voltage	CPUx x indicates the CPU number with a value of 0 - 1
PVCCFA_FIVR_CPUx	UPI IIO voltage	CPUx x indicates the CPU number with a value of 0 - 1
PVCCINFAON_CPUx	CPUx boot voltage	CPUx x indicates the CPU number with a value of 0 - 1
PVCCFA_EHV_CPUx	Controller voltage	CPUx x indicates the CPU number with a value of 0 - 1
PVCCD_HV_CPUx	Memory controller voltage	CPUx x indicates the CPU number with a value of 0 - 1
CPUx_VR_Temp	CPUx VR temperature	CPUx x indicates the CPU number with a value of 0 - 1
PSUx_VIN	PSUx input voltage	PSUx x indicates the PSU number with a value of 0 - 1
PSUx_VOUT	PSUx output voltage	PSUx x indicates the PSU number with a value of 0 - 1
SYS_12V	System 12 V voltage (output by HSC)	Motherboard
SYS_5V	System 5 V voltage	Motherboard
SYS_3V3	System 3.3 V voltage	Motherboard

Sensor	Description	Sensor Location
RTC_Battery	Motherboard RTC battery voltage	Motherboard
PVNN_MAIN_CPUx	CPUx voltage	Motherboard
P12V_CPUx_DIMM	CPUx DIMM voltage	Motherboard
PVNN_PCH_STBY	PCH core voltage	Motherboard
P1V05_PCH_STBY	PCH logic voltage	Motherboard
CPUx_Temp	CPUx core temperature	CPUx x indicates the CPU number with a value of 0 - 1
CPUx_DTS	CPU margin temperature before it reaches the throttling frequency	CPUx x indicates the CPU number with a value of 0 - 1
CPUx_DIMM_T	The maximum temperature among DDR5 DIMMs of CPUx	CPUx x indicates the CPU number with a value of 0 - 1
PCH_Temp	PCH temperature	Motherboard
PSU_Inlet_Temp	PSU temperature	PSU
Total_Power	Total power	Motherboard
FAN_Power	Total fan power	Fan
PSUx_PIN	PSUx input power	PSUx x indicates the PSU number with a value of 0 - 1
PSUx_POUT	PSUx output power	PSUx x indicates the PSU number with a value of 0 - 1
CPU_Power	Total CPU power	Motherboard
Memory_Power	Total memory power	Motherboard
FANx_F_Speed, FANx_R_Speed	FANx speed	• FANx: x indicates the fan number with a value of 0, 2, 3, 5, 6, 7, 8 or 9 • F stands for front fan • R stands for rear fan
RAID_Temp	PCIe RAID card temperature (Max temp. will be taken in case of multiple RAID	PCIe RAID card

Sensor	Description	Sensor Location
	cards, including SAS, RAID, and HBA)	
HDD_MAX_Temp	Maximum temperature among all drives	-
OCP_RAID_Temp	RAID mezz card temperature	RAID mezz card
NVMe_Temp	Maximum temperature among all NVMe drives	-
OCP_NIC_SFP_Temp	OCP card SFP module temperature	Optical module
PCIe_NIC_SFP_T	PCIe NIC SFP module temperature	Optical module
OCP_NIC_Temp	OCP card temperature (Max temp. will be taken in case of multiple OCP cards)	OCP card
PCIe_NIC_Temp	PCIe NIC temperature (Max temp. will be taken in case of multiple PCIe NICs)	PCIe NIC
MEM_ResourceRate	Memory utilization rate	-
CPU_ResourceRate	CPU utilization rate	-
GPUx_Temp	GPUx core temperature	GPUx x indicates the GPU number with a value of 0 - 2
CPUx_Status	CPUx status	CPUx x indicates the CPU number with a value of 0 - 1
SEL_Status	SEL status	-
PSU_Mismatch	PSU model mismatch	-
PSU_Redundant	PSU redundancy status	-
FANx_Status	FANx status	FANx x indicates the fan number with a value of 0, 2, 3, 5, 6, 7, 8 or 9
FAN_Redundant	Fan redundancy status	-
PCIe_Status	The status of PCIe device (including PCIe buses, slots and expansion cards)	-

Sensor	Description	Sensor Location
POST_Status	System firmware and POST status	-
PWR_CAP_Fail	Power capping failure	-
CPU_Config	CPU configuration status (mixing of CPUs, or primary CPU not installed)	-
PSUx_Status	PSUx status	PSUx x indicates the PSU number with a value of 0 - 1
K_HDDx	Drive	Drive • K denotes front, internal and rear, with a value of F/I/R respectively • x indicates the drive number with a value of 0 - 11
ACPI_PWR	ACPI power status	-
Sys_Health	System health status	-
BMC_Boot_Up	BMC boot up complete	-
BIOS_Boot_Up	BIOS boot up complete	-
Intrusion	Detects chassis-opening activity	Top cover
LeakageSensor	Leak detection	Leak detection cable
ME_FW_Status	ME health status	-
TPM_Verify	TPM status verification	-
ACPI_PWR	ACPI power status	-
PWR_On_TMOUT	Power on timeout	-
System_Error	System emergency error	-
BMC_Status	BMC status	-
HBA_Temp	HBA card temperature	HBA card
FPGA_Card_Temp	FPGA temperature	FPGA card
PCle_HCA_Temp	PCIe HCA card temperature	HCA card
PCle_HCA_SFP_T	PCIe HCA card SFP module temperature	HCA card SFP module

Sensor	Description	Sensor Location
R_HDD_BP_Temp	Rear drive temperature	Rear drive backplane

13 Appendix B Acronyms and Abbreviations

13.1 A - E

A

AC	Alternating Current
ACPI	Advanced Configuration and Power Interface
AI	Artificial Intelligence
AQSIQ	General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China
ARMA	Advanced Return Material Authorization
AVX	Advanced Vector Extensions

B

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

C

CAS	Column Address Strobe
CB	Certification Body
CE	Conformite Europeenne

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

D

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

E

EAC	Eurasian Conformity
EBG	Emmitsburg
ECC	Error-Correcting Code
ECMA	European Computer Manufacturer Association
EMR	Emerald Rapids
ESD	Electro-static Discharge

EU	European Union
EVAC	Extended Volume Air Cooling
E1.S	Enterprise & Data Center SSD Form Factor 1 Unit Short

13.2 F - J

F

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

G

GPU	Graphics Processing Unit
GUI	Graphical User Interface

H

HBA	Host Bus Adapter
HBM	High Bandwidth Memory
HCA	Host Channel Adapter
HDD	Hard Disk Drive
HHHL	Half-Height Half-Length
HSC	Hot Swap Controller
HSE	Health and Safety Executive
HTTPS	HyperText Transfer Protocol Secure

I

IEC	International Electrotechnical Commission
IIPC	Intel Intelligent Power Capability
iMC	Integrated Memory Controller
I/O	Input/Output
IP	Internet Protocol
IPMB	Intelligent Platform Management Bus
IPMI	Intelligent Platform Management Interface
ISO	International Organization for Standardization

13.3 K - O

K

KC	Korean Certification
KVM	Keyboard, Video, Mouse

L

LAN	Local Area Network
LCD	Liquid Crystal Display
LDAP	Lightweight Directory Access Protocol
LED	Light Emitting Diode

M

MCIO	Mini Cool Edge IO
ME	Management Engine

N

NBD	Next Business Day
NC-SI	Network Controller Sideband Interface
NIC	Network Interface Card
NIOSH	National Institute for Occupational Safety and Health
NOM	Norma Oficial Mexicana
NPU	Network Processing Unit
NTRA	National Telecom Regularity Authority
NVMe	Non-Volatile Memory Express

O

OCP	Open Compute Project
O&M	Operations and Maintenance
OS	Operating System

13.4 P - T

P

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

R

RAID	Redundant Arrays of Independent Disks
RAS	Reliability, Availability, Serviceability
RCM	Regulatory Compliance Mark
RDIMM	Registered Dual In-line Memory Module
RH	Relative Humidity
RMA	Return Material Authorization
RPM	Revolutions Per Minute
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
SFP	Small Form-factor Pluggable
SGPIO	Serial General Purpose Input/Output
SGX	Software Guard Extensions
SLA	Service Level Agreements
SLES	SUSE Linux Enterprise Server
SN	Serial Number
SNMP	Simple Network Management Protocol
SPR	Sapphire Rapids
SSD	Solid State Drive
SSH	Secure Shell

T

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

13.5 U - Z

U

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

V

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