White Paper for
K24V2 Series Servers
Powered by Intel Processors

For K24-X2-A0-R0-00 and K24-X2-C0-R0-00

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Applicable Model

Model	Node	Maintenance	Cooling
K24-X2-A0-R0-00	KM1270-X2-A0-R0-00	Rear access	Air cooling
K24-X2-C0-R0-00	KM1270-X2-C0-R0-00	Rear access	Liquid cooling

Technical Support

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- For server open source software statements, please contact us.

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Preface

Abstract

This white paper describes the K24V2 server's appearance, features, performance parameters, and software and hardware compatibility, providing in-depth information of K24V2.

Intended Audience

This white paper is intended for pre-sales engineers.

Symbol Conventions

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

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

Revision History

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

Table of Contents

1 Product Overview

The K24V2 is a 2U/4N 2-socket rack server that is powered by the 4th/5th Gen Intel Xeon Scalable processors (Sapphire Rapids/Emerald Rapids). It is specially designed to cater to the needs of such fields as educational science and finance in markets inside and outside China. The product supports both air and liquid cooling configurations, and can accommodate processors with a TDP of up to 350 W, significantly improving computing performance. The server features cold plates that efficiently dissipate the heat generated by CPUs, DIMMs, and voltage regulator (VR) modules, contributing to low power usage effectiveness (PUE) of only 1.1. It has also been optimized to deliver superior cooling performance, power supply, and monitor management. The K24V2 meets the hardware requirements of high-performance applications in different scenarios, thus helping customers to build new-generation high-density green data centers.

Figure 1-1 K24-X2-A0-R0-00 (5 × 8086 Fan Configuration)

Figure 1-2 K24-X2-A0-R0-00 (8 × 2.5-inch Drive + 4 × 8086 Fan Configuration)

Figure 1-3 K24-X2-A0-R0-00 (4 × 2.5-inch Drive + 4 × 8086 Fan Configuration)

Figure 1-4 K24-X2-C0-R0-00 (8 × 2.5-inch Drive + 2 × 8080 Fan Configuration)

Figure 1-5 K24-X2-C0-R0-00 (4 × 2.5-inch Drive + 2 × 8080 Fan Configuration)

2 Features

2.1 Scalability and Performance

- Features the 4th/5th Gen Intel Xeon Scalable processor (Sapphire Rapids/Emerald Rapids), with up to 56 cores per processor, a max Turbo frequency of 4.1 GHz, an L3 cache of 300 MB, and 4 UPI links at 20 GT/s, delivering unrivaled processing performance.

  - A node supports 2 processors with 56 cores and 112 threads per processor, maximizing the concurrent execution of multi-threaded applications.

  - With the processor cache hierarchy optimization, a larger L2 cache of private 2 MB per core is provided, so that memory data can be put and processed directly in L2 cache, improving the memory access performance, and a single processor can share up to 300 MB of L3 cache.

  - Supports Intel Turbo Boost Technology 2.0 and automatically scales CPU speeds up to the max Turbo frequency at peak workloads, allowing processor cores to exceed the thermal design power (TDP) for a limited time.

  - Supports Intel Hyper-Threading Technology, allowing up to 2 threads to run on each core to improve the performance of multi-threaded applications.

  - Supports Intel Virtualization Technology that provides hardware assist to the virtualization software, allowing the operating system to better use hardware to handle virtualized workloads.

  - Intel AVX is designed for use by applications that are strongly floating point compute intensive and can be vectorized.

  - Supports Intel DL Boost (VNNI) instructions, improving the performance for deep learning applications.

- Up to 64 DDR5 ECC DIMMs (5,600 MT/s, RDIMMs), delivering high availability and a memory capacity up to 16 TB. Flexible drive configurations, providing elastic and scalable storage solutions to meet different capacity and update requirements.

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

- Offers 24 Gbps serial attached SCSI (SAS), quadrupling the data transfer rate of internal storage of 6 Gbps SAS solution and maximizing the performance of storage I/O-intensive applications.

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

- A single node in the air-cooling configuration supports up to 1 standard HHHL PCIe 5.0 x16 expansion card, 1 standard HHHL PCIe 4.0 x16 expansion card, and 1 OCP 3.0 card.

- A single node in the liquid-cooling configuration supports up to 1 standard HHHL PCIe 5.0 x16 expansion card and 1 OCP 3.0 card.

- A node supports 1 hot-plug OCP slot (compatible with 1 OCP 3.0 card) that can flexibly support 1/10/25 Gb NICs.

2.2 Availability and Serviceability

- Supports hot-swap SAS/SATA/NVMe drives and RAID controller cards with RAID levels 0/1 (with SAS/SATA drives), RAID cache and data protection enabled by the super-capacitor in case of power failures. Supported RAID levels vary with RAID controller cards.

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

- The LEDs for fault diagnosis on the front and rear panel and the BMC Web GUI indicate the status of key components and quickly lead technicians to failed (or failing) components, simplifying maintenance, speeding up troubleshooting, and enhancing system availability.

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

- The server supports 4 hot-swap PSUs (1 PSU per node) with 2+2 redundancy, and provides up to 5 front hot-swap fan modules with N+1 redundancy, improving system availability.

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

- Online memory diagnosis helps technicians quickly locate the failed DIMM that needs servicing through the onboard LEDs, improving maintenance efficiency.

2.3 Manageability and Security

- The onboard BMC monitors system operating status and enables remote management.

- The Network Controller Sideband Interface (NC-SI) feature allows a network port to serve as a management port and a service port. The NC-SI feature is disabled by default and can be enabled/disabled through the BIOS or BMC.

- Integrates the industry-standard UEFI, improving the efficiency of setup, configuration and update, and simplifying the error handling process.

- Firmware update mechanism based on digital signatures prevents unauthorized firmware updates.

- Flexible BMC access control policies and double-factor authentication improve BMC management security.

- Dual-image mechanism for BMC and BIOS recovers firmware upon detection of firmware damage.

- BMC Secure Boot based on hardware root of trust protects BMC from malicious tampering.

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

- 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.

- BIOS Secure Boot based on Trusted Platform Module (TPM) protects BIOS from malicious tampering.

- BIOS Secure Flash and BIOS Lock Enable (BLE) reduce attacks from malicious software on the BIOS flash region.

- UEFI Secure Boot protects the system from malicious boot loaders.

- Hierarchical password protection in BIOS ensures system boot and management security.

- Optional secure system wiping functionality enabled by ISQP and BMC to wipe data on the storage device with one click.

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

📄 **NOTE**

The NC-SI port supports the following features:
- The NC-SI port can be bonded to any network port of the OCP card.
- Supports the enablement/disablement and configuration of Virtual Local Area Network (VLAN). VLAN is disabled by default and the default VLAN ID is 0.
- Supports IPv6 and IPv4 addresses. IP address, subnet mask, default

gateway, and prefix length of IPv6 address can be configured.

2.4 Energy Efficiency

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

- Offers 2+2 redundant PSUs for improved system reliability.

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

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

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

- Offers power capping and power control measures.

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

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

- Supports low-voltage 4th/5th Gen 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 thermals.

3 System Parts Breakdown

Figure 3-1 Exploded View
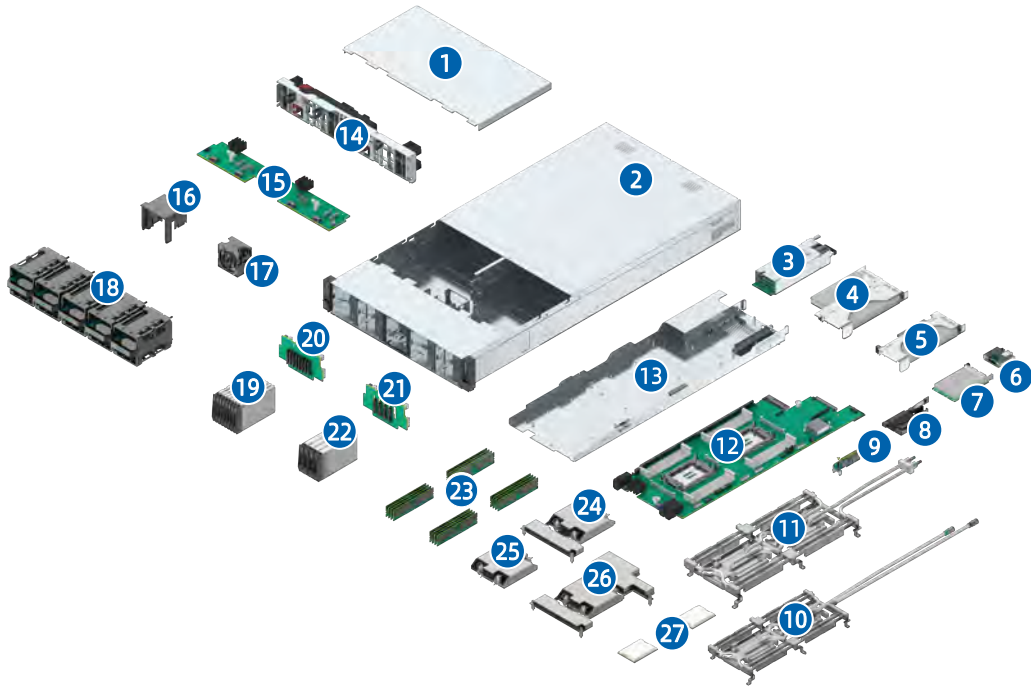
Item	Feature	Item	Feature
1	Top Cover	2	Chassis
3	PSU	4	PCIe Riser Module
5	PCIe Riser Module	6	I/O Module
7	OCP 3.0 Card	8	Super-Capacitor Module
9	M.2 SSD Module	10	Liquid-Cooling Heatsink (Hose Solution)
11	Liquid-Cooling Heatsink (Copper Tube Solution)	12	Motherboard
13	Node Chassis	14	Interior Module
15	Midplane Board	16	Air Duct
17	6038 Fan Module	18	8086 Fan Module × 5
19	2.5-inch Drive × 8	20	8-Drive Backplane
21	4-Drive Backplane	22	2.5-inch Drive × 4
23	DIMM × 16	24	EVAC Air-Cooling Heatsink 1
25	General Air-Cooling Heatsink	26	EVAC Air-Cooling Heatsink 2
27	CPU × 2	–	–

4 System Logical Diagram

Figure 4-1 System Logical Diagram
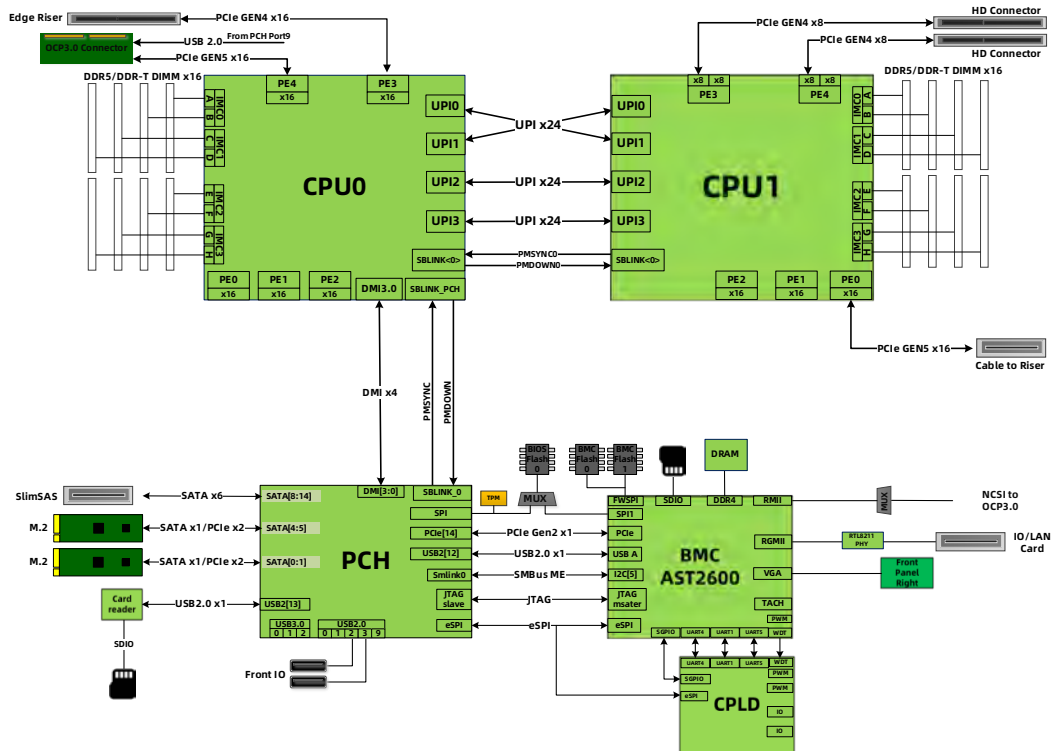
- A node supports two 4th/5th Gen Intel Xeon Scalable processors (Sapphire Rapids/Emerald Rapids).

- A node supports up to 16 DDR5 RDIMMs.

- The processors are interconnected through 4 UPI links at up to 20 GT/s.

- A node supports up to 2 PCIe x16 slots and 1 OCP 3.0 card supported.

- The mezz RAID controller card is connected to CPU1 via the PCIe bus, and is connected to the drive backplane via the high-density cable. Multiple local storage configurations are supported through different drive backplanes.

- The motherboard integrates the Emmitsburg Platform Controller Hub (PCH) to support 2 USB 2.0 ports, 2 SATA 3.0 drives, 2 SATA/PCIe x2 M.2 SSDs, and 1 TF card.

- The motherboard integrates an AST2600 management chip which supports a VGA port, a management network port, a serial port, fan connectors, and other connectors.

5 Hardware Description

5.1 Front Panel

5.1.1 Front View

1. K24-X2-A0-R0-00

● 5 × 8086 Fan Configuration

Figure 5-1 Front View

Item	Feature	Item	Feature
1	Power Button and LED	2	Node Switch Button
3	Fan 0	4	Fan 1
5	Fan 2	6	Fan 3
7	Fan 4	8	VGA Port
9	USB 2.0 Port	10	USB 2.0 Port
11	Ear Latch × 2	12	UID Button
13	LEDs	-	-

● 8 × 2.5-inch Drive + 4 × 8086 Fan Configuration

Figure 5-2 Front View
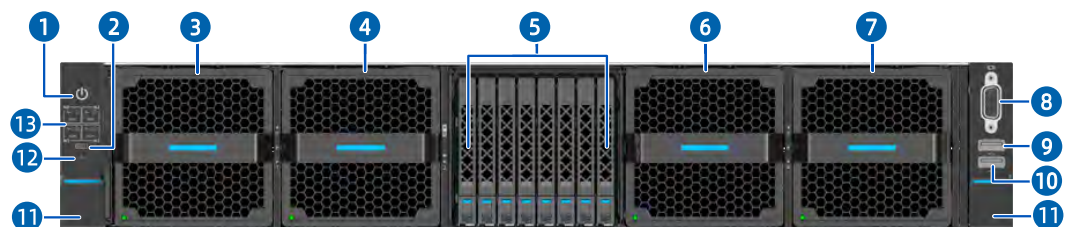
Item	Feature	Item	Feature
1	Power Button and LED	2	Node Switch Button

Item	Feature	Item	Feature
3	Fan 0	4	Fan 1
5	Drive Bay × 8	6	Fan 3
7	Fan 4	8	VGA Port
9	USB 2.0 Port	10	USB 2.0 Port
11	Ear Latch × 2	12	UID Button
13	LEDs	-	-

- 4 × 2.5-inch Drive + 4 × 8086 Fan Configuration

Figure 5-3 Front View
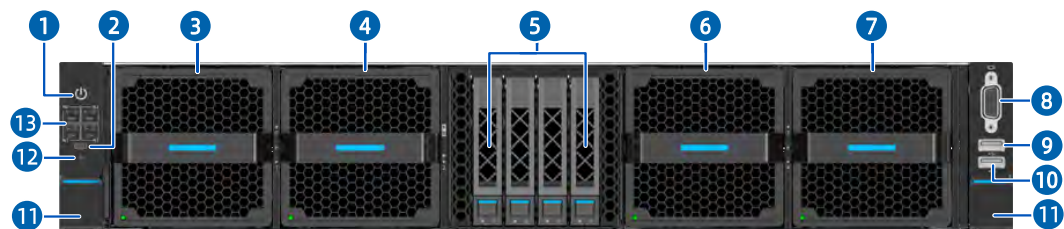
Item	Feature	Item	Feature
1	Power Button and LED	2	Node Switch Button
3	Fan 0	4	Fan 1
5	Drive Bay × 4	6	Fan 3
7	Fan 4	8	VGA Port
9	USB 2.0 Port	10	USB 2.0 Port
11	Ear Latch × 2	12	UID Button
13	LEDs	-	-

2. K24-X2-C0-R0-00

- 8 × 2.5-inch Drive + 2 × 8080 Fan Configuration

Figure 5-4 Front View
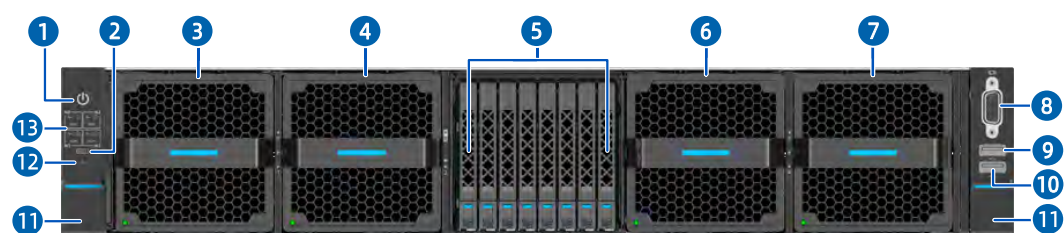
Item	Feature	Item	Feature
1	Power Button and LED	2	Node Switch Button
3	Fan Dummy	4	Fan 1
5	Drive Bay × 8	6	Fan 3
7	Fan Dummy	8	VGA Port
9	USB 2.0 Port	10	USB 2.0 Port
11	Ear Latch × 2	12	UID Button
13	LEDs	-	-

- 4 × 2.5-inch Drive + 2 × 8080 Fan Configuration

Figure 5-5 Front View
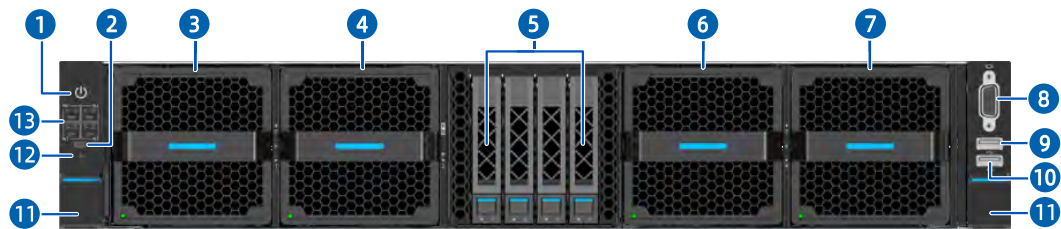
Item	Feature	Item	Feature
1	Power Button and LED	2	Node Switch Button
3	Fan Dummy	4	Fan 1
5	Drive Bay × 4	6	Fan 3
7	Fan Dummy	8	VGA Port
9	USB 2.0 Port	10	USB 2.0 Port
11	Ear Latch × 2	12	UID Button
13	LEDs	-	-

5.1.2 LEDs and Buttons

1. LED and Button Locations

Figure 5-6 Front Panel LED and Button Locations

Item	Feature	Item	Feature
1	Power Button and LED	2	Node 0 LED
3	Node 1 LED	4	Node Switch Button
5	UID Button	6	Node 2 LED
7	Node 3 LED	8	Node Status LED
9	Node Selection LED	10	Node UID LED
11	Fan LED	-	-

2. LED and Button Description

Table 5-1 Front Panel LED and Button Description

Icon	Feature	Description
	Power Button and LED	• Solid green = Power-on state • Solid yellow = Standby state • Long press the button for 4s to force a shutdown
	Node 0 LED	-
	Node 1 LED	-
	Node 2 LED	-
	Node 3 LED	-

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Icon	Feature	Description
[NODE]	Node Switch Button	Enables you to switch the selected node. Upon switching to a specific node, the front USB and VGA ports will serve as the output ports for that node.
(UID icon)	UID Button	• Short press the button to turn on/off the locating LED. • Long press the button for 6s to reset the BMC
(Health icon)	Node Health LED	• Off = Normal • Flashing red (1 Hz) = A failure occurs • Solid red = A warning occurs
KVM	Node Selection LED	• Off = The current node is not selected • Solid white = The current node is selected
(UID LED icon)	Node UID LED	Solid blue = The UID button is pressed
-	Fan LED	• Off = Normal • Flashing red (1 Hz) = A failure occurs • Solid red = A warning occurs

5.1.3　Ports

1. Port Locations

Figure 5-7 Front Panel Port Locations

Item	Feature	Item	Feature
1	VGA Port	2	USB 2.0 Port
3	USB 2.0 Port	-	-

2. Port Description

Table 5-2 Front Panel Port Description

Feature	Type	Quantity	Description
VGA Port	DB15	1	Enables you to connect a display terminal, for example, a monitor or KVM, to the system.
USB 2.0 Port	USB 2.0	2	Enables you to connect a USB 2.0 device to the system. Note: Make sure that the USB device is in good condition or it may cause the server to work abnormally.

5.2 Rear Panel

5.2.1 Rear View

1. K24-X2-A0-R0-00

Figure 5-8 Server Rear View
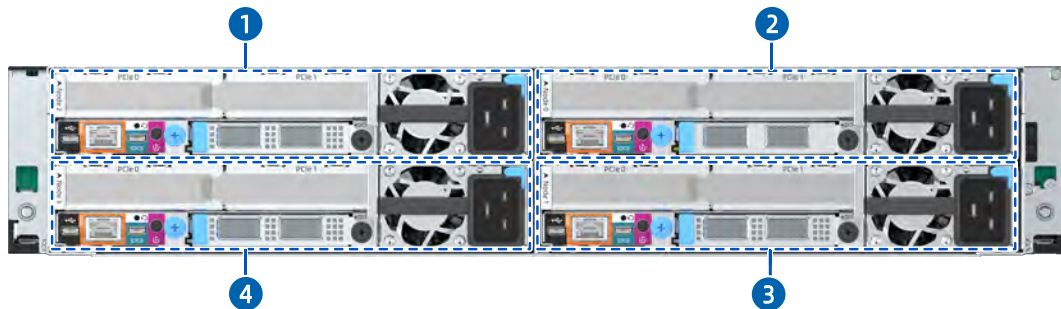
Item	Feature	Item	Feature
1	Node 2	2	Node 0
3	Node 1	4	Node 3

Figure 5-9 Node Rear View
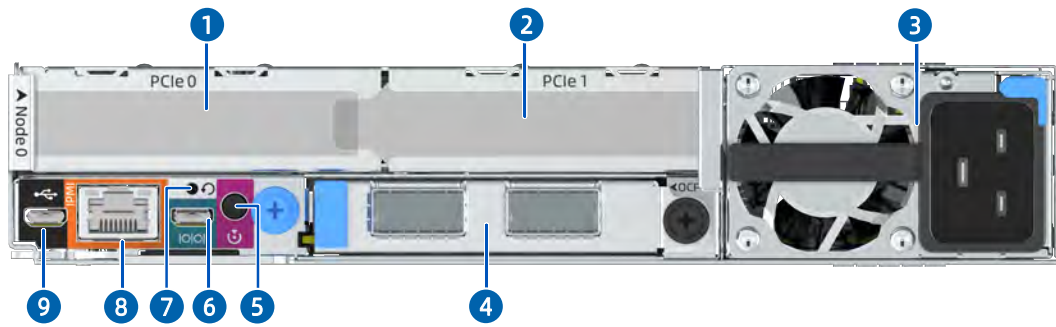
Item	Feature	Item	Feature
1	PCIe Slot 0	2	PCIe Slot 1
3	PSU	4	OCP 3.0 Card
5	UID/BMC RST Button and LED	6	System Debugging/BMC Management Serial Port
7	System Reset Button	8	BMC Management Network Port
9	Micro USB Port	-	-

2. K24-X2-C0-R0-00

Figure 5-10 Server Rear View
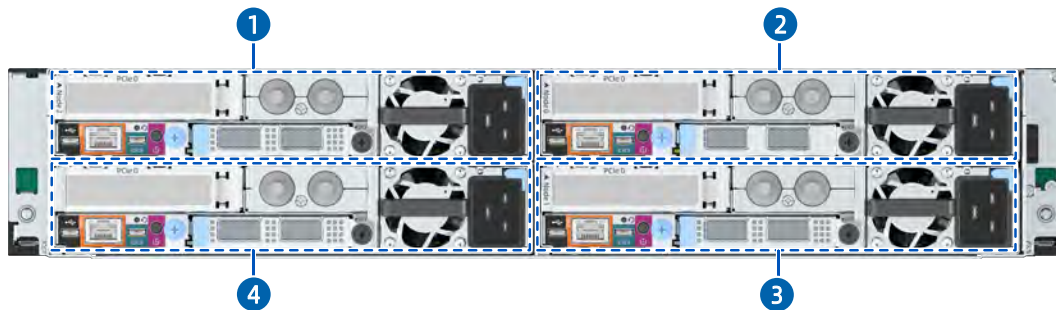
Item	Feature	Item	Feature
1	Node 2	2	Node 0
3	Node 1	4	Node 3

Figure 5-11 Node Rear View
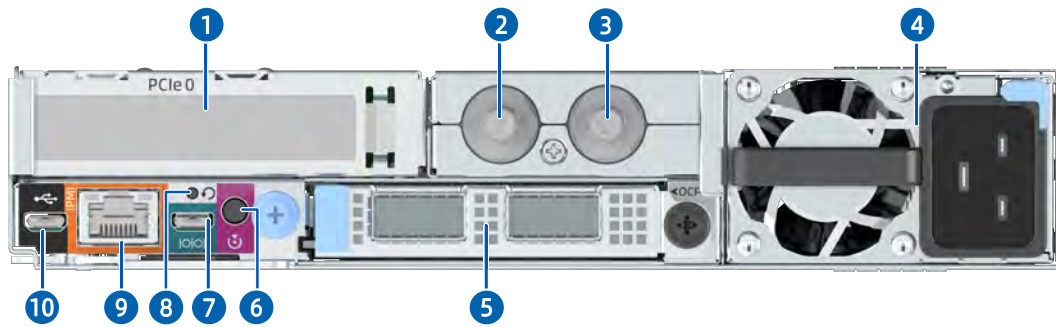
Item	Feature	Item	Feature
1	PCIe Slot 0	2	Liquid Outlet
3	Liquid Inlet	4	PSU
5	OCP 3.0 Card	6	UID/BMC RST Button and LED
7	System Debugging/BMC Management Serial Port	8	System Reset Button
9	BMC Management Network Port	10	Micro USB Port

5.2.2　LEDs and Buttons

1. LED and Button Locations

Figure 5-12 Rear Panel LED and Button Locations
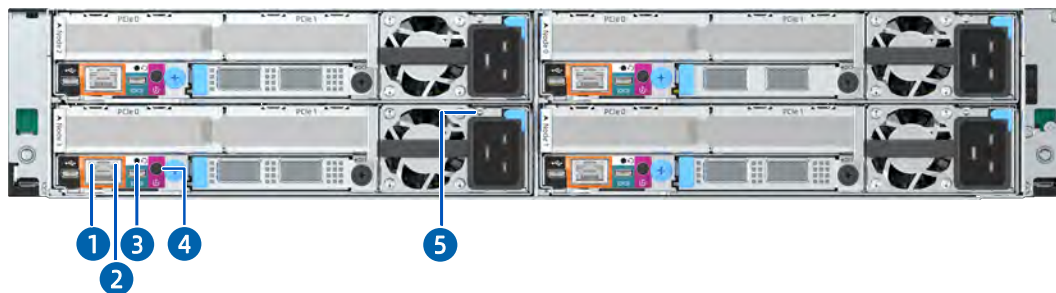
Item	Feature	Item	Feature
1	Management Network Port Link Speed LED	2	Management Network Port Link Activity LED
3	System Reset Button	4	UID/BMC RST Button and LED
5	PSU LED	-	-

2. LED and Button Description

Table 5-3 Rear Panel LED and Button Description

Icon	Feature	Description
-	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 10/100 Mbps
-	Management Network Port Link Activity LED	• Off = No network connection • Solid green = Network connected without data being transmitted • Flashing green = Network connected with data being transmitted
	System Reset Button	Press the button to reset the system.
	UID/BMC RST Button and LED	• Solid blue = The UID LED turns on when activated by the UID button or via BMC • Long press the button for 6s to force the BMC to reset
	PSU LED	• Off = No power to PSU • Flashing green (1 Hz) = PSU operating in standby state with normal input • Flashing green (2 Hz) = PSU firmware updating • Flashing green (off for 1s and on for 2s) = PSU in cold redundant state • Solid green = Normal input and output • Flashing amber (1 Hz) = PSU warning event where the PSU continues to operate (possible causes: PSU overtemperature, PSU output overcurrent, excessively high or low fan speed)

Icon	Feature	Description
		• Solid amber = Normal input, but no output (possible causes: PSU overtemperature protection, PSU output overcurrent or short circuit, output overvoltage, short circuit protection, component (not all components) failure).

5.2.3   Ports

1. Port Locations

Figure 5-13 Rear Panel Port Location
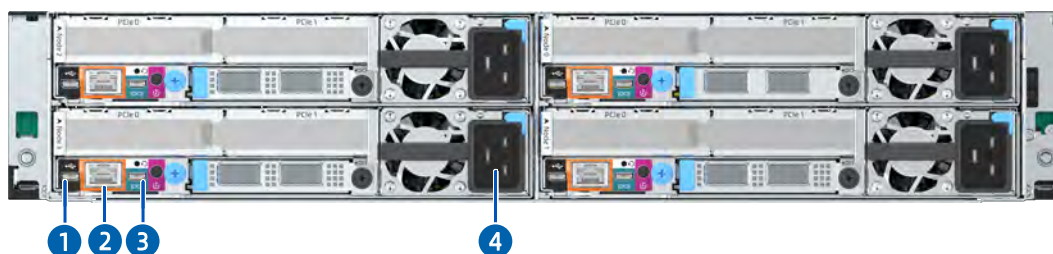
Item	Feature	Item	Feature
1	Micro USB Port	2	BMC Management Network Port
3	System Debugging/BMC Management Serial Port	4	PSU Socket

2. Port Description

Table 5-4 Rear Panel Port Description

Feature	Type	Quantity	Description
Micro USB Port	Micro USB	1	Enables you to transmit data.
BMC Management Network Port	RJ45	1	BMC management network port, used to manage the server. Note: It is a Gigabit Ethernet port that supports 100 Mbps and 1,000 Mbps auto-negotiation.
System Debugging/BMC Management Serial Port	Micro USB	1	Enables you to debug and monitor the system/BMC.

Feature	Type	Quantity	Description
PSU Socket	-	1	Connected through a power cord. User can select the PSUs as needed. Note: Make sure that the rated power of every PSU is greater than that of the server.

5.3 Processors

- A single node supports up to 2 processors.

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

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

Figure 5-14 CPU Locations (K24-X2-A0-R0-00)
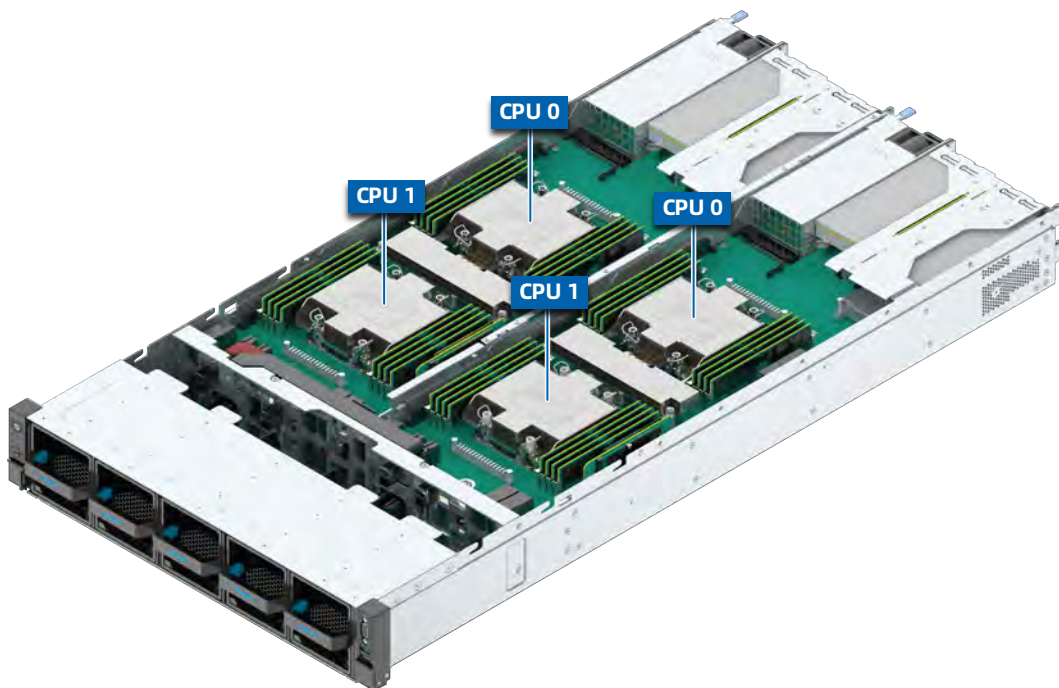
Figure 5-15 CPU Locations (K24-X2-C0-R0-00)
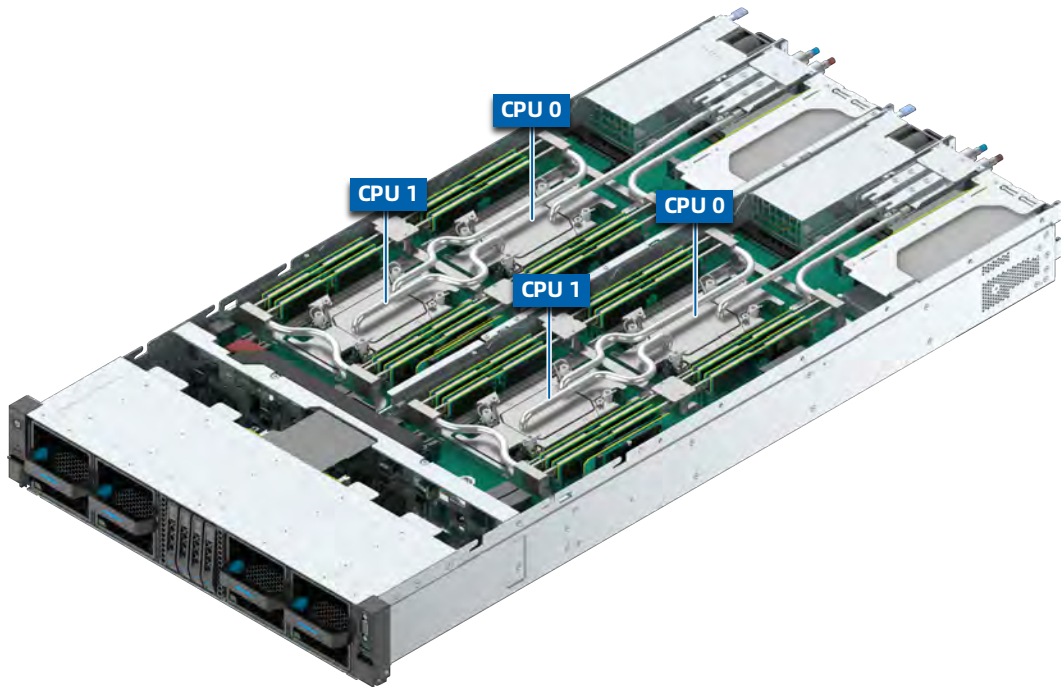
5.4 DDR5 DIMMs

5.4.1 Identification

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

Figure 5-16 DIMM Identification
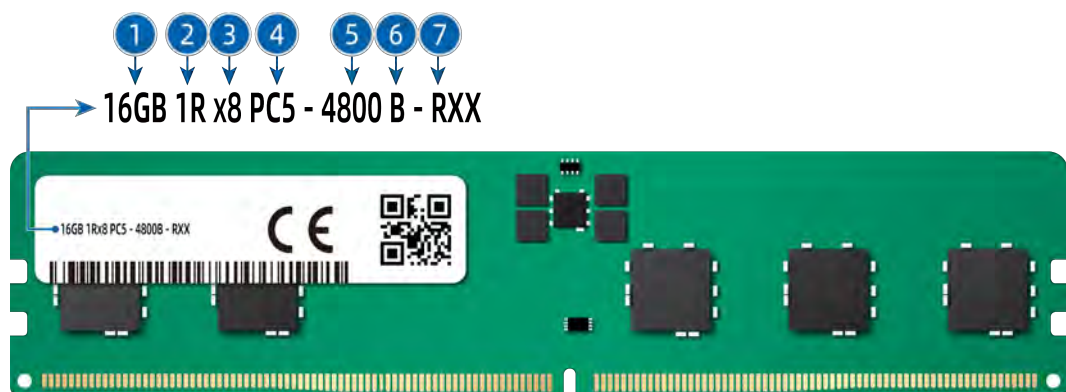
Item	Description	Example
1	Capacity (GB)	• 16 • 32 • 64

Item	Description	Example
		• 128 • 256
2	Rank(s)	• 1R = Single rank • 2R = Dual rank • 2S2R = Two ranks of two high stacked 3DS DRAM • 2S4R = Four ranks of two high stacked 3DS DRAM • 4R = Quad rank
3	Data width of DRAM	• x4 = 4 bits • x8 = 8 bits
4	DIMM slot type	PC5 = DDR5
5	Maximum memory speed (MT/s)	• 4,800 • 5,600
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

5.4.2   Memory Subsystem Architecture

A single node supports 16 DIMM slots and 8 memory channels per processor.

Table 5-5 DIMM Slot List

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

CPU	Channel ID	Silk Screen
	Channel 6	CPU0_C6D0
	Channel 7	CPU0_C7D0
CPU1	Channel 0	CPU1_C0D0
	Channel 1	CPU1_C1D0
	Channel 2	CPU1_C2D0
	Channel 3	CPU1_C3D0
	Channel 4	CPU1_C4D0
	Channel 5	CPU1_C5D0
	Channel 6	CPU1_C6D0
	Channel 7	CPU1_C7D0

5.4.3   Compatibility

Refer to the following rules to configure the DDR5 DIMMs.

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

- DDR5 DIMMs can be used with the 4th/5th Gen Intel Xeon Scalable processors (Sapphire Rapids/Emerald Rapids). The maximum memory capacity supported is different for different CPU models.

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

- The total memory capacity cannot exceed the maximum memory capacity supported by all CPUs.

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

📄 NOTE

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

Table 5-6 DDR5 DIMM (4,800 MT/S) Specifications

Item		Value			
Capacity per DDR5 DIMM (GB)		32	64	128	256
Type		RDIMM	RDIMM	RDIMM	RDIMM
Rated speed (MT/s)		4,800	4,800	4,800	4,800
Operating voltage (V)		1.1	1.1	1.1	1.1
Maximum number of DDR5 DIMMs supported in a server[a]		64	64	64	64
Maximum capacity of DDR5 DIMMs supported in a server (TB)[b]		2	4	8	16
Actual speed (MT/s)	1DPC[c] @ SPR CPU	4,800	4,800	4,800	4,800
	1DPC[c] @ EMR CPU	4,800	4,800	4,800	4,800
a: The maximum number of DDR5 DIMMs supported is based on the 4-node configuration. The number is halved for the 2-node configuration. b: It indicates the maximum memory capacity supported when all the DIMM slots are populated with DDR5 DIMMs. The maximum DDR5 capacity varies with the CPU type. c: DIMM Per Channel (DPC) is the number of DIMMs per memory channel. The above information is for reference only. Consult your local sales representative for details.					

Table 5-7 DDR5 DIMM (5,600 MT/S) Specifications

Item		Value			
Capacity per DDR5 DIMM (GB)		32	64	128	256
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]		64	64	64	64
Maximum capacity of DDR5 DIMMs supported in a server (TB)[b]		2	4	8	16
Actual speed (MT/s)	1DPC[c] @ SPR CPU	4,800	4,800	4,800	4,800
	1DPC[c] @ EMR CPU	5,600	5,600	5,600	5,600
a: The maximum number of DDR5 DIMMs supported is based on the 4-node configuration. The number is halved for the 2-node configuration.					

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

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

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

5.4.4   Population Rules

General population rules for DDR5 DIMMs:

- Install DIMMs only when the corresponding processor is installed.

- Install RDIMMs only.

- Install dummies in the empty DIMM slots.

- At least one DDR5 DIMM must be installed in the DIMM slot corresponding to each CPU.

Population rules for DDR5 DIMMs in specific modes:

- Memory sparing

    - Follow the general population rules.

    - Each channel must have a valid online spare configuration.

    - Each channel can have a different online spare configuration.

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

- Memory mirroring

    - Follow the general population rules.

    - Each processor supports 4 integrated memory controllers (IMCs). Each IMC has 2 channels to be populated with DIMMs. Installed DIMMs must be of the same capacity and organization.

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

5.4.5   DIMM Slot Layout

Up to 64 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.

> **! IMPORTANT**
>
> At least 1 DDR5 DIMM must be installed in the corresponding channel of CPU0 and CPU1.

Figure 5-17 DIMM Slot Layout
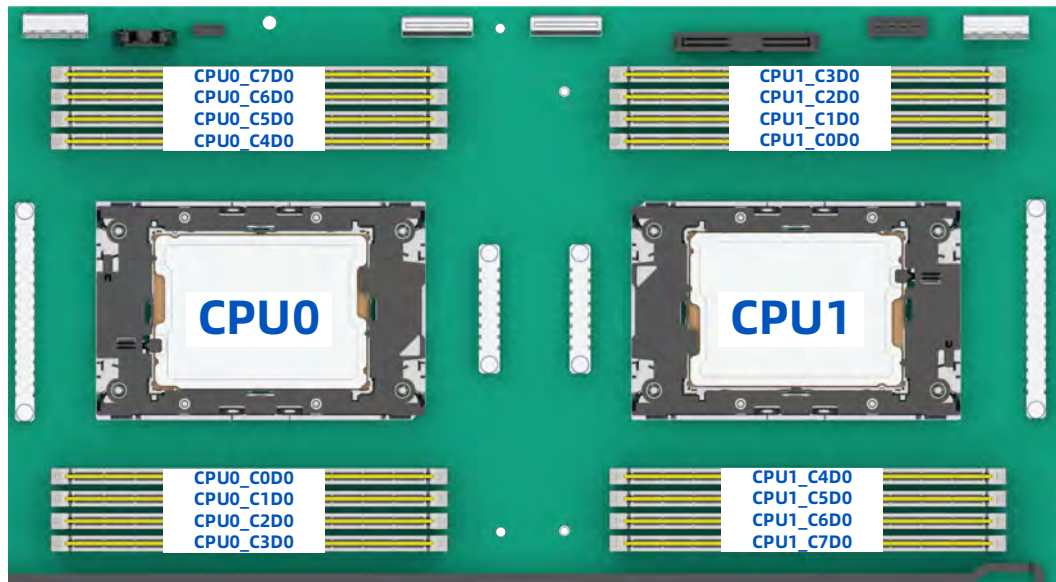
Detailed DIMM population rules are as follows:

DDR5 DIMM Population Rules for Dual-CPU Configuration:

Table 5-8 DIMM Population Rules (Dual-CPU Configuration)

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

Table 5-9 DIMM Population Rules (Dual-HBM CPU Configuration)

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

5.5 Storage

5.5.1 Drive Configurations

1. K24-X2-A0-R0-00

Table 5-10 Drive Configurations

Config.	Front Drives	Internal Drives	Drive Management Mode
8 × 2.5-inch 7-mm (0.28 in.) SAS/SATA/NVMe SSD Configuration	8 × front 2.5-inch SSD: SSD bays 0 to 7 support SAS/SATA/NVMe SSDs	M.2 SSDs: Configured on the M.2 adapter	• SATA SSDs: Directly connected to the PCH • NVMe SSDs: Directly connected to the CPU • SAS SSDs: 1 × standard RAID controller card
4 × 2.5-inch 15-mm (0.59 in.) SAS/SATA/NVMe SSD Configuration	4 × front 2.5-inch SSD: SSD bays 0 to 3 support SAS/SATA/NVMe SSDs	M.2 SSDs: Configured on the M.2 adapter	• SATA SSDs: Directly connected to the PCH • NVMe SSDs: Directly connected to the CPU • SAS SSDs: 1 × standard SAS controller card

2. K24-X2-C0-R0-00

Table 5-11 Drive Configurations

Config.	Front Drives	Internal Drives	Drive Management Mode
8 × 2.5-inch 7-mm (0.28 in.) SAS/SATA/NVMe SSD Configuration	8 × front 2.5-inch SSD: SSD bays 0 to 7 support SAS/SATA/NVMe SSDs	M.2 SSDs: Configured on the M.2 adapter	• SATA SSDs: Directly connected to the PCH • NVMe SSDs: Directly connected to the CPU • SAS SSDs: 1 × standard RAID controller card
4 × 2.5-inch 15-mm (0.59 in.) SAS/SATA/NVMe SSD Configuration	4 × front 2.5-inch SSD: SSD bays 0 to 3 support SAS/SATA/NVMe SSDs	M.2 SSDs: Configured on the M.2 adapter	• SATA SSDs: Directly connected to the PCH • NVMe SSDs: Directly connected to the CPU • SAS SSDs: 1 × standard SAS controller card

5.5.2 Drive Numbering

1. 8 × 2.5-inch Drive Configuration

📄 NOTE

Applicable models: K24-X2-A0-R0-00 and K24-X2-C0-R0-00.

Figure 5-18 Drive Numbering

Physical Drive Number	Silk Screen on Chassis	Drive Number Identified by BMC
0	N0_0	0
1	N0_1	1
2	N1_0	2
3	N1_1	3
4	N2_0	4
5	N2_1	5
6	N3_0	6
7	N3_1	7

2. 4 × 2.5-inch Drive Configuration

📄 NOTE

Applicable models: K24-X2-A0-R0-00 and K24-X2-C0-R0-00.

Figure 5-19 Drive Numbering

Physical Drive Number	Silk Screen on Chassis	Drive Number Identified by BMC
0	N0_0	0
1	N1_0	1
2	N2_0	2
3	N3_0	3

5.5.3　Drive LEDs

1. SAS/SATA Drive LEDs

Figure 5-20 SAS/SATA Drive LEDs

Table 5-12 SAS/SATA Drive LED Description

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

2. NVMe Drive LEDs

Figure 5-21 NVMe Drive LEDs

Table 5-13 NVMe Drive LED Description

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

📄 NOTE

When the VMD function is enabled with the latest VMD driver installed, the NVMe drives support VROC RAID.

5.5.4 RAID Controller Cards

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

5.6 Network

NICs provide network expansion capabilities.

● The OCP slot supports the OCP 3.0 card. Users can select the OCP 3.0 card as needed.

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

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

5.7 I/O Expansion

5.7.1 K24-X2-A0-R0-00

1. PCIe Cards

The PCIe cards provide system expansion capabilities.

- A node supports up to 1 PCIe 5.0 expansion slot, 1 PCIe 4.0 expansion slot, and 1 dedicated slot for the OCP 3.0 card.

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

2. PCIe Slot Locations

Figure 5-22 PCIe Slots

Slot 0 and slot 1 reside in the PCIe riser module.

3. PCIe Riser Modules

- PCIe Riser Module (with 2 x16 slots)

  - Slot 0 and slot 1 reside in this module.

Figure 5-23 PCIe Riser Module
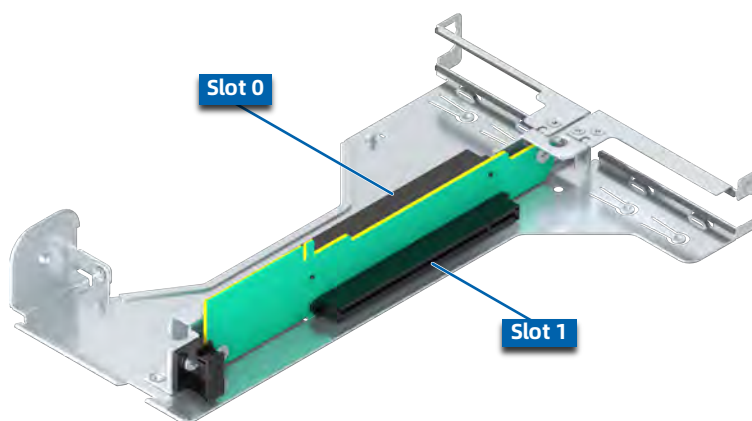
4. PCIe Slot Description

Table 5-14 PCIe Slot Description

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Root Port (B/D/F)	Form Factor
Slot 0	CPU1	PCIe 5.0	x16	x16	PCIe 0	83/01/00	HHHL
Slot 1	CPU0	PCIe 4.0	x16	x16	PCIe 1	8f/01/00	HHHL
OCP 3.0 Slot	CPU0	PCIe 5.0	x16	x16	CPU0_OCP3.0	58/00/0	Standard OCP 3.0 specs

5.7.2   K24-X2-C0-R0-00

1. PCIe Cards

The PCIe cards provide system expansion capabilities.

- A node supports up to 1 PCIe 5.0 expansion slot and 1 dedicated slot for the OCP 3.0 card.

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

2. PCIe Slot Locations

Figure 5-24 PCIe Slots

Slot 0 resides in the PCIe riser module.

3. PCIe Riser Modules

● PCIe Riser Module (with 1 x16 slot)

- Slot 0 resides in this module.

Figure 5-25 PCIe Riser Module
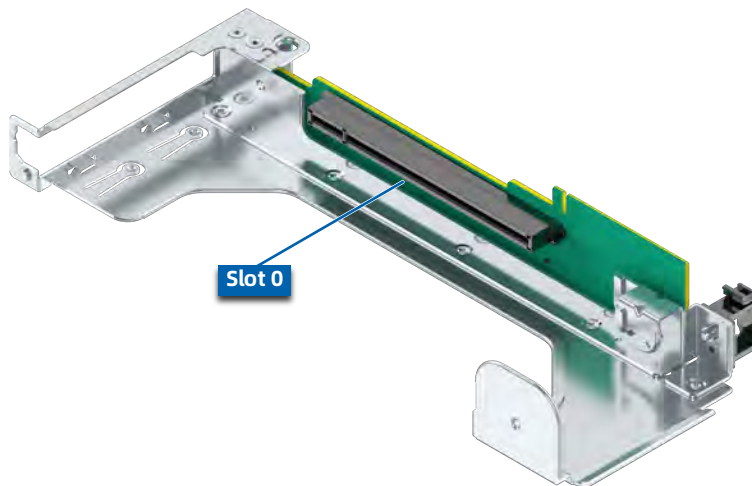
4. PCIe Slot Description

Table 5-15 PCIe Slot Description

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Root Port (B/D/F)	Form Factor
Slot 0	CPU1	PCIe 5.0	x16	x16	PCIe 0	83/01/00	HHHL
OCP 3.0 Slot	CPU0	PCIe 5.0	x16	x16	CPU0_OCP3.0	58/00/0	Standard OCP 3.0 specs

5.8 PSUs

- The server supports up to 4 PSUs.

- A node supports up to 1 PSU.

- The server supports AC or DC PSUs.

- The PSUs are hot-swappable.

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

Figure 5-26 PSU Locations
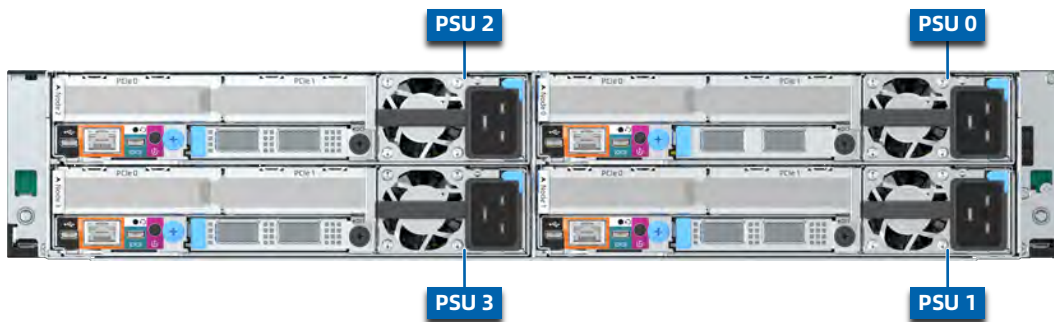
5.9 Fans

Front fan modules:

- The K24-X2-A0-R0-00 server supports 5 or 4 hot-swap 8086 fans with N+1 redundancy.

- The K24-X2-C0-R0-00 server supports 2 hot-swap 8080 fans with N+1 redundancy.

- Supports smart fan speed control.

- According to the fan partition regulation, there are 2 airflow spaces:

  - For airflow space 0, BMC0 and BMC1 control fan 0 and fan 1 respectively.

  - For airflow space 1, BMC2 and BMC3 control fan 3 and fan 4 respectively.

  - Fan 2 speed is the maximum rpm value among fans in airflow space 0 and 1.

  - For manually reducing the fan speed, you need to set the fan mode under the both BMCs in the same airflow space to manual mode, and then you can manually reduce the fan speed under either BMC. For manually increasing the fan speed, there is no this kind of limit.

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

Internal fan modules:

● The server supports up to 1 internal 6038 fan module.

● The fan is not hot-swappable.

● The fan does not support N+1 redundancy.

Figure 5-27 Front Fan Module Locations

Figure 5-28 Internal Fan Module Location
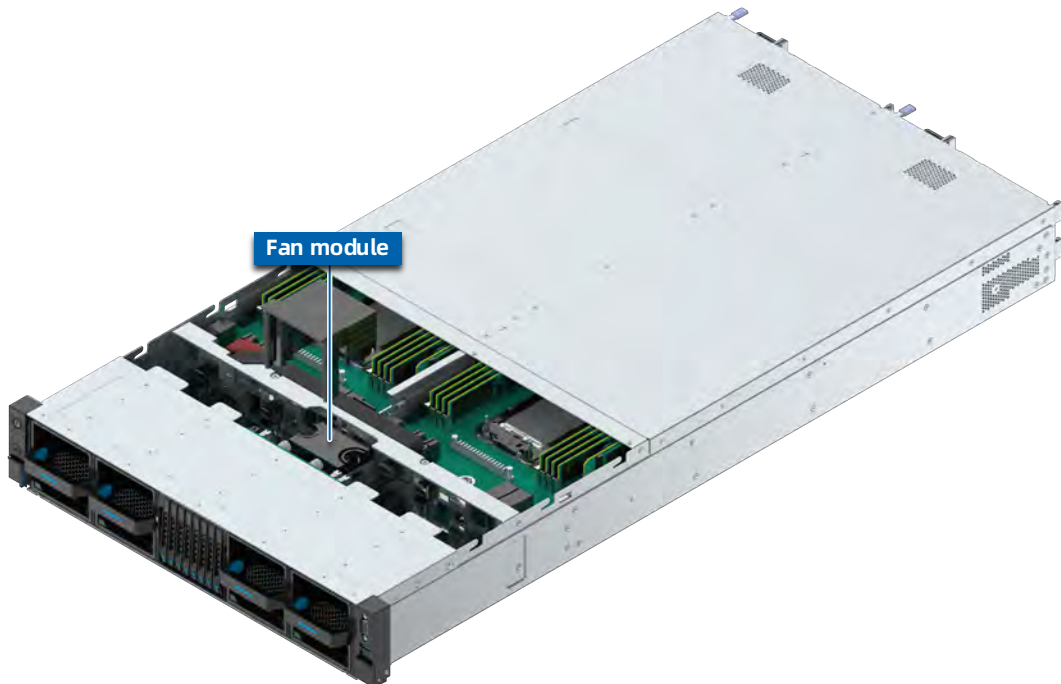
5.10 Boards

5.10.1 Motherboard

Figure 5-29 Motherboard Layout
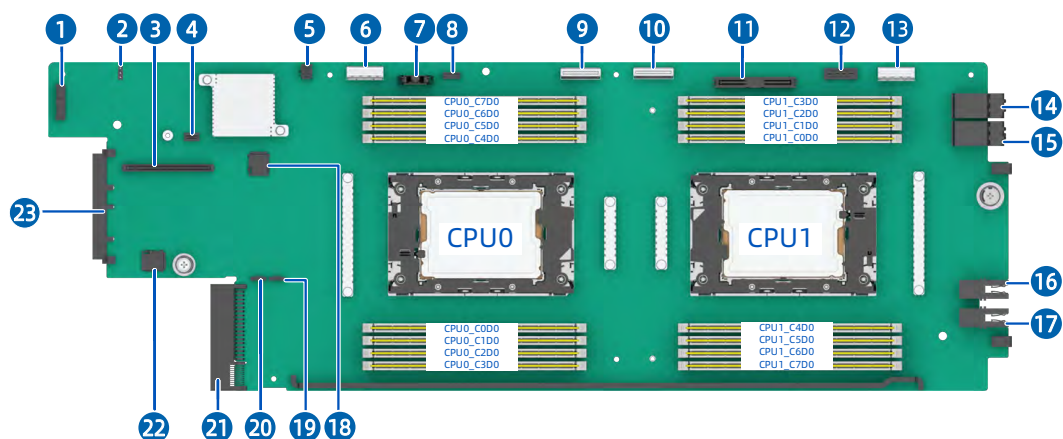
Item	Feature	Item	Feature
1	I/O Board Connector	2	CLR_CMOS Jumper
3	PCIe Riser Slot	4	TCM/TPM Connector
5	PCIe Power Connector	6	SLIM_SATA_VGA Connector 0
7	CMOS Battery Socket	8	RAID Key Connector
9	MCIO Connector (MCIO_CPU1_PE0_EG)	10	MCIO Connector (MCIO_CPU1_PE0_AC)
11	M.2 Adapter Slot	12	XDP Connector
13	SLIM_SATA_VGA Connector 1	14	Low-Speed and High-Density Connector
15	High-Speed and High-Density Connector	16	Bus Bar - Negative Terminal
17	Bus Bar - Positive Terminal	18	PCH TF Card Slot
19	Leak Detection Connector 0	20	Leak Detection Connector 1
21	PSU Connector	22	BMC TF Card Slot
23	OCP 3.0 Slot	-	-

5.10.2 Drive Backplanes

1. Front Drive Backplane

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

Figure 5-30 4 × 2.5-inch SAS/SATA/NVMe Drive Backplane
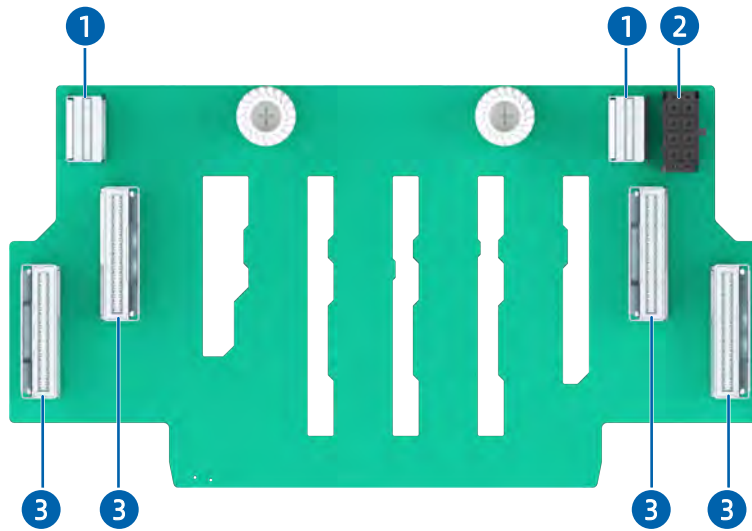
Item	Feature	Item	Feature
1	Slimline x4 Connector × 2	2	Backplane Power Connector
3	MCIO x8 Connector × 4	-	-

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

Figure 5-31 8 × 2.5-inch SAS/SATA/NVMe Drive Backplane
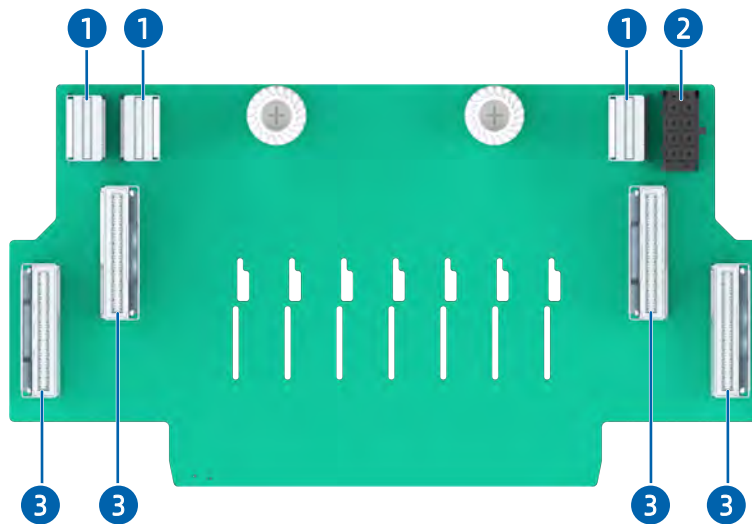
Item	Feature	Item	Feature
1	Slimline x4 Connector × 3	2	Backplane Power Connector
3	MCIO x8 Connector × 4	-	-

2. Internal Drive Backplane

- 2 × M.2 SATA/NVMe SSD Backplane

Figure 5-32 2 × M.2 SATA/NVMe SSD Backplane
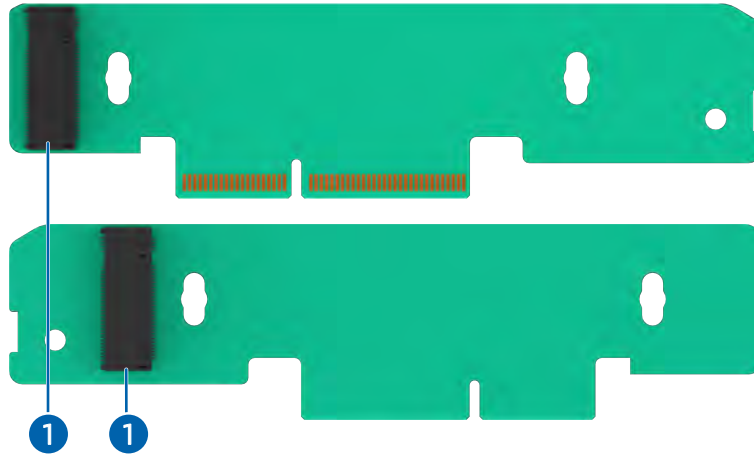
Item	Feature	Item	Feature
1	M.2 SSD Slot × 2	/	/

6 Product Specifications

6.1 K24-X2-A0-R0-00

6.1.1 Technical Specifications

Table 6-1 Technical Specifications

Item	Description
Form Factor	2U/4N rack server
Chipset	Intel C740
Processor	Supports two 4th/5th Gen Intel Xeon Scalable processors (Sapphire Rapids/Emerald Rapids) per node • Integrated memory controllers and 8 memory channels per processor • Integrated PCIe controllers and 80 PCIe 5.0 lanes per processor • Up to 4 UPI links per CPU at up to 20 GT/s • Up to 56 cores • Max Turbo frequency at 4.1 GHz • Minimum L3 cache of 1.875 MB per core • TDP up to 350 W Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.

Memory	• Up to 64 DIMM slots (16 DIMM slots per node)
	
	• Up to 16 DDR5 DIMMs per node
	
	  - Supports RDIMMs
	
	  - Speed up to 5,600 MT/s
	
	  - Mixing DDR5 DIMM 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:

Item	Description
	The information above is for reference only. See 7.2 Hardware Compatibility for details.

Storage Drive	Supports multiple drive configurations. See 5.5.1 Drive Configurations for details.
	
	• Supports up to 8 front SAS/SATA/NVMe SSDs
	
	• Supports up to 2 M.2 SSDs per node
	
	  - The M.2 SSDs support RAID configuration.
	
	  - When the server is configured with an M.2 adapter, the SATA/PCIe M.2 SSDs support VROC.
	
	Notes:
	• It is recommended that the M.2 SSD is only used as a boot device for installing the OS.
	• The M.2 SSD has low endurance and cannot be used as a data storage device, especially in scenarios with frequent data erasing and re-writing. The reason is that write limits can be reached within a short period of time, which will result in damage and unavailability.
	• For data storage, use enterprise-class HDDs or SSDs with higher DWPD.
	• Write-intensive business software will cause the M.2 SSD to reach write endurance and wear out; therefore, the M.2 SSD is not recommended for such business scenarios.
	• Do not use the M.2 SSD as caching.
	
	• Supports hot-swap SAS/SATA/NVMe drives.
	
	Notes:
	When the server is configured with NVMe drives:
	• When the VMD function is enabled and the latest VMD driver is installed, the NVMe drives support VROC RAID.
	• Supports multiple models of RAID controller cards. See 7.2 Hardware Compatibility for details.

Network	Supports multiple types of network expansion.
	
	• Supports OCP 3.0 cards
	
	  - One slot supports 1 OCP 3.0 card (1/10/25 Gb), which can be selected as required.
	
	  - The OCP 3.0 cards are hot-swappable.
	
	• Supports 1/10/25/40/100 Gb PCIe NICs

I/O Expansion	Supports PCIe expansion slots. For servers with rear PCIe riser modules: - A node supports 1 dedicated expansion slot for the OCP 3.0 card and up to 2 PCIe expansion slots.

Item	Description
	- The server supports 4 dedicated expansion slots for OCP 3.0 cards and up to 8 PCIe expansion slots. Note: For details, see 5.7 I/O Expansion.
Port	Supports multiple ports. • Front (for the server): - 2 × USB 2.0 port - 1 × VGA port • Rear (for a node): - 1 × Micro USB port - 1 ×system debugging/BMC management serial port - 1 × BMC management network port Note: OS installation on the USB storage media is not recommended.
Display	Integrated VGA on the motherboard with a video memory of 64 MB and a maximum 16M color resolution of 1,920 × 1,200 at 60 Hz. Note: 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.
System Management	• UEFI • BMC • NC-SI • KSManage • KSManage Tools
Security Feature	• Trusted Platform Module (TPM) and Trusted Cryptography Module (TCM) • Intel Trusted Execution Technology • Firmware update mechanism based on digital signatures • UEFI Secure Boot • Hierarchical BIOS password protection • BIOS Secure Flash and BIOS Lock Enable (BLE) • BMC dual-image mechanism

6.1.2 Environmental Specifications

Table 6-2 Environmental Specifications

Parameter	Description
Temperature[1,2,3]	• Operating: 5°C to 40°C (41°F to 104°F) • Storage (packed): -40°C to +70°C (-40°F to +158°F) • Storage (unpacked): -40°C to +70°C (-40°F to +158°F)
Relative Humidity (RH, non-condensing)	• Operating: 5% to 90% • Storage (packed): 5% to 95% • Storage (unpacked): 5% to 95%
Operating Altitude	≤3,050 m (10,007 ft)
Corrosive Gaseous Contaminants	Maximum growth rate of corrosion film thickness: • Copper coupon: 300 Å/month (compliant with the gaseous corrosivity level of G1 defined in ANSI/ISA-71.04-2013) • Silver coupon: 200 Å/month (compliant with the gaseous corrosivity level of G1 defined in ANSI/ISA-71.04-2013)

Acoustic Noise[4,5,6]	Noise emissions are measured in accordance with ISO 7779 (ECMA 74) and declared in accordance with ISO 9296 (ECMA 109). Listed are the declared A-weighted sound power levels (LWAd) and declared average bystander position A-weighted sound pressure levels (LpAm) at a server operating temperature of 23°C (73.4°F):
	
	• Idle:
	  - LWAd: 56.9 dBA for standard configuration
	  - LpAm: 78.1 dBA for standard configuration
	• Operating:
	  - LWAd: 75.5 dBA for standard configuration
	  - LpAm: 87.8 dBA for standard configuration

Notes:

1. Not all configurations support an operating temperature range of 5°C to 40°C (41°F to 104°F).

2. Standard operating temperature:

   - 10°C to 35°C (50°F to 95°F) is the standard operating temperature range at sea level. At the altitude of 0 to 3,050 m (0 to 10,007 ft), derate the maximum allowable temperature by 1°C per 305 m (1°F per 556 ft). The maximum temperature gradient is 20°C/h (36°F/h), varying with server configuration.

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

3. Expanded operating temperature:

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

   - Any fan failure or operations under expanded environments 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). The listed sound levels apply to the standard configuration. Additional options may result in increased sound levels. 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 with server configuration. These values are for reference only and subject to change without further notice.

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

6.1.3   Physical Specifications

Table 6-3 Physical Specifications

Item	Description
Outer Packaging Dimensions (L × W × H)	1,190 × 600 × 295 mm (46.85 × 23.62 × 11.61 in.)
Installation Dimension Requirements	• Installation requirements for the cabinet are as follows: - General cabinet compliant with the International Electrotechnical Commission 297 (IEC 297) standard - Width: 482.6 mm (19 in.) - Depth: Above 1,000 mm (39.37 in.) • Installation requirements for the server rails are as follows: - L-bracket rails: applicable to our cabinets only - L-bracket static rails: The distance between the mounting flanges at the front and rear of the cabinet ranges from 609 to 914 mm (23.98 to 35.98 in.)
Weight	• 5 × 8086 fan configuration: - Net weight: 44.00 kg (97.00 lbs) - Gross weight: 52.52 kg (115.79 lbs) (including server, packaging box, rails and accessory box) • 8 × 2.5-inch SAS/SATA/NVMe drive configuration: - Net weight: 44.85 kg (98.88 lbs) - Gross weight: 53.37 kg (117.66 lbs) (including server, packaging box, rails and accessory box) • 4 × 2.5-inch SAS/SATA/NVMe drive configuration: - Net weight: 44.16 kg (97.36 lbs) - Gross weight: 52.68 kg (116.14 lbs) (including server, packaging box, rails and accessory box) Note: The product weight is for reference only. The actual weight may differ depending on the model you purchased.

Figure 6-1 Chassis Dimensions
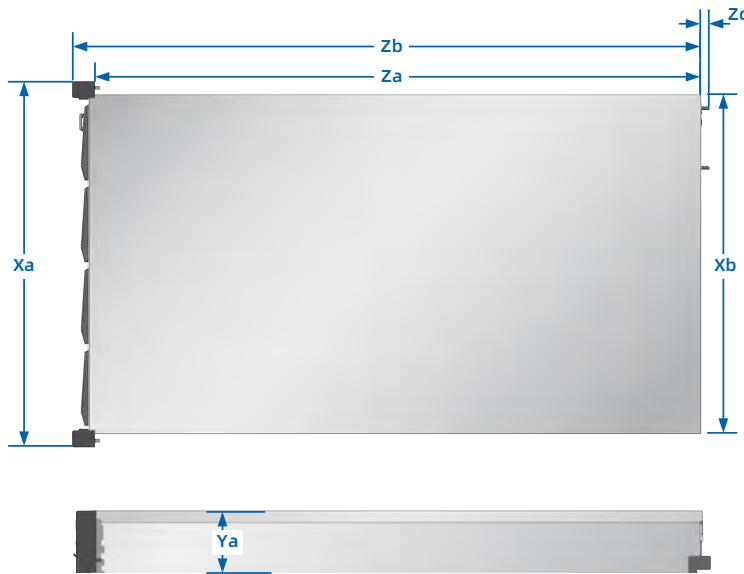
Model	Xa	Xb	Ya	Za	Zb	Zc
K24-X2-A0-R0-00	482 mm (18.98 in.)	447 mm (17.60 in.)	87 mm (3.43 in.)	896 mm (35.28 in.)	921 mm (36.26 in.)	25.14 mm (0.99 in.)

6.2 K24-X2-C0-R0-00

6.2.1 Technical Specifications

Table 6-4 Technical Specifications

Item	Description
Form Factor	2U/4N rack server
Chipset	Intel C740
Processor	Supports two 4th/5th Gen Intel Xeon Scalable processors (Sapphire Rapids/Emerald Rapids) per node • Integrated memory controllers and 8 memory channels per processor • Integrated PCIe controllers and 80 PCIe 5.0 lanes per processor • Up to 4 UPI links at up to 20 GT/s • Up to 56 cores

Item	Description
	• Max Turbo frequency at 4.1 GHz • Minimum L3 cache of 1.875 MB per core • TDP up to 350 W Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.
Memory	• Up to 64 DIMM slots (16 DIMM slots per node) • Up to 16 DDR5 DIMMs per node - Supports RDIMMs - Speed up to 5,600 MT/s - Mixing DDR5 DIMM 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 Drive	Supports multiple drive configurations. See 5.5.1 Drive Configurations for details. • Up to 8 front SAS/SATA/NVMe SSDs • Supports up to 2 M.2 SSDs per node - The M.2 SSDs support RAID configuration. - When the server is configured with an M.2 adapter, the SATA/PCIe M.2 SSDs support VROC. Notes: • It is recommended that the M.2 SSD is only used as a boot device for installing the OS. • The M.2 SSD has low endurance and cannot be used as a data storage device, especially in scenarios with frequent data erasing and re-writing. The reason is that write limits can be reached within a short period of time, which will result in damage and unavailability. • For data storage, use enterprise-class SSDs with higher DWPD or HDDs. • Write-intensive business software will cause the M.2 SSD to reach write endurance and wear out; therefore, the M.2 SSD is not recommended for such business scenarios. • Do not use the M.2 SSD as caching. • Supports hot-swap SAS/SATA/NVMe drives. Notes:

Item	Description
	When the server is configured with NVMe drives: • When the VMD function is enabled and the latest VMD driver is installed, the NVMe drives support VROC RAID. • Supports multiple models of RAID controller cards. See 7.2 Hardware Compatibility for details.

Network	Supports multiple types of network expansion.
	
	• OCP 3.0 Card
	
	  - One slot supports 1 OCP 3.0 card (1/10/25 Gb), which can be selected as required.
	
	  - The OCP 3.0 cards are hot-swappable.
	
	• Supports 1/10/25/40/100 Gb PCIe NICs

I/O Expansion	Supports PCIe expansion slots.
	For servers with rear PCIe riser modules:
	
	  - A node supports 1 dedicated expansion slot for the OCP 3.0 card and up to 1 PCIe expansion slot.
	
	  - The server supports 4 dedicated expansion slots for OCP 3.0 cards and up to 4 standard PCIe expansion slots.
	
	Note:
	For details, see 5.7 I/O Expansion.

Port	Supports multiple ports.
	
	• Front (for the server):
	
	  - 2 × USB 2.0 port
	
	  - 1 × VGA port
	
	• Rear (for a node):
	
	  - 1 × Micro USB port
	
	  - 1 × Micro USB system debugging/BMC management serial port
	
	  - 1 × BMC management network port
	
	Note:
	OS installation on the USB storage media is not recommended.

Display	Integrated VGA on the motherboard with a video memory of 64 MB and a maximum 16M color resolution of 1,920 × 1,200 at 60 Hz. Note:

Item	Description
	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.
Cold Plate	• Material: copper • Cooling liquid: deionized water, PG-25, etc. • Diameter of particles passing through the filter: ≤5 μm • Volume flow rate: 1 to 1.4 L/min for each node, depending on the actual situation • Inlet water temperature: below 50°C (122°F) • Outlet water temperature: depending the actual configuration • Operating pressure: below 50 psi • Maximum transient pressure: 150 psi
Quick Disconnect	Staubli DAG/SCG
System Management	• UEFI • BMC • NC-SI • KSManage • KSManage Tools
Security	• Trusted Platform Module (TPM) and Trusted Cryptography Module (TCM) • Intel Trusted Execution Technology • Firmware update mechanism based on digital signatures • UEFI Secure Boot • Hierarchical BIOS password protection • BIOS Secure Flash and BIOS Lock Enable (BLE) • BMC and BIOS dual-image mechanism

6.2.2　Environmental Specifications

Table 6-5 Environmental Specifications

Parameter	Description
Temperature[1,2,3]	• Operating: 5 to 45℃ (41 to 113°F) • Storage (packed): -40℃ to +70℃ (-40°F to +158°F) • Storage (unpacked): -40℃ to +70℃ (-40°F to +158°F)
Relative Humidity (RH, non-condensing)	• Operating: 5% to 90% • Storage (packed): 5% to 95% • Storage (unpacked): 5% to 95%
Operating Altitude	≤3,050 m (10,007 ft)
Corrosive Gaseous Contaminants	Maximum growth rate of corrosion film thickness: • Copper coupon: 300 Å/month (compliant with the gaseous corrosivity level of G1 defined in ANSI/ISA-71.04-2013) • Silver coupon: 200 Å/month (compliant with the gaseous corrosivity level of G1 defined in ANSI/ISA-71.04-2013)

Acoustic Noise[4,5,6]	Noise emissions are measured in accordance with ISO 7779 (ECMA 74) and declared in accordance with ISO 9296 (ECMA 109). Listed are the declared A-weighted sound power levels (LWAd) and declared average bystander position A-weighted sound pressure levels (LpAm) at a server operating temperature of 23℃ (73.4°F):
	
	• Idle:
	
	   - LWAd: 56.9 dBA for standard configuration
	
	   - LpAm: 78.1 dBA for standard configuration
	
	• Operating:
	
	   - LWAd: 75.5 dBA for standard configuration
	
	   - LpAm: 87.8 dBA for standard configuration

Notes:

1. Not all configurations support an operating temperature range of 5°C to 45°C (41°F to 113°F).

2. Standard operating temperature:

   - 10°C to 35°C (50°F to 95°F) is the standard operating temperature range at sea level. At the altitude of 0 to 3,050 m (0 to 10,007 ft), derate the maximum allowable temperature by 1°C per 305 m (1°F per 556 ft). The maximum temperature gradient is 20°C/h (36°F/h), varying with server configuration.

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

3. Expanded operating temperature:

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

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

   - Any fan failure or operations under expanded environments 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). The listed sound levels apply to the standard configuration. Additional options may result in increased sound levels. 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 with server configuration. These values are for reference only and subject to change without further notice.

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

6.2.3   Physical Specifications

Table 6-6 Physical Specifications

Item	Description
Outer Packaging Dimensions (L × W × H)	1,190 × 600 × 295 mm (46.85 × 23.62 × 11.61 in.)
Installation Dimension Requirements	• Installation requirements for the cabinet are as follows: - General cabinet compliant with the International Electrotechnical Commission 297 (IEC 297) standard - Width: 482.6 mm (19 in.) - Depth: Above 1,000 mm (39.37 in.) • Installation requirements for the server rails are as follows: - L-bracket rails: applicable to our cabinets only - L-bracket static rails: The distance between the mounting flanges at the front and rear of the cabinet ranges from 609 to 914 mm (23.98 to 35.98 in.)
Weight	• 8 × 2.5-inch SAS/SATA/NVMe drive configuration: - Net weight: 50.65 kg (111.66 lbs) - Gross weight: 74.00 kg (163.14 lbs) (including server, packaging box, rails and accessory box) • 4 × 2.5-inch SAS/SATA/NVMe drive configuration: - Net weight: 49.96 kg (110.14 lbs) - Gross weight: 73.31 kg (161.62 lbs) (including server, packaging box, rails and accessory box) Note: The product weight is for reference only. The actual weight may differ depending on the model you purchased.

Figure 6-2 Chassis Dimensions
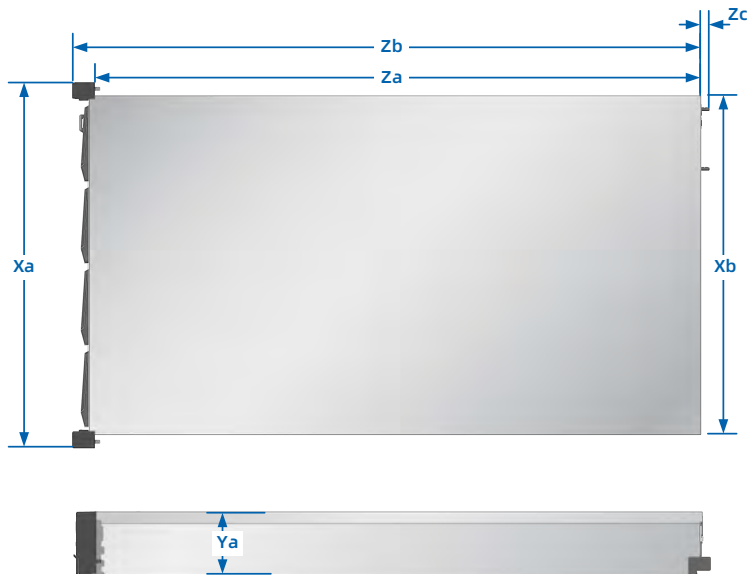
Model	Xa	Xb	Ya	Za	Zb	Zc
K24-X2-C0-R0-00	482 mm (18.98 in.)	447 mm (17.60 in.)	87 mm (3.43 in.)	896 mm (35.28 in.)	921 mm (36.26 in.)	25.14 mm (0.99 in.)

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 controller cards, or firmware versions) during the pre-sales phase.

7.1 Supported Operating Systems

Table 7-1 Supported Operating Systems

OS Version
Red Hat Enterprise Linux 8.6
Red Hat Enterprise Linux 9.0
CentOS 8.5
Ubuntu 22.4
Debian 9.x
Windows Server 2019
Windows Server 2022
VMware ESXi 7.0
VMware ESXi 8.0

7.2 Hardware Compatibility

7.2.1 CPU Specifications

The server includes 4 nodes, and each node supports two 4th/5th Gen Intel Xeon Scalable processors (Sapphire Rapids/Emerald Rapids) with a TDP of up to 350 W.

Table 7-2 CPU Specifications

Model	Cores	Threads	Base Frequency (GHz)	Max Turbo Frequency (GHz)	Cache (MB)	TDP (W)
9462	32	64	2.70	3.50	75	350
8480+	56	112	2.00	3.80	105	350
8470	52	104	2.00	3.80	105	350
8470Q	52	104	2.10	3.80	105	350
8470N	52	104	1.70	3.60	97.5	300
8468	48	96	2.10	3.80	105	350
8468V	48	96	2.40	3.80	97.5	330
8462Y+	32	64	2.80	4.10	60	300
8460Y	40	80	2.00	3.70	105	300
8458P	44	88	2.70	3.80	82.5	350
8452Y	36	72	2.00	3.20	67.5	300
6454S	32	64	2.20	3.40	60	270
6444Y	16	32	3.60	4.00	45	270
6448Y	32	64	2.10	4.10	60	225
6442Y	24	48	2.60	4.00	60	225
6438Y	32	64	2.00	4.00	60	205
6438M	32	64	2.20	3.90	60	205
6430	32	64	2.10	3.40	60	270
6426Y	16	32	2.50	4.10	37.5	185
6458Q	32	64	3.10	4.00	60	350
6434	8	16	3.70	4.10	22.5	195
6428N	32	64	1.80	3.80	60	185
5420+	28	56	2.00	4.10	52.5	205
5418Y	24	48	2.00	3.80	45	185
5418N	24	48	1.80	3.80	45	165
5415+	8	16	2.90	4.10	22.5	150
4416+	20	40	2.00	3.90	37.5	165
4410Y	12	24	2.00	3.90	30	150
4514Y	16	32	2.00	3.40	30	150
5520+	28	56	2.20	4.00	52.5	205
6530	32	64	2.10	4.00	160	270
6558Q	32	64	3.20	4.10	60	350

Model	Cores	Threads	Base Frequency (GHz)	Max Turbo Frequency (GHz)	Cache (MB)	TDP (W)
6542Y	24	48	2.90	4.10	60	250
8558	48	96	2.10	4.00	260	330
8558P	48	96	2.70	4.00	260	350
8568Y	48	96	2.30	4.00	300	350
8570	56	112	2.10	4.00	300	350

7.2.2 DIMM Specifications

The server includes 4 nodes, and each node supports up to 16 RDIMMs. Each processor supports 8 memory channels with up to 2 DIMMs per channel. RDIMMs are supported.

Table 7-3 DIMM Specifications

Type	Capacity (GB)	Speed (MHz)	Data Width	Organization
RDIMM	16	4,800	x80	1R x8
RDIMM	32	4,800	x80	2R x8
RDIMM	64	4,800	x80	2R 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 SAS/SATA SSD Specifications

Type	Capacity	Max. Qty.
SATA SSD	240 GB	8
SATA SSD	480 GB	8
SATA SSD	960 GB	8
SAS SSD	960 GB	4
SAS SSD	1.92 TB	4
SAS SSD	3.84 TB	4
SAS SSD	7.68 TB	4
SAS SSD	15.36 TB	4

Table 7-5 U.2 NVMe SSD Specifications

Type	Capacity (TB)	Max. Qty.
U.2 NVMe SSD	1.6	4
U.2 NVMe SSD	1.92	4
U.2 NVMe SSD	3.2	4
U.2 NVMe SSD	3.84	4
U.2 NVMe SSD	6.4	4
U.2 NVMe SSD	7.68	4

Table 7-6 M.2 SSD Specifications

Type	Capacity (GB)	Max. Qty.
M.2 SATA SSD	240	2
M.2 SATA SSD	480	2

7.2.4 SAS/RAID Controller Card Specifications

Table 7-7 SAS/RAID Controller Card Specifications

Type	Description
RAID Controller Card	RAID Controller Card_PM8204_RA_8_2GB_SAS3_PCIe3
	RAID Controller Card_PM8204_RA_8_4GB_SAS3_PCIe3
	RAID Controller Card_L_8R0_9560-8i_4G_HDM12G_PCIe4

7.2.5 NIC Specifications

Table 7-8 OCP Card Specifications

Type	Description	Speed (Gb/s)	Port Qty.
OCP 3.0 Card	NIC_Mozart_I350_1G_RJ_O3x4_4 OCP	1	4
	NIC_A-M6_X710_10G_LC_O3x8_2	10	2
	NIC_Andes-M6_E810_25G_LC_OCP3x8_2	25	2

Table 7-9 PCIe NIC Specifications

Type	Description	Speed (Gb/s)	Port Qty.
PCIe NIC	NIC_Vostok_I350_1G_RJ_PCIex4_4	1	4
	NIC_Pyxis_X550_10G_RJ_PCIex8_2_XR	10	2
	NIC_I_10G_X550T2_RJ_PCIEx4_2_XR	10	2

Type	Description	Speed (Gb/s)	Port Qty.
	NIC_I_10G_X710DA2_LC_PCIEx8_2_XR_M7	10	2
	NIC_Vostok_X710_10G_LC_PCIEx8_2_M7	10	2
	NIC_M_25G_MCX631102AN_LC_PCIEx8_2_XR	25	2
	NIC_M_25G_MCX512A-ACAT_LC_PCIEx8_2_XR	25	2
	NIC_I_25G_E810XXVDA2_LC_PCIEx8_2_XR_M7	25	2
	NIC_M_25G_MCX621102AN_LC_PCIEx8_2_XR	25	2

7.2.6   HCA Card Specifications

Table 7-10 HCA Card Specifications

Type	Description	Speed (Gb/s)	Port Qty.
HCA Card	HCA Card_M_1-HDR100_MCX653105A-ECAT_PCIE	100	1
	HCA Card_M_2-HDR100_MCX653106A-ECAT_PCIE	100	2
	HCA Card_M_1-HDR4X100_MCX653105A-HDAT_PCIE	200	1
	HCA Card_M_2-QSFP_MCX653106A-HDAT_PCIE	200	2
	HCA Card_NV_1-NDR200_MCX75310AAS-HEAT_PCIE	200	1
	HCA Card_NV_2-NDR200_MCX755106AS-HEAT_PCIE	200	2
	HCA Card_NV_1-NDR_MCX75310AAS-NEAT_PCIE	400	1

7.2.7   PSU Specifications

The server supports up to 4 CR68 PSUs in 2+2 redundancy with an output power of 2,200 W. 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 CR68 PSUs are 80 Plus Platinum or Titanium rated with various output powers, allowing customers to choose as needed.

- The following rated 110 Vac and 230 Vac PSUs in 2+2 redundancy are supported:

    - 2,200 W Platinum PSU: 1,000 W (110 Vac), 2,200 W (230 Vac)

    - 2,200 W Titanium PSU: 1,000 W (110 Vac), 2,200 W (230 Vac)

NOTE

At a rated voltage of 110 Vac, the 2,200 W power supply will be derated to 1,000 W.

Operating voltage range:

- 100 to 240 Vac: 90 to 264 Vac

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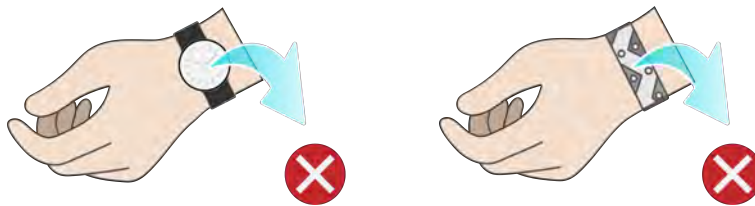
How to put on an ESD strap (Figure 8-3).

    a. Put your hand through an ESD wrist strap.

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

    c. Plug the alligator clip of the ESD wrist strap into the corresponding jack on the grounded cabinet or grounded chassis.

Figure 8-3 Wearing an ESD Wrist Strap
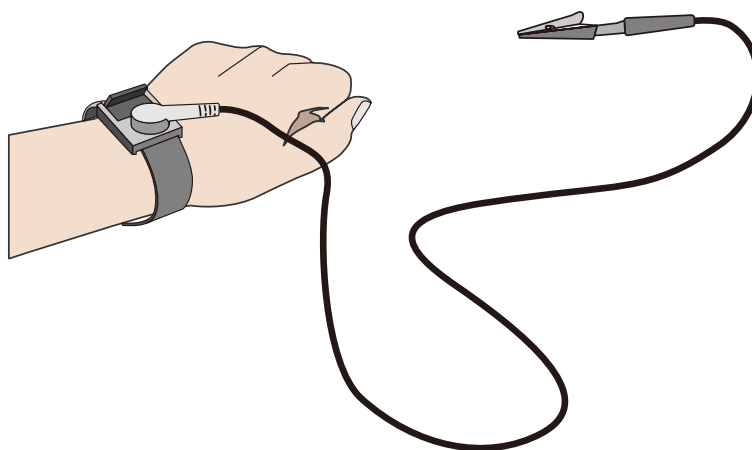
- Use tools correctly to avoid personal injury.

- When moving or lifting equipment above shoulder height, use lifting devices and other tools as necessary to avoid personal injury or equipment damage due to equipment slippage.

- The power sources of the server carry a high voltage. Direct contact or indirect contact through damp objects with the high-voltage power source is fatal.

- To ensure personal safety, ground the server before connecting power.

- When using ladders, always have someone hold and guard the bottom of the ladders. In order to prevent injury, never use a ladder alone.

- When connecting, testing or replacing optical fiber cable, avoid looking into the optical port without eye protection in order to prevent eye damage from laser light.

8.1.3   Equipment Safety

- To ensure personal safety and prevent equipment damage, use only the power cords and cables that come with the server. Do not use them with any other equipment.

- Before touching the equipment, put on ESD clothing and ESD gloves to prevent static electricity from damaging the equipment.

- When moving the server, hold the bottom of the server. Do not hold the handles of any module installed in the server, such as PSUs, fan modules, drive modules, or motherboard. Handle the equipment with care at all times.

- Use tools correctly to avoid damage to the equipment.

- Connect the power cords of active and standby PSUs to different PDUs to ensure high system reliability.

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

8.1.4   Transportation Precautions

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

● Hire a trusted logistics company to move all equipment. The transportation process must comply with international transportation standards for electronic equipment. Always keep the equipment being transported upright. 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
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 proper 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 proper 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 anytime, including weekends and local national holidays.

9.2 Our Service SLA

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

- RMA Service

- ARMA Service

- 9 × 5 × NBD Onsite Service

- 24 × 7 × 4 Onsite Service

9.3 Warranty Exclusions

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

The Limited Warranty does not apply to

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

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

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

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

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

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

- damage or defects by virus infection;

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

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

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

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

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

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

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

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

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

10 System Management

10.1 Intelligent Management System BMC

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

BMC supports:

- IPMI 2.0

- Redfish 1.13

- SNMP v1/v2c/v3

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

- remote virtual media

- login via web browsers

- intelligent fault diagnosis

Table 10-1 BMC Features

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

Feature	Description
Accurate and Intelligent Fault Location	IDL, a fault diagnosis system, offers accurate and comprehensive hardware fault location capabilities, and outputs detailed fault causes and handling suggestions.
Alert Management	Supports rich automatic remote alert capabilities, including proactive alerting mechanisms such as SNMP Trap (v1/v2/v3), email alerts and syslog remote alerts to ensure 24 × 7 reliability.
Remote Console KVM	Supports HTML5- and Java-based remote console to remotely control and operate the monitor/mouse/keyboard of the server, providing highly available remote management capabilities without on-site operation.
Virtual Network Console (VNC)	Supports mainstream third-party VNC clients without relying on Java, improving management flexibility.
Remote Virtual Media	Supports virtualizing images, USB devices, folders and local media devices as media devices of remote servers, simplifying OS installation, file sharing, and other O&M tasks.
Web GUI	Supports the visual management interface developed by us, displaying abundant information of the server and components, and offers easy-to-use Web GUIs.
Crash Screenshot and Manual Screenshot	• Supports automatic crash screenshot with the last screen before crash saved • 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 faults or flash damage, improving operational reliability.
Power Capping	Supports power capping, increasing deployment density and reducing energy consumption.
IPv4/IPv6	Supports both IPv4 and IPv6, enhancing network deployment flexibility.
Auto-Switching of Management Network Port	Supports auto-switching between the dedicated management network port and shared management network port, providing customers with flexible network deployment solutions for different management network deployment scenarios.
BMC Self-Diagnosis and Self-Recovery System	• Supports the reliable dual watchdog mechanism for hardware and software, enabling automatic restoration of BMC in case of BMC abnormality. • Provides a thermal protection mechanism, which is automatically triggered when the BMC is abnormal to

Feature	Description
	ensure that the fan operates at safe speeds to avoid system overheating. • Supports self-diagnosis of processors, memory modules, and storage devices of BMC, and automatically cleans the workload to restore to normal when the device usage rate is too high.
Power Supply Control	Supports virtual power buttons for startup, shutdown, restart, and restart after shutdown.
UID LED	Supports remote lighting of the UID LED for locating the server in the server room.
Secure Firmware Update	• Supports firmware update based on secure digital signatures, and mismatch prevention mechanism for firmware from different manufacturers and firmware for different models. • Supports firmware update of BMC/BIOS/CPLD/PSU.
Serial Port Redirection	Supports remote redirection of the system serial port, BMC serial port and other serial ports, and directs the server-side serial port output to the local administrator via the network for server debugging.
Storage Information Display	Displays RAID logical array information and drive information, and supports remote RAID creation for improved deployment efficiency.
User Role Management	Supports user detail management based on user roles and flexible creation of user roles with different privileges, provides more user roles to allow administrators to grant different privileges to O&M personnel.
Security Features	Adopts the industry-leading server security baseline standard V3.0. SSH, HTTPS, SNMP and IPMI use secure and reliable algorithms. BMC offers capabilities including secure update and boot and security reinforcement mechanisms such as anti-replay, anti-injection, and anti-brute force.
Double-Factor Authentication	Double factor authentication is supported for local BMC users. Users need to log into BMC with both password and certificate, and thus to prevent attacks caused by password leakage.
Import and Export Configuration	The existing system configurations can be imported and exported.

Feature	Description
System Information Display	The System Information page displays basic information and health status of major server components, including CPU, Memory, Power, Device Inventory, Hard Drive, Network Adapter, and Security Chip.
Fan Management	On the Fan Management page, users can view its status, current speed, duty ratio, and other information of a fan module. Users can also select the fan control mode, and preset the speed for each fan module in the Manual Fan Control mode.
Power Policy	Users can set how the server operating system reacts under the BMC's control when AC power is reconnected to the server.
One-Click Wiping	Data on all the storage devices can be irretrievably wiped off to protect data from leakage when the server is to be retired.
System Lockdown	After lockdown, users can not configure the parameters and perform certain operations on the server.

10.2 KSManage

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

Built on cutting-edge O&M concepts, KSManage provides users with leading and efficient overall management solutions for data centers to ensure advanced infrastructure management. This platform provides a rich set of functions such as centralized asset management, in-depth fault diagnosis, component fault early warning, intelligent energy consumption management, 3D automatic topologies, and stateless automatic deployment. With these functions, users can implement centralized O&M of servers, storage devices, network devices, security devices, and edge devices, effectively improving O&M efficiency, reducing O&M costs, and ensuring the secure, reliable, and stable operation of data centers. KSManage offers:

- lightweight deployment in multiple scenarios and full lifecycle management of devices

- high reliability and on-demand scalability enabled by 1 to N data collectors

- intelligent asset management and real-time tracking of asset changes

- comprehensive monitoring for overall business control

- intelligent fault diagnosis for reduced maintenance time

- second-level performance monitoring for real-time status of devices

- batch configuration, deployment and update, shortening the time needed to bring the production environment online

- improved firmware version management efficiency

- standardized northbound interfaces for easy integration and interfacing

Table 10-2 KSManage Features

Feature	Description
Home	Display of basic information (data centers, server rooms, cabinets, assets and alerts), quick addition of devices and custom home page
Assets	• Batch asset import, automatic asset discovery, and full lifecycle management of assets • Management of the full range of our server family, including general-purpose rack servers, AI servers, multi-node servers, edge servers and all-in-one servers • Management of our general-purpose disk arrays and distributed storage devices • Management of network devices (switches, routers, etc.), security devices (firewalls, load balancers, etc.), cabinets and clouds • Management of data centers • Asset warranty information management, asset inventory reports for server acceptance, asset attribute expansion, etc.
Monitor	• Display of real-time alerts, history alerts, blocked alerts and events • Fault prediction of drives and memories • Custom inspection plan and inspection result management • Notification record viewing • Intelligent fault diagnosis and analysis, automatic fault reporting and repair ticket viewing • Trap management and Redfish management • Management of monitoring rules, such as alert rules, notification rules, blocking rules, alert noise reduction

Feature	Description
	rules, compression rules and fault reporting rules, and redefinition of above rules
Control	• Quick start of firmware update, OS installation, power management, drive data erasing and stress test • Batch firmware update (BMC/BIOS/RAID Card/NIC/Drive/HBA Card/MB CPLD/BP CPLD/PSU) • Batch firmware configuration (BMC/BIOS) • Batch RAID configuration and OS deployment for servers • Secure and quick drive data erasing • CPU and memory stress test • Automatic firmware baseline management • BMC and BIOS snapshot management • Repositories for update files
Energy Efficiency	• Overview of data center power consumption trend chart and carbon emission trend chart • Setting of server dynamic power consumption policies and minimum power consumption policies • Server temperature optimization, utilization optimization, power consumption characteristics analysis, power consumption prediction, load distribution, etc. • Carbon asset and carbon emission management
Log	• Fault log record management • Diagnosis record and diagnosis rule management
Topologies	• Centralized management of multiple data centers and panoramic 3D views, including dynamic display of power consumption, temperature, alerts and cabinet capacity of the data center • Network topologies

Feature	Description
Reports	• Management of warranty information reports, alert reports, asset reports, hardware reports and performance reports • Export of reports in .xlsx format
System	• Password management, alert forwarding and data dump • Customized KSManage parameters
Security	Security control of KSManage via a set of security policies such as user management, role management, authentication management (local authentication and LDAP authentication) and certificate management

10.3 KSManage Tools

Table 10-3 Features of KSManage Tools

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

11 Certifications

11.1 K24-X2-A0-R0-00

Table 11-1 Certifications

Country/Region	Certification	Mandatory/Voluntary
International Mutual Recognition	CB	Voluntary
EU	CE	Mandatory
US	FCC	Mandatory
	UL	Voluntary
	Energy Star	Voluntary
Canada	IC	Mandatory
Australia	RCM	Mandatory
Korea	KC	Mandatory
Japan	VCCI	Voluntary
India	BIS	Mandatory

11.2 K24-X2-C0-R0-00

Table 11-2 Certifications

Country/Region	Certification	Mandatory/Voluntary
International Mutual Recognition	CB	Voluntary
EU	CE	Mandatory
US	FCC	Mandatory
	UL	Voluntary
Canada	IC	Mandatory

12 Appendix A

12.1 Operating Temperature Specification Limits

12.1.1 K24-X2-A0-R0-00

Table 12-1 Operating Temperature Specification Limits

Config.	Max. Operating Temp. 35°C (95°F)	Max. Operating Temperature: 40°C (104°F)
8 × 2.5-Inch 7mm NVMe/SAS/SATA Drive Configuration	4 × 8086 fan + 1 × 6038 fan - CPU TDP ≤300 W, single memory capacity ≤96 GB - CPU TDP ≤350 W, single memory capacity ≤32 GB - GPUs not supported - Single fan failure supported (CPU TDP ≤ 300 W, single memory capacity = 16 GB) - PCIe slot 1 on the rear panel supports NICs ≤ 100 G	4 × 8086 fan + 1 × 6038 fan - CPU TDP ≤270 W, single memory capacity ≤16 GB - GPUs not supported - Single fan failure supported (CPU TDP ≤ 250 W, single memory capacity ≤16 GB) - PCIe slot 1 on the rear panel supports NICs ≤ 100 G
4 × 2.5-Inch 15mm NVMe/SAS/SATA Drive Configuration	4 × 8086 fan + 1 × 6038 fan - CPU TDP ≤300 W, single memory capacity ≤96 GB	4 × 8086 fan + 1 × 6038 fan - CPU TDP ≤270 W, single memory capacity ≤16 GB) - GPUs not supported

Config.	Max. Operating Temp. 35°C (95°F)	Max. Operating Temperature: 40°C (104°F)
	• CPU TDP ≤350 W, single memory capacity ≤32 GB • GPUs not supported • Single fan failure supported (CPU TDP ≤ 300 W, single memory capacity = 16 GB) • PCIe slot 1 on the rear panel supports NICs ≤ 100 G	• Single fan failure supported (CPU TDP ≤ 250 W, single memory capacity ≤16 GB) • PCIe slot 1 on the rear panel supports NICs ≤ 100 G
No front drives	• 5 × 8086 fan • CPU TDP ≤350 W, single memory capacity ≤128 GB • GPUs not supported • Single fan failure supported (CPU TDP ≤ 350 W, single memory capacity ≤64 GB) • PCIe slot 1 on the rear panel supports NICs ≤ 100 G	• 5 × 8086 fan • CPU TDP ≤350 W, single memory capacity ≤32 GB • GPUs not supported • Single fan failure supported (CPU TDP ≤ 300 W, single memory capacity ≤32 GB) • PCIe slot 1 on the rear panel supports NICs ≤ 100 G

NOTE

Stack servers in a rack.

12.1.2 K24-X2-C0-R0-00

Table 12-2 Operating Temperature Specification Limits

Config.	Max. Operating Temperature: 35°C (95°F)	Max. Operating Temperature: 40°C (104°F)	Max. Operating Temperature: 45°C (113°F)
8 × 2.5-Inch 7mm NVMe/SAS/SATA Drive Configuration	• 2 × 8080 fan + 1 × 6038 fan • CPU TDP ≤350 W • GPUs not supported • Single fan failure supported (CPU TDP ≤350 W) • Rear NICs ≤100 G supported	• 2 × 8080 fan + 1 × 6038 fan • Single memory capacity ≤32 GB • CPU TDP ≤350 W • GPUs not supported • Single fan failure supported (CPU TDP ≤ 350 W) • Rear NICs ≤10 G supported	• 2 × 8080 fan + 1 × 6038 fan • Single memory capacity ≤16 GB • CPU TDP ≤350 W • GPUs not supported • Single fan failure supported (CPU TDP ≤ 350 W) • Rear NICs ≤10 G supported
4 × 2.5-Inch 15mm NVMe/SAS/SATA Drive Configuration	• 2 × 8080 fan + 1 × 6038 fan • CPU TDP ≤350 W • GPUs not supported • Single fan failure supported (CPU TDP ≤350 W) • Rear NICs ≤100 G supported	• 2 × 8080 fan + 1 × 6038 fan • Single memory capacity ≤32 GB • CPU TDP ≤350 W • GPUs not supported • Single fan failure supported	• 2 × 8080 fan + 1 × 6038 fan • Single memory capacity ≤16 GB • CPU TDP ≤350 W • GPUs not supported • Single fan failure supported

Config.	Max. Operating Temperature: 35℃ (95°F)	Max. Operating Temperature: 40℃ (104°F)	Max. Operating Temperature: 45℃ (113°F)
		(CPU TDP ≤ 350 W) • Rear NICs ≤10 G supported	(CPU TDP ≤ 350 W) • Rear NICs ≤10 G supported

12.2 Model

Certified Model	Description
K24-X2-A0-R0-00	Global
K24-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

Sensor	Description	Sensor Location
Inlet_Temp	Air inlet temperature	-
Outlet_Temp	Air outlet temperature	-
CPUx_VR_Temp	CPUx VR temperature	CPUx x indicates the CPU number with a value of 0 - 1
CPUx_Temp	CPUx core temperature	CPUx x indicates the CPU number with a value of 0 - 1
CPUx_DTS	CPU_DTS temperature CPU margin temperature before it reaches the throttling frequency	CPUx x indicates the CPU number with a value of 0 - 1
CPUx_DIMM_T	The maximum temperature among DDR5 DIMMs of CPUx	CPUx x indicates the CPU number with a value of 0 - 1

Sensor	Description	Sensor Location
CPUx_PMEM_DIMM_T	The maximum temperature among PMEM 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
P2V5_BMC_STBY	BMC 2.5 V voltage	-
PVNN_MAIN_CPUx	CPUx GPIO voltage	CPUx x indicates the CPU number with a value of 0 - 1
PSUx_VIN	PSUx input voltage	PSUx x indicates the PSU number with a value of 0 - 3
PSUx_VOUT	PSUx output voltage	PSUx x indicates the PSU number with a value of 0 - 3
SYS_12V	System 12 V voltage (output by HSC)	Motherboard
STBY_5V	System 5 V voltage	Motherboard
SYS_3V3	System 3.3 V voltage	Motherboard
PVNN_PCH_STBY	PCH core voltage	Motherboard
P1V05_PCH_STBY	PCH logic voltage	Motherboard
RTC_Battery	Motherboard RTC battery voltage	Motherboard
Total_Power	Total power	-
PSUx_PIN	PSUx input power	PSUx x indicates the PSU number with a value of 0 - 3
PSUx_POUT	PSUx output power	PSUx x indicates the PSU number with a value of 0 - 3
CPU_Power	Total CPU power (obtained through ME)	-
Memory_Power	Total memory power (obtained through ME)	-
FANx_F_Speed, FANx_R_Speed	FanX speed	FanX X indicates the fan number with a value of 0 - 4
P3V3_STBY	3.3 V voltage on motherboard	Motherboard
RAID_Temp	Maximum temperature among all non-mezz RAID controller card temperature	RAID controller card

Sensor	Description	Sensor Location
HDD_MAX_Temp	Maximum temperature among all drives	-
NVME_Temp	Maximum temperature among all NVMe drives	-
OCP_NIC_SFP_Temp	OCP card SFP temperature	SFP optical module
PCIe_NIC_SFP_T	PCIe NIC SFP temperature	SFP 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
PCIe_HCA_Temp	Temperature of PCIe HCA card (Max temp. will be taken in case of multiple PCIe HCA cards)	PCIe HCA card
PCIe_HCA_SFP_T	PCIe HCA card SFP temperature	PCIe HCA card SFP optical module
HBA_Temp	HBA card temperature	HBA card
FPGA_Card_Temp	FPGA card temperature	FPGA card
FAN_Power	Total fan power	-
CPUx_P12V_STBY	CPUx 12 V voltage	CPUx x indicates the CPU number with a value of 0 - 1
PVCCIN_CPUx	CPUx core voltage	CPUx x indicates the CPU number with a value of 0 - 1
PVCCFA_FIVR_CPUx	UPI IIO voltage	CPUx x indicates the CPU number with a value of 0 - 1
PVCCINFAON_CPUx	CPUx boot voltage	CPUx x indicates the CPU number with a value of 0 - 1
PVCCFA_EHV_CPUx	Controller voltage	CPUx x indicates the CPU number with a value of 0 - 1
PVCCD_HV_CPUx	Memory controller voltage	CPUx x indicates the CPU number with a value of 0 - 1
P1V2_STBY_SENSOR	System 1.2 V voltage	-
P1V8_STBY_SENSOR	System 1.8 V voltage	-
P1V_BMC_STBY_SEN	BMC 1 V voltage	-

Sensor	Description	Sensor Location
IOBoard_Temp	I/O board temperature	I/O board
Riser_Temp	Temperature of riser card	Riser card
FanBoard_Temp	Fan board temperature	Fan board
MidPlane_Temp	Midplane temperature	Midplane
M.2_Riser_Temp	M.2 SSD Riser card temperature	M.2 Riser card
M.2_Temp	NVMe M.2 SSD temperature	NVMe M.2 SSD
M.2 Inlet	M.2 SSD inlet temperature	-
Left_UI_Temp	Left mounting ear temperature	Left mounting ear
CPUx_Status	CPUx status	CPUx x indicates the CPU number with a value of 0 - 1
PSU_Redundant	PSU redundant status	-
FANx_Status	FanX status	FanX X indicates the fan number with a value of 0 - 4
CPUx1_Cx2Dx3	DIMM silkscreen	Motherboard x1 indicates the CPU number with a value of 0 - 1 x2 indicates the channel number with a value of 0 - 7 x3 indicates the DIMM number with a value of 0
PSU_Mismatch	PSU model mismatch Alarm logs of abnormal power failure upgrade in the test	-
POST_Status	System firmware and POST status	-
CPU_Config	CPU configuration status (mixing of CPUs, or primary CPU not installed)	-
SEL_Status	SEL status	-
PCIe_Status	The status of PCIe device	-
PWR_CAP_Fail	Power capping failure	-
PSUx_Status	PSUx status	PSUx x indicates the PSU number with a value of 0 - 3
K_HDDx	Drive	DriveX

Sensor	Description	Sensor Location
		K denotes front, internal and rear, with a value of F/I/R respectively x indicates the HDD number
BMC_Boot_Up	BMC boot up complete	-
BIOS_Boot_Up	BIOS boot up complete	-
FAN_Redundant	Fan redundancy status	-
Sys_Health	System health status	-
ACPI_PWR	ACPI power status	-
LeakageStatus	Leak detection	Motherboard
ME_FW_Status	ME health status	-
TPM_Verify	TPM verification status	-
PWR_On_TMOUT	Power-on timeout	-
System_Error	System error	-
BMC_Status	FRU status on motherboard	-

13 Appendix B Acronyms and Abbreviations

13.1 A - E

A

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

B

BIOS	Basic Input Output System
BIS	Bureau of Indian Standards
BLE	BIOS Lock Enable
BMC	Baseboard Management Controller
BPS	Barlow Pass
BSMI	The Bureau of Standards, Metrology and Inspection

C

CAS	Column Address Strobe

CB	Certification Body
CCC	China Compulsory Certificate
CE	Conformitè Europëenne
CECP	China Energy Conservation Program
CEN	European Committee for Standardization
CLI	Command-Line Interface
CLK	Clock
CMOS	Complementary Metal-Oxide-Semiconductor
CPLD	Complex Programmable Logic Device
CPU	Central Processing Unit
CRPS	Common Redundant Power Supply

D

DC	Direct Current
DCMI	Data Center Manageability Interface
DDR5	Double Data Rate 5
DIMM	Dual In-line Memory Module
DL	Deep Learning
DPC	DIMM Per Channel
DRAM	Dynamic Random Access Memory
DTS	Digital Thermal Sensor

E

EAC	Eurasian Conformity
ECC	Error-Correcting Code
ECMA	European Computer Manufacturers Association

EMR	Emerald Rapids
ESD	Electrostatic Discharge
E1.S	Enterprise & Data Center SSD Form Factor 1 Unit Short

13.2 F - J

F

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

G

GbE	Gigabit Ethernet
GPU	Graphics Processing Unit
GUI	Graphical User Interface

H

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

I

I/O	Input/Output
IC	Industry Canada
IEC	International Electrotechnical Commission
IIPC	Intel Intelligent Power Capability
IMC	Integrated Memory Controller
IOPS	Input/Output Operations Per Second
IP	Internet Protocol
IPMI	Intelligent Platform Management Interface
IPV4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISO	International Organization for Standardization

J

JTAG	Joint Test Action Group

13.3 K - O

K

KC	Korea Certification
KVM	Keyboard Video Monitor

L

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

LOA	Letter of Authority
LRDIMM	Load-Reduced Dual In-line Memory Module

M

ME	Management Engine
MM	Memory Mode

N

NC-SI	Network Controller Sideband Interface
NIC	Network Interface Card
NIOSH	National Institute for Occupational Safety and Health
NOM	Norma Oficial Mexicana
NUMA	Non-Uniform Memory Access
NVMe	Non-Volatile Memory Express

O

OCP	Open Compute Project
OS	Operating System

13.4 P - T

P

PCH	Platform Controller Hub
PCIe	Peripheral Component Interconnect Express
PDU	Power Distribution Unit
PID	Proportional-Integral-Derivative

PMem	Persistent Memory
POST	Power-On Self-Test
PSU	Power Supply Unit
PXE	Pre-boot Execution Environment

R

RAID	Redundant Arrays of Independent Disks
RAS	Reliability, Availability, Serviceability
RCM	Regulatory Compliance Mark
RDIMM	Registered Dual In-line Memory Module
RH	Relative Humidity
RHEL	Red Hat Enterprise Linux
RJ45	Registered Jack 45
RST	Reset
RTC	Real Time Clock

S

SABS	South African Bureau of Standards
SAS	Serial Attached SCSI
SATA	Serial Advanced Technology Attachment
SCSI	Small Computer System Interface
SEL	System Event Log
SFP	Small Form-Factor Pluggable
SGPIO	Serial General Purpose Input/Output
SGX	Software Guard Extensions
SII	The Standards Institution of Israel

SN	Serial Number
SNMP	Simple Network Management Protocol
SPR	Sapphire Rapids
SSD	Solid State Drive
SSH	Secure Shell
Syslog	System Log

T

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

13.5 U - Z

U

UEFI	Unified Extensible Firmware Interface
UID	Unit Identification
UKCA	UK Conformity Assessed
UL	Underwriters Laboratories
UPI	Ultra Path Interconnect
USB	Universal Serial Bus

V

VGA	Video Graphics Array

VLAN	Virtual Local Area Network
VMD	Volume Management Device
VNC	Virtual Network Console
VNNI	Vector Neural Network Instructions
VPP	Virtual Pin Port
VRD	Voltage Regulator-Down
VROC	Virtual RAID on CPU