White Paper for KR1280V3 Series Servers

Powered by Intel Processors

For KR1280-X3-A0-R0-00

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Applicable Model

Model	Maintenance	Cooling
KR1280-X3-A0-00-00	Rear access	Air cooling

Technical Support

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Preface

Abstract

This document describes the KR1280V3 Intel-based server's appearance, features, performance parameters, and software and hardware compatibility, providing in-depth information of the server.

Intended Audience

This document is intended for pre-sales engineers.

Symbol Conventions

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

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

Revision History

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

Table of Contents

1 Product Overview

The KR1280V3 Intel-based system is a 1U 2-socket high-density computing server powered by the Intel Xeon 6 processors. With an excellent cooling channel design and optimized thermal control strategies, it supports CPUs with a TDP of up to 350 W in a 1U space. It is upgraded to fully support PCIe 5.0, achieving a balanced design that maximizes computing performance, storage density, and PCIe expandability. With the innovative 32 × E1.S SSD configuration, it meets the needs of data explosion and higher processing efficiency urgently required by large-scale AI models. With this server, data is stored quickly and computed even faster. Hence, it can better support massive data, low latency, and highly task-parallel business scenarios, well suited for data center users in finance, cloud service and other industries.

1.1.1 10 × 2.5-Inch Drive Configuration

Up to ten 2.5-inch SAS/SATA/NVMe drives at the front, as shown in the following figure.

Figure 1-1 Appearance

1.1.2 4 × 3.5-Inch Drive + 4 × E3.S SSD Configuration

Up to four 3.5-inch SAS/SATA/NVMe drives and four E3.S SSDs at the front, as shown in the following figure.

NOTE

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

Figure 1-2 Appearance

1.1.3 8 × 2.5-Inch Drive + 2 × PCIe Slot Configuration

Up to eight 2.5-inch SAS/SATA/NVMe drives and two HHHL PCIe expansion cards at the front, as shown in the following figure.

Figure 1-3 Appearance

1.1.4 32 × E1.S SSD Configuration

Up to thirty-two E1.S SSDs, as shown in the following figure.

Figure 1-4 Appearance

2 Features

2.1 Scalability and Performance

Table 2-1 Scalability and Performance

Technical Feature	Description
Intel Xeon 6 Processors	• 6700P/6500P-series CPUs - Up to 2 processors. - Up to 86 cores per processor and 4 UPI links per CPU at up to 24 GT/s per link. - With the processor cache hierarchy optimization, a larger L2 cache is provided, so that memory data can be put and processed directly in the L2 cache, improving the memory access performance. - Intel Turbo Boost Technology 2.0 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. - Intel Hyper-Threading Technology allows up to 2 threads to run on each core to improve the performance of multi-threaded applications. - Intel Virtualization Technology provides hardware assist to the virtualization software, allowing the operating system to better use hardware to handle virtualized workloads. - Intel Advanced Vector Extensions 512 (Intel AVX-512) significantly improves floating-point performance for compute-intensive applications. - Intel Deep Learning Boost (Intel DL Boost) uses Vector Neural Network Instructions (VNNI), improving the performance for deep learning applications • 6700E-series CPUs - Up to 2 processors. - Up to 144 cores per processor, with a max. Turbo frequency up to 3.2 GHz, an L3 cache of 330 MB, and 4 UPI links per CPU at up to 24 GT/s per link.

Technical Feature	Description
	- With the processor cache hierarchy optimization, a larger L2 cache of private 1 MB per core is provided, so that memory data can be put and processed directly in the L2 cache, improving the memory access performance. A single processor can share up to 330 MB of L3 cache. - Intel Turbo Boost Technology 2.0 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. - Intel Virtualization Technology provides hardware assist to the virtualization software, allowing the operating system to better use hardware to handle virtualized workloads. - Intel Deep Learning Boost (Intel DL Boost) uses Vector Neural Network Instructions (VNNI), improving the performance for deep learning applications.
DDR5 DIMMs	• Up to 32 DDR5 ECC DIMMs • RDIMMs and MRDIMMs supported • Max memory speed: - RDIMMs: 6,400 MT/s at 1 DPC, 5,200 MT/s at 2 DPC - MRDIMMs: 8,000 MT/s at 1 DPC Notes: • Only 6700P/6500P-series CPUs support MRDIMMs. • MRDIMMs only supports 1 DPC.
Flexible Drive Configurations	Provides elastic and expandable storage solutions to meet different capacity and upgrade requirements.
Support for All-SSD Configuration	Delivers all-SSD configurations, bringing higher I/O performance over all-HDD or HDD-SSD mixing configurations.
24 Gbps Serial Attached SCSI (SAS)	Quadruples the data transfer rate of internal storage of the 6 Gbps SAS solution, maximizing the performance of storage I/O-intensive applications.
Intel Integrated I/O Technology	The processors integrate the PCIe 5.0 controllers to significantly reduce I/O latency and enhance overall system performance.
PCIe Expansion	• Front:

Technical Feature	Description
	- Up to 2 HHHL PCIe 5.0 x16 expansion cards • Rear: - Up to 3 standard PCIe expansion cards (1 FHHL and 2 HHHL PCIe 5.0 x16 expansion cards) or - Up to 2 FHHL PCIe 5.0 x16 expansion cards
OCP Expansion	Two OCP slots that can flexibly support 10/25/100 Gb hot-plug OCP 3.0 cards at the rear.

2.2 Availability and Serviceability

Table 2-2 Availability and Serviceability

Technical Feature	Description
Hot-Swap SAS/SATA/NVMe Drives	Supports hot-swap SAS/SATA/NVMe drives and RAID cards with RAID levels 0/1/1E/10/5/50/6/60, RAID cache and data protection enabled by the super-capacitor in case of power failures. Supported RAID levels vary by RAID card.
Reliability	• SSDs are much more reliable than traditional HDDs, increasing system uptime. • The BMC monitors system parameters in real time and sends alerts in advance, enabling technicians to take appropriate measures in time to minimize system downtime.
Availability	• The LEDs on the front and rear panels and the BMC Web GUI indicate the status of key components and quickly lead technicians to failed (or failing) components, simplifying maintenance and speeding up troubleshooting. • Provides 2 hot-swap PSUs with 1+1 redundancy. • Provides 8 hot-swap fan modules with N+1 redundancy.
O&M Efficiency	• The BMC management network port on the rear panel enables remote BMC O&M, improving O&M efficiency. • Online memory diagnosis helps technicians to quickly locate the DIMM that needs servicing.

2.3 Manageability and Security

Table 2-3 Manageability and Security

Technical Feature	Description
Remote Management	The BMC monitors the system operating status and enables remote management.
Network Controller Sideband Interface (NC-SI) Feature	Allows a network port to serve as a management port and a service port. The NC-SI feature is disabled by default and can be enabled/disabled through the BIOS or BMC. Notes: The NC-SI port supports the following features: • The NC-SI port can be bonded to any network port of the OCP card or of the PCIe NIC that supports NC-SI. • Supports the enablement/disablement and configuration of Virtual Local Area Network (VLAN). VLAN is disabled by default. • Supports both IPv6 and IPv4 addresses. The subnet mask of IPv4 or prefix length of IPv6 subnet mask, IP addresses, and default gateways can be configured.
Intel PFR	Intel Platform Firmware Resilience (PFR) is a security technology that follows NIST SP 800-193 guidelines. Intel PFR helps protect platform assets, detects corrupted firmware as well as other malicious or erroneous behaviors, and even restores platform firmware to a good state.
Unified Extensible Firmware Interface (UEFI)	The industry-standard UEFI improves the efficiency of setup, configuration and update, and simplifies the error handling process.
TPM & TCM	Trusted Platform Module (TPM) 2.0 and Trusted Cryptography Module (TCM) provide advanced encryption.
Intel Trusted Execution Technology	Intel Trusted Execution Technology provides enhanced security through hardware-based resistance to malicious software attacks.
Firmware Update Mechanism	The firmware update mechanism based on digital signatures prevents unauthorized firmware updates.
UEFI Secure Boot	Protects the system from malicious bootloaders.
Hierarchical Password Protection in BIOS	Ensures system boot and management security.

Technical Feature	Description
BIOS Secure Flash and BIOS Lock Enable (BLE)	Reduce attacks from malicious software on the BIOS flash region.
Dual-Image Mechanism for BMC and BIOS	Recovers firmware upon detection of corrupted firmware.
BMC Secure Boot	Protects BMC from malicious tampering.
BMC Access Control Policies	Flexible BMC access control policies improve BMC management security.
Chassis Intrusion Detection	Enhances physical security.
BMC Management Security	Supports flexible BMC access control policies and double factor authentication.
Intel SGX Technology	Intel Software Guard Extensions (SGX) technology allows applications to run in their own isolated space, helping prevent malicious theft and modification of critical codes and data.
System Secure Erase	(Optional) System secure erase function can wipe data on the storage devices with just one click.
Front Bezel with a Lock	(Optional) Prevents unauthorized users from removing or installing drives, thus ensuring the security of local data.
Memory Protection Technology	Supports failed DIMM isolation, Single Device Data Correction (SDDC), patrol scrub, DDR command and address parity check and retry, memory thermal throttling, Adaptive Double Device Data Correction (ADDDC), and data scrambling.
DMPU for Fault Diagnosis	Takes snapshots of power sequence signal changes and CPU error signal changes, supports a virtual oscilloscope visualizing abnormal voltage signals, collects and analyzes out-of-band (OOB) logs of components, gathers BMC serial port logs, switches between UART topologies, and creates JBOD/RAID 0/RAID 1 with 2 TF cards.
Intelligent Runtime Update Technology	• Enables runtime firmware OOB modular update, delivering rapid and flexible firmware update • Offloads RAS to OS, improving system reliability

Technical Feature	Description
(IRUT) Hitless Firmware Update	• Updates System Management Mode (SMM) driver in real time • Modifies hardware registers in time, optimizing resource allocation • Supports fast boot, reducing boot time and improving business operational efficiency
Memory UCE Prevent and Repair (MUPR) for Intelligent Forewarning and Healing	• The core of the pre-UCE failure diagnosis and healing technology lies in the ability to forecast the change in the faulty memory cell, to accurately diagnose the memory error type and to fix the faulty memory cell in real time. It enables 24 × 7 monitoring of memory health status from multi-aspects. • It offers online monitoring of memory errors at cell, row/column and bank/die levels, compares with the memory UCE occurrence characteristics efficiently, and handles the faulty memory cell in time, thus significantly reducing the system downtime risk caused by memory faults.

2.4 Energy Efficiency

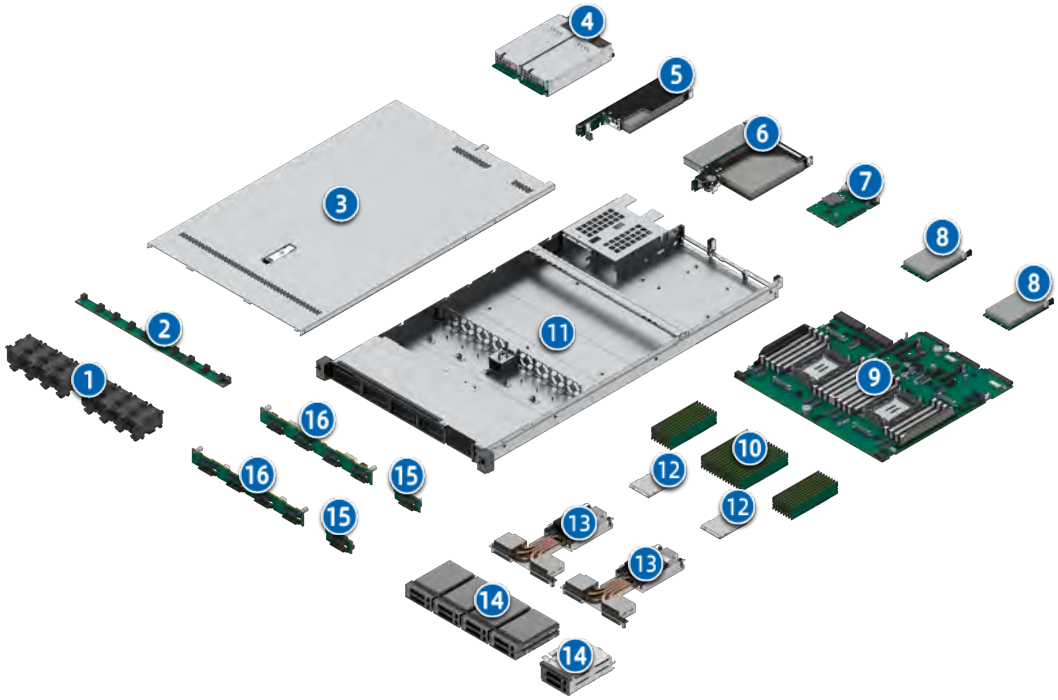
Table 2-4 Energy Efficiency

Technical Feature	Description
80 Plus Platinum/Titanium PSUs	Equipped with 80 Plus Platinum/Titanium PSUs of different power efficiency levels, with power efficiency up to 96% at a load of 50%.
1+1 Redundant PSUs	Supports AC/DC power input with improved power conversion efficiency.
VRD Solution	Features the high-efficiency single-board voltage regulator-down (VRD) solution, reducing DC-DC conversion loss.
Intelligent Fan Speed Control and CPU Frequency Scaling	Supports Proportional-Integral-Derivative (PID) intelligent fan speed control and intelligent CPU frequency scaling, conserving energy.

Technical Feature	Description
System Cooling Design	Offers a fully-optimized system cooling design with energy-efficient cooling fans, lowering energy consumption from system cooling.
Power Capping and Power Control	Provides power capping and power control measures.
Staggered Spin-up of Drives	Supports staggered spin-up of drives, reducing power consumption during server startup.
Intel Intelligent Power Capability	Supports Intel Intelligent Power Capability (IIPC) to optimize energy usage in the processor cores by turning computing functions on only when needed.
Low Energy Consumption	Supports low-voltage Intel Xeon 6 processors, consuming less energy and meeting the demands of data centers and telecommunications environments constrained by power and thermal limits.
Power/Performance Profile	Supports various typical power/performance profiles such as performance, balance/energy efficiency, and power. Users can switch among power/performance profiles simply by changing BIOS options. The factory default setting is Custom mode (Parameter settings of Custom mode bring forth performance close to that of Performance mode). Other modes can be customized or configured through BIOS options.

3 System Parts Breakdown

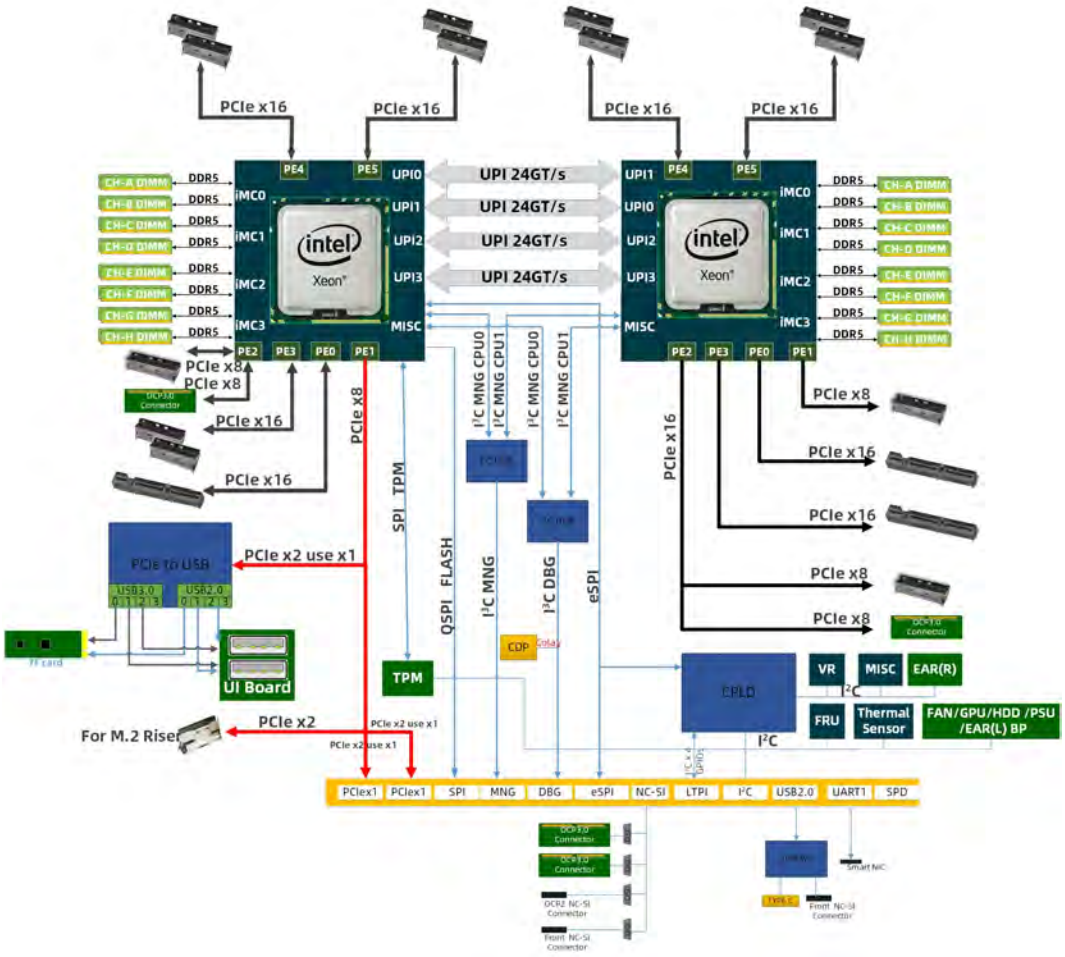
Figure 3-1 Exploded View



Item	Feature	Item	Feature
1	System Air Duct	15	Chassis
2	PSU Air Duct	16	CPU
3	M.2 Drive Module	17	EVAC heatsink
4	Fan Module	18	Front PCIe Riser Module
5	Fan Board	19	8 × 2.5-Inch Drive Backplane
6	Top Cover	20	2 × 2.5-Inch Drive Backplane
7	PSU	21	2.5-Inch Drive Module
8	PCIe Riser Module 1	22	Standard Heatsink
9	PCIe Riser Module 0	23	E3.S Drive Backplane
10	DC-SCM Board	24	E3.S Drive Module
11	OCP 3.0 Card	25	E1.S Drive Backplane
12	PCIe Riser Module 2	26	4 × 3.5-Inch Drive Backplane
13	Motherboard Module (motherboard and motherboard tray)	27	E1.S Drive Module
14	DIMM	28	3.5-Inch Drive Module

4 System Logical Diagram

Figure 4-1 System Logical Diagram

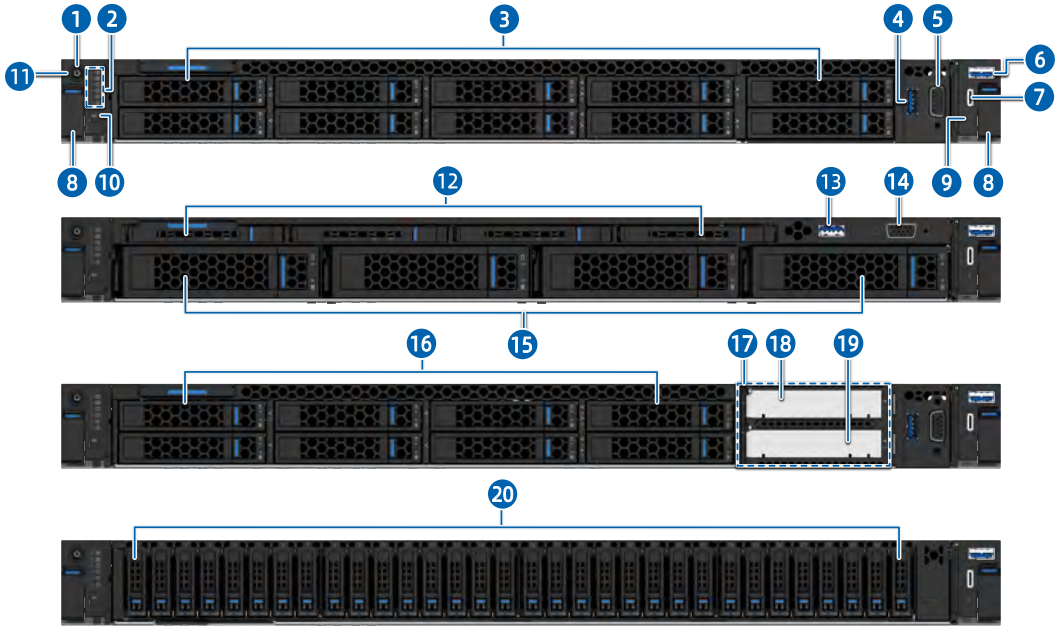


- One or two Intel Xeon 6 processors (6700P/6500P-series CPUs or 6700E-series CPUs).
- Up to 32 DDR5 DIMMs.
- Four UPI 2.0 links per CPU at up to 24 GT/s per link.
- Up to 2 front PCIe slots (up to PCIe 5.0) and 3 rear PCIe slots (up to PCIe 5.0). Up to 2 rear OCP 3.0 slots.
- The motherboard supports 3 USB 3.0 ports, 1 USB 2.0/LCD port, 1 TF card slot, and 2 NVMe/SATA M.2 SSD connectors.
- The DC-SCM board integrates an AST2600 management chip and supports 1 VGA port, 1 BMC management network port, and other connectors.

5 Hardware Description

5.1 Front Panel

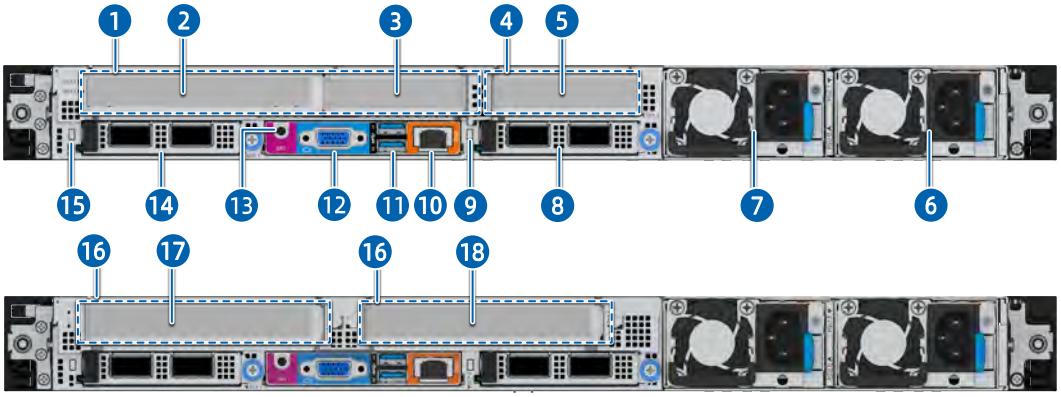
Figure 5-1 Front View



Item	Feature	Item	Feature
1	Power Button and LED	11	System Load Status LED
2	LEDs	12	E3.S Drive Bay
3	2.5-Inch Drive Bay	13	USB 2.0/LCD Port
4	USB 2.0/LCD Port	14	VGA Port
5	VGA Port	15	3.5-Inch Drive Bay
6	USB 3.0 Port	16	2.5-Inch Drive Bay
7	USB Type-C Port	17	Front PCIe Riser Module
8	Ear Latch	18	Front PCIe Slot 1
9	USB Type-C Status LED	19	Front PCIe Slot 2
10	UID/BMC RST Button and LED	20	E1.S Drive Bay

5.2 Rear Panel

Figure 5-2 Rear View



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

5.3 LEDs and Buttons

Table 5-1 LED and Button Description

Icon	Feature	Description
	System Load Status LED	• Off: No power • Running LED: Server booting • Solid green: 0 < load ≤ 30% • Solid blue: 30% < load ≤ 80% • Solid yellow: 80% < load ≤ 100%

Icon	Feature	Description
	Power Button and LED	• Power button: - Press and release the button to power on the system from the standby state. - Press and hold the button for 6 seconds to force a shutdown from the power-on state. • Power LED: - Off: No power - Solid green: Power-on state - Solid orange: Standby state
	System Status LED	• Off: Normal • Blinking red (1 Hz): A warning error is detected on CPU, memory, power supply, drive, fan, etc. • Solid red: A critical error is detected on CPU, memory, power supply, drive, fan, etc.
	Memory Status LED	• Off: Normal • Blinking red (1 Hz): A warning error occurs • Solid red: A critical error occurs
	Fan Status LED	• Off: Normal • Blinking red (1 Hz): A warning error occurs • Solid red: A critical error occurs, including fan failure and fan absence
	Power Status LED	• Off: Normal • Blinking red (1 Hz): A warning error occurs • Solid red: A critical error occurs
	System Overheat LED	• Off: Normal • Blinking red (1 Hz): A warning error occurs, including Proc Hot, resulting in CPU throttling

Icon	Feature	Description
		• Solid red: A critical error occurs, including CPU Thermal Trip/PCH Hot/MEM Hot
	Network Status LED	• Off: No network connection • Blinking green: Network connected with data being transmitted • Solid green: Network connected without data being transmitted Note: It only indicates the status of the self-developed OCP card.
	UID/BMC RST Button and LED	• UID/BMC RST button: - Press and release the button to activate the UID LED - Press and hold the button for 6 seconds to force the BMC to reset • UID/BMC RST LED: - Off: The server is not connected to power, or the UID LED is not activated when the server is in standby or power-on state - Gradually turning blue within 2 seconds and then gradually turning off within 2 seconds: PFR authentication in progress (Note: The server can be powered on only after this LED turns off.) - Blinking blue (4 Hz): PFR authentication failed and the firmware cannot be recovered - Blinking blue (1 Hz) = The UID LED is activated by the UID button or via the BMC when the server is in standby state - Solid blue: The UID LED is activated by the UID button or via the BMC when the server is powered on
-	USB Type-C Status LED	• Connected to a terminal: - Off: Not connected to a terminal

Icon	Feature	Description
		- Blinking green (2 Hz) for 3 seconds and then off: Port function is disabled - Solid green: Connected to a terminal • Connected to a USB storage device: - Off: Not connected to a USB storage device - Blinking red (1 Hz): Job fails or is completed with an error reported - Blinking green (2 Hz): Job in progress - Blinking green (2 Hz) 5 times and then off: Port function is disabled - Solid green: Job is completed successfully
-	OCP 3.0 Card Hot-Plug Button and LED	• OCP 3.0 card hot-plug button: - With the LED solid on, press and release the button to power off the OCP 3.0 card. - With the LED off and the OCP card installed, press and release the button to power on the OCP card. • OCP 3.0 card hot-plug LED: - Off: OCP card is powered off - Blinking green: OCP card is getting ready for hot-plugging or OCP card is being identified after being inserted - Solid green: OCP card is powered on

NOTE

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

5.4 Port Description

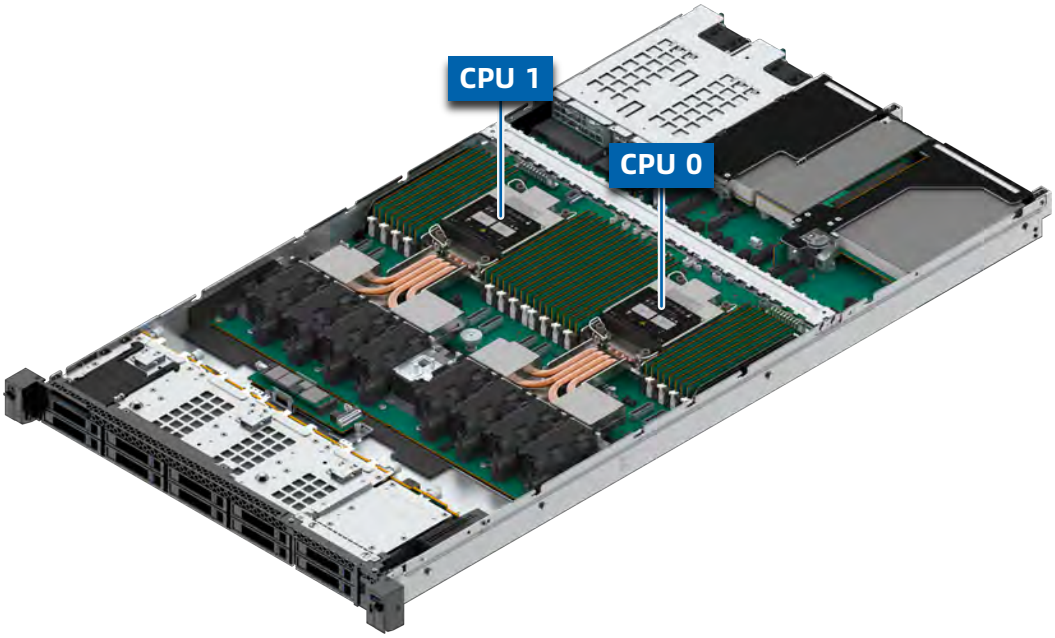
Table 5-2 Port Description

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

5.5 Processors

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

Figure 5-3 Processor Locations

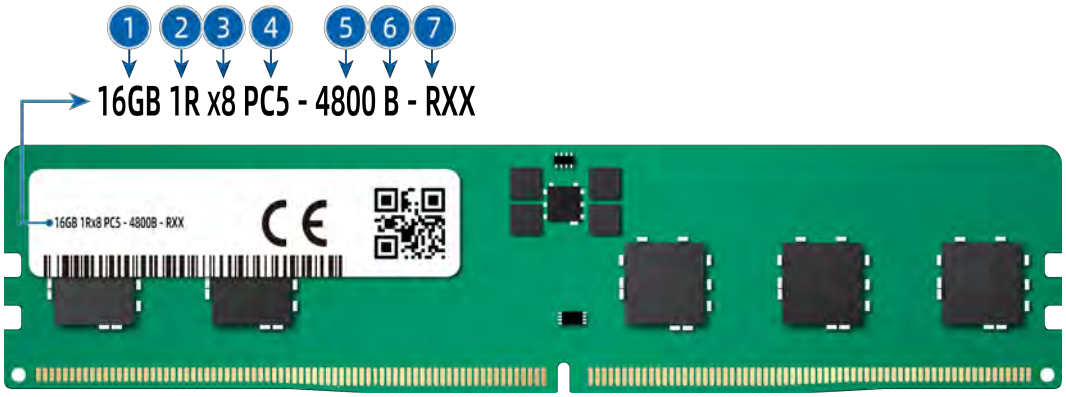


5.6 DDR5 DIMMs

5.6.1 Identification

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

Figure 5-4 DIMM Identification



Item	Description	Example
1	Capacity	• 16 GB • 24 GB • 32 GB • 48 GB

Item	Description	Example
		• 64 GB • 96 GB • 128 GB • 256 GB
2	Rank(s)	• 1R = Single rank • 2R = Dual rank • 2S2R = Two ranks of two high stacked 3DS DRAM • 2S4R = Four ranks of two high stacked 3DS DRAM • 4R = Quad rank
3	Data width of DRAM	• x4 = 4 bits • x8 = 8 bits
4	DIMM slot type	PC5 = DDR5
5	Maximum memory speed	• 4,800 MT/s • 5,600 MT/s • 6,400 MT/s • 8,000 MT/s
6	CAS latency	• SDP 4800B = 40-39-39 • 3DS 4800B = 46-39-39 • SDP 5600B = 46-45-45 • 3DS 5600B = 52-45-45 • SDP 6400B = 52-52-52
7	DIMM type	• R = RDIMM • MR = MRDIMM

5.6.2 Memory Subsystem Architecture

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

Table 5-3 DIMM Slot List

CPU	Channel ID	Silk Screen
CPU0	Channel 0	CPU0_C0D0
		CPU0_C0D1
	Channel 1	CPU0_C1D0

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

5.6.3 Compatibility

Refer to the following rules to select the DDR5 DIMMs.

IMPORTANT

- A server must use DDR5 DIMMs with the same part number (P/N code). All DDR5 DIMMs operate at the same speed, which is the lowest of:

  - Memory speed supported by a specific CPU.
  - Maximum operating speed of a specific memory configuration.
- Mixing DDR5 DIMMs of different specifications (capacity, bit width, rank, height, etc.) is not supported.
- For specific memory options, consult your local sales representative or refer to 7.2 Hardware Compatibility.

- DDR5 DIMMs can be used with the Intel Xeon 6 processors. The maximum memory capacity supported varies by CPU model.
- The maximum number of DIMMs supported varies by CPU type, DIMM type and rank quantity.

NOTE

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

Table 5-4 DDR5 DIMM Specifications

Item			**Value**			
Capacity per DDR5 DIMM (GB)			16	24	32	64
Type	1 DPC		RDIMM	RDIMM	RDIMM/MRDIMM	RDIMM/MRDIMM
	2 DPC		RDIMM	RDIMM	RDIMM	RDIMM
Rated speed (MT/s)		RDIMM	6,400	6,400	6,400	6,400
		MRDIMM	-	-	8,800	8,800
Operating voltage (V)			1.1	1.1	1.1	1.1
Maximum number of DDR5 DIMMs supported in a server[1]		RDIMM	32	32	32	32
		MRDIMM	-	-	16	16
Maximum capacity of DDR5 DIMMs supported in a server (GB)[2]		RDIMM	512	768	1,024	2,048
		MRDIMM	-	-	512	1,024
Actual speed (MT/s)	1 DPC[3]	RDIMM	6,400	6,400	6,400	6,400
		MRDIMM	-	-	8,000	8,000
	2 DPC[3]	RDIMM	5,200	5,200	5,200	5,200
		MRDIMM	-	-	-	-
Notes:						

Item	Value
1. The maximum number of DDR5 DIMMs supported is based on the dual-CPU configuration. The number is halved for the single-CPU configuration. 2. It indicates the maximum memory capacity supported when all the DIMM slots are populated with DDR5 DIMMs. The maximum DDR5 capacity varies by CPU type. 3. DIMM Per Channel (DPC) is the number of DIMMs per memory channel. The information above is for reference only. Consult your local sales representative for details.	

5.6.4 DIMM Population Rules

General population rules for DDR5 DIMMs:

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

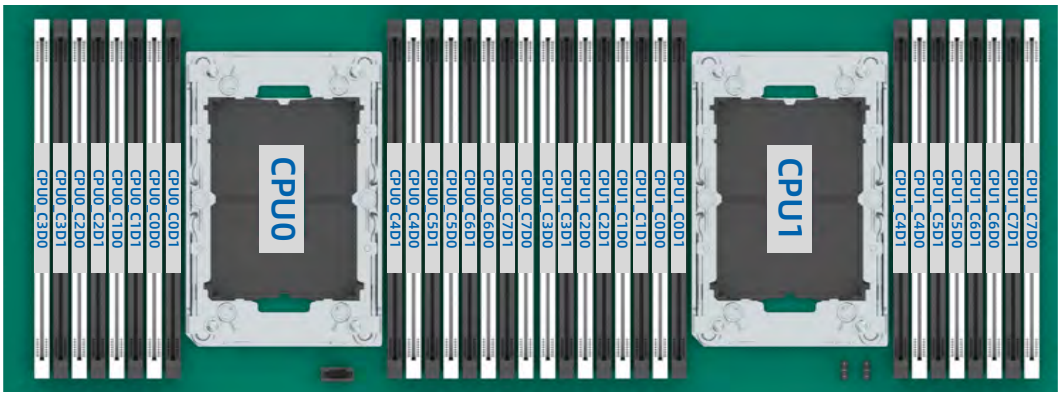
Population rules for DDR5 DIMMs in specific modes:

- Memory sparing mode
  - Follow the general population rules.
  - Each channel must have a valid online spare configuration.
  - Each channel can have a different online spare configuration.
  - Each channel with a DIMM installed must have a spare rank.
- Memory mirroring mode
  - Follow the general population rules.
  - Each processor supports 8 integrated memory controllers (iMCs). Each iMC has 2 channels to be populated with DIMMs. Installed DIMMs must be of the same capacity and organization.
  - In a multi-processor configuration, each processor must have a valid memory mirroring configuration.

5.6.5 DIMM Slot Layout

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

Figure 5-5 DIMM Slot Layout



5.6.6 DIMM Population Requirements

CAUTION

- Only 6700P/6500P-series CPUs support MRDIMMs. MRDIMMs only supports 1 DPC.
- If only 1 DIMM is to be installed, populate it in the C0D0 DIMM slot. The requirements for 1-DIMM configuration are:
  - 6700P/6500P-series CPUs only support 16 GB (1R x8) and 32 GB (2R x8) DIMMs.
  - 6700E-series CPUs only support 32 GB (2R x8) DIMMs.

Table 5-5 Population Requirements for 6700P/6500P-Series CPU Configuration (RDIMMs)

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

Table 5-6 Population Requirements for 6700P/6500P-Series CPU Configuration (MRDIMMs)

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

Table 5-7 Population Requirements for 6700E CPU Configuration (RDIMMs)

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

5.6.7 DIMM Population Rules

CAUTION

- The DIMM population rules may vary by CPU series. Identify the CPU series configured in the server first.
- Different requirements apply for DIMMs used with different CPU series. Read 5.6.6 DIMM Population Requirements before installation.

- DDR5 DIMM Population Rules (Single-CPU Configuration)

Table 5-8 DDR5 DIMM Population Rules for 6700P/6500P-Series CPU Configuration

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

Table 5-9 DDR5 DIMM Population Rules for 6700E-Series CPU Configuration

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

- DDR5 DIMM Population Rules (Dual-CPU Configuration)

Table 5-10 DDR5 DIMM Population Rules for 6700P/6500P-Series CPU Configuration

DDR	CPU0																CPU1													
QTY	C0D0	C0D1	C1D0	C1D1	C2D0	C2D1	C3D0	C3D1	C4D0	C4D1	C5D0	C5D1	C6D0	C6D1	C7D0	C7D1	C0D0	C0D1	C1D0	C1D1	C2D0	C2D1	C3D0	C3D1	C4D0	C4D1	C5D0	C5D1	C6D0	C6D1	C7D0	C7D1
1	•																															
2	•																•															
8	•				•				•				•				•				•				•				•			
16	•		•		•		•		•		•		•		•		•		•		•		•		•		•		•		•	
24	•	•	•		•	•	•		•	•	•		•	•	•		•	•	•		•	•	•		•	•	•		•	•	•	
32	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Table 5-11 DDR5 DIMM Population Rules for 6700E-Series CPU Configuration

DDR	CPU0																CPU1													
QTY	C0D0	C0D1	C1D0	C1D1	C2D0	C2D1	C3D0	C3D1	C4D0	C4D1	C5D0	C5D1	C6D0	C6D1	C7D0	C7D1	C0D0	C0D1	C1D0	C1D1	C2D0	C2D1	C3D0	C3D1	C4D0	C4D1	C5D0	C5D1	C6D0	C6D1	C7D0	C7D1
1	•																															
2	•																•															
8	•				•				•				•				•				•				•				•			
16	•		•		•		•		•		•		•		•		•		•		•		•		•		•		•		•	
32	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

5.7 Storage

CAUTION

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

5.7.1 Drive Configurations

NOTE

- For the physical drive No. of each configuration, refer to 5.7.2 Drive Numbering.
- The 850 mm (33.46 in.) deep chassis supports 2280/22110 M.2 SSDs. The 780 mm (30.71 in.) deep chassis supports 2280 M.2 SSDs only.

Table 5-12 Drive Configurations

Configuration	Front Drives	Internal Drives	Drive Management Mode
10 × 2.5-Inch Drive Configuration	10 × 2.5-inch drive (Drive bays with physical drive No. 0 to 9 support SAS/SATA/NVMe drives)	2 × SATA/NVMe M.2 SSD	• NVMe drive: Trimode PCIe RAID card or CPU • SAS/SATA drive: PCIe RAID/SAS/IOH card • Internal SATA M.2 SSD: SATA controller • Internal NVMe M.2 SSD: CPU
4 × 3.5-inch Drive + 4 × E3.S SSD Configuration	• 4 × E3.S SSD (Drive bays with physical drive No. 0 to 3 support E3.S SSDs only) • 4 × 3.5-inch drive (Drive bays with physical drive No. 4 to 7 support SAS/SATA/NVMe drives)	2 × SATA/NVMe M.2 SSD	• NVMe drive (in drive bays with physical drive No. 4 to 7): Trimode PCIe RAID card or CPU • SAS/SATA drive: PCIe RAID/SAS/IOH card • E3.S SSD: Trimode PCIe RAID card or CPU • Internal SATA M.2 SSD: SATA controller • Internal NVMe M.2 SSD: CPU
8 × 2.5-Inch Drive Configuration	8 × 2.5-inch drive (Drive bays with physical drive No. 0 to 7 support SAS/SATA/NVMe drives)	2 × SATA/NVMe M.2 SSD	• NVMe drive: Trimode PCIe RAID card or CPU • SAS/SATA drive: PCIe RAID/SAS/IOH card • Internal SATA M.2 SSD: SATA controller

Configuration	Front Drives	Internal Drives	Drive Management Mode
			• Internal NVMe M.2 SSD: CPU
32 × E1.S SSD Configuration	32 × E1.S SSD (Drive bays with physical drive No. 0 to 31 support E1.S SSDs only)	2 × SATA/NVMe M.2 SSD	• E1.S SSD: CPU • Internal SATA M.2 SSD: SATA controller • Internal NVMe M.2 SSD: CPU

5.7.2 Drive Numbering

1. 10 × 2.5-Inch Drive Configuration

Figure 5-6 Drive Numbering

Configuration	Physical Drive No.	Drive No. Identified by BMC	Front/Rear	Drive Number Identified by a 16i RAID Card
10 × SAS/SATA	0 to 9	0 to 9	Front	0 to 9
10 × NVMe	0 to 9	0 to 9	Front	-

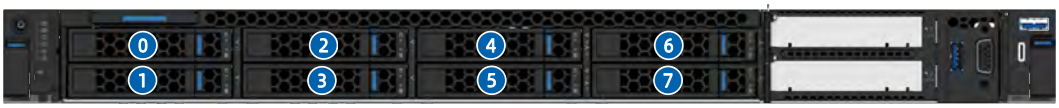
2. 4 × 3.5-inch Drive + 4 × E3.S SSD Configuration

Figure 5-7 Drive Numbering

Configuration	Physical Drive No.	Drive No. Identified by BMC	Front/Rear	Drive Number Identified by a 16i RAID Card
4 × E3.S	0 to 3	0 to 3	Front	-
4 × SAS/SATA	4 to 7	0 to 3	Front	0 to 3

3. 8 × 2.5-Inch Drive + 2 × PCIe Slot Configuration

Figure 5-8 Drive Numbering



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

4. 32 × E1.S SSD Configuration

Figure 5-9 Drive Numbering

Configuration	Physical Drive No.	Drive No. Identified by BMC	Front/Rear	Drive Number Identified by a 16i RAID Card
32 × E1.S	0 to 31	0 to 31	Front	-

5.7.3 Drive LEDs

1. SAS/SATA Drive LEDs

Figure 5-10 SAS/SATA Drive LEDs

Activity LED (①)	Locator/Error LED (②)			Description
Green	Blue	Red		
Off	Off	RAID created	RAID not created	Drive absent
		Solid on	Off	

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

2. NVMe Drive LEDs

Figure 5-11 NVMe Drive LEDs

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

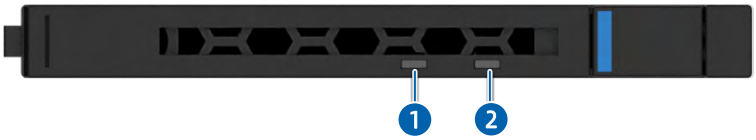
Table 5-13 NVMe Drive LED Description

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

Activity LED (①)	Locator/Error LED (②)		Description
Green	Blue	Red	
Blinking (4 Hz)	Solid on	Off	Drive selected and in use
Off	Solid on	Off	Drive is selected but fails
Any status	Off	Solid on	Drive fails

3. E3.S Drive LEDs

Figure 5-12 E3.S Drive LEDs



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

4. E1.S Drive LEDs

Figure 5-13 E1.S Drive LEDs

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

5.7.4 RAID Cards

RAID cards provide functions such as RAID configuration, RAID level migration, and drive roaming.

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

5.8 Network

NICs provide network expansion capabilities.

- The OCP slots support OCP 3.0 cards. Users can select the OCP 3.0 cards as needed.
- The PCIe expansion slots support PCIe NICs. Users can select the PCIe cards as needed.
- For specific NIC options, consult your local sales representative or refer to 7.2 Hardware Compatibility.

5.9 I/O Expansion

5.9.1 PCIe Expansion Cards

PCIe expansion cards provide system expansion capabilities.

- Up to 2 PCIe 5.0 expansion slots at the front.
- Up to 3 PCIe 5.0 expansion slots and 2 dedicated slots for OCP 3.0 cards at the rear.
- For specific PCIe expansion card options, consult your local sales representative or refer to 7.2 Hardware Compatibility.

5.9.2 PCIe Slot Locations

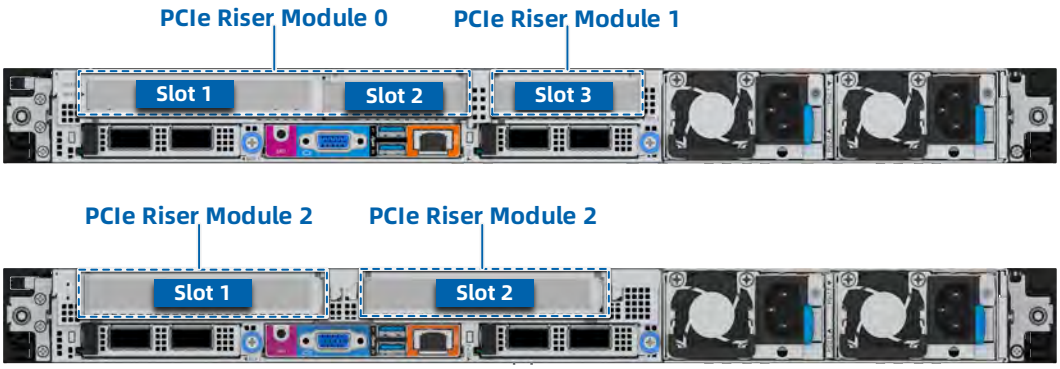
1. Front Panel

Figure 5-14 PCIe Slots

- Front slot 1 and front slot 2 reside in the front PCIe riser module.

2. Rear Panel

Figure 5-15 PCIe Slots



- Slot 1 and slot 2 reside in PCIe riser module 0.
- Slot 3 resides in PCIe riser module 1.
- Slot 1 and slot 2 reside in PCIe riser module 2.

5.9.3 PCIe Riser Modules

Figure 5-16 Front PCIe Riser Module (Two PCIe x16 Slots)

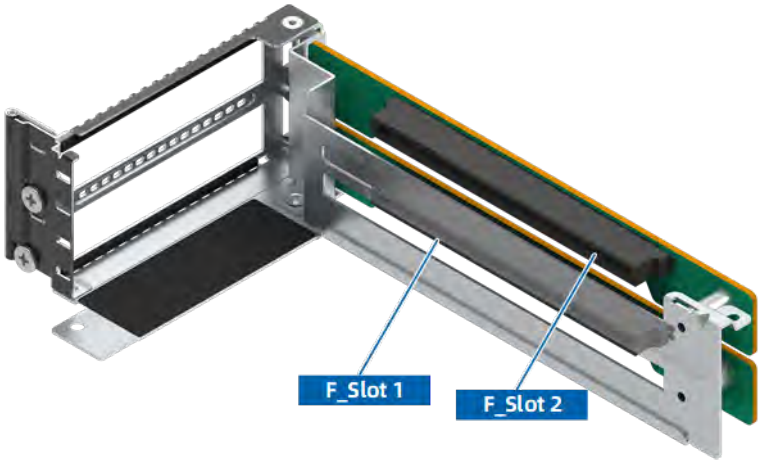


Figure 5-17 PCIe Riser Module 0 (Two PCIe x16 Slots)

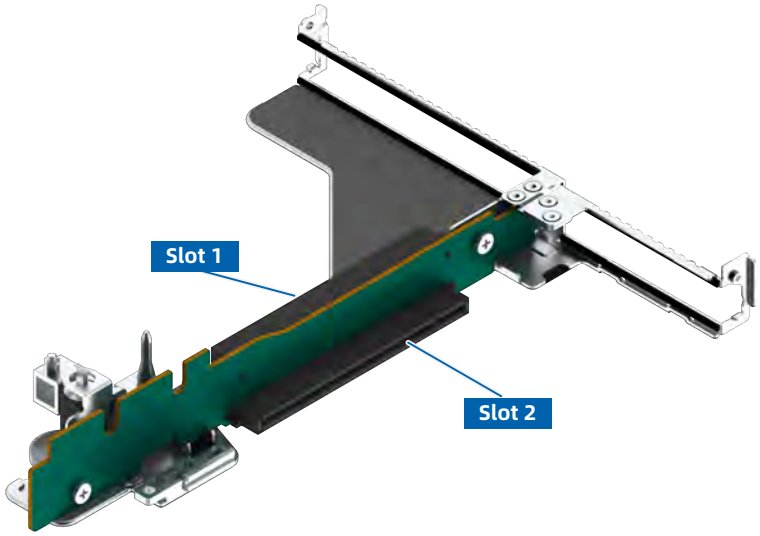


Figure 5-18 PCIe Riser Module 0 (Two PCIe x8 Slots)

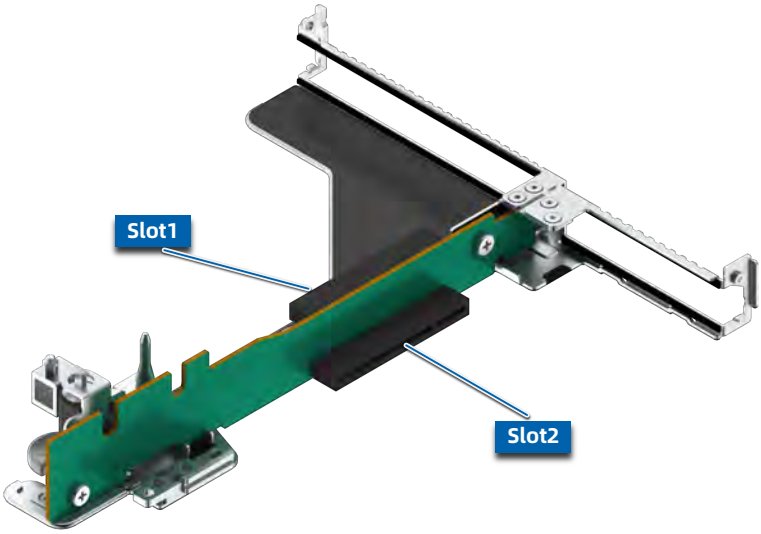


Figure 5-19 PCIe Riser Module 1 (One PCIe x16 Slot)

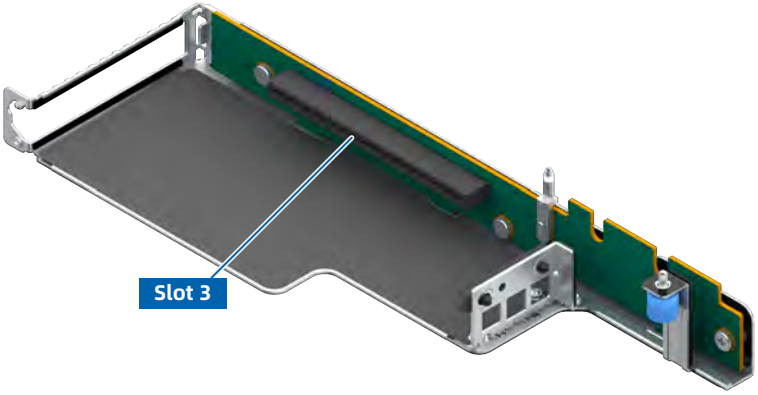
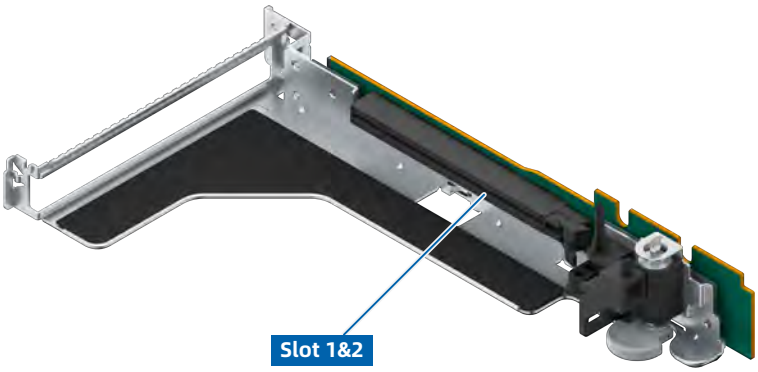


Figure 5-20 PCIe Riser Module 2 (One PCIe x16 Slot)



5.9.4 PCIe Slot Description

NOTE

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

Table 5-14 PCIe Slot Description

PCIe Slot		Owner	PCIe Standard	Connector Width	Bus Width	Port No.	Form Factor
Front PCIe Riser Module	Front Slot 1	CPU0	PCIe 5.0	x16	x16	PE4	HHHL
	Front Slot 2	CPU1	PCIe 5.0	x16	x16	PE4	HHHL
PCIe Riser Module 0	Slot 1	CPU0	PCIe 5.0	x8/x16	x8/x16	PE3	FHHL
	Slot 2	CPU0	PCIe 5.0	x8/x16	x8/x16	PE0	HHHL
PCIe Riser Module 1	Slot 3	CPU1	PCIe 5.0	x16	x16	PE3	HHHL
PCIe Riser Module 2	Slot 1	CPU0	PCIe 5.0	x16	x16	PE0	FHHL
	Slot 2	CPU1	PCIe 5.0	x16	x16	PE0	FHHL
OCP 3.0 Slot 0		CPU0/CPU1	PCIe 5.0	x8/x16	x8/x16	PE2	SFF
OCP 3.0 Slot 1		CPU0/CPU1	PCIe 5.0	x8/x16	x8/x16	PE2	SFF

NOTE

- OCP 3.0 card single-host mode:
  - The x8 bandwidth of OCP 3.0 slot 0 can be expanded to x16 (CPU0) by connecting OCP 3.0 card 0 with CPU0 MCIO x8 connector via a cable.
  - The x8 bandwidth of OCP 3.0 slot 1 can be expanded to x16 (CPU1) by connecting OCP 3.0 card 1 with CPU1 MCIO x8 connector via a cable.
- OCP 3.0 card multi-host mode:

- The x8 bandwidth of OCP 3.0 slot 0 can be expanded to x8 + x8 (CPU0 + CPU1) by connecting OCP 3.0 card 0 with CPU1 MCIO x8 connector via a cable. Thus, the bandwidth is expanded to x16.
- The x8 bandwidth of OCP 3.0 slot 1 can be expanded to x8 + x8 (CPU0 + CPU1) by connecting OCP 3.0 card 1 with CPU0 MCIO x8 connector via a cable. Thus, the bandwidth is expanded to x16.

5.10 PSUs

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

5.10.1 PSU Locations

Figure 5-21 PSU Locations

5.10.2 PSU LED

Figure 5-22 PSU LED Description

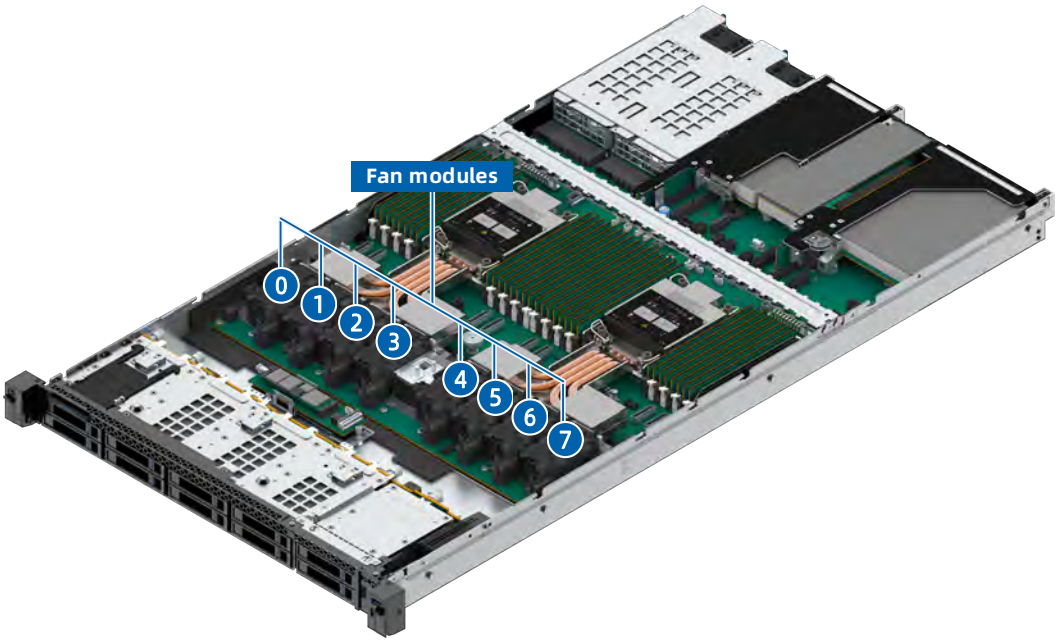
PSU LED Status	Description
Solid green	Normal
Off	No AC/DC input to the PSU

PSU LED Status	Description
Solid amber	PSU critical event causing a shutdown (possible causes: PSU overtemperature protection, PSU overcurrent protection, PSU overvoltage protection, short circuit protection)
Blinking amber (1 Hz)	PSU warning event where the PSU continues to operate (possible causes: PSU overtemperature warning, PSU overcurrent warning, excessively low fan speed warning)
Blinking green (1 Hz)	PSU operating in standby mode with normal input
Blinking green (on for 2 seconds and off for 1 second)	PSU in sleep state for cold redundancy
Blinking green (2 Hz)	PSU firmware updating

5.11 Fan Modules

- The server supports eight 4056 fan modules.
- The fan modules are hot-swappable.
- The fan modules support N+1 redundancy, which means that the server can continue working properly when a single fan fails.
- The server supports intelligent fan speed control.
- The server must use fan modules with the same part number (P/N code).

Figure 5-23 Fan Module Locations



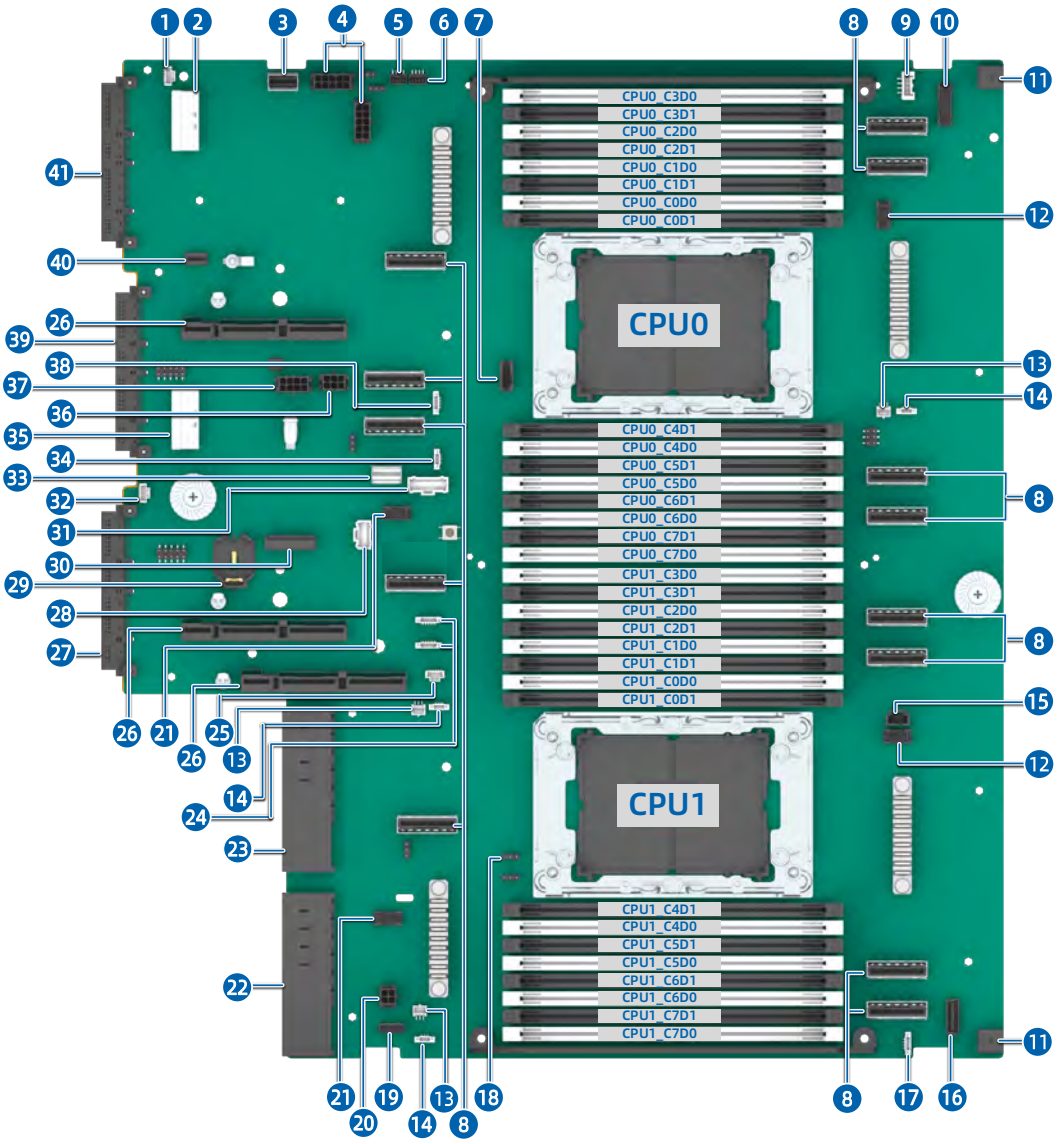
5.12 Boards

NOTE

The figures below may differ from the actual configuration.

5.12.1 Motherboard

Figure 5-24 Motherboard

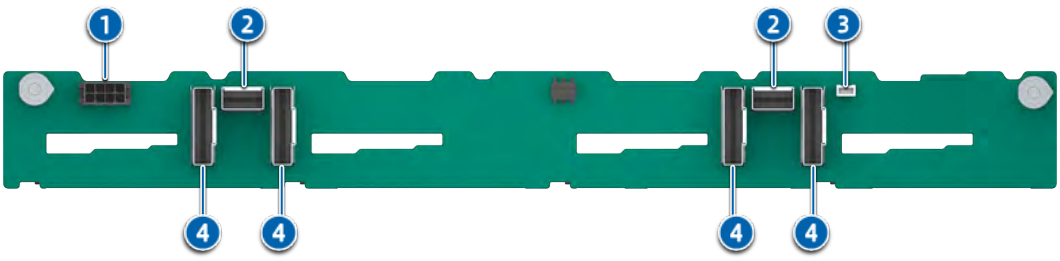


Item	Feature	Item	Feature
1	OCP 3.0 Card 0 Hot-Plug Button and LED Connector	21	PSU1 Connector
2	OCP 3.0 Card 0 MCIO x8 Connector	22	PSU0 Connector
3	Right Control Panel Connector	23	PCIe Riser I^3C Connector
4	Drive BP/PCIe Riser Power Connector	24	M.2 Adapter I^2C Connector
5	Leak Simulation Connector	25	PCIe Riser Connector

Item	Feature	Item	Feature
6	Leak Detection Connector	26	OCP 3.0 Card 1 Connector
7	MCIO x8 Connector	27	USB Type-C Port & LED Connector
8	Inlet Temperature Sensor Connector	28	Button Cell Battery Socket
9	Fan Board Signal Connector	29	System TF Card/USB Module Adapter Connector
10	Fan Board Power Connector	30	NC-SI Connector
11	Drive BP I²C Connector	31	OCP 3.0 Card 1 Hot-Plug Button and LED Connector
12	DMPU UART Connector 3V3	32	M.2 Adapter Slimline x4 Connector
13	DMPU UART Connector 1V8	33	Smart NIC UART Connector
14	Intrusion Detection Connector	34	OCP 3.0 Card 1 MCIO x8 Connector
15	Left Control Panel Connector	35	Drive BP/PCIe Riser Power Connector
16	DMPU/TSOM I²C Connector	36	Smart NIC Power Connector
17	CMOS Jumper	37	Smart NIC Presence Detection Connector
18	RAID Key Connector	38	DC-SCM Connector
19	M.2 Adapter Power Connector	39	TPM Connector
20	PCIe Riser I²C Connector	40	OCP 3.0 Card 0 Connector

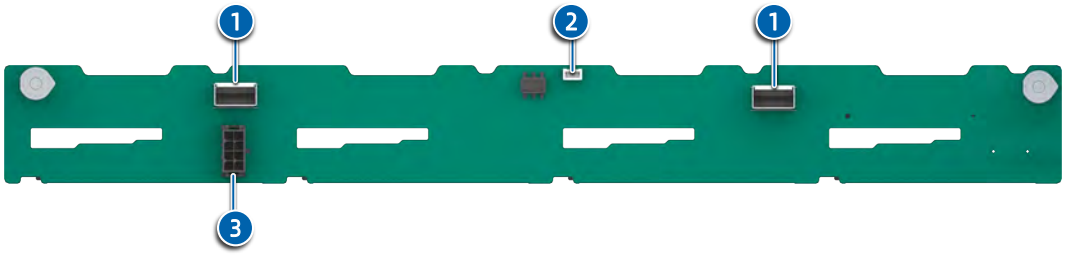
5.12.2 Drive Backplanes

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



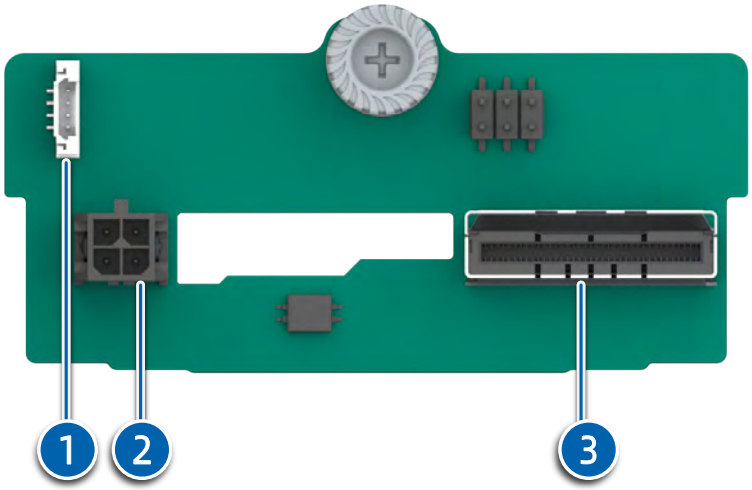
Item	Feature	Item	Feature
1	Power Connector	3	I²C Connector
2	Slimline x4 Connector	4	MCIO x8 Connector

Figure 5-26 8 × 2.5-Inch SAS/SATA Drive Backplane



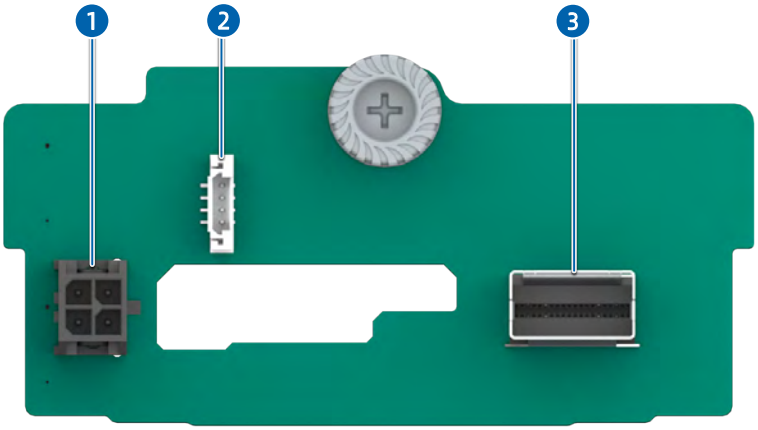
Item	Feature	Item	Feature
1	Slimline x4 Connector	3	Power Connector
2	I²C Connector	-	-

Figure 5-27 2 × 2.5-Inch NVMe Drive Backplane



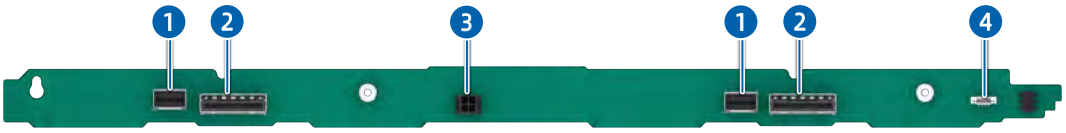
Item	Feature	Item	Feature
1	I²C Connector	3	MCIO x8 Connector
2	Power Connector	-	-

Figure 5-28 2 × 2.5-Inch SAS/SATA Drive Backplane



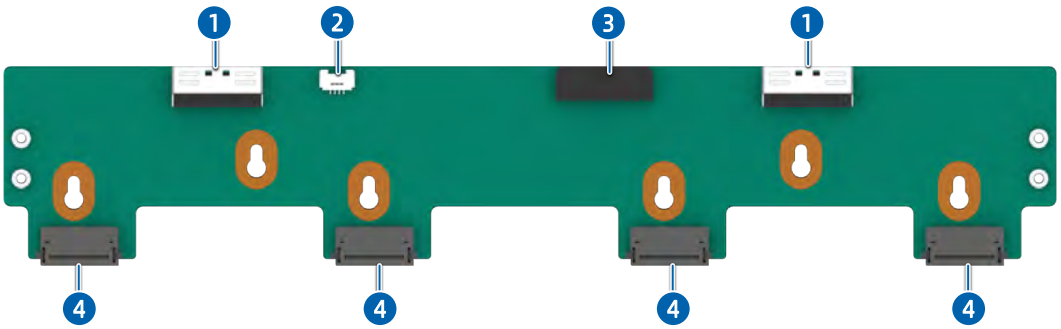
Item	Feature	Item	Feature
1	Power Connector	3	Slimline x4 Connector
2	I²C Connector	-	-

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



Item	Feature	Item	Feature
1	Slimline x4 Connector	3	Power Connector
2	MCIO x8 Connector	4	I²C Connector

Figure 5-30 4 × E3.S Drive Backplane

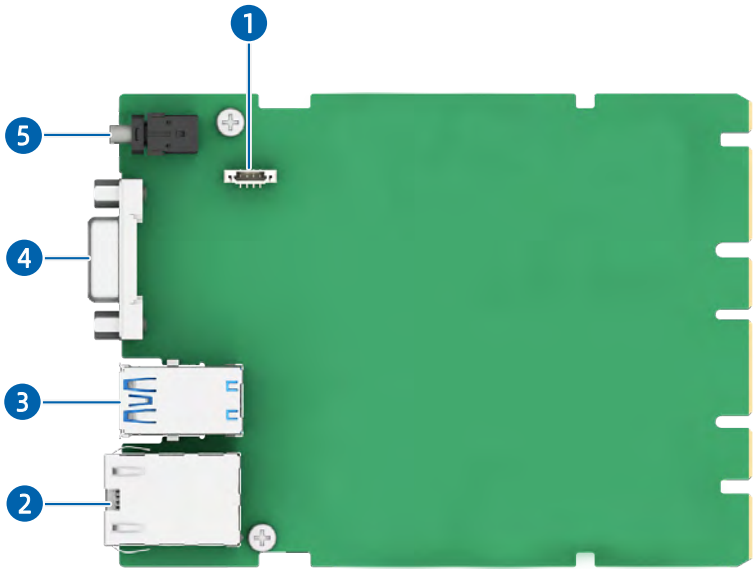


Item	Feature	Item	Feature
1	MCIO x8 Connector	3	Power Connector

Item	Feature	Item	Feature
2	I^2C Connector	4	E3.S Drive Connector

5.12.3 DC-SCM Board

Figure 5-31 DC-SCM Board



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

6 Product Specifications

6.1 Technical Specifications

Table 6-1 Technical Specifications

Item	Description
Form Factor	1U rack server
Processor	Up to two Intel Xeon 6 processors • Integrated memory controllers and 8 memory channels per processor • Integrated PCIe 5.0 controllers and 88 PCIe lanes per processor • Four UPI links per CPU at up to 24 GT/s per link • TDP up to 350 W • Up to 144 cores (6700E-series CPUs)/86 cores (6700P/6500P-series CPUs) per CPU • Max. Turbo frequency up to 3.2 GHz (6700E-series CPUs) • L3 cache up to 330 MB per CPU (6700E-series CPUs) Note: The information above is for reference only. See 7.2 Hardware Compatibility for details.
Memory	Up to 32 DDR5 DIMMs • RDIMMs and MRDIMMs supported • Max memory speed: - RDIMMs: 6,400 MT/s at 1 DPC, 5,200 MT/s at 2 DPC - MRDIMMs: 8,000 MT/s at 1 DPC • Mixing DDR5 DIMMs of different specifications (capacity, bit width, rank, height, etc.) is not supported. • A server must use DDR5 DIMMs with the same part number (P/N code). Notes: • Only 6700P/6500P-series CPUs support MRDIMMs. • MRDIMMs only supports 1 DPC. • The information above is for reference only. See 7.2 Hardware Compatibility for details.
Storage	• Front: - Up to 10 × 2.5-inch SAS/SATA/NVMe drive (hot-swap) or

Item	Description
	- Up to 4 × 3.5-inch SAS/SATA/NVMe drive + 4 × E3.S SSD (hot-swap) or - Up to 32 × E1.S SSD (hot-swap) • Internal: - Up to 1 × TF card - Up to 2 × SATA/NVMe M.2 SSD (2280/22110) Notes: • The 850 mm (33.46 in.) deep chassis supports 2280/22110 M.2 SSDs. • The 780 mm (30.71 in.) deep chassis supports 2280 M.2 SSDs only.
Network	• Up to two 10/25/100 Gb hot-plug OCP 3.0 cards • 1/10/25/200 Gb PCIe NICs • 1 BMC management network port of 100/1,000 Mbps auto-negotiation
I/O Expansion	• Front: - Up to 2 HHHL PCIe 5.0 x16 expansion cards • Rear: - Up to 3 standard PCIe expansion cards (1 FHHL and 2 HHHL PCIe 5.0 x16 expansion cards) or up to 2 FHHL PCIe 5.0 x16 expansion cards - Up to two 10/25/100 Gb OCP 3.0 cards For details, see 5.9.2 PCIe Slot Locations and 5.9.4 PCIe Slot Description.
Port	• Front: - 1 × USB 2.0/LCD port - 1 × USB 3.0 port - 1 × USB Type-C port - 1 × VGA port • Rear: - 2 × USB 3.0 port - 1 × VGA port - 1 × BMC management network port Notes: • 32 × E1.S SSD configuration has no USB 2.0/LCD ports or VGA ports on the front panel. • OS installation on the USB storage media is not recommended.
Display	Integrated VGA on the DC-SCM board with a video memory of 64 MB and a maximum 16M color resolution of 1,920 × 1,200 at 60 Hz

Item	Description
	Notes: • The integrated VGA can support a maximum resolution of 1,920 × 1,200 only when the video driver matching the OS version is installed; otherwise, only the default resolution of the OS is supported. • When both the front and rear VGA ports are connected to monitors, only the monitor connected to the front VGA port works.
System Management	• UEFI • BMC • NC-SI • KSManage • KSManage Tools
Security	• Intel Platform Firmware Resilience (PFR) • Trusted Platform Module (TPM) 2.0 and Trusted Cryptography Module (TCM) • Intel Trusted Execution Technology • Firmware update mechanism based on digital signatures • UEFI Secure Boot • Double factor authentication • Single sign-on (SSO) • TPM-based BIOS secure boot • Hardware-based BMC secure boot • BIOS Secure Flash and BIOS Lock Enable (BLE) • BMC and BIOS dual-image mechanism • Chassis intrusion detection • System secure erase (optional) • Memory protection technology • DMPU for fault diagnosis • IRUT hitless firmware update • MUPR for intelligent forewarning and healing

6.2 Environmental Specifications

Table 6-2 Environmental Specifications

Item	Description
Temperature[1,2,3]	• Operating: 10°C to 35°C (50°F to 95°F)

Item	Description
	• Storage (packed): -40°C to 65°C (-40°F to 149°F) • Storage (unpacked): -40°C to 70°C (-40°F to 158°F)
Relative Humidity (RH, non-condensing)	• Operating: 5% to 90% RH • Storage (packed): 5% to 95% RH • Storage (unpacked): 5% to 95% RH
Altitude	• Operating: 0 to 3,048 m (0 to 10,000 ft) • Shipping (storage): 0 to 12,000 m (0 to 39,370 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) at a server operating temperature of 23°C (73.4°F): • Idle: - LWAd: 5.96 Bels • Operating: - LWAd: 6.91 Bels

Notes:

1. When the system operates in the expanded temperature range of 5°C to 10°C (41°F to 50°F) or 35°C to 40°C (95°F to 104°F), system performance may be impacted.

2. When the system operates in the expanded temperature range of -5°C to 10°C (23°F to 50°F) or 35°C to 45°C (95°F to 113°F), ambient temperature warnings may be reported.

3. Expanded operating temperature:

- For some configurations below an altitude of 3,048 m (10,000 ft):
  - For configurations compliant with ASHRAE class A2 (10°C to 35°C (50°F to 95°F)), derate the maximum allowable temperature by 1°C per 300 m (1°F per 547 ft) at an altitude of 950 to 3,048 m (3,117 to 10,000 ft).
  - For configurations compliant with ASHRAE class A3 (5°C to 40°C (41°F to 104°F)), derate the maximum allowable temperature by 1°C per 175 m (1°F per 319 ft) at an altitude of 950 to 3,048 m (3,117 to 10,000 ft).
  - For configurations compliant with ASHRAE class A4 (5°C to 45°C (41°F to 113°F)), derate the maximum allowable temperature by 1°C per 125 m (1°F per 228 ft) at an altitude of 950 to 3,048 m (3,117 to 10,000 ft).

- Any fan failure or operations under the expanded operating temperature may lead to system performance degradation.

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

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

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

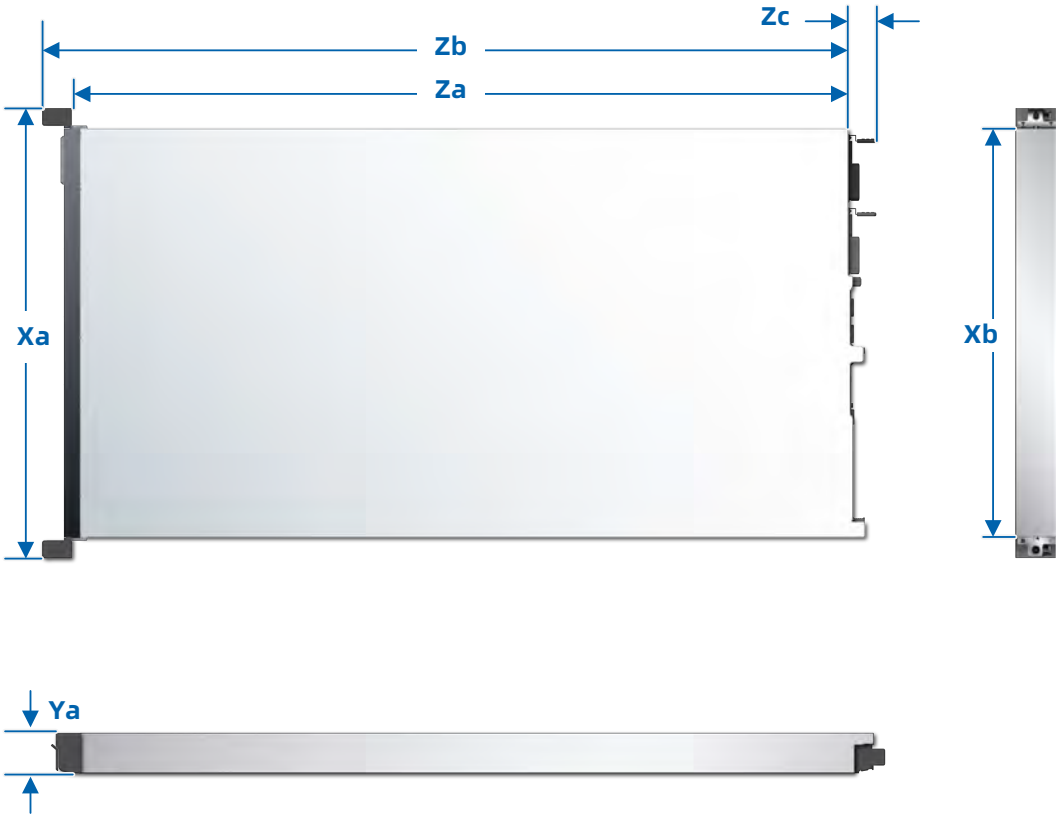
6.3 Physical Specifications

Table 6-3 Physical Specifications

Item	Description
Outer Packaging Dimensions (L × W × H)	• 780 mm (30.71 in.) deep chassis: 1,030 × 650 × 240 mm (40.55 × 25.59 × 9.45 in.) • 850 mm (33.46 in.) deep chassis: 1,090 × 720 × 240 mm (42.91 × 28.35 × 9.45 in.)
Installation Dimension Requirements	• Installation requirements for the cabinet are as follows: - General cabinet compliant with the International Electrotechnical Commission 297 (IEC 297) standard - Width: 482.6 mm (19 in.) - Depth: Above 1,200 mm (47.24 in.) • Installation requirements for the server rails are as follows: - Static rail kit: The distance between the front and rear mounting flanges ranges from 609 to 914 mm (23.98 to 35.98 in.). - Ball-bearing slide rail kit: The distance between the front and rear mounting flanges ranges from 609 to 914 mm (23.98 to 35.98 in.).
Weight	• 10 × 2.5-inch drive configuration: - Net weight: 19 kg (41.89 lbs) - Gross weight: 29 kg (63.93 lbs) (including server, packaging box, rails and accessory box) • 4 × 3.5-inch drive configuration: - Net weight: 20 kg (44.09 lbs) - Gross weight: 30 kg (66.14 lbs) (including server, packaging box, rails and accessory box) • 8 × 2.5-inch drive + 2 × PCIe slot configuration:

Item	Description
	- Net weight: 18.5 kg (40.79 lbs) - Gross weight: 28.5 kg (62.83 lbs) (including server, packaging box, rails and accessory box) Note: The server weight varies by configuration.

Figure 6-1 Chassis Dimensions



Model	Chassis Type	Xa	Xb	Ya	Za	Zb	Zc
KR1280-X3-A0-R0-00	780 mm (30.71 in.) deep	482 mm (18.98 in.)	438 mm (17.24 in.)	43.05 mm (1.69 in.)	780 mm (30.71 in.)	810 mm (31.89 in.)	30 mm (1.18 in.)
	850 mm (33.46 in.) deep	482 mm (18.98 in.)	438 mm (17.24 in.)	43.05 mm (1.69 in.)	850 mm (33.46 in.)	880 mm (34.65 in.)	30 mm (1.18 in.)

7 Operating System and Hardware Compatibility

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

IMPORTANT

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

7.1 Supported Operating Systems

Table 7-1 Supported Operating Systems

OS Version
SLES 15 SP6
RHEL 8.10
RHEL 9.4
Ubuntu 24.04

7.2 Hardware Compatibility

7.2.1 CPU Specifications

Table 7-2 CPU Specifications

Model	Cores	Threads	Base Frequency (GHz)	Max. Turbo Frequency (GHz)	Cache (MB)	TDP (W)
6710E	64	64	2.4	3.2	96	205
6740E	96	96	2.4	3.2	96	250
6756E	128	128	1.8	2.6	96	225
6766E	144	144	1.9	2.7	108	250
6780E	144	144	2.2	3.0	108	330

7.2.2 DIMM Specifications

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

Table 7-3 DIMM Specifications

Type	Capacity (GB)	Speed (MT/s)	Data Width	Organization
RDIMM	32	6,400	x72	2R x8
RDIMM	64	6,400	x72	2R x4

7.2.3 Drive Specifications

Table 7-4 SAS/SATA SSD Specifications

Type	Capacity	Max. Qty.
SATA SSD	240 GB	10
SATA SSD	480 GB	10
SATA SSD	960 GB	10
SATA SSD	1.92 TB	10
SATA SSD	3.84 TB	10
SATA SSD	7.68 TB	10
SAS SSD	960 GB	10
SAS SSD	1.92 TB	10
SAS SSD	3.84 TB	10

Type	Capacity	Max. Qty.
SAS SSD	7.68 TB	10
SAS SSD	15.36 TB	10

Table 7-5 U.2 NVMe SSD Specifications

Type	Capacity	Max. Qty.
U.2 NVMe SSD	1.6 TB	10
U.2 NVMe SSD	1.92 TB	10
U.2 NVMe SSD	3.2 TB	10
U.2 NVMe SSD	3.84 TB	10
U.2 NVMe SSD	6.4 TB	10
U.2 NVMe SSD	7.68 TB	10
U.2 NVMe SSD	12.8 TB	10

Table 7-6 M.2 SSD Specifications

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

7.2.4 SAS/RAID Card Specifications

Table 7-7 SAS/RAID Card Specifications

Type	Description
SAS Card	IAG_DW_PM8252SHBA_8R0_SAS4_PCIE4
	BRCM_16R0_9500-16i_SMSAS3_PCIE4
	BRCM_8R0_9500-8i_SMSAS3_PCIE4
	IAG_8222_S-HBA_8R0_SAS3_PCIE3_M
RAID Card	BRCM_8R0_9560-8i_4G_SMSAS3_PCIE4_7
	BRCM_16R_9560-16i_8_SMSAS3_PCIE4_7

Type	Description
	IAG_DW_PM8254_8R0_4G_SAS4_PCIE4
	IAG_DW_PM8254_8R0_8G_SAS4_PCIE4

7.2.5 NIC Specifications

Table 7-8 OCP Card Specifications

Type	Description	Speed (Gbps)	Port Qty.
OCP 3.0 Card	IAG_Andes-M6_X710_10G_LC_O3x8_2	10	2
	IAG_Liszt_BCM_25G_LC_O3x8_2	25	2
	M_25G_MCX631432AN_LC_OCP3x8_2_XR	25	2
	IAG_Andes-M6_E810_25G_LC_O3x8_2	25	2
	M_100G_MCX623436AN_LC_OCP3x16_2_XR	100	2

Table 7-9 PCIe NIC Specifications

Type	Description	Speed (Gbps)	Port Qty.
PCIe NIC	IAG_Vostok_I350_1G_RJ_P4-G2_2	1	2
	I_10G_X710T2L_RJ_PCIEx8_2_XR	10	2
	IAG_Pyxis_X550_10G_RJ_P4-G3_2	10	2
	M_25G_MCX631102AN_LC_PCIEx8_2_XR	25	2
	IAG_BCM57414_25G_LC_P8-G3_2	25	2
	IAG_Andes-M6_E810_25G_LC_P8-G4_2	25	2
	BRCM_100G_57508_LC_PCIEx16_2_XR	100	2
	I_100G_E810CQDA2_LC_PCIEx16_2_XR	100	2
	I_100G_E810CQDA2_LC_PCIEx16_2_XR	100	2

7.2.6 HBA/HCA Card Specifications

Table 7-10 HBA Card Specifications

Type	Description	Speed (Gbps)	Port Qty.
HBA Card	E_0R1_LPE31000-AP_FC16G_PCIE	16	1
	QL_0R2_QLE2692-ISR-BK_FC16G_PCIE	16	2
	E_0R2_LPE31002_FC16G_PCIE	16	2
	E_0R2_LPE31002_FC16G_PCIE	32	1
	Marvell_0R2_QLE2772_FC32G_PCIE_4.0	32	1
	E_0R2_LPE35002_FC32G_PCIE	32	2

7.2.7 GPU Specifications

Table 7-11 GPU Specifications

Type	Description	Max. Qty.
GPU	GPU_NV_24G_L2_192b_LP_S	2

7.2.8 PSU Specifications

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

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

- 1,300 W Titanium PSU: 1,300 W (230 Vac)
- 1,600 W Titanium PSU: 1,600 W (230 Vac)
- 2,000 W Titanium PSU: 2,000 W (230 Vac)

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

Operating voltage range:

- 110 Vac: 90 Vac to 132 Vac
- 230 Vac: 180 Vac to 264 Vac

- The following rated -48 Vdc PSUs in 1+1 redundancy are supported:
  - 800 W PSU: 800 W (-48 Vdc)
  - 1,300 W PSU: 1,300 W (-48 Vdc)

  Operating voltage range:

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

8 Regulatory Information

8.1 Safety

8.1.1 General

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

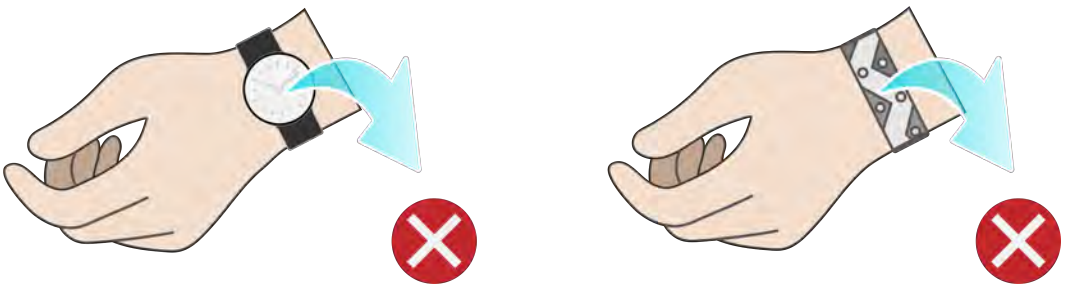
8.1.2 Personal Safety

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

Figure 8-1 Protective Clothing

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

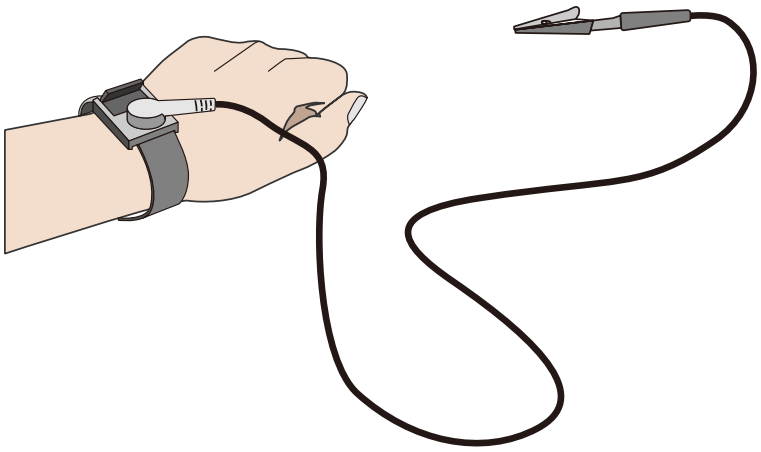
Figure 8-2 Removing Conductive Objects



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

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

Figure 8-3 Wearing an ESD Wrist Strap



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

8.1.3 Equipment Safety

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

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

8.1.4 Transportation Precautions

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

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

8.1.5 Manual Handling Weight Limits

CAUTION

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

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

Table 8-1 Manual Handling Weight Limits per Person

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

9 Limited Warranty

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

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

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

9.1 Warranty Service

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

9.1.1 Remote Technical Support

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

Information needed when requesting support:

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

9.1.2 RMA Service

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

NOTE

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

9.1.3 ARMA Service

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

NOTE

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

9.1.4 9 × 5 × NBD Onsite Service

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

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

NOTE

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

9.1.5 24 × 7 × 4 Onsite Service

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

NOTE

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

9.2 Our Service SLA

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

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

9.3 Warranty Exclusions

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

The Limited Warranty does not apply to

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

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

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

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

10 System Management

10.1 Intelligent Management System BMC

BMC, a remote server management system, supports mainstream management specifications in the industry such as IPMI 2.0 and Redfish 1.18. BMC features high operational reliability, easy serviceability for different business scenarios, accurate and comprehensive fault diagnosis capabilities, and industry-leading security reinforcement capabilities.

BMC supports:

- IPMI 2.0
- Redfish 1.18
- SNMP v1/v2c/v3
- HTML5/Java remote consoles (Keyboard, Video, Mouse)
- remote virtual media
- login via web browsers
- intelligent fault diagnosis

Table 10-1 BMC Features

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

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

Feature	Description
	• Provides a thermal protection mechanism, which is automatically triggered when the BMC is abnormal to ensure that the fan operates at safe speeds to avoid system overheating. • Supports self-diagnosis of processors, memory modules, and storage devices of BMC, and automatically cleans the workload to restore to normal when the device usage rate is too high.
Power Control	Supports virtual power buttons for power on/off, power cycle and reset.
UID LED	Supports remote lighting of the UID LED for locating the server in the server room.
Secure Firmware Update	• Supports firmware updates based on secure digital signatures, and mismatch prevention mechanism for firmware from different manufacturers and firmware for different models. • Supports firmware update of BMC/BIOS/CPLD/PSU.
Serial Port Redirection	Supports remote redirection of the system serial port, BMC serial port and other serial ports, and directs the server-side serial port output to the local administrator via the network for server debugging.
Storage Information Display	Displays RAID logical array information and drive information, and supports remote RAID creation for improved deployment efficiency.
User Role Management	Supports user detail management based on user roles and flexible creation of user roles with different privileges, and provides more user roles to allow administrators to grant different privileges to O&M personnel.
Security Features	Adopts the industry-leading server security baseline standard V5.0. SSH, HTTPS, SNMP and IPMI use secure and reliable algorithms. BMC offers capabilities including secure update and boot and security reinforcement mechanisms such as anti-replay, anti-injection, and anti-brute force.
Double Factor Authentication	Supports double factor authentication for local BMC users. Users need to log in to the BMC with both password and certificate, thus to prevent attacks caused by password leakage.

Feature	Description
Configuration Exporting and Importing	To import and export the existing system configurations.
System Information Display	Displays the server basic information such as the information and health status of key server components, including CPU, memory, power supply, device inventory, drive, NIC, security chip, GPU, and HBA card.
Fan Management	Displays the status, current speed, duty ratio, and other information of a fan module. You can select the fan control mode and preset the speed for each fan module in the Manual Fan Control mode.
Power Policy	To set how the server operating system reacts under the BMC's control when AC power is reconnected to the server.
One-Click Erasing	To perform non-recoverable erasing on all storage devices of the server, preventing data leakage when the server is to be retired.
System Lockdown	After this feature is enabled, some parameters of the server cannot be set and some operations cannot be performed on the server.

10.2 KSManage

The server is compatible with the latest version of KSManage.

KSManage is 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	• Automatic asset discovery and batch asset import • Online asset management combined with offline asset management enabled by IoT solutions brings integrated digital asset management • Management of the full range of our server family, including general-purpose rack servers, AI servers, multi-node servers, edge servers and all-in-one servers • Management of our general-purpose disk arrays and distributed storage devices • Management of network devices (switches, routers, etc.), security devices (firewalls, load balancers, etc.), cabinets and clouds • Management of data centers • Asset warranty information management, asset inventory reports for server acceptance, asset attribute expansion, etc.
Monitor	• Display of real-time alerts, history alerts, blocked alerts and events • Fault prediction of drives and memories • Custom inspection plan and inspection result management • Notification record viewing • Intelligent fault diagnosis and analysis, automatic fault reporting and repair ticket viewing

Feature	Description
	• Trap management and Redfish management • Management of monitoring rules, such as alert rules, notification rules, blocking rules, alert noise reduction rules, compression rules and fault reporting rules, and redefinition of above rules
Control	• Quick start of firmware update, OS installation, power management, drive data erasing and stress test • Batch firmware update (BMC/BIOS/RAID Card/NIC/Drive/HBA Card/MB CPLD/BP CPLD/PSU) • Batch firmware configuration (BMC/BIOS) • Batch RAID configuration and OS deployment for servers • Secure and quick drive data erasing • CPU and memory stress test • Automatic firmware baseline management • BMC and BIOS snapshot management • Repositories for update files
Energy Efficiency	• Overview of data center power consumption trend chart and carbon emission trend chart • Setting of server dynamic power consumption policies and minimum power consumption policies • Carbon asset and carbon emission management
Log	• Fault log record management • Diagnosis record and diagnosis rule management
Topologies	• Centralized management of multiple data centers and panoramic 3D views, including dynamic display of power consumption, temperature, alerts and cabinet capacity of the data center • Network topologies
Reports	• Management of warranty information reports, alert reports, asset reports, hardware reports and performance reports • Export of reports in .xlsx format
System	• Password management, alert forwarding and data dump • Customized KSManage parameters
Security	Security control of KSManage via a set of security policies such as user management, role management, authentication

Feature	Description
	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 Certification

Table 11-1 Certification

Country/Region	Certification	Mandatory/Voluntary
US	FCC	Mandatory
	UL	Voluntary
EU	CE	Mandatory
Korea	KC	Mandatory
	E-Standby	Mandatory
International	CB	Voluntary

12 Appendix A

12.1 Thermal Restrictions

Table 12-1 Thermal Restrictions

Configuration		Max. Operating Temperature			
		30°C (86°F)	35°C (95°F)	40°C (104°F)	45°C (113°F)
10 × 2.5-Inch Drive + EVAC Heatsink	PCIe NIC Configuration	All options supported	CPUs with TDP >350 W not supported Note: CPUs with TDP >185 W are not supported when NICs/HCA cards >200 Gb are used.	• CPUs with TDP >205 W not supported • PCIe NICs ≥100 Gb not supported	• CPUs with TDP >165 W not supported • PCIe NICs ≥100 Gb not supported
	GPU Configuration	All options supported	CPUs with TDP >250 W not supported	Not supported	Not supported
10 × 2.5-Inch Drive + 1U Standard Heatsink	PCIe NIC Configuration	CPUs with TDP >205 W not supported	CPUs with TDP >180 W not supported	• CPUs with TDP >165 W not supported • PCIe NICs ≥100 Gb not supported	• CPUs with TDP >165 W not supported • PCIe NICs ≥100 Gb not supported
	GPU Configuration	CPUs with TDP >180 W not supported	CPUs with TDP >165 W not supported	Not supported	Not supported

NOTE

The above thermal restrictions do not apply to liquid-cooled CPUs.

12.2 Power/Performance Profiles

Table 12-2 Power/Performance Profiles

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

12.3 Model

Table 12-3 Model

Certified Model	Description
KR1280-X3-A0-R0-00	Global

12.4 RAS Features

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

12.5 Sensor List

Table 12-4 Sensor List

Sensor	Description	Sensor Location	Note
Inlet_Temp	Air inlet temperature	Right mounting ear	-
Outlet_Temp	Air outlet temperature	Motherboard	-
CPUx_Temp	CPUx core temperature	CPUx	x indicates the CPU number with a value of 0 to 1
CPUx_Margin_Temp	CPUx margin temperature	CPUx	x indicates the CPU number with a value of 0 to 1
CPUx_DIMM_Temp	The maximum temperature among DIMMs of CPUx	DIMMs of CPUx	x indicates the CPU number with a value of 0 to 1
CPUx_VR_Temp	The maximum temperature among VR modules of CPUx	CPUx	x indicates the CPU number with a value of 0 to 1
PSUx_Inlet_Temp	PSUx temperature	PSUx	x indicates the PSU number with a value of 0 to 1
GPUx_Temp	GPUx temperature	GPUx	x indicates the GPU number with a value of 0 to 1
GPU_MEM_MAX_T	The maximum memory temperature among all GPUs	GPUs	-
GPU_TLM_MIN_T	The minimum T.Limit temperature among all GPUs	GPUs	-
M.2_Temp	The maximum temperature among all M.2 SSDs	M.2 adapter	-

Sensor	Description	Sensor Location	Note
RAID_Temp	The maximum temperature among all RAID cards	RAID cards	-
SSD_MAX_Temp	The maximum temperature among all SAS and SATA SSDs	SSDs	-
HDD_MAX_Temp	The maximum temperature among all SAS and SATA HDDs	HDDs	-
OCP_NIC_Temp	The maximum temperature among all OCP cards	OCP cards	-
OCP_NIC_SFP_Temp	The maximum temperature among all OCP card SFP modules	SFP modules	-
PCIe_NIC_Temp	The maximum temperature among all PCIe NICs	PCIe NICs	-
PCIe_SFP_Temp	The maximum temperature among all PCIe NIC SFP modules	SFP modules	-
PCIe_HBA_Temp	The maximum temperature among all HBA cards	HBA cards	-
PCIe_HCA_Temp	The maximum temperature among all HCA cards	HCA cards	-
CPU_Tjmax	The maximum temperature among all CPU cores	Motherboard	-
CPU_TControl	CPU core temperature	Motherboard	-
BP_Front_Temp	Front backplane temperature	Drive backplane	-
BP_Middle_Temp	Middle backplane temperature	Drive backplane	-

Sensor	Description	Sensor Location	Note
BP_Rear_Temp	Rear backplane temperature	Drive backplane	-
PCIe_Retimer_T	The maximum core temperature among PCIe retimer cards	Retimer cards	-
OCP_Retimer_Temp	The maximum core temperature among OCP retimer cards	Retimer cards	-
NVME_F_MAX_T	The maximum temperature among all front NVMe drives	Drives	-
NVME_I_R_MAX_T	The maximum temperature among all internal and rear NVMe drives	Drives	-
SYS_12V	Motherboard 12 V voltage	Motherboard	-
SYS_5V	Motherboard 5 V voltage	Motherboard	-
SYS_3V3	Motherboard 3.3 V voltage	Motherboard	-
RTC_Battery	Battery voltage	Motherboard RTC battery	-
PSUx_VIN	PSUx input voltage	Motherboard	x indicates the PSU number with a value of 0 to 1
PSUx_VOUT	PSUx output voltage	Motherboard	x indicates the PSU number with a value of 0 to 1
PVCCIN_CPUx	CPUx core input voltage	CPUx	x indicates the CPU number with a value of 0 to 1
PVNN_MAIN_CPUx	CPUx main voltage	CPUx	x indicates the CPU number with a value of 0 to 1
SYS_1V8	Motherboard 1.8 V voltage	Motherboard	-
CPU_CUPS	CPU utilization rate	CPU	-
MEM_CUPS	Memory utilization rate	Memory	-

Sensor	Description	Sensor Location	Note
PSUx_IOUT	PSUx output current	PSUx	x indicates the PSU number with a value of 0 to 1
PSUx_PIN	PSUx input power	PSUx	x indicates the PSU number with a value of 0 to 1
PSUx_POUT	PSUx output power	PSUx	x indicates the PSU number with a value of 0 to 1
CPUx_Power	CPUx power	CPUx	x indicates the CPU number with a value of 0 to 1
Total_Power	Total system input power	PSUs	-
CPU_Total_Power	Total CPU power	CPUs	-
MEM_Total_Power	Total memory power	Memories	-
Fan_Total_Power	Total fan power	Fans	-
FANx_F_Speed	FANx front rotor speed	FANx	x indicates the fan number with a value of 0 to 7
FANx_R_Speed	FANx rear rotor speed	FANx	x indicates the fan number with a value of 0 to 7
FAN_Redundant	Fan redundancy status	Fans	-
FANx_Status	FANx health status	FANx	x indicates the fan number with a value of 0 to 7
FANx_Present	FANx presence status	FANx	x indicates the fan number with a value of 0 to 7
CPUx_Status	CPUx status	CPUx	x indicates the CPU number with a value of 0 to 1
CPUx_CXDY	DIMM health status of CPUx	DIMM of CPUx	• x indicates the CPU number with a value of 0 to 1

Sensor	Description	Sensor Location	Note
			• X indicates the memory channel number with a value of 0 to 7 • Y indicates the DIMM number with a value of 0 to 1
F_HDDx	Front drive health status	Drive	x indicates the drive number with a value of 0 to 31
I_HDDx	Internal drive health status	Drive	x indicates the drive number with a value of 0 to 1
PSU_Redundant	PSU redundancy status	PSUs	-
PSU_Mismatch	PSU models mismatch	PSUs	-
PSUx_Status	PSUx status	PSUx	x indicates the PSU number with a value of 0 to 1
LeakageSensor	Leakage status	Motherboard	-
BMC_Boot_Up	Records BMC boot event	Virtual sensor	-
BIOS_Boot_Up	BIOS boot up complete	Virtual sensor	-
Sys_Health	System health status	Management module	-
SEL_Status	Records SEL is almost full or has been cleared	Virtual sensor	-
POST_Status	POST status	Virtual sensor	-
BMC_Status	BMC status	Virtual sensor	-
PWR_On_TMOUT	Power-on timeout	Motherboard	-

Sensor	Description	Sensor Location	Note
System_Error	System emergency errors	Virtual sensor	-
Intrusion	Chassis-opening activity	Motherboard	-
CPU_Config	CPU configuration status (mixing of CPUs, or CPU0 not installed)	CPUs	-
ACPI_PWR	ACPI power status	Virtual sensor	-
Watchdog2	Watchdog	Motherboard	-
PWR_CAP_Fail	Power capping failure	Motherboard	-
PCIe_Status	The status of PCIe device (including PCIe bus, slots and cards)	PCIe expansion cards	-
IO_CUPS	I/O utilization rate	CPU	-

13 Appendix B Acronyms and Abbreviations

13.1 A - E

A

AC	Alternating Current
ACPI	Advanced Configuration and Power Interface
ADDDC	Adaptive Double Device Data Correction
AI	Artificial Intelligence
ANSI	American National Standards Institute
AQSIQ	General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China
ARMA	Advanced Return Material Authorization
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
AVX	Advanced Vector Extensions

B

BIOS	Basic Input Output System
BLE	BIOS Lock Enable
BMC	Baseboard Management Controller
BP	Backplane

C

CAS	Column Address Strobe
CEN	European Committee for Standardization
CLI	Command-Line Interface

CLP	Command Line Protocol
CMOS	Complementary Metal-Oxide-Semiconductor
CPLD	Complex Programmable Logic Device
CPU	Central Processing Unit
CRPS	Common Redundant Power Supply

D

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

E

ECC	Error-Correcting Code
ECMA	European Computer Manufacturers Association
ESD	Electrostatic Discharge
EVAC	Extended Volume Air Cooling
E1.S	Enterprise & Data Center SSD Form Factor 1 Unit Short

13.2 F - J

F

FCC	Federal Communications Commission
FHHL	Full-Height Half-Length

G

GNR	Granite Rapids
GPU	Graphics Processing Unit
GUI	Graphical User Interface

H

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

I

I/O	Input/Output
I^2C	Inter-Integrated Circuit
IEC	International Electrotechnical Commission
IIPC	Intel Intelligent Power Capability
IOH	Input/Output Hub
IP	Internet Protocol
IPMI	Intelligent Platform Management Interface
IRUT	Intelligent Runtime Update Technology
ISA	International Society of Automation
ISO	International Organization for Standardization

13.3 K - O

K

KVM	Keyboard Video Mouse

L

LDAP	Lightweight Directory Access Protocol
LED	Light Emitting Diode

M

MCIO	Mini Cool Edge Input/Output
MRDIMM	Multiplexed Rank DIMM

N

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

O

OCP	Open Compute Project
OLTP	Online Transaction Processing
OOB	Out-of-Band
OS	Operating System

13.4 P - T

P

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

R

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

S

SAS	Serial Attached SCSI
SATA	Serial Advanced Technology Attachment
SCSI	Small Computer System Interface

SEL	System Event Log
SFF	Small Form Factor
SFP	Small Form-factor Pluggable
SGX	Software Guard Extensions
SLA	Service Level Agreement
SLES	SUSE Linux Enterprise Server
SMM	System Management Mode
SNMP	Simple Network Management Protocol
SSD	Solid State Drive
SSH	Secure Shell

T

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

13.5 U - Z

U

UART	Universal Asynchronous Receiver/Transmitter
UCE	Uncorrectable Memory Error
UEFI	Unified Extensible Firmware Interface
UID	Unit Identification
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
VRD	Voltage Regulator-Down