FusionServer 2288 V8 Server

Technical White Paper

Issue 02

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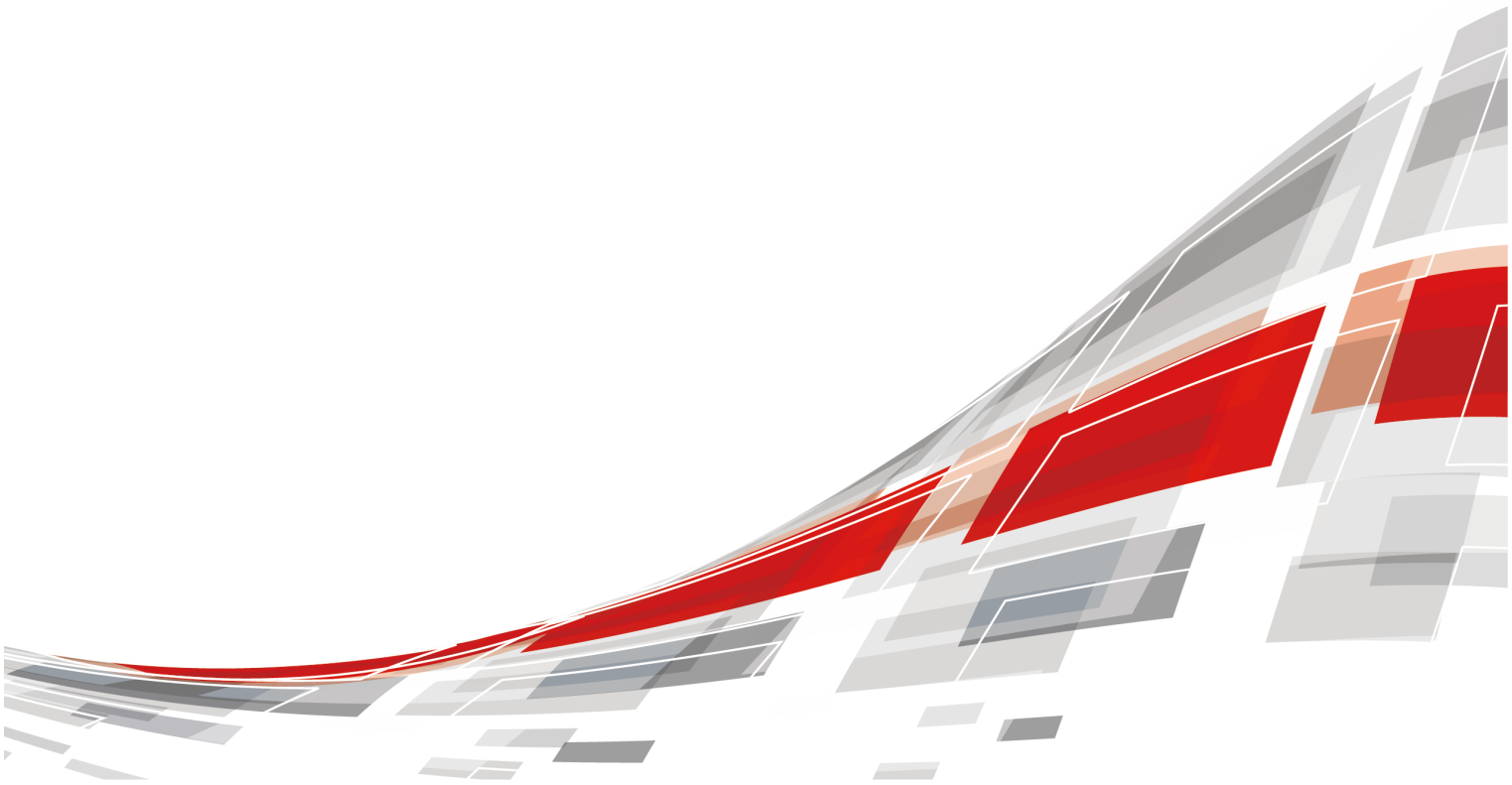

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About This Document

Purpose

This document describes the appearance, features, performance parameters, and hardware and software compatibility of the server, so that users can have an in-depth and detailed understanding of it.

Intended Audience

This document is intended for pre-sales engineers.

Symbolic Conventions

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

Symbol	Description
DANGER	Indicates a hazard with a high level of risk which, if not avoided, could result in death or serious injury.
WARNING	Indicates a hazard with a medium risk which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a low-level hazard which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in device damage, data loss, device performance degradation, or other unpredictable results. NOTICE is used to address practices not related to personal injury.
NOTE	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

Issue	Release Date	Change Description
02	2025-12-03	This issue is the second official release.
01	2025-09-12	This issue is the first official release.

Contents

About This Document ii
1 Overview 1
2 Product Features 2
3 Physical Structure 5
4 Logic Structure 7
5 Hardware Description 8
5.1 Front Panel 8
5.1.1 Appearance 8
5.1.2 Indicators and Buttons 9
5.1.3 Ports 13
5.2 Rear Panel 16
5.2.1 Appearance 16
5.2.2 Indicators and Buttons 16
5.2.3 Ports 18
5.3 Processors 20
5.4 Memory 21
5.4.1 DDR5 Memory 21
5.4.1.1 Memory Subsystem Architecture 21
5.4.1.2 Memory Compatibility 22
5.4.1.3 DIMM Installation Rules 25
5.4.1.4 Positions of the Memory Modules 25
5.4.1.5 Memory Protection Technologies 28
5.5 Storage 28
5.5.1 Drive Configuration and Drive Numbering 28
5.5.1.1 SAS/SATA Configurations 28
5.5.1.1.1 8 x 2.5" Pass-Through Configuration 29
5.5.1.1.2 12 x 3.5" Pass-Through Configuration 31
5.5.1.1.3 16 x 2.5" Pass-Through Configuration 34
5.5.1.2 SAS/SATA/NVMe Pass-Through Configurations 35
5.5.1.2.1 8 x 2.5" Pass-Through Configurations 36
5.5.1.2.2 12 x 3.5" Pass-Through Configurations 39

5.5.1.2.3 16 x 2.5" Pass-Through Configurations....47
5.5.1.2.4 24 x 2.5" Pass-Through Configurations....52
5.5.1.3 NVMe Hard RAID Configurations....59
5.5.1.3.1 8 x 2.5" Pass-Through Configuration....59
5.5.1.3.2 16 x 2.5" Hardware RAID Configurations....61
5.5.1.3.3 24 x 2.5" Hardware RAID Configurations....64
5.5.2 Drive Indicators....66
5.5.3 RAID Controller Card....68
5.6 Network....69
5.6.1 OCP 3.0 NICs....69
5.7 I/O Expansion....69
5.7.1 PCIe Card....69
5.7.2 PCIe Slots....69
5.7.2.1 Rear PCIe Riser Module....70
5.7.2.1.1 General-Purpose GPU Riser Module....70
5.7.2.1.2 Dedicated PCIe Riser Module....77
5.7.3 PCIe Slot Description....80
5.7.3.1 Rear PCIe Riser Module....81
5.8 PSUs....82
5.9 Fan Modules....83
5.10 Board....84
5.10.1 Mainboard....85
5.10.2 Drive Backplane....87
5.10.3 Fan Board....96
5.10.4 Built-in M.2 Adapter Card....97
5.10.5 SATA Pass-through Card....99

6 Specifications....100

6.1 Technical Specifications....100
6.2 Environmental Specifications....105
6.3 Physical Specifications....107

7 Software and Hardware Compatibility....109

8 Safety Instructions....110

8.1 Security....110
8.2 Maintenance and Warranty....114

9 System Management....115

10 Certifications....117

11 Waste Product Recycling....119

A Appendix....120

A.1 Chassis Label Information....120
A.1.1 Chassis Head Label....120

A.1.1.1 Nameplate....121
A.1.1.2 Certificate and Quick Access Label....122
A.1.2 Chassis Internal Label....123
A.1.3 Chassis Tail Label....124
A.2 Drive ID....124
A.3 Product SN....125
A.4 Operating Temperature Limitations....127
A.5 Nameplate....134
A.6 Names and Content of Hazardous Substances....134
A.7 Sensor List....135
B Glossary....140
B.1 A-E....140
B.2 F-J....141
B.3 K-O....141
B.4 P-T....141
B.5 U-Z....142
C Acronyms and Abbreviations....143
C.1 A-E....143
C.2 F-J....144
C.3 K-O....145
C.4 P-T....146
C.5 U-Z....148

1 Overview

FusionServer 2288 V8 (hereinafter referred to as 2288 V8) is a new generation 2U 2-socket rack server based on the Intel® Xeon® 6 Processors of 6500P/6700P/6700E-series designed for the Internet, Internet Data Center (IDC), cloud computing, enterprise, and telecom.

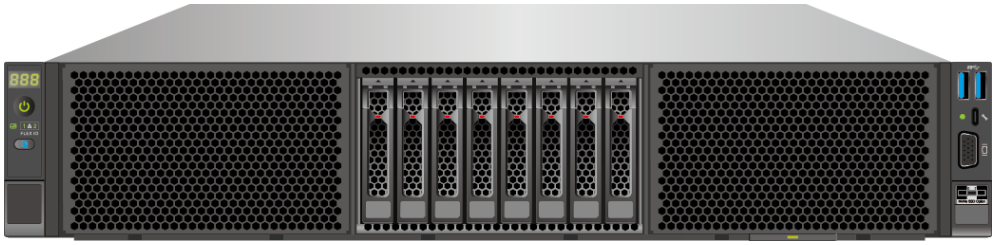
This product is ideal for IT core services, cloud computing, virtualization, high-performance computing, distributed storage, big data processing, enterprise or telecom applications, and other complex workloads.

This product features low power consumption, high scalability, high reliability, and easy management and deployment.

NOTE

For details about the server nameplate, see **A.5 Nameplate**.

Figure 1-1 Server with 8 x 2.5" drives (example)



2 Product Features

Performance

- Intel® Xeon® 6 Processors: 6500P-series and 6700P-series
  - A processor provides up to 86 cores and 172 threads, up to 350 W TDP, a maximum turbo frequency of 3.8 GHz, a maximum of 336 MB L3 cache, and 4 groups of 24 GT/s UPI links, which deliver the supreme processing performance.
  - For 2DPC, it supports a maximum of 32DDR5 Registered Dual In-line Memory Module (RDIMM), with a maximum rate of 5200 MT/s. For 1DPC, it supports a maximum of 16 6400 MT/s DDR5 RDIMM memory, with a maximum rate of 6400 MT/s. It provides excellent speed, high availability.
  - Supports up to 16 8800 MT/s Multiplexed Rank Dual In-line Memory Module (MRDIMM) memory, maximum speed of 8000 MT/s for 1DPC, providing excellent speed, high availability.
- Intel® Xeon® 6 Processors: 6700E-series
  - A processor provides up to 144 cores and 144 threads, up to 330 W TDP, a maximum turbo frequency of 3.0 GHz, a maximum of 108 MB L3 cache, and 4 groups of 24 GT/s UPI links, which deliver the supreme processing performance.
  - For 2DPC, it supports a maximum of 32 DDR5 RDIMM, with a maximum rate of 5200 MT/s. For 1DPC, it supports a maximum of 16 6400 MT/s DDR5 RDIMM memory, with a maximum rate of 6400 MT/s. It provides excellent speed and high availability.

Scalability

- Flexible drive configurations cater to a variety of business requirements and ensure high elasticity and scalability of storage resources.
  - Supports 12 x 3.5" or 24 x 2.5" SAS/SATA/NVMe front drives.
  - Supports 24 x 2.5" NVMe U.2 front drives, improving storage density and I/O performance.
  - Supports rear 4 x 2.5" SAS/SATA + 4 x 2.5" NVMe drives.
  - Supports 2 x M.2 SSDs (optional) to meet the fastboot of the OS drive and improve the flexibility of maintenance.

- Supports multiple flexible PCIe card configurations to meet the different network connectivity requirements and upgrade requirements.
  - Supports five rear slots with PCIe x16 slots or two PCIe x16 slots + six PCIe x8 slots.
  - Supports two rear FLEX I/O cards (optional).
  - Supports 2 OCP 3.0 NICs, FLEX I/O card 1 can expand the bandwidth to PCIe 5.0 x16, FLEX I/O card 2 can support PCIe 5.0 x8. Supports the flexible configuration of GE/10GE/25GE/100GE NICs and orderly hot swap.

    NOTE

    A hot swap of an OCP NIC requires support of related OS drivers. Ensure that the OS is started and the OCP hot swap-related drivers have been loaded before performing a hot swap of an OCP NIC.

Availability and Serviceability

- Carrier-class components with process expertise ensure high system reliability and availability.
- The server supports hot-swappable SAS/SATA/NVMe drives. Different RAID controller cards support different RAID levels. When the 39xx series RAID controller card is configured, it supports RAID 0/1/10/5/50/6/60, and uses a supercapacitor to protect the RAID cache data against power failures.
- The panel provides a UID/Healthy LED indicator and a fault diagnosis LED, enabling technical personnel to quickly locate components that have failed or are at risk of failure, thereby simplifying maintenance tasks, accelerating problem resolution, and enhancing system availability.
- The mounting ear provides the iBMC direct connect management port to support local iBMC O&M, improving O&M efficiency.
- A server provides two hot-swappable PSUs in 1+1 redundancy mode and four hot-swappable fan modules in *N*+1 redundancy mode, improving system availability.
- The intelligent Baseboard Management Controller (iBMC) can continuously monitor system parameters, trigger alarms, and take recovery measures to minimize shutdown.

Manageability and Security

- The built-in iBMC monitors server operating status and provides remote management.
- Supports BIOS menu passwords to ensure the security of system startup and system management.
- Supports the Network Controller Sideband Interface (NC-SI) feature that allows a network port to provide functions of both a management network port and a service network port. The NC-SI feature can be enabled or disabled through the iBMC or BIOS. The NC-SI feature is disabled by default.

NOTE

The service network port of the NC-SI feature supports the following configurations:

- It can be bound to any network port of the server's OCP 3.0 NIC or other standard PCIe NICs that support the NC-SI function.
- It allows users to enable or disable the virtual local area network ID (VLAN ID) and configure the VLAN ID. The VLAN ID is **0** and disabled by default.
- It supports IPv4 and IPv6 addresses, and allows users to configure the IP address, subnet mask, default gateway, or prefix length of an IPv6 address.

- The integrated Unified Extensible Firmware Interface (UEFI) improves setup, configuration, and update efficiency and simplifies fault clearance.
- Supports the lockable server front bezel to ensure local data security.
- Optional chassis opening detection module to enhance physical security.
- Supports secure boot based on the chip-level Root of Trust (RoT) and provides the level-by-level verification function starting from the hardware trusted root, building a complete secure boot chain.
- Supports the trusted platform module (TPM), providing advanced encryption functions, such as digital signatures and remote authentication.
- Meets the following requirements in NIST SP 800-147B:
  - The BIOS firmware digital signature update mechanism is supported. During the upgrade, the digital signature is verified to prevent unauthorized BIOS firmware upgrade.
  - The flash security protection mechanism is supported to prevent unauthorized modification of the flash in the OS.

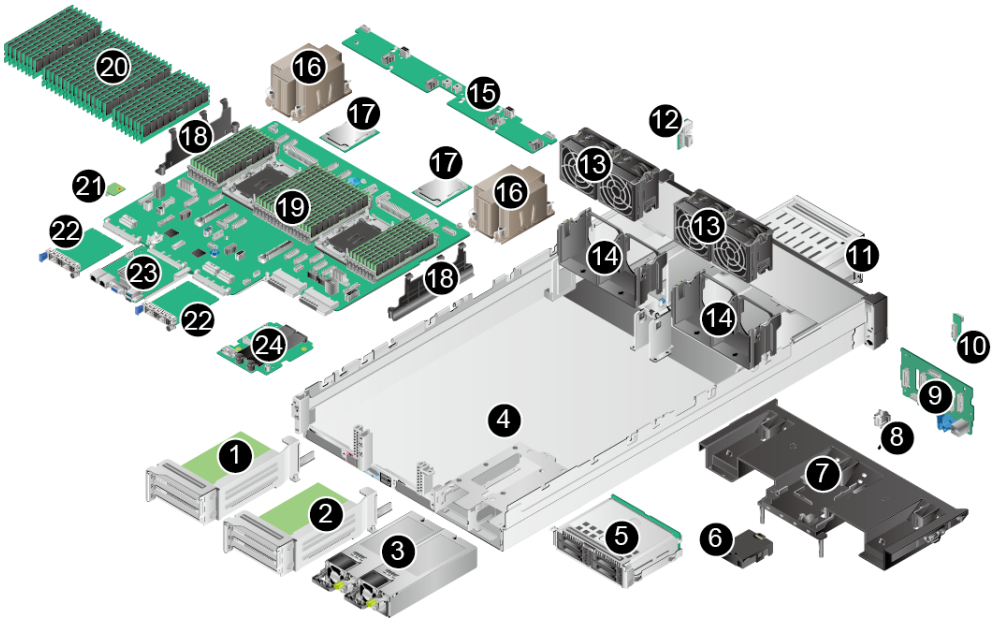
Energy Efficiency

- Provides 80 Plus Platinum/Titanium PSUs with different energy efficiency levels. The efficiency of the PSUs reaches 96% when the load is 50%.
- Supports active/standby power supply and high-voltage DC power supply to improve the efficiency of the power supply system.
- Efficient Voltage Regulator Down (VRD) power supplies for boards minimize the energy loss from DC power conversion.
- Area-based Proportional-Integral-Derivative (PID) intelligent fan speed adjustment and intelligent CPU frequency scaling optimize heat dissipation and reduce overall system power consumption.
- The improved thermal design with energy-efficient fans ensures optimal heat dissipation and reduces system power consumption.
- Staggered spinup of drives reduces the server boot power consumption.

3 Physical Structure

General-purpose server

Figure 3-1 Physical structure of a server

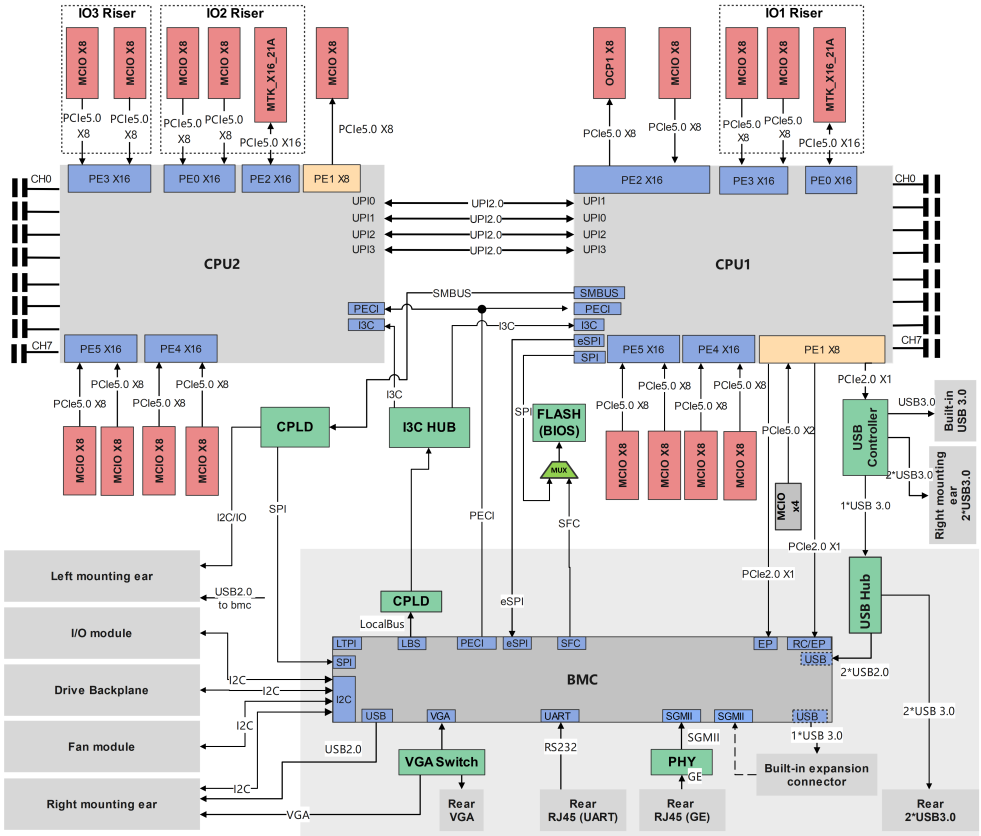


1	Rear I/O module 1	2	Rear I/O module 2
3	PSU	4	Chassis
5	Rear I/O module 3	6	Supercapacitor
7	Air duct	8	Intrusion sensor
9	Front-Drive Backplane	10	Left mounting ear plate
11	Front-drive module	12	Right mounting ear plate
13	Fan module	14	Fan module bracket
15	Fan board	16	Processor heat sink

17	Processor	18	Cable management arm
19	Mainboard	20	DIMM
21	TPM	22	OCP 3.0 NIC
23	BMC card	24	M.2 SSD

4 Logic Structure

Figure 4-1 Logic structure



- The board supports 1 or 2 Intel® Xeon® 6 Processors of 6500P/6700P/6700E-series and 32 DIMMs. Processor PCIe resources are routed via integrated PCB or cables connecting with PCIe riser cards and NVMe pass-through drive backplanes, enabling compatibility with diverse riser/backplane configurations and supporting variable PCIe card slots and NVMe drive slots.
- The BMC card integrates the BMC management chip and provides external video graphic array (VGA), management network port, and serial port.
- The BMC manages the I/O module, drive backplane, and fan module through the I2C.

5 Hardware Description

5.1 Front Panel
5.2 Rear Panel
5.3 Processors
5.4 Memory
5.5 Storage
5.6 Network
5.7 I/O Expansion
5.8 PSUs
5.9 Fan Modules
5.10 Board

5.1 Front Panel

5.1.1 Appearance

- Front panel

Figure 5-1 8 x 2.5" drive configuration 1

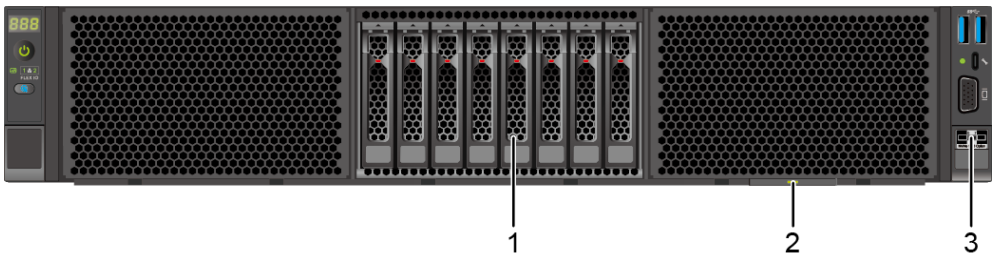


Figure 5-2 8 x 2.5" drive configuration 2

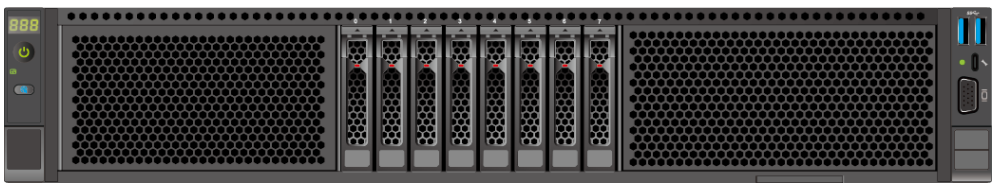


Figure 5-3 12 x 3.5" drive configuration

Figure 5-4 16 x 2.5" drive configuration 1

Figure 5-5 16 x 2.5" drive configuration 2

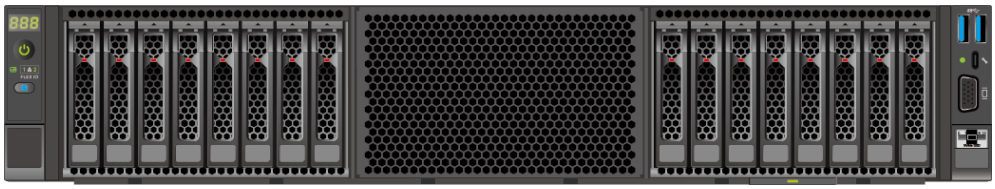


Figure 5-6 24 x 2.5" drive configuration

1	Drive module	2	Slide-out label plate (with an SN label)
3	Drive ID **NOTE** The pictures are for reference only. For details, see **A.2 Drive ID**.	-	-

5.1.2 Indicators and Buttons

Indicator and Button Positions

- Indicators and buttons on the front panel

Figure 5-7 8 x 2.5" drive configuration 1

Figure 5-8 8 x 2.5" drive configuration 2

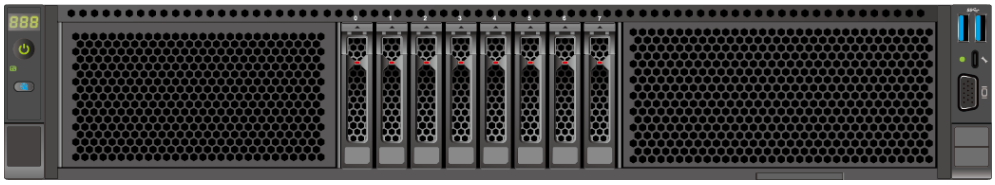


Figure 5-9 12 x 3.5" drive configuration

Figure 5-10 16 x 2.5" drive configuration 1

Figure 5-11 16 x 2.5" drive configuration 2

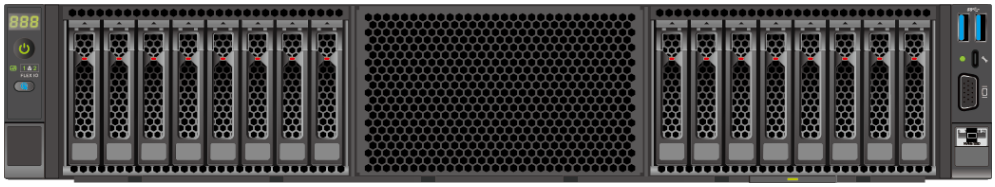


Figure 5-12 24 x 2.5" drive configuration

1	UID button/indicator	2	Health status indicator

3	Power button/indicator	4	Fault diagnosis LED
5	FlexIO card 1 presence indicator	6	FlexIO card 2 presence indicator
7	iBMC direct connect management port indicator	-	-

Indicator and Button Description

Table 5-1 Indicators and buttons on the front panel

Sign	Indicators and Buttons	Description
	Fault diagnosis LED	● ---: The device is operating properly. ● Error code: A component is faulty. For details about fault codes, see the *iBMC Alarm Handling*.
	Health status indicator	● Off: The device is powered off or faulty. ● Blinking red at 1 Hz: A major alarm has been generated on the system. ● Blinking red at 5 Hz: A critical alarm has been generated on the system. ● Steady green: The device is operating properly.
	FlexIO card presence indicator	Indicates whether the FlexIO card is detected. ● Off: The FlexIO card is not detected. ● Blinking green at 0.5 Hz: The FlexIO card is detected but is not powered on. ● Blinking green at 2 Hz: The FlexIO card is detected and has just been inserted. ● Steady green: The FlexIO card is detected and the power supply is normal.

Sign	Indicators and Buttons	Description
	Power button/ indicator	Power indicator: ● Off: The device is powered off. ● Steady green: The device is powered on. ● Blinking yellow: The iBMC is starting. The power button is locked and cannot be pressed. The iBMC is started in about 1 minute, and then the power indicator turns steady yellow. ● Steady yellow: The device is in the standby state. Power button: ● When the device is powered on, you can press this button to gracefully shut down the OS. **NOTE** For different OSs, you may need to shut down the OS as prompted. ● When the device is powered on, you can hold down this button for 6 seconds to forcibly power off the device. ● When the power indicator is steady yellow, you can press this button to power on the device.
	UID button/ indicator	The UID button/indicator helps identify and locate a device. UID indicator: ● Off: The device is not being located. ● Blinking or steady blue: The device is being located. UID button: ● You can control the UID indicator status by pressing the UID button or using the iBMC. ● You can press this button to turn on or off the UID indicator. ● You can press and hold down this button for 4 to 6 seconds to reset the iBMC.

Sign	Indicators and Buttons	Description
	iBMC direct connect management port indicator	Indicates the status when the iBMC direct connect management port connects to a terminal (local PC or Android mobile phone): ● Off: No terminal is connected. ● Blinking green at 5 Hz for 3 seconds and then off: The port is disabled. ● Steady green: The terminal is connected. Indicates the status when the iBMC direct connect management port connects to a USB device: ● Blinking red at 0.5 Hz: The job fails or an error is reported when the job is complete. ● Blinking green at 5 Hz: The job is being executed. ● Blinking green at 5 Hz for 3 seconds and then off: The port is disabled. ● Steady green: The server configuration file is being copied from the USB device or the job is successfully completed.

5.1.3 Ports

Port Positions

- Ports on the front panel

Figure 5-13 8 x 2.5" drive configuration 1

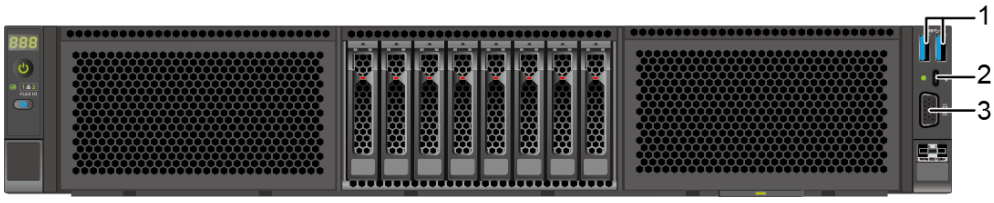


Figure 5-14 8 x 2.5" drive configuration 2

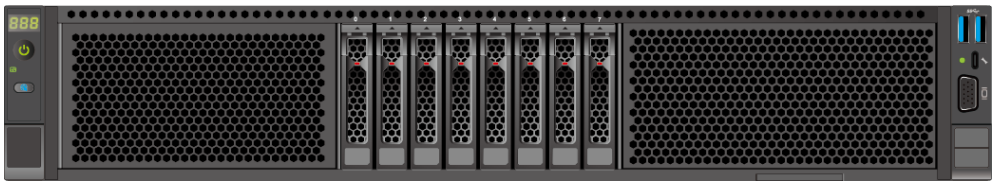


Figure 5-15 12 x 3.5" drive configuration

Figure 5-16 16 x 2.5" drive configuration 1

Figure 5-17 16 x 2.5" drive configuration 2

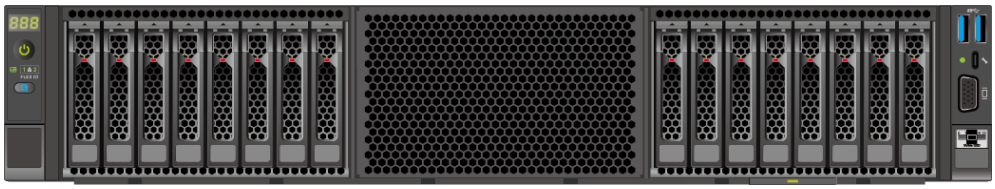


Figure 5-18 24 x 2.5" drive configuration

1	USB 3.0 port	2	iBMC direct connect management port
3	VGA port	-	-

Port Description

Table 5-2 Ports on the front panel

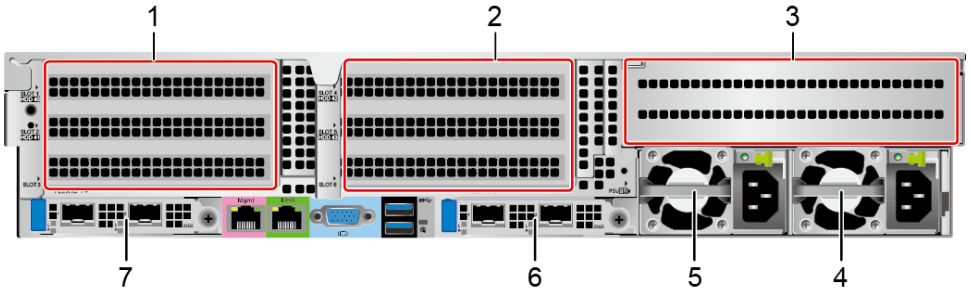
Name	Type	Quantity	Description
iBMC direct connect management port	USB Type-C **NOTE** The USB 2.0 protocol is supported.	1	Used to connect to a local PC or mobile phone using a USB Type-C cable to monitor and manage the system. **NOTE** Only local PCs running Windows 10 and mobile phones running Android are supported. ● To log in to the iBMC from a local PC, enter **https://** *169.254.1.5* in the address box of the browser on the local PC. Used to connect to a USB device. **NOTICE** ● Before connecting an external USB device, ensure that the USB device functions properly; otherwise, it may adversely impact the server. ● For details about how to connect a USB device to the iBMC direct connect management port, see the *iBMC User Guide*.
USB port	USB 3.0	2	Used to connect to a USB 3.0 device. **NOTICE** ● Before connecting an external USB device, ensure that the USB device functions properly; otherwise, it may adversely impact the server. ● The USB 3.0 port can be used to supply power to low-power peripherals. However, the USB 3.0 port must comply with the USB specifications. To run advanced peripherals, such as external CD/DVD drives, an external power supply is required.
VGA port	DB15	1	Used to connect a display terminal, such as a monitor or KVM.

5.2 Rear Panel

5.2.1 Appearance

- Server with drive modules or PCIe riser modules on the rear panel

Figure 5-19 Rear panel



1	Rear I/O module 1	2	Rear I/O module 2
3	Rear I/O module 3	4	PSU 2
5	PSU 1	6	(Optional) FlexIO card 2 **NOTE** The FlexIO card slot supports only OCP 3.0 NICs with PCIe 5.0 x8.
7	(Optional) FlexIO card 1 **NOTE** The FLEX IO card slot only supports OCP 3.0 network cards with PCIe 5.0 x16.	-	-

NOTE

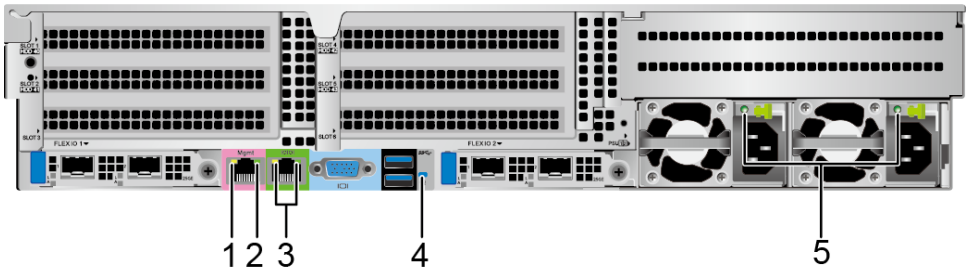
- I/O module 1 and I/O module 2 can support a PCIe riser module, 2 x 3.5" rear-drive module, or 2 x 2.5" rear drives and one PCIe riser module.
- I/O module 3 supports a PCIe riser module or 4 x 2.5" rear-drive module.
- For details about the OCP 3.0 NIC, see **5.6.1 OCP 3.0 NICs**.
- The figure is for reference only. The actual configuration may vary.

5.2.2 Indicators and Buttons

Indicator Positions

- Server with PCIe riser modules on the rear panel

Figure 5-20 Indicators on the rear panel



1	Data transmission status indicator of the management network port	2	Connection status indicator of the management network port
3	Serial port indicator **NOTE** Reserved and unavailable currently.	4	UID indicator
5	PSU indicators	-	-

Indicator Description

Table 5-3 Indicators on the rear panel

Sign	Indicator	Description
-	Data transmission status indicator of the management network port	• Off: No data is being transmitted. • Blinking yellow: Data is being transmitted.
-	Connection status indicator of the management network port	• Off: The network is not connected. • Steady green: The network port is properly connected.

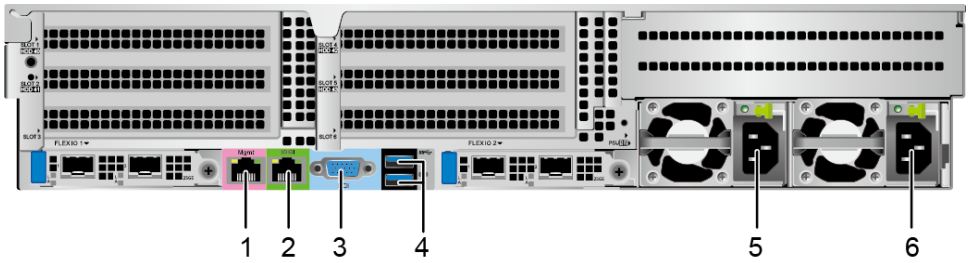
Sign	Indicator	Description
-	PSU indicator	● Off: No power is supplied. ● Blinking green at 1 Hz: – The input is normal and the power supply enters SV12 mode. – The input is overvoltage or undervoltage. – The PSU is in deep hibernation mode. ● Blinking green at 4 Hz: The firmware is being upgraded online. ● Steady green: The input and output are normal. ● Steady orange: The input is normal but there is no output. **NOTE** The possible causes of no output are as follows: ● Power supply overtemperature protection ● Power output overcurrent or short-circuit ● Output overvoltage ● Short-circuit protection ● Device failure (excluding failure of all devices)
	UID indicator	The UID indicator helps identify and locate a device. ● Off: The device is not being located. ● Blinking or steady blue: The device is being located. **NOTE** You can control the UID indicator status by pressing the UID button or using the iBMC.

5.2.3 Ports

Port Positions

- Server with drive modules or PCIe riser modules on the rear panel

Figure 5-21 Ports on the rear panel



1	Management network port	2	Serial port
3	VGA port	4	USB 3.0 port
5	Socket for PSU 1	6	Socket for PSU 2

Port Description

Table 5-4 Ports on the rear panel

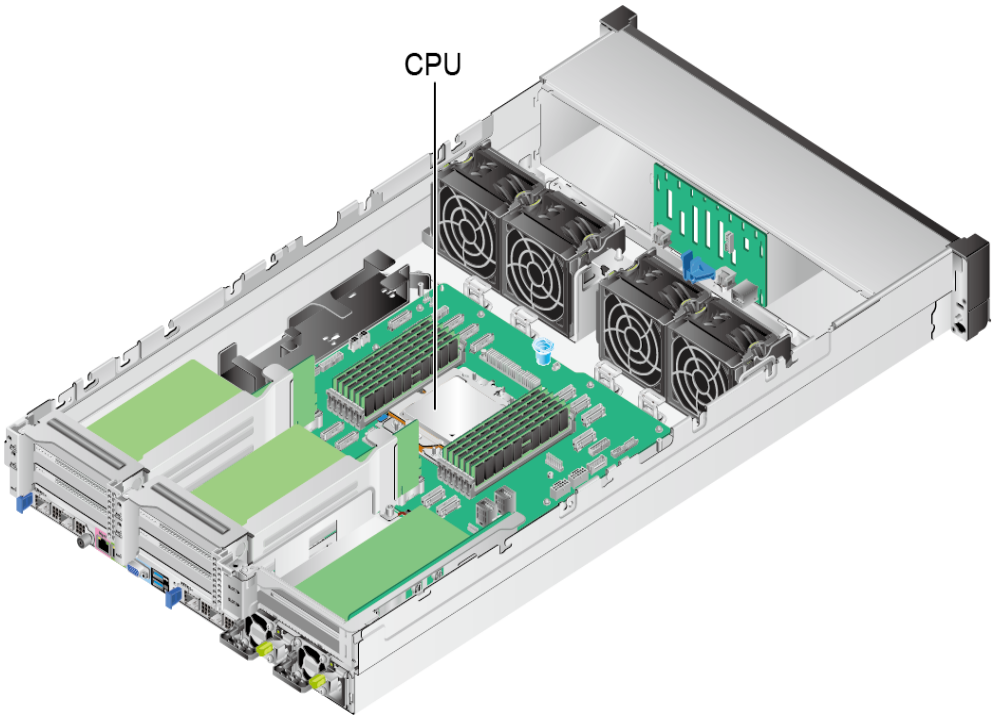
Name	Type	Quantity	Description
Management network port	RJ45	1	iBMC management network port, which is used to manage the server. **NOTE** • The management network port is a GE port that supports 100 Mbit/s and 1000 Mbit/s auto-negotiation. • The iBMC management network port cannot be connected to a PoE-powered device (such as a PoE switch with the PoE function enabled). Forcible interconnection may cause link communication problems or damage to the management network port.
Serial port	RJ45	1	A port used for debugging. By default, it serves as the OS serial port. You can also set it as the iBMC serial port on the iBMC CLI. **NOTE** The port is a 3-wire serial communication port, and its default baud rate is 115,200 bit/s.

Name	Type	Quantity	Description
VGA port	DB15	1	Used to connect a display terminal, such as a monitor or KVM.
USB port	USB 3.0	2	Used to connect to a USB 3.0 device. **NOTICE** ● The maximum current is 1.3 A for an external USB device. ● Before connecting an external USB device, ensure that the USB device functions properly; otherwise, it may adversely impact the server. ● The USB 3.0 port can be used to supply power to low-power peripherals. However, the USB 3.0 port must comply with the USB specifications. To run advanced peripherals, such as external CD/DVD drives, an external power supply is required.
PSU socket	-	2	Used to connect to a power distribution unit (PDU) through a power cable. You can select the PSUs as required. **NOTE** When determining the PSUs, ensure that the rated power of the PSUs is greater than that of the server.

5.3 Processors

- The server supports one or two processors.
- If only one processor is required, install it in socket CPU 1.
- Processors of the same model must be used in a server.
- For details about the optional components, consult the local sales representative or see "Search Parts" in the compatibility list on the technical support website.

Figure 5-22 Position of the processor



5.4 Memory

5.4.1 DDR5 Memory

5.4.1.1 Memory Subsystem Architecture

The server provides 32 memory interfaces. Each processor integrates 8 memory channels.

Install the memory modules in the primary memory channels first. If the primary memory channel is not populated, the memory modules in secondary memory channels cannot be used.

Table 5-5 Memory channels

CPU	Channel	Memory Slot
CPU1	A (primary)	DIMM000(A0)
	A	DIMM001(A1)
	B (primary)	DIMM010(B0)
	B	DIMM011(B1)
	C (primary)	DIMM020(C0)
	C	DIMM021(C1)

CPU	Channel	Memory Slot
	D (primary)	DIMM030(D0)
	D	DIMM031(D1)
	E (primary)	DIMM040(E0)
	E	DIMM041(E1)
	F (primary)	DIMM050(F0)
	F	DIMM051(F1)
	G (primary)	DIMM060(G0)
	G	DIMM061(G1)
	H (primary)	DIMM070(H0)
	H	DIMM071(H1)
CPU2	A (primary)	DIMM100(A0)
	A	DIMM101(A1)
	B (primary)	DIMM110(B0)
	B	DIMM111(B1)
	C (primary)	DIMM120(C0)
	C	DIMM121(C1)
	D (primary)	DIMM130(D0)
	D	DIMM131(D1)
	E (primary)	DIMM140(E0)
	E	DIMM141(E1)
	F (primary)	DIMM150(F0)
	F	DIMM151(F1)
	G (primary)	DIMM160(G0)
	G	DIMM161(G1)
	H (primary)	DIMM170(H0)
	H	DIMM171(H1)

5.4.1.2 Memory Compatibility

Observe the following rules when configuring DDR5 memory modules:

NOTICE

- A server must use DDR5 memory modules of the same part number (P/N code), and the memory speed is the lower one of the following two speed values:
  - Memory speed supported by a CPU
  - Maximum operating speed of a memory module
- The DDR5 memory modules of different types (RDIMM and MRDIMM) and specifications (capacity, bit width, rank, and height) cannot be used together.
- For details about the optional components, consult the local sales representative.

- The calculation formula of total memory capacity supported is as follows: the total memory capacity equals the capacity sum of all DDR5 memory modules.
- For details about the type of a single memory module, consult your local sales representatives or see "Search Parts" in the compatibility list on the technical support website.
- The maximum number of memory modules supported depends on the memory module type and number of ranks.

Table 5-6 DDR5 memory parameters (6500P/6700P-series)

Parameter		Specifications		
Capacity of a DDR5 DIMM (GB)		32	64	64
Type		RDIMM	RDIMM	MRDIMM[a]
Rated speed (MT/s)		6400	6400	8800
Operating voltage (V)		1.1	1.1	1.1
Maximum number of DDR5 DIMMs of a server[b]		32	32	16
Maximum DDR5 memory capacity of the server (GB)		1024	2048	1024
Actual speed (MT/s)	1DPC[c]	6400	6400	8000
	2DPC	5200	5200	Not supported.

Parameter	Specifications
● a: Only processors of 6787P/6767P/6747P-series support MRDIMM. ● b: The maximum number of DDR5 memory modules is based on dual-processor configuration. The number is halved for a server with only one processor. ● c: DIMM per channel (DPC) indicates the number of memory modules per channel. ● The maximum DIMM working rate depends on the configured CPU and DIMM configuration. ● The maximum DDR5 DIMM capacity depends on the processor type. This capacity indicates the maximum DDR5 DIMM capacity with fully populated DIMM slots. ● The information listed in this table is for reference only. For details, consult the local sales representatives or see "Search Parts" in the compatibility list on the technical support website.	

Table 5-7 DDR5 memory parameters (6700E-series)

Parameter		Specifications	
Capacity of a DDR5 DIMM (GB)		32	64
Type		RDIMM	RDIMM
Rated speed (MT/s)		6400	6400
Operating voltage (V)		1.1	1.1
Maximum number of DDR5 DIMMs of a server[a]		16	32
Maximum DDR5 DIMM capacity of the server (GB)		512	2048
Actual speed (MT/s)	1DPC[b]	6400[c]	6400[c]
	2DPC	Not supported.	5200

Parameter	Specifications
● a: The maximum number of DDR5 memory modules is based on dual-processor configuration. The number is halved for a server with only one processor. ● b: DIMM per channel (DPC) indicates the number of memory modules per channel. ● c: When configured with processors such as 6710E-series and 6746E-series, the maximum working rate is only 5600 MT/s. ● The maximum DIMM working rate depends on the configured CPU and DIMM configuration. ● The maximum DDR5 DIMM capacity depends on the processor type. This capacity indicates the maximum DDR5 DIMM capacity with fully populated DIMM slots. ● The information listed in this table is for reference only. For details, consult the local sales representatives or see "Search Parts" in the compatibility list on the technical support website.	

5.4.1.3 DIMM Installation Rules

Observe the following rules when configuring DDR5 memory modules:

- The memory modules configured must be DDR5 RDIMMs.
- The memory modules must be configured with the same number of ranks.
- If no memory module is installed, a memory module filler must be installed in the memory slot to ensure the heat dissipation performance of the server.

5.4.1.4 Positions of the Memory Modules

A server supports up to 32 DDR5 DIMM modules.

Observe the memory module installation rules when configuring memory modules. For details, see the memory configuration guide on the technical support website.

Figure 5-23 Positions of the memory modules

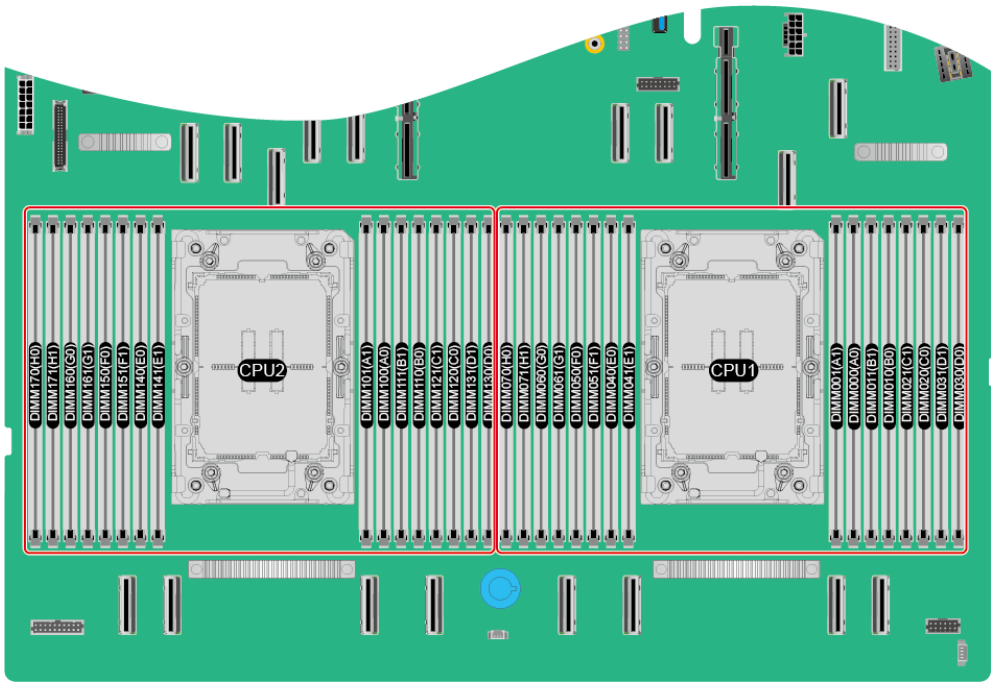


Table 5-8 DDR5 memory installation guide (one processor)

Processor	Channel	DIMM Slot	Number of DIMMs				
			1	4	8	12[a]	16
CPU1	A (primary)	DIMM000(A0)	●	●	●	●	●
	A	DIMM001(A1)	X	X	X	●	●
	B (primary)	DIMM010(B0)	X	X	●	●	●
	B	DIMM011(B1)	X	X	X	X	●
	C (primary)	DIMM020(C0)	X	●	●	●	●
	C	DIMM021(C1)	X	X	X	●	●
	D (primary)	DIMM030(D0)	X	X	●	●	●
	D	DIMM031(D1)	X	X	X	X	●
	E (primary)	DIMM040(E0)	X	●	●	●	●
	E	DIMM041(E1)	X	X	X	●	●
	F (primary)	DIMM050(F0)	X	X	●	●	●
	F	DIMM051(F1)	X	X	X	X	●
	G (primary)	DIMM060(G0)	X	●	●	●	●
	G	DIMM061(G1)	X	X	X	●	●
	H (primary)	DIMM070(H0)	X	X	●	●	●

	H	DIMM071(H1)	X	X	X	X	●
Note: ● indicates an installation position, and X indicates an empty slot. a: Twelve DIMMs are supported only when the processor with P-Cores is configured.							

Table 5-9 DDR5 memory installation guide (two processors)

Processor	Channel	DIMM Slot	Number of DIMMs				
			2	8	16	24[a]	32
CPU1	A (primary)	DIMM000(A0)	●	●	●	●	●
	A	DIMM001(A1)	X	X	X	●	●
	B (primary)	DIMM010(B0)	X	X	●	●	●
	B	DIMM011(B1)	X	X	X	X	●
	C (primary)	DIMM020(C0)	X	●	●	●	●
	C	DIMM021(C1)	X	X	X	●	●
	D (primary)	DIMM030(D0)	X	X	●	●	●
	D	DIMM031(D1)	X	X	X	X	●
	E (primary)	DIMM040(E0)	X	●	●	●	●
	E	DIMM041(E1)	X	X	X	●	●
	F (primary)	DIMM050(F0)	X	X	●	●	●
	F	DIMM051(F1)	X	X	X	X	●
	G (primary)	DIMM060(G0)	X	●	●	●	●
	G	DIMM061(G1)	X	X	X	●	●
	H (primary)	DIMM070(H0)	X	X	●	●	●
	H	DIMM071(H1)	X	X	X	X	●
CPU2	A (primary)	DIMM100(A0)	●	●	●	●	●
	A	DIMM101(A1)	X	X	X	●	●
	B (primary)	DIMM110(B0)	X	X	●	●	●
	B	DIMM111(B1)	X	X	X	X	●
	C (primary)	DIMM120(C0)	X	●	●	●	●
	C	DIMM121(C1)	X	X	X	●	●
	D (primary)	DIMM130(D0)	X	X	●	●	●

	D	DIMM131(D1)	X	X	X	X	●
	E (primary)	DIMM140(E0)	X	●	●	●	●
	E	DIMM141(E1)	X	X	X	●	●
	F (primary)	DIMM150(F0)	X	X	●	●	●
	F	DIMM151(F1)	X	X	X	X	●
	G (primary)	DIMM160(G0)	X	●	●	●	●
	G	DIMM161(G1)	X	X	X	●	●
	H (primary)	DIMM170(H0)	X	X	●	●	●
	H	DIMM171(H1)	X	X	X	X	●
Note: ● indicates an installation position, and X indicates an empty slot. a: Twenty-four DIMMs are supported only when the processor with P-Cores is configured.							

5.4.1.5 Memory Protection Technologies

- ECC
- Memory Mirroring
- Memory Single Device Data Correction (SDDC)
- Failed DIMM Isolation
- Memory Thermal Throttling
- Command/Address Parity Check and Retry
- Memory Demand/Patrol Scrubbing
- Memory Data Scrambling
- Post Package Repair (PPR)
- Write Data CRC Protection
- Adaptive Data Correction - Single Region (ADC-SR)
- Adaptive Double Device Data Correction (ADDDC)

5.5 Storage

5.5.1 Drive Configuration and Drive Numbering

5.5.1.1 SAS/SATA Configurations

5.5.1.1.1 8 x 2.5" Pass-Through Configuration

Drive Configurations

Table 5-10 Drive configurations

Configuration	Front drive	Rear Drive	Drive Management Mode
8 x 2.5" SAS/SATA drive pass-through configuration	• Front drives (8 x 2.5"): – Slots 0 to 7 support only SAS/SATA drives.	-	• SAS/SATA drives: PCIe plug-in RAID controller card[a]/ RAID controller cable card[b]/ SATA pass-through card[b/c] • NVMe drive: CPU pass-through
• a: The PCIe plug-in RAID controller card is installed in slot 3. • b: The RAID controller cable card or the SASA pass-through card is installed in slot 1 or the built-in support. • c: When the is configured with a SATA pass-through card, only one or two SATA drives can be configured. • For details about the optional components, consult the local sales representative.			

Drive Numbers

NOTICE

The drive numbers identified by the RAID controller card vary depending on the cabling of the RAID controller card. This section uses the drive numbers identified by a RAID controller card that adopts the default cabling described in "Internal Cabling" in the server *Maintenance and Service Guide*.

- Drive number of the "8 x 2.5" SAS/SATA/NVMe drive pass-through configuration 1" in the **Table 5-10**

Figure 5-24 Drive numbers

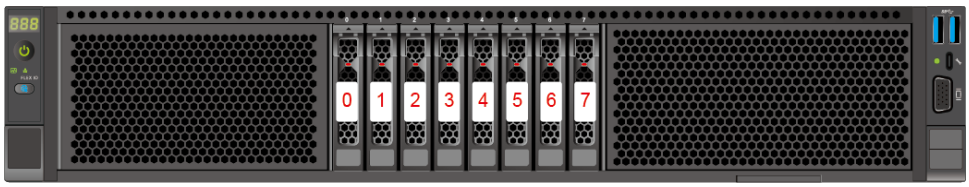


Table 5-11 Drive numbers

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7

5.5.1.1.2 12 x 3.5" Pass-Through Configuration

Table 5-12 Drive configurations

Configuration	Front drive	Rear Drive	Drive Management Mode
12 x 3.5" SAS/ SATA drive pass-through configuration	● Front drives (12 x 3.5"): – Slots 0 to 11 support only SAS/ SATA drives.	● I/O module 1 (2 x 2.5"): – Slots 40 and 41 support only SAS/ SATA drives[a/b]. ● I/O module 2 (2 x 2.5"/2 x 3.5"): – Slots 42 and 43 support only SAS/ SATA drives[a/b]. ● I/O module 3 (4 x 2.5"): – Slots 44 to 47 support SAS/ SATA drives[a]. – Slots 44 to 47 support only NVMe drives[c].	● SAS/SATA drives: – SAS/SATA drives in slot 0 to slot 11: PCIe plug-in RAID controller card[d]/RAID controller cable card[b/e] – SAS/SATA drives in slot 40 to slot 43: PCIe plug-in RAID controller card[d] – SAS/SATA drives in slot 44 to slot 47: PCIe plug-in RAID controller card[d] ● NVMe drive: CPU pass-through

- a: I/O module 1/2 and I/O module 3 do not support SAS/SATA drive modules.
- b: When the rear I/O module 1 is configured with a RAID controller card, the rear I/O module 1 and I/O module 2 cannot be configured with a drive module.
- c: NVMe drives are supported when CPU 2 is configured. A single-CPU server does not support NVMe drives.
- d: The PCIe plug-in RAID controller card is installed in slot 3.
- e : The RAID control cable card is installed in slot 1.
- For details about the optional components, consult the local sales representative.

Drive Numbers

NOTICE

The drive numbers identified by the RAID controller card vary depending on the cabling of the RAID controller card. This section uses the drive numbers identified by a RAID controller card that adopts the default cabling described in "Internal Cabling" in the server *Maintenance and Service Guide*.

- Drive numbers of the 12 x 3.5" SAS/SATA drive pass-through configuration in the **Table 5-12**

Figure 5-25 Drive number 1

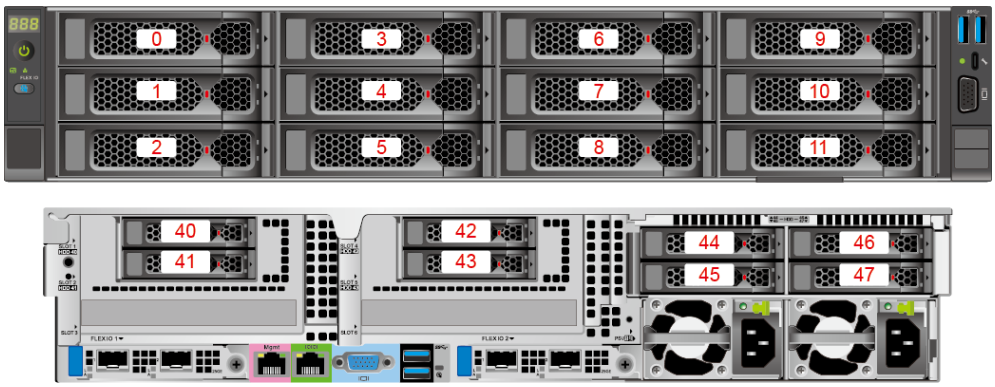


Figure 5-26 Drive number 2

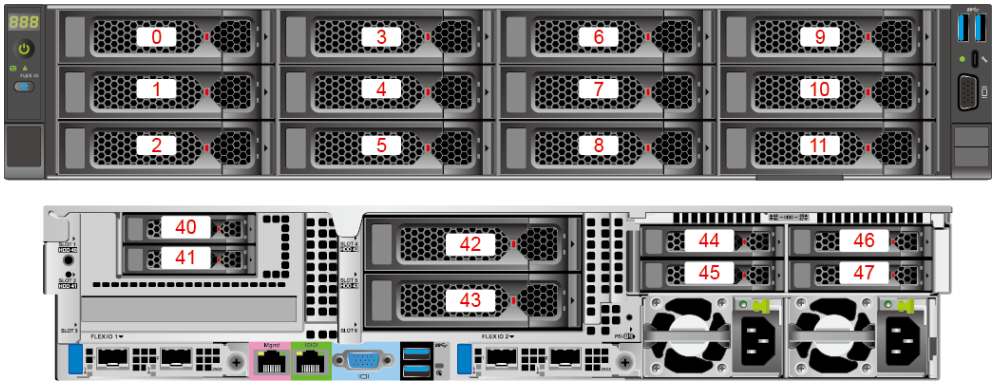


Figure 5-27 Drive number 3

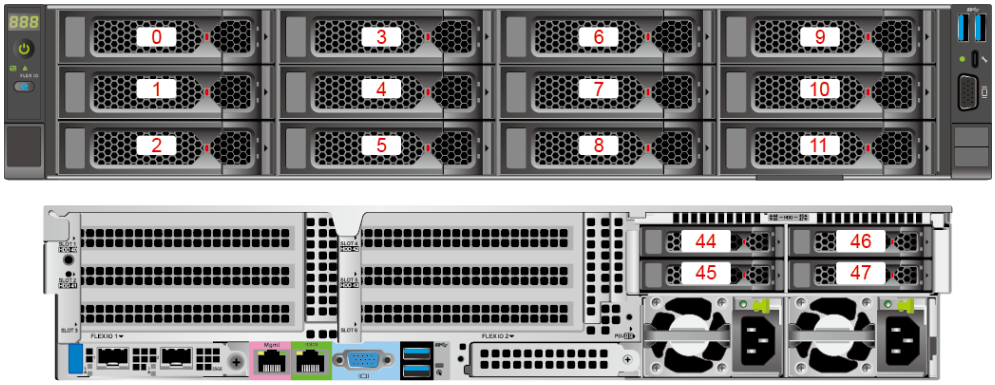


Table 5-13 Drive numbers

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
11	11	11
40	40	40
41	41	41
42	42	42
43	43	43[Note]
44	44	44[Note]
45	45	45 [Note]
46	46	46 [Note]

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
47	47	47 Note
Note: If the slot is configured with an SAS/SATA drive, the RAID controller card can manage the drive and allocate a number to the drive.		

5.5.1.1.3 16 x 2.5" Pass-Through Configuration

Table 5-14 Drive Configurations

Configuration	Front drive	Rear Drive	Drive Management Mode
16 x 2.5" SAS/SATA drive pass-through configuration	• Front drive (16 x 2.5"): – Slots 0 to 15 support only SAS/SATA drives.	-	• SAS/SATA drives: PCIe plug-in RAID controller card[a]/ RAID controller cable card[b]
• a: The PCIe plug-in RAID controller card is installed in slot 3. • b: The RAID control cable card is installed in slot 1. • For details about the optional components, consult the local sales representative.			

Drive Numbers

NOTICE

The drive numbers identified by the RAID controller card vary depending on the cabling of the RAID controller card. This section uses the drive numbers identified by a RAID controller card that adopts the default cabling described in "Internal Cabling" in the server *Maintenance and Service Guide*.

- Drive numbers of the "16 x 2.5" SAS/SATA drive pass-through configuration" in the **Table 5-14**

Figure 5-28 Drive numbers

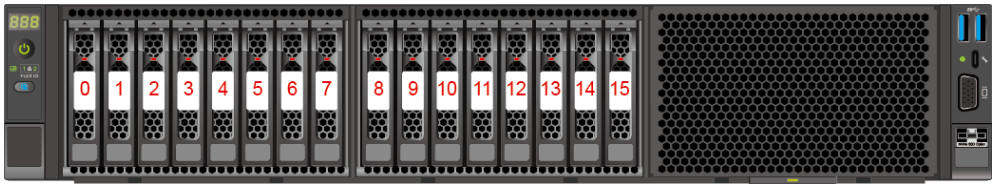


Table 5-15 Drive numbers

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
11	11	11
12	12	12
13	13	13
14	14	14
15	15	15

5.5.1.2 SAS/SATA/NVMe Pass-Through Configurations

5.5.1.2.1 8 x 2.5" Pass-Through Configurations

Drive Configurations

Table 5-16 Drive configurations

Configuration	Front drive	Rear Drive	Drive Management Mode
8 x 2.5" SAS/ SATA/NVMe drives pass-through configuration (dedicated for dual CPUs)	● Front drives (8 x 2.5"): – Slots 0 to 7 support only SAS/SATA/ NVMe drives.	-	● SAS/SATA drives: PCIe plug-in RAID controller card[a]/ RAID controller cable card[b]/SATA pass-through card[b/c] ● NVMe drives – NVMe drives in slots 0 to 3: CPU 2 pass-through – NVMe drives in slots 4 0 to 7: CPU 1 pass-through
8 x 2.5" SAS/ SATA/NVMe drives pass-through configuration (dedicated for a single CPU)	● Front drives (8 x 2.5"): – Slots 0 to 7 support only SAS/SATA/ NVMe drives.	-	● SAS/SATA drives: PCIe plug-in RAID controller card[a]/ RAID controller cable card[b]/SATA pass-through card[b/c] ● NVMe drives: CPU1 pass-through
8 x 2.5" NVMe drive pass-through configuration (dedicated for dual CPUs)	● Front drives (8 x 2.5"): – Slots 0 to 7 support only NVMe drives.	-	● NVMe drive – NVMe drives in slots 0 to 3: CPU 2 pass-through – NVMe drives in slots 4 to 7: CPU 1 pass-through

Configuration	Front drive	Rear Drive	Drive Management Mode
8 x 2.5" NVMe drive pass-through configuration (dedicated for a single CPU)	• Front drives (8 x 2.5"): – Slots 0 to 7 support only NVMe drives.	-	• NVMe drives: CPU1 pass-through
• a: The PCIe plug-in RAID controller card is installed in slot 3. • b: RAID control cable card/SATA pass-through card is installed in slot 1. • c: When the is configured with a SATA pass-through card, only one or two SATA drives can be configured. • For details about the optional components, consult the local sales representative.			

Drive Numbers

NOTICE

The drive numbers identified by the RAID controller card vary depending on the cabling of the RAID controller card. This section uses the drive numbers identified by a RAID controller card that adopts the default cabling described in "Internal Cabling" in the server *Maintenance and Service Guide*.

- Drive numbers of the 8 x 2.5" SAS/SATA/NVMe drive pass-through configuration (dedicated for dual CPUs) and 8 x 2.5" SAS/SATA/NVMe drive pass-through configuration (dedicated for a single CPU) in **Table 5-16**

Figure 5-29 Drive numbers

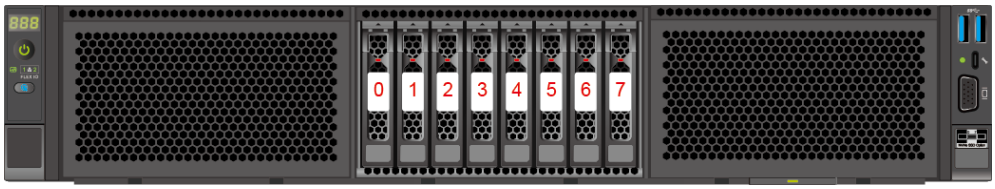


Table 5-17 Drive numbers

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
0	0	0[Note]
1	1	1[Note]

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
2	2	2Note
3	3	3Note
4	4	4Note
5	5	5Note
6	6	6Note
7	7	7Note
Note: If the slot is configured with an SAS/SATA drive, the RAID controller card can manage the drive and allocate a number to the drive.		

- Drive numbers of the 8 x 2.5" NVMe drive pass-through configuration (dedicated for dual CPUs) and 8 x 2.5" NVMe drive pass-through configuration (dedicated for a single CPU) in **Table 5-16**

Figure 5-30 Drive number 1

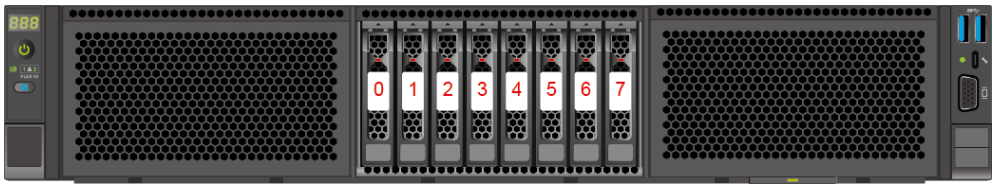


Table 5-18 Drive number

Drive Number	Drive Number Displayed on the iBMC WebUI
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7

5.5.1.2.2 12 x 3.5" Pass-Through Configurations

Table 5-19 Drive configurations

Configuration	Front drive	Rear Drive	Drive Management Mode
12 x 3.5" 8 x SAS/SATA + 4 x NVMe drive pass-through	• Front drive (12 x 3.5"): – Slots 0 to 7 support only SAS/SATA drives. – Slots 8 to 11 support only NVMe drives.	• I/O module 3 (4 x 2.5"): – Slots 44 to 47 support only NVMe drives[a].	• SAS/SATA drives: PCIe plug-in RAID controller card[b]/ RAID controller cable card[c] • NVMe drive: CPU pass-through
12 x 3.5" (8 x SAS/SATA + 4 x SAS/SATA/NVMe) drive pass-through configuration	• Front drive (12 x 3.5"): – Slots 0 to 7 support only SAS/SATA drives. – Slots 8 to 11 support SAS/SATA/NVMe drives.	• I/O module 1 (2 x 2.5"): – Slots 40 and 41 support only SAS/SATA drives[d]. • I/O module 2 (2 x 2.5"): – Slots 42 and 43 support only SAS/SATA drives[d]. • I/O module 3 (4 x 2.5"): – Slots 44 to 47 support only NVMe drives[a]. – Slots 44 to 47 support SAS/SATA drives[d].	• SAS/SATA drives: PCIe plug-in RAID controller card[b]/ RAID controller cable card • NVMe drive: CPU pass-through

Configuration	Front drive	Rear Drive	Drive Management Mode
12 x 3.5" (8 x SAS/SATA + 4 x SAS/SATA/NVMe) drive dual-RAID pass-through configuration 1	● Front drive (12 x 3.5"): – Slots 0 to 7 support only SAS/SATA drives. – Slots 8 to 11 support SAS/SATA/NVMe drives.	● I/O module 3 (4 x 2.5"): – Slots 44 to 47 support SAS/SATA drives.	● SAS/SATA drives: – Slots 0 to 11 support only SAS/SATA drives. RAID control standard card[b] – Slots 44 to 47 support only SAS/SATA drives. RAID controller cable card [e]/ SATA pass-through card[e/f] ● NVMe drive: CPU pass-through
12 x 3.5" (8 x SAS/SATA + 4 x SAS/SATA/NVMe) drive dual-RAID pass-through configuration 2	● Front drive (12 x 3.5"): – Slots 0 to 7 support only SAS/SATA drives. – Slots 8 to 11 support SAS/SATA/NVMe drives.	● I/O module 1 (2 x 2.5"): – Slots 40 and 41 support only SAS/SATA drives. ● I/O module 3 (4 x 2.5"): – Slots 44 to 47 support only NVMe drives[a].	● SAS/SATA drives: – SAS/SATA drives in slots 0 to 11: PCIe plug-in RAID controller card[b] – SAS/SATA drives in slot 40 to slot 41: RAID controller cable card[e]/ SATA pass-through card[e/f] ● NVMe drive: CPU pass-through

Configuration	Front drive	Rear Drive	Drive Management Mode
• a: NVMe drives are supported when CPU 2 is configured. A single-CPU server does not support NVMe drives. • b: The PCIe plug-in RAID controller card is installed in slot 3. • c: The RAID control cable card is installed in slot 1. • d: I/O module 1/2 and I/O module 3 do not support SAS/SATA drive modules. • e: The RAID control cable card is installed on the air duct. • f: When the is configured with a SATA pass-through card, only one or two SATA drives can be configured. • For details about the optional components, consult the local sales representative.			

Drive Numbers

NOTICE

The drive numbers identified by the RAID controller card vary depending on the cabling of the RAID controller card. This section uses the drive numbers identified by a RAID controller card that adopts the default cabling described in "Internal Cabling" in the server *Maintenance and Service Guide*.

- Drive numbers of the "12 x 3.5" (8 x SAS/SATA + 4 x NVMe) drive pass-through configuration" in the **Table 5-19**

Figure 5-31 Drive numbers 1

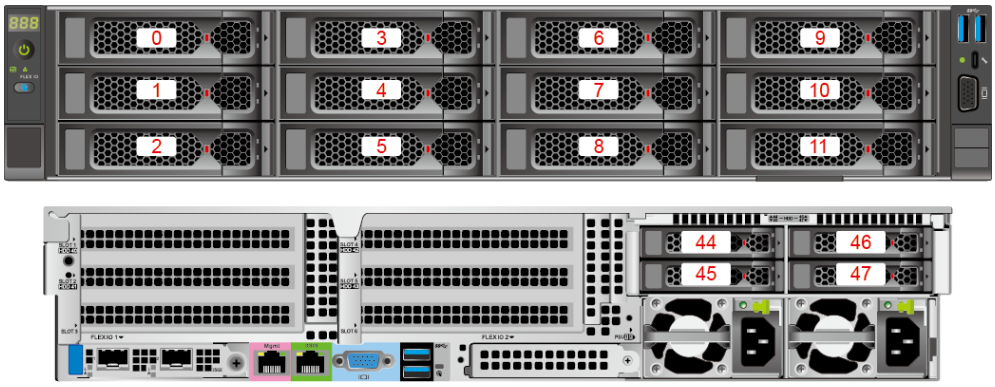


Table 5-20 Drive numbers

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
11	11	11
44	44	-
45	45	-
46	46	-
47	47	-

- Drive number of the "12 x 3.5" 8 x SAS/SATA + 4 x SAS/SATA/NVMe drive pass-through configuration" in the **Table 5-12**

Figure 5-32 Drive numbers 1

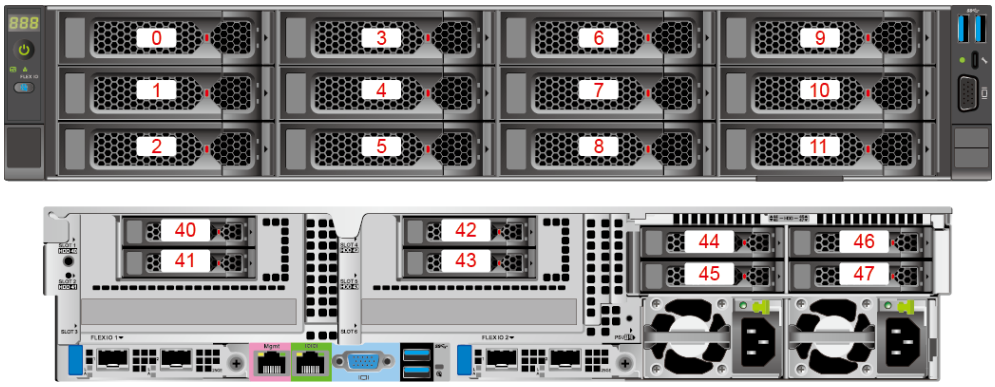


Figure 5-33 Drive numbers 2

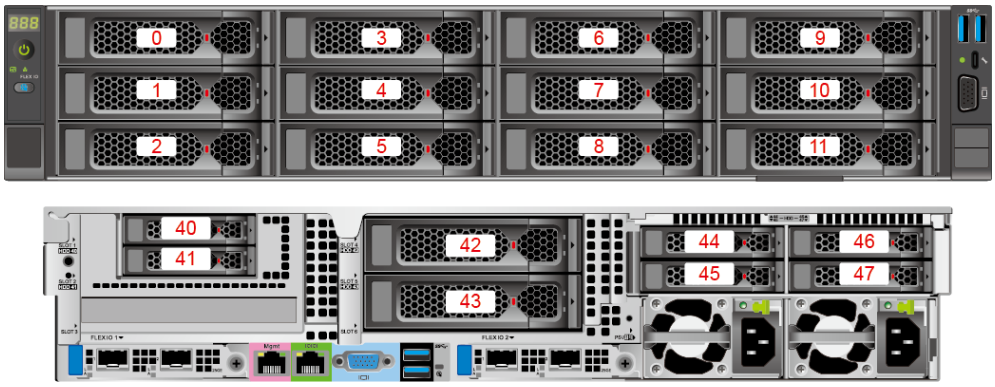


Figure 5-34 Drive numbers 3

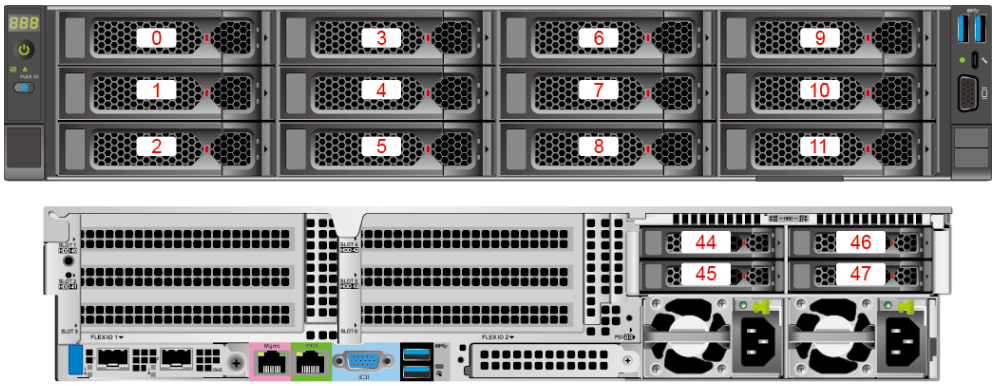


Table 5-21 Drive numbers

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8Note
9	9	9Note
10	10	10Note

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
11	11	11 Note
40	40	40
41	41	41
42	42	42
43	43	43
44	44	44 Note
45	45	45 Note
46	46	46 Note
47	47	47 Note
Note: If the slot is configured with an SAS/SATA drive, the RAID controller card can manage the drive and allocate a number to the drive.		

- Drive number of the "12 x 3.5" (8 x SAS/SATA + 4 x SAS/SATA/NVMe) drive dual-RAID pass-through configuration 1" in the **Table 5-19**

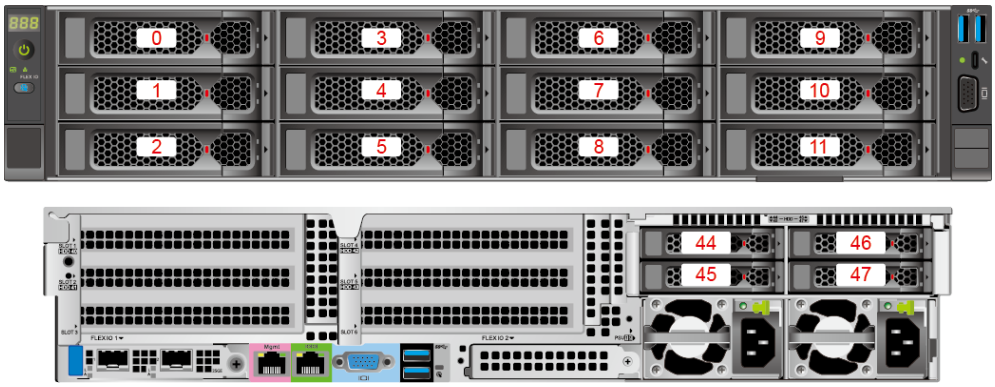


Table 5-22 Drive number

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
5	5	5
6	6	6
7	7	7
8	8	8Note
9	9	9Note
10	10	10Note
11	11	11Note
44	44	44 Note
45	45	45 Note
46	46	46 Note
47	47	47 Note
Note: If the slot is configured with an SAS/SATA drive, the RAID controller card can manage the drive and allocate a number to the drive.		

- Drive number of the "12 x 3.5" 8 x SAS/SATA + 4 x SAS/SATA/NVMe drive with dual-RAID pass-through configuration 2" in the **Table 5-19**

Figure 5-35 Drive numbers

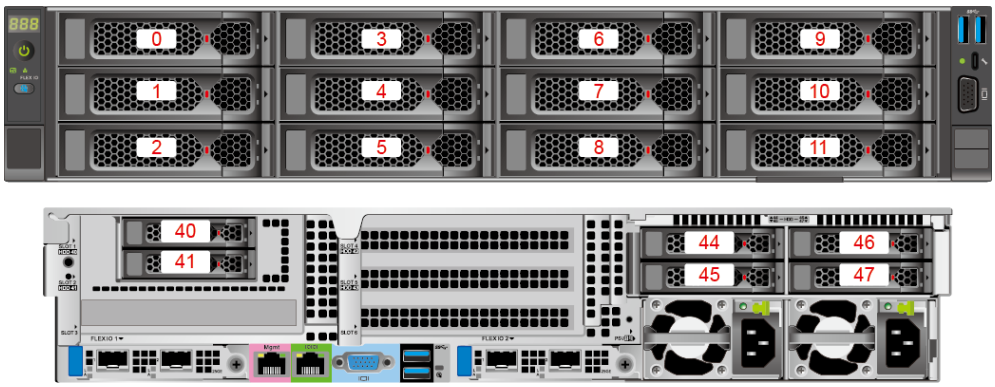


Table 5-23 Drive numbers

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
0	0	0

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8Note
9	9	9Note
10	10	10Note
11	11	11Note
40	40	40
41	41	41
44	44	44
45	45	45
46	46	46
47	47	47
Note: If the slot is configured with an SAS/SATA drive, the RAID controller card can manage the drive and allocate a number to the drive.		

5.5.1.2.3 16 x 2.5" Pass-Through Configurations

Table 5-24 Drive Configurations

Configuration	Front Drive	Rear Drive	Drive Management Mode
16 x 2.5" (8 x SAS/SATA + 8 x NVMe) drive pass-through configuration (dedicated for dual CPUs)	● Front drive (16 x 2.5"): – Slots 0 to 7 support only SAS/SATA drives. – Slots 8 to 15 support only NVMe drives.	-	● SAS/SATA drives: PCIe plug-in RAID controller card[a]/ RAID controller cable card[b] ● NVMe drives: – NVMe drives in slots 8 to 11: CPU 2 pass-through – NVMe drives in slots 12 to 15: CPU 1 pass-through
16 x 2.5" (8 x SAS/SATA + 8 x NVMe) drive pass-through configuration (dedicated for a single CPU)	● Front drive (16 x 2.5"): – Slots 0 to 7 support only SAS/SATA drives. – Slots 8 to 15 support only NVMe drives.	-	● SAS/SATA drives: PCIe plug-in RAID controller card[a]/ RAID controller cable card[b] ● NVMe drives: CPU 1 pass-through
16 x 2.5" NVMe drive pass-through configuration	● Front drive (16 x 2.5"): – Slots 0 to 7 support only NVMe drives. – Slots 16 to 23 support only NVMe drives.	-	NVMe drives: ● NVMe drives in slots 0 to 7: CPU 2 pass-through ● NVMe drives in slots 16 to 23: CPU 1 pass-through

Configuration	Front Drive	Rear Drive	Drive Management Mode
16 x 2.5" (8 x SAS/SATA + 8 x NVMe) drive pass-through configuration	• Front drive (16 x 2.5"): – Slots 0 to 7 support SAS/SATA/NVMe drives. – Slots 16 to 23 support only NVMe drives.	-	• SAS/SATA drives: PCIe plug-in RAID controller card [a]/RAID controller cable card[b] • NVMe drives: – NVMe drives in slots 0 to 7: CPU 2 pass-through – NVMe drives in slots 16 to 23: CPU 1 pass-through
• a: The PCIe plug-in RAID controller card is installed in slot 3. • b: The RAID control cable card is installed in slot 1. • For details about the optional components, consult the local sales representative.			

Drive number

NOTICE

The drive numbers identified by the RAID controller card vary depending on the cabling of the RAID controller card. This section uses the drive numbers identified by a RAID controller card that adopts the default cabling described in "Internal Cabling" in the server *Maintenance and Service Guide*.

- Drive numbers of the 16 x 2.5" (8 x SAS/SATA + 8 x NVMe) drive pass-through configuration (dedicated for dual CPUs) and 16 x 2.5" (8 x SAS/SATA + 8 x NVMe) drive pass-through configuration (dedicated for a single CPU) in **Table 5-24**

Figure 5-36 Drive numbers

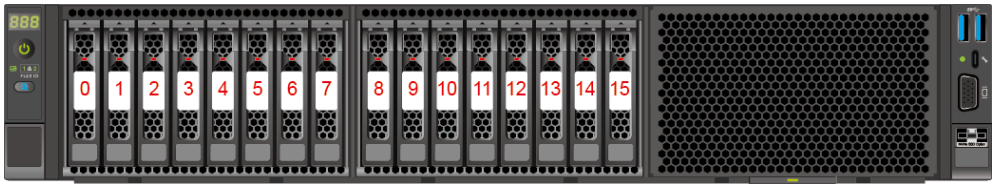


Table 5-25 Drive numbers

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	-
9	9	-
10	10	-
11	11	-
12	12	-
13	13	-
14	14	-
15	15	-

- Drive number of the 16 x 2.5" NVMe drive pass-through configuration in **Table 5-24**

Figure 5-37 Drive number

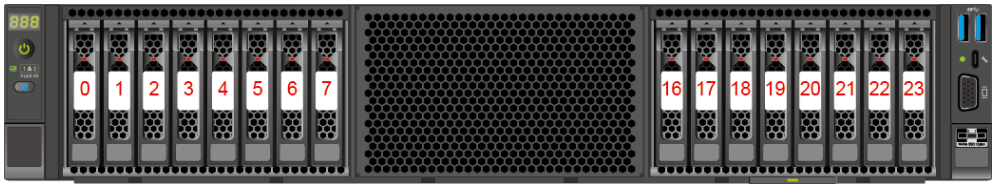


Table 5-26 Drive number

Drive Number	Drive Number Displayed on the iBMC WebUI
0	0
1	1

Drive Number	Drive Number Displayed on the iBMC WebUI
2	2
3	3
4	4
5	5
6	6
7	7
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23

- Drive number of the 16 x 2.5" 8 x SAS/SATA/NVMe +8 x NVMe drive pass-through configuration in the **Table 5-24**

Figure 5-38 Drive number

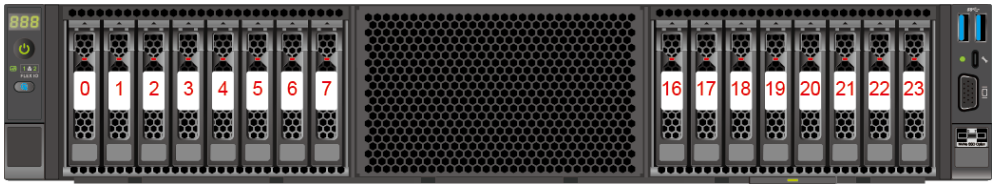


Table 5-27 Drive number

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
0	0	0Note
1	1	1Note
2	2	2Note
3	3	3Note

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
4	4	4Note
5	5	5Note
6	6	6Note
7	7	7Note
16	16	-
17	17	-
18	18	-
19	19	-
20	20	-
21	21	-
22	22	-
23	23	-
Note: If the slot is configured with an SAS/SATA drive, the RAID controller card can manage the drive and allocate a number to the drive.		

5.5.1.2.4 24 x 2.5" Pass-Through Configurations

Table 5-28 Drive configurations

Configuration	Front Drive	Rear Drive	Drive Management Mode
24 x 2.5" (8 x SAS/SATA + 16 x NVMe) drive pass-through	● Front drives (24 x 2.5"): – Slots 4 to 7 and slots 16 to 23 support only NVMe drives. – Slots 8 to 15 support only SAS/SATA drives.	-	● SAS/SATA drives: PCIe plug-in RAID controller card[a]/ RAID controller cable card[b] ● NVMe drives: – NVMe drives in slots 0 to 7: CPU 2 pass-through – NVMe drives in slots 16 to 23: CPU 1 pass-through
24 x 2.5" (16 x SAS/SATA + 8 x NVMe) drive pass-through configuration (dedicated for dual CPUs)	● Front drives (24 x 2.5"): – Slots 4 to 7 and slots 16 to 23 support only SAS/SATA drives. – Slots 8 to 15 support only NVMe drives.	-	● SAS/SATA drives: PCIe plug-in RAID controller card[a]/ RAID controller cable card[b] ● NVMe drives: – NVMe drives in slots 8 to 11: CPU 2 pass-through – NVMe drives in slots 12 to 15: CPU 1 pass-through

Configuration	Front Drive	Rear Drive	Drive Management Mode
24 x 2.5" (16 x SAS/SATA + 8 x NVMe) drive pass-through configuration (dedicated for a single CPU)	● Front drives (24 x 2.5"): – Slots 0 to 7 and slots 16 to 23 support only SAS/SATA drives. – Slots 8 to 15 support only NVMe drives.	-	● SAS/SATA drives: PCIe plug-in RAID controller card[a]/ RAID controller cable card[b] ● NVMe drives: CPU1 pass-through
24 x 2.5" NVMe drive pass-through configuration	● Front drives (24 x 2.5"): – Slots 0 to 23 support only NVMe drives.	● I/O module 3 (4 x 2.5"): – Slots 44 to 47 support only SAS/ SATA drives.	NVMe drives: ● NVMe drives in slots 0 to 11: CPU 2 pass-through ● NVMe drives in slots 12 to 23: CPU 1 pass-through ● SAS/SATA drives: PCIe plug-in RAID controller card[a]/ RAID controller cable card[b]
24 x 2.5" (8 x SAS/ SATA/NVMe + 16 x NVMe) drive pass-through	● Front drives (24 x 2.5"): – Slots 0 to 7 support only 8 x SAS/ SATA/NVMe drives. – Slots 8 to 23 support only NVMe drives.	-	● SAS/SATA drives: PCIe plug-in RAID controller card[a]/ RAID controller cable card[b] ● NVMe drive: CPU 2 pass-through
● a: The PCIe plug-in RAID controller card is installed in slot 3. ● b: The RAID control cable card is installed in slot 1. ● For details about the optional components, consult the local sales representative.			

Drive number

NOTICE

The drive numbers identified by the RAID controller card vary depending on the cabling of the RAID controller card. This section uses the drive numbers identified by a RAID controller card that adopts the default cabling described in "Internal Cabling" in the server *Maintenance and Service Guide*.

- Drive number of the "24 x 2.5" (8 x SAS/SATA + 16 x NVMe) drive pass-through configuration" in the **Table 5-28**

Figure 5-39 Drive number

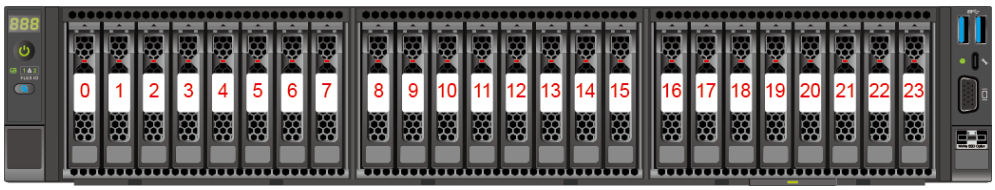


Table 5-29 Drive number

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
0	0	-
1	1	-
2	2	-
3	3	-
4	4	-
5	5	-
6	6	-
7	7	-
8	8	8
9	9	9
10	10	10
11	11	11
12	12	12
13	13	13
14	14	14

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
15	15	15
16	16	-
17	17	-
18	18	-
19	19	-
20	20	-
21	21	-
22	22	-
23	23	-

- Drive numbers of the 16 x SAS/SATA + 8 x NVMe drive pass-through configuration (dedicated for dual CPUs) and 16 x SAS/SATA + 8 x NVMe drive pass-through configuration (dedicated for a single CPU) in **Table 5-28**

Figure 5-40 Drive number

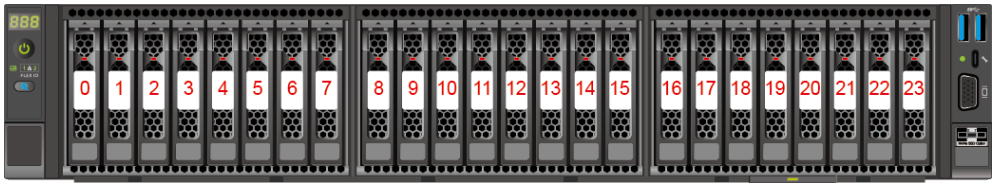


Table 5-30 Drive number

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
8	8	-
9	9	-
10	10	-
11	11	-
12	12	-
13	13	-
14	14	-
15	15	-
16	16	16
17	17	17
18	18	18
19	19	19
20	20	20
21	21	21
22	22	22
23	23	23

- Drive numbers of the "24 x 2.5" NVMe drive pass-through configuration" in **Table 5-28**

Figure 5-41 Drive number

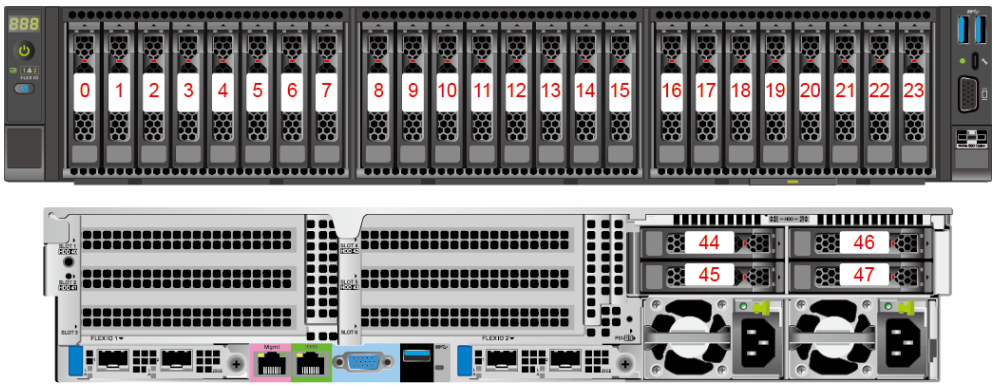


Table 5-31 Drive number

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
0	0	-
1	1	-
2	2	-
3	3	-
4	4	-
5	5	-
6	6	-
7	7	-
8	8	-
9	9	-
10	10	-
11	11	-
12	12	-
13	13	-
14	14	-
15	15	-
16	16	-
17	17	-
18	18	-
19	19	-
20	20	-
21	21	-
22	22	-
23	23	-
44	44	44
45	45	45
46	46	46

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
47	47	47

- Drive number of the "24 x 2.5" (8 x SAS/SATA/NVMe +16 x NVMe) drive pass-through configuration" in the **Table 5-28**

Figure 5-42 Drive number

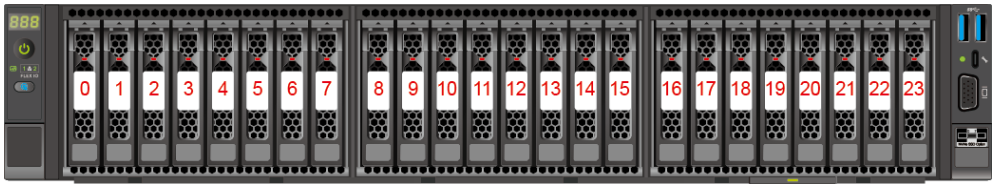


Table 5-32 Drive number

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
0	0	0[Note]
1	1	1[Note]
2	2	2[Note]
3	3	3[Note]
4	4	4[Note]
5	5	5[Note]
6	6	6[Note]
7	7	7[Note]
8	8	-
9	9	-
10	10	-
11	11	-
12	12	-
13	13	-
14	14	-
15	15	-

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
16	16	-
17	17	-
18	18	-
19	19	-
20	20	-
21	21	-
22	22	-
23	23	-
Note: If the slot is configured with an SAS/SATA drive, the RAID controller card can manage the drive and allocate a number to the drive.		

5.5.1.3 NVMe Hard RAID Configurations

5.5.1.3.1 8 x 2.5" Pass-Through Configuration

Drive Configurations

Table 5-33 Drive configurations

Configuration	Front drive	Rear Drive	Drive Management Mode
8 x 2.5" NVMe hardware RAID configuration	● Front drives (8 x 2.5"): – Slots 0 to 7 support only NVMe drives.	-	● NVMe drive: PCIe plug-in RAID controller card[a]
● a: The PCIe plug-in RAID controller card is installed in slot 3. ● For details about the optional components, consult the local sales representative.			

Drive number

NOTICE

The drive numbers identified by the RAID controller card vary depending on the cabling of the RAID controller card. This section uses the drive numbers identified by a RAID controller card that adopts the default cabling described in "Internal Cabling" in the server *Maintenance and Service Guide*.

- Drive number of the 8 x 2.5" NVMe hardware drive configuration in **5.5.1.3.1 8 x 2.5" Pass-Through Configuration**

Figure 5-43 Drive number

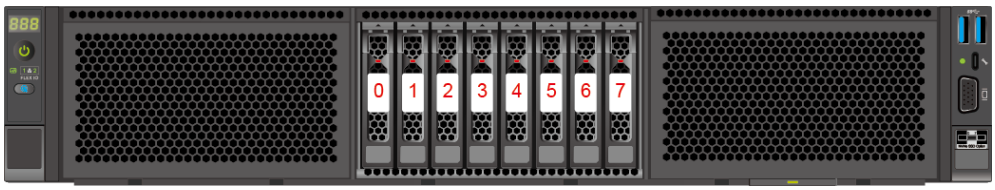


Table 5-34 Drive Numbers

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7

5.5.1.3.2 16 x 2.5" Hardware RAID Configurations

Table 5-35 Drive configurations

Configuration	Front drive	Rear Drive	Drive Management Mode
16 x 2.5" 8 x SAS/SATA + 8 x NVMe drive hardware RAID configuration (dedicated for dual RAID controller cards)	● Front drive (16 x 2.5"): – Slots 0 to 7 support SAS/SATA drives. – Slots 8 to 15 support only NVMe drives.	-	● SAS/SATA drives: PCIe plug-in RAID control card[a]/ RAID cable card[b] ● NVMe drive: PCIe plug-in RAID controller card[c]
16 x 2.5" NVMe drive hardware RAID configuration (dedicated for dual RAID controller cards)	● Front drive (16 x 2.5"): – Slots 0 to 15 support only NVMe drives.	-	● NVMe drives: 2 x RAID PCIe plug-in RAID controller card – 1 x PCIe plug-in RAID controller card manages NVMe drives in slots 0 to 7 The PCIe plug-in RAID controller card is installed in slot 2. – 1 x PCIe plug-in RAID controller card manages NVMe drives in slots 8 to 15. The PCIe plug-in RAID controller card is installed in slot 3.

Configuration	Front drive	Rear Drive	Drive Management Mode
• a: The PCIe plug-in RAID controller card can be installed in slot 2. • d: The RAID controller cable card is installed in slot 1. • b: The PCIe plug-in RAID controller card can be installed in slot 3. • For details about the optional components, consult the local sales representative.			

Drive Numbers

NOTICE

The drive numbers identified by the RAID controller card vary depending on the cabling of the RAID controller card. This section uses the drive numbers identified by a RAID controller card that adopts the default cabling described in "Internal Cabling" in the server *Maintenance and Service Guide*.

- Drive numbers of 16x2.5" (8xSAS/SATA+8xNVMe) drive hardware RAID configuration (dual-RAID controller card) and 16x2.5" NVMe drive hardware RAID configuration (dual-RAID controller card) in **Table 5-35**

Figure 5-44 Drive numbers

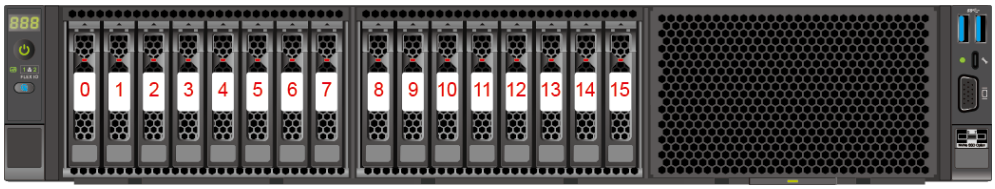


Table 5-36 Drive numbers

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
6	6	6
7	7	7
8	8	0
9	9	1
10	10	2
11	11	3
12	12	4
13	13	5
14	14	6
15	15	7

5.5.1.3.3 24 x 2.5" Hardware RAID Configurations

Table 5-37 Drive configurations

Configuration	Front drive	Rear Drive	Drive Management Mode
24 x 2.5" NVMe drive hardware RAID configuration (dedicated for 3 x RAID controller cards)	● Front drives (24 x 2.5"): – Slots 0 to 23 support only NVMe drives.	-	● NVMe drive: 3 x PCIe plug-in RAID controller cards – 1 x PCIe plug-in RAID controller card manages NVMe drives in slots 0 to 7. The PCIe plug-in RAID controller card is installed in slot 2. – 1 x PCIe plug-in RAID controller card manages NVMe drives in slots 8 to 15. The PCIe plug-in RAID controller card is installed in slot 3. – 1 x PCIe RAID controller card manages drives in slots 16 to 23. The PCIe plug-in RAID controller

Configuration	Front drive	Rear Drive	Drive Management Mode
			card is installed in slot 6.
For details about the optional components, consult the local sales representative.			

Drive Numbers

NOTICE

The drive numbers identified by the RAID controller card vary depending on the cabling of the RAID controller card. This section uses the drive numbers identified by a RAID controller card that adopts the default cabling described in "Internal Cabling" in the server *Maintenance and Service Guide*.

- Drive numbers of 24 x 2.5" NVMe drive hardware RAID configuration (3 x RAID controller cards) in **Table 5-37**

Figure 5-45 Drive numbers

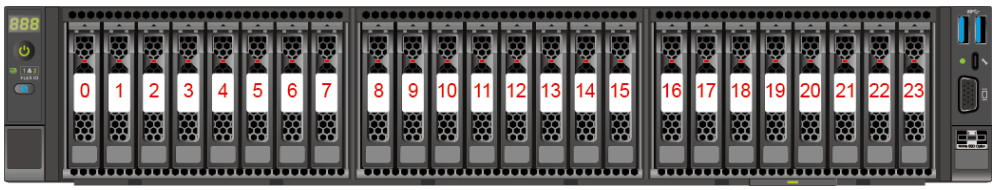


Table 5-38 Drive numbers

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7

Drive Number	Drive Number Displayed on the iBMC WebUI	Drive Number Identified by the RAID Controller Card
8	8	0
9	9	1
10	10	2
11	11	3
12	12	4
13	13	5
14	14	6
15	15	7
16	16	0
17	17	1
18	18	2
19	19	3
20	20	4
21	21	5
22	22	6
23	23	7

5.5.2 Drive Indicators

SAS/SATA Drive Indicators

Figure 5-46 SAS/SATA drive indicators

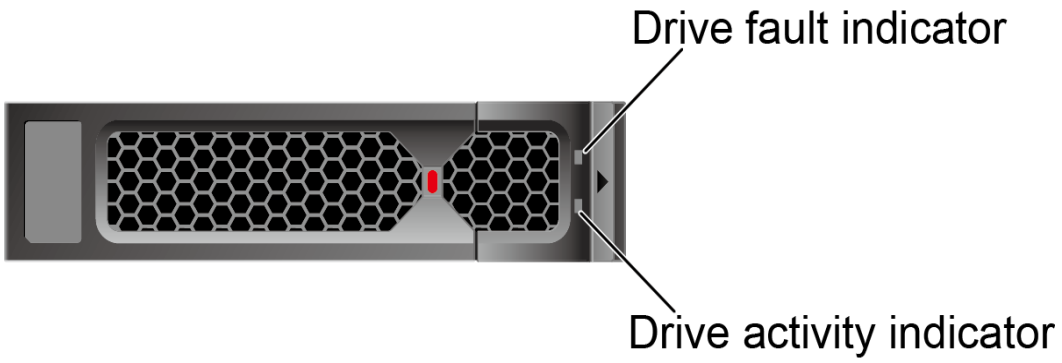
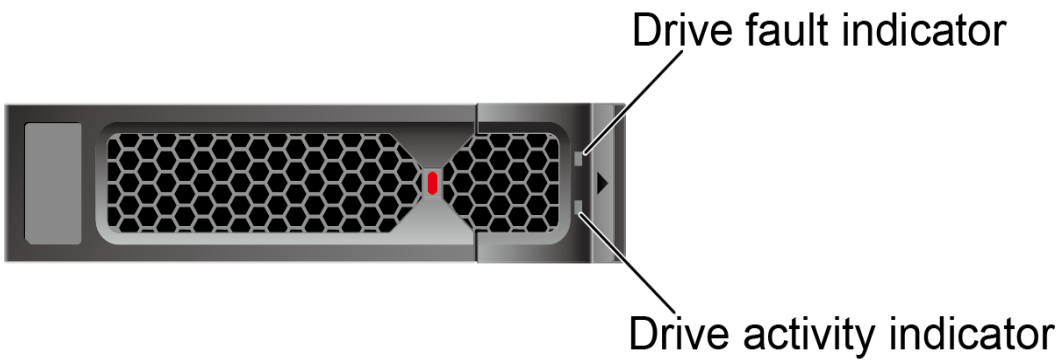


Table 5-39 SAS/SATA drive indicators

Activity Indicator (Green)	Fault Indicator (Red/Blue)	Description
Off	Off	The drive is not detected.
Steady on	Off	The drive is detected.
Blinking at 4 Hz	Off	Data is being read or written properly, or data on the primary drive is being rebuilt.
Steady on	Blinking blue at 4 Hz	The drive is being located.
Blinking at 1 Hz	Blinking red at 1 Hz synchronously	Data on the secondary drive is being rebuilt.
Off	Red steady on	A member drive in the RAID array is removed.
Steady on	Red steady on	The drive is faulty.

NVMe Drive Indicators

Figure 5-47 NVMe drive indicators



- If the VMD function is enabled and the latest VMD driver is installed, the NVMe drives support surprise hot swap.

Table 5-40 NVMe drive indicator description (VMD function enabled)

Activity Indicator (Green)	Fault Indicator (Red/Blue)	Description
Off	Off	The NVMe drive is not detected.
Steady on	Off	The NVMe drive is detected and operating properly.

Activity Indicator (Green)	Fault Indicator (Red/Blue)	Description
Blinking at 4 Hz	Off	Data is being read from or written to the NVMe drive.
Steady on/ blinking	Blinking blue at 4 Hz	The NVMe drive is being located.
Blinking at 1 Hz	Blinking red at 1 Hz synchronously	Data on the NVMe secondary drive is being rebuilt.
Steady on/off	Red steady on	The NVMe drive is faulty.

- If the VMD function is disabled, the NVMe drives support only orderly hot swap.

Table 5-41 NVMe drive indicator description (VMD function disabled)

Activity Indicator (Green)	Fault Indicator (Red/Blue)	Description
Off	Off	The NVMe drive is not detected.
Steady on	Off	The NVMe drive is detected and operating properly.
Blinking at 4 Hz	Off	Data is being read from or written to the NVMe drive.
Steady on/ blinking	Blinking blue at 4 Hz	The NVMe drive is being located.
Off	Blinking red at 0.5 Hz	The NVMe drive has completed the hot swap process and is removable.
Off	Blinking red at 2 Hz	The NVMe drive is being hot-swapped.
Steady on/off	Red steady on	The NVMe drive is faulty.

5.5.3 RAID Controller Card

The RAID controller card supports RAID configuration, RAID level migration, and drive roaming.

- For details about the optional components, consult your local sales representative or see "Search Parts" in the compatibility list on the technical support website.
- For details about the RAID controller card, see the server *RAID Controller Card User Guide*.

5.6 Network

5.6.1 OCP 3.0 NICs

The OCP 3.0 NICs provide network expansion capabilities.

- The FlexIO slot supports an OCP 3.0 network adapter, which can be configured as required.
- For details about the optional components, consult your local sales representative or see "Search Parts" in the compatibility list on the technical support website.
- For details about the OCP 3.0 NICs, see the *OCP 3.0 NIC User Guide*.

5.7 I/O Expansion

5.7.1 PCIe Card

PCIe cards are used to provide ease of expandability and connection.

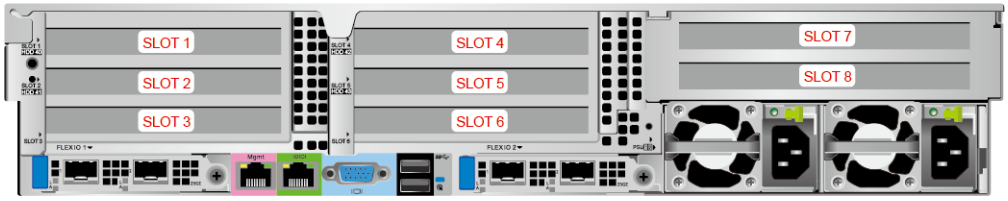
- When equipped with a PCIe riser module at the rear panel, the server supports a maximum of eight PCIe expansion slots.
- For details about the optional components, consult your local sales representative or see "Search Parts" in the compatibility list on the technical support website.
- When IB cards are used to build an IB network, ensure that the IPoIB modes of the IB cards at both ends of the network connection are the same. For details, contact technical support.

5.7.2 PCIe Slots

Positions of PCIe Slots

- Server with drive modules or PCIe riser modules on the rear panel

  Figure 5-48 PCIe slots

  – I/O module 1 provides slots 1, 2, and 3.
  – I/O module 2 provides slots 4, 5, and 6.
  – I/O module 3 provides slots 7 and 8.

5.7.2.1 Rear PCIe Riser Module

5.7.2.1.1 General-Purpose GPU Riser Module

PCIe Riser Cards (Applicable to the Server with a Drive Module or a PCIe Riser Module on the Rear Panel)

- PCIe Riser card 1 of I/O module 1/2 (BC16M01PRUK)

Figure 5-49 PCIe Riser card 1 (BC16M01PRUK)

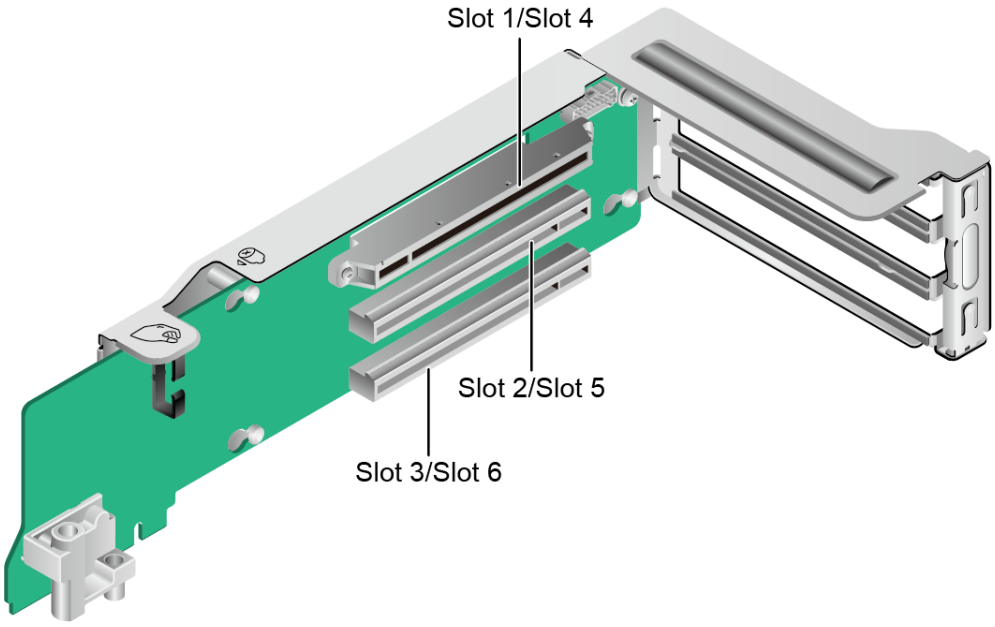


Table 5-42 PCIe Slot Description

PCIe Riser Card	PCIe Riser Card Installation Position	PCIe Slot on the PCIe Riser Card	PCIe Slot and Port Description	Standby CPU	PCIe Port Number	PCIe Devices Supported by the PCIe Slot or Port
BC16M01PRUK	I/O module 1	Slot1	PCIe 5.0 x16[a] (x16)[b]	CPU1	Port3A	FHHL
		Slot2	PCIe 5.0 x16 (x8)	CPU1	Port0A	FHHL
		Slot3	PCIe 5.0 x16 (x8)	CPU1	Port0E	FHHL

PCIe Riser Card	PCIe Riser Card Installation Position	PCIe Slot on the PCIe Riser Card	PCIe Slot and Port Description	Standby CPU	PCIe Port Number	PCIe Devices Supported by the PCIe Slot or Port
	I/O module 2	Slot4	PCIe 5.0 x16 (x16)	CPU2	Port0A	FHHL
		Slot5	PCIe 5.0 x16 (x8)	CPU2	Port2A	FHHL
		Slot6	PCIe 5.0 x16 (x8)	CPU2	Port2E	FHHL
• a: PCIe 5.0 refers to the PCIe of the fifth generation, and x16 refers to the physical slot width. • b: x16 in parentheses indicates that the signal link bandwidth is x16.						

- PCIe Riser card 2 of I/O module 1/2 (BC16M01PRUN)

Figure 5-50 PCIe Riser card 2 (BC16M01PRUN)

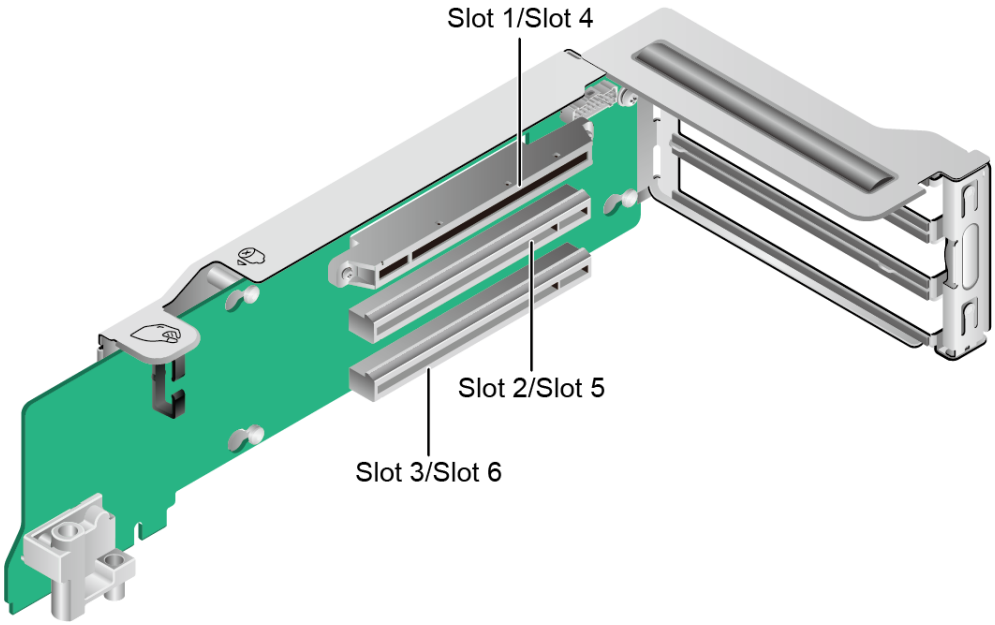


Table 5-43 PCIe Slot Description

PCIe Riser Card	PCIe Riser Card Installation Position	PCIe Slot on the PCIe Riser Card	PCIe Slot and Port Description	Standby CPU	PCIe Port Number	PCIe Devices Supported by the PCIe Slot or Port
BC16M01PRUN	I/O module 1	Slot1	PCIe 5.0 x16[a] (x16)[b]	CPU1	Port3A	FHHL
		Slot2	PCIe 4.0 x16 (x8)	CPU1	Port0A	FHHL
		Slot3	PCIe 4.0 x16 (x8)	CPU1	Port0E	FHHL
	I/O module 2	Slot4	PCIe 5.0 x16 (x16)	CPU2	Port0A	FHHL
		Slot5	PCIe 4.0 x16 (x8)	CPU2	Port2A	FHHL
		Slot6	PCIe 4.0 x16 (x8)	CPU2	Port2E	FHHL

- a: PCIe 5.0 refers to the PCIe of the fifth generation, and x16 refers to the physical slot width.
- b: x16 in parentheses indicates that the signal link bandwidth is x16.

- PCIe Riser card 3 of I/O module 1/2 (BC16M01PRUL)

Figure 5-51 PCIe Riser card 3 (BC16M01PRUL)

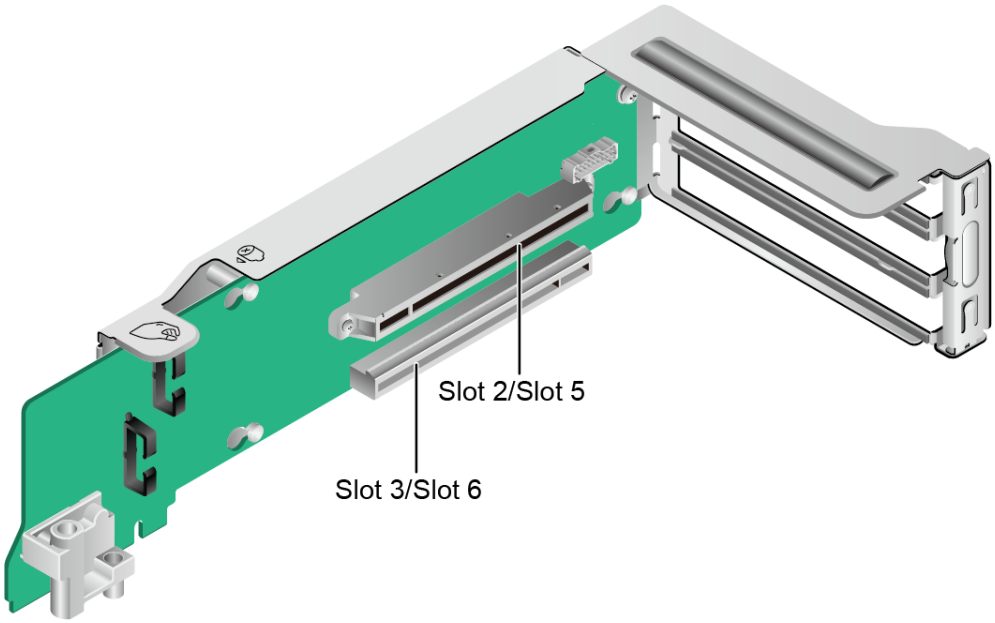


Table 5-44 PCIe Slot Description

PCIe Riser Card	PCIe Riser Card Installation Position	PCIe Slot on the PCIe Riser Card	PCIe Slot and Port Description	Standby CPU	PCIe Port Number	PCIe Devices Supported by the PCIe Slot or Port
BC16M01PRUL	I/O module 1	Slot2	PCIe 5.0 x16[a] (x16)[b]	CPU1	Port3A	FHHL
		Slot3	PCIe 5.0 x16 (x16)	CPU1	Port0A	FHHL
	I/O module 2	Slot5	PCIe 5.0 x16 (x16)	CPU2	Port0A	FHHL
		Slot6	PCIe 5.0 x16 (x16)	CPU2	Port2A	FHHL

- a: PCIe 5.0 refers to the PCIe of the fifth generation, and x16 refers to the physical slot width.
- b: x16 in parentheses indicates that the signal link bandwidth is x16.

- PCIe Riser card 4 of I/O module 1/2 (BC16M01PRUKA)

Figure 5-52 PCIe Riser card 4 (BC16M01PRUKA)

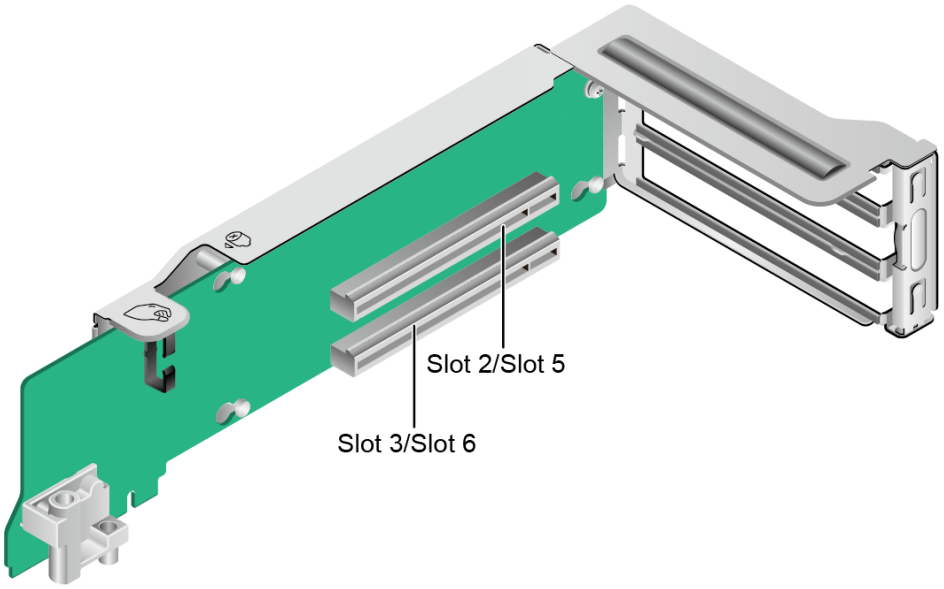


Table 5-45 PCIe Slot Description

PCIe Riser Card	PCIe Riser Card Installation Position	PCIe Slot on the PCIe Riser Card	PCIe Slot and Port Description	Standby CPU	PCIe Port Number	PCIe Devices Supported by the PCIe Slot or Port
BC16M01PRUKA	I/O module 1	Slot2	PCIe 5.0 x16[a] (x8) [b]	CPU1	Port0A	FHHL
		Slot3	PCIe 5.0 x16 (x8)	CPU1	Port0E	FHHL
	I/O module 2	Slot5	PCIe 5.0 x16 (x8)	CPU2	Port2A	FHHL
		Slot6	PCIe 5.0 x16 (x8)	CPU2	Port2E	FHHL

- a: PCIe 5.0 refers to the PCIe of the fifth generation, and x16 refers to the physical slot width.
- b: x8 in parentheses indicates that the signal link bandwidth is x8.

- PCIe Riser card 5 of I/O module 1/2 (BC16PRUD)

Figure 5-53 PCIe Riser card 5 of I/O module 1/2 (BC16PRUD)

NOTE

The cables configured for I/O module 1 and I/O module 2 are different. For details, see "Internal Cabling" in the server maintenance and service guide.

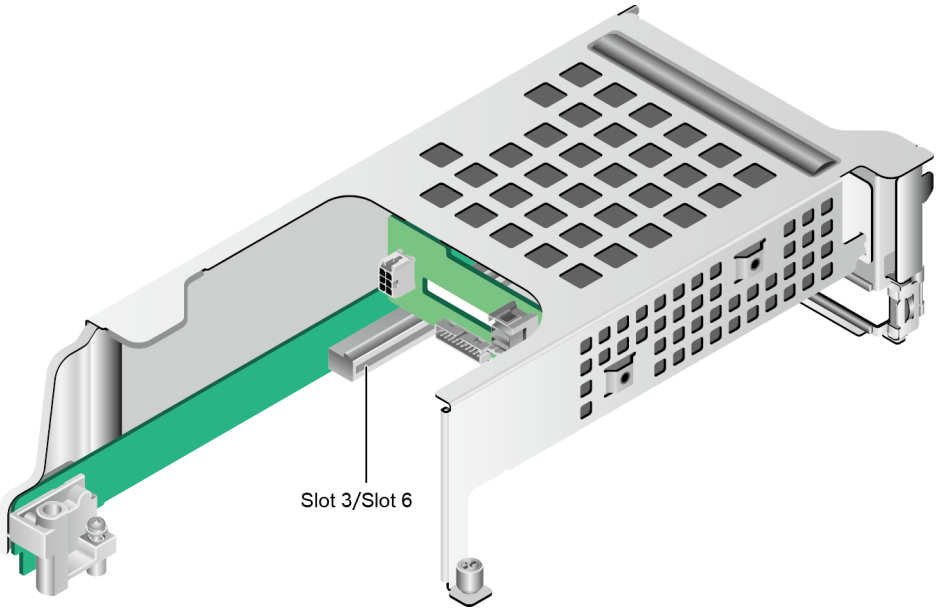


Table 5-46 PCIe Slot Description

PCIe Riser Card	PCIe Riser Card Installation Position	PCIe Slot on the PCIe Riser Card	PCIe Slot and Port Description	Standby CPU	PCIe Port Number	PCIe Devices Supported by the PCIe Slot or Port
BC16PRUD	I/O module 1	Slot3	PCIe 5.0 x16[a] (x16)[b]	CPU1	Port0A	FHHL
	I/O module 2	Slot6	PCIe 5.0 x16 (x16)	CPU2	Port2A	FHHL
• a: PCIe 5.0 refers to the PCIe of the fifth generation, and x16 refers to the physical slot width. • b: x16 in parentheses indicates that the signal link bandwidth is x16.						

- PCIe Riser card 1 of I/O module 3 (BC16M01PRUE)

Figure 5-54 PCIe Riser card 1 of I/O module 3 (BC16M01PRUE)

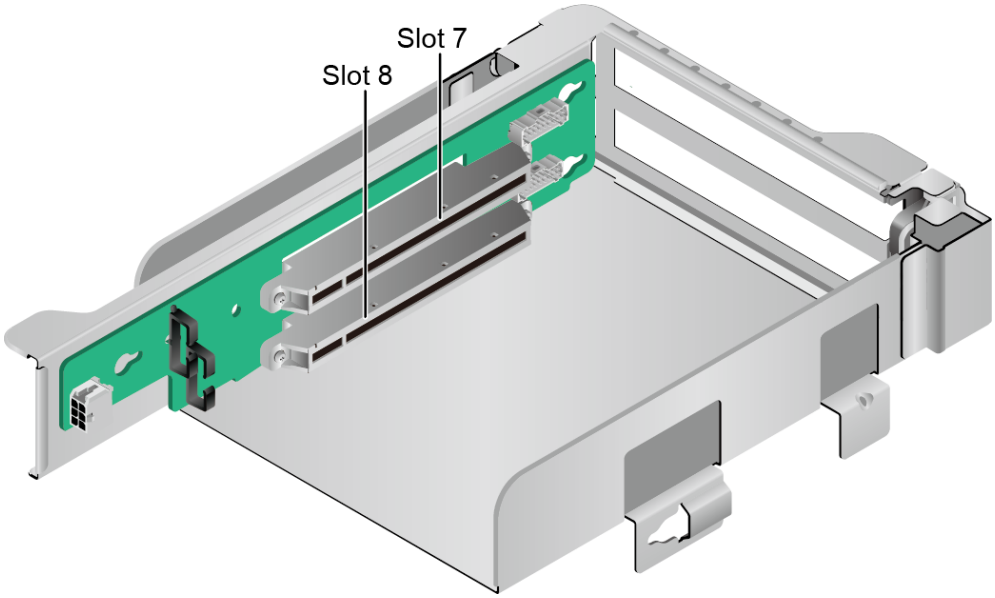


Table 5-47 PCIe Slot Description

PCIe Riser Card	PCIe Riser Card Installation Position	PCIe Slot on the PCIe Riser Card	PCIe Slot and Port Description	Standby CPU	PCIe Port Number	PCIe Devices Supported by the PCIe Slot or Port
BC16M01PRUE	I/O module 3	Slot7	PCIe 5.0 x16[a] (x8) [b]	CPU2	Port3E	FHHL
		Slot8	PCIe 5.0 x16 (x8)	CPU2	Port3A	FHHL
• a: PCIe 5.0 refers to the PCIe of the fifth generation, and x16 refers to the physical slot width. • b: x8 in parentheses indicates that the signal link bandwidth is x8.						

- PCIe Riser card 2 of I/O module 3 (BC16M01PRUEA)

Figure 5-55 PCIe Riser card 2 of I/O module 3 (BC16M01PRUEA)

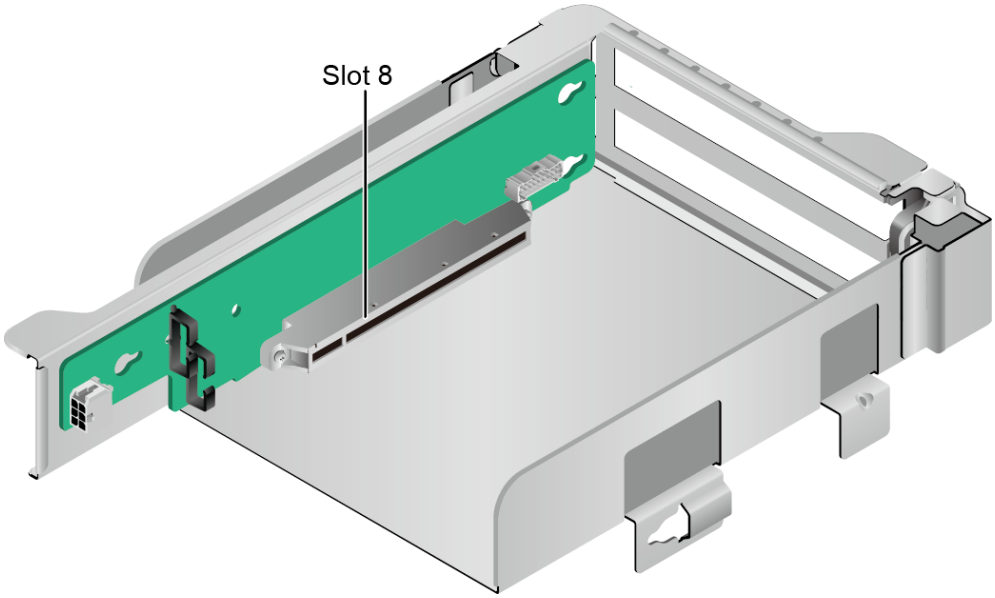


Table 5-48 PCIe Slot Description

PCIe Riser Card	PCIe Riser Card Installation Position	PCIe Slot on the PCIe Riser Card	PCIe Slot and Port Description	Standby CPU	PCIe Port Number	PCIe Devices Supported by the PCIe Slot or Port
BC16M01PRUEA	I/O module 3	Slot8	PCIe 5.0 x16[a] (x16)[b]	CPU2	Port3A	FHHL

- a: PCIe 5.0 refers to the PCIe of the fifth generation, and x16 refers to the physical slot width.
- b: x16 in parentheses indicates that the signal link bandwidth is x16.

5.7.2.1.2 Dedicated PCIe Riser Module

PCIe Riser Cards (Applicable to the Server with a Drive Module or a PCIe Riser Module on the Rear Panel)

- PCIe Riser card 1 of I/O module 1/2 (BC16M02PRUL-supporting the cable card)
  The RAID controller cable card is fixed on the support and installed in slot 1.

Figure 5-56 PCIe riser card 1 (BC16M02PRUL-supporting the cable card)

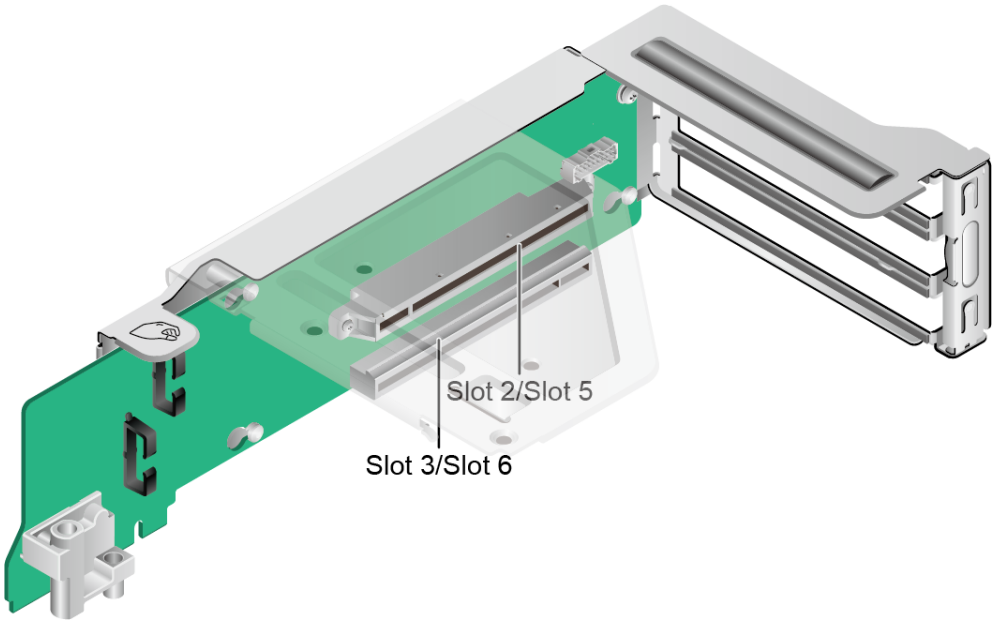


Table 5-49 PCIe Slot Description

PCIe Riser Card	PCIe Riser Card Installation Position	PCIe Slot on the PCIe Riser Card	PCIe Slot and Port Description	Standby CPU	PCIe Port Number	PCIe Devices Supported by the PCIe Slot or Port
BC16M02PRUL-Supports cable cards	I/O module 1	Slot2	PCIe 5.0 x16[a] (x16)[b]	CPU1	Port3A	FHHL
		Slot3	PCIe 5.0 x16 (x16)	CPU1	Port0A	FHHL
	I/O module 2	Slot5	PCIe 5.0 x16 (x16)	CPU2	Port0A	FHHL
		Slot6	PCIe 5.0 x16 (x16)	CPU2	Port2A	FHHL

- a: PCIe 5.0 refers to the PCIe of the fifth generation, and x16 refers to the physical slot width.
- b: x16 in parentheses indicates that the signal link bandwidth is x16.

- PCIe Riser card 2 of I/O module 1/2 (BC16M03PRUL-supporting the full-length and dual-width GPU)

Figure 5-57 PCIe riser card 1 (BC16M03PRUL-supporting the full-length and dual-width GPU)

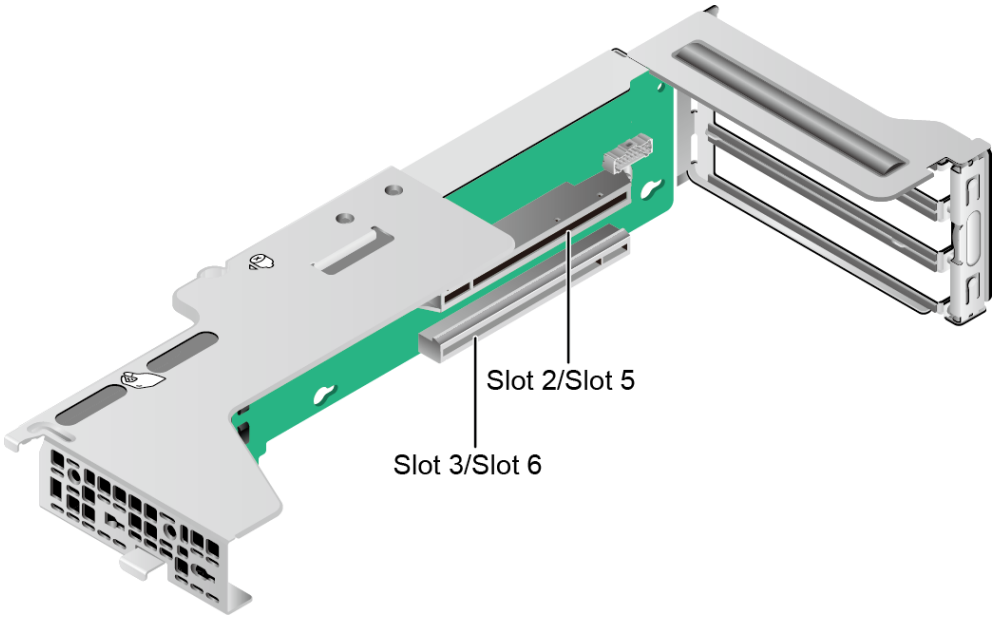


Table 5-50 PCIe Slot Description

PCIe Riser Card	PCIe Riser Card Installation Position	PCIe Slot on the PCIe Riser Card	PCIe Slot and Port Description	Standby CPU	PCIe Port Number	PCIe Devices Supported by the PCIe Slot or Port
BC16M03PRUL-Supports full-length dual-width GPU	I/O module 1	Slot2	PCIe 5.0 x16[a] (x16)[b]	CPU1	Port3A	FHFL dual-width
		Slot3	PCIe 5.0 x16 (x16)	CPU1	Port0A	FHHL
	I/O module 2	Slot5	PCIe 5.0 x16 (x16)	CPU2	Port0A	FHFL dual-width
		Slot6	PCIe 5.0 x16 (x16)	CPU2	Port2A	FHHL

- a: PCIe 5.0 refers to the PCIe of the fifth generation, and x16 refers to the physical slot width.
- b: x16 in parentheses indicates that the signal link bandwidth is x16.

- PCIe Riser card 3 of I/O module 1/2 (BC16M02PRUKA-supporting the cable card)

  The RAID controller cable card is fixed on the support and installed in slot 1.

Figure 5-58 PCIe riser card 41 (BC16M02PRUKA-supporting the cable card)

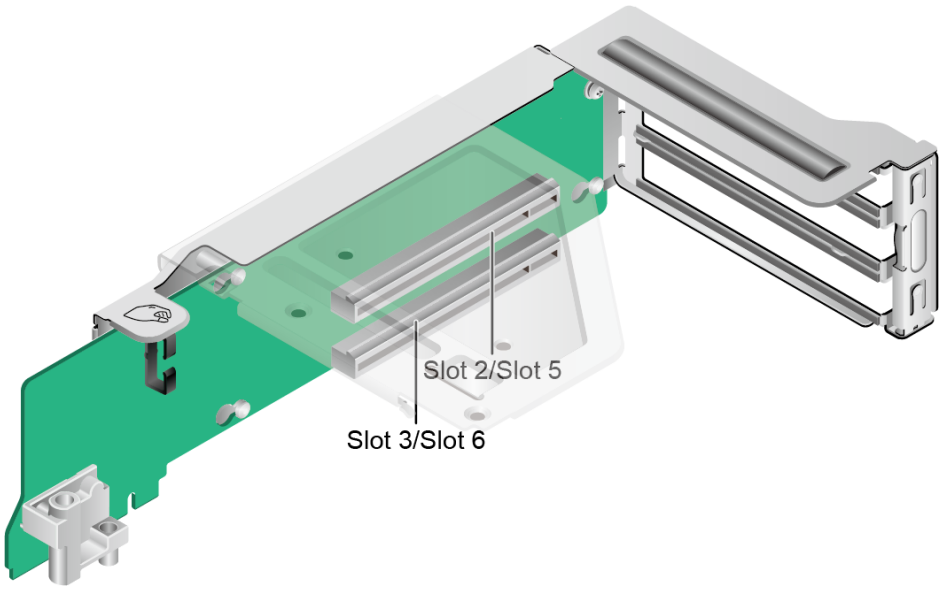


Table 5-51 PCIe Slot Description

PCIe Riser Card	PCIe Riser Card Installation Position	PCIe Slot on the PCIe Riser Card	PCIe Slot and Port Description	Standby CPU	PCIe Port Number	PCIe Devices Supported by the PCIe Slot or Port
BC16M02PRUKA - Supports cable cards	I/O module 1	Slot2	PCIe 5.0 x16[a] (x8) [b]	CPU1	Port0A	FHHL
		Slot3	PCIe 5.0 x16 (x8)	CPU1	Port0E	FHHL
	I/O module 2	Slot5	PCIe 5.0 x16 (x8)	CPU2	Port2A	FHHL
		Slot6	PCIe 5.0 x16 (x8)	CPU2	Port2E	FHHL

- a: PCIe 5.0 refers to the PCIe of the fifth generation, and x16 refers to the physical slot width.
- b: x16 in parentheses indicates that the signal link bandwidth is x16.

5.7.3 PCIe Slot Description

NOTE

The PCIe port numbers in table 1 correspond to CPUs. For details about the PCIe port number displayed on the BIOS screen, see the BIOS parameter reference of the server.

5.7.3.1 Rear PCIe Riser Module

Table 5-52 PCIe Slot Description (maximum configuration example)

PCIe Riser Card	PCIe Riser Card Installation Position	PCIe Slot on the PCIe Riser Card	PCIe Slot and Port Description	Standby CPU	PCIe Port Number	PCIe Devices Supported by the PCIe Slot or Port
BC16M01PRUK	I/O module 1	Slot1	PCIe 5.0 x16[a] (x16)[b]	CPU1	Port3A	FHHL
		Slot2	PCIe 5.0 x16 (x8)	CPU1	Port0A	FHHL
		Slot3	PCIe 5.0 x16 (x8)	CPU1	Port0E	FHHL
	I/O module 2	Slot4	PCIe 5.0 x16 (x16)	CPU2	Port0A	FHHL
		Slot5	PCIe 5.0 x16 (x8)	CPU2	Port2A	FHHL
		Slot6	PCIe 5.0 x16 (x8)	CPU2	Port2E	FHHL
BC16M01PRUE	I/O module 3	Slot7	PCIe 5.0 x16 (x8)	CPU2	Port3E	FHHL
		Slot8	PCIe 5.0 x16 (x8)	CPU2	Port3A	FHHL
-	-	FLEX IO card 1[c]	PCIe 5.0 x16 (x8)	CPU1	Port2A	OCP 3.0 specifications
			PCIe 5.0 x16 (x16)	CPU1	Port2A	OCP 3.0 specifications
			PCIe 5.0 x16 (x8+x8)	CPU1	Port2A	OCP 3.0 specifications
				CPU2	Port1E	
-	-	FLEX IO card 2[d]	PCIe5.0 x16	-	-	-
-	-		PCIe 5.0 x16 (x8)	CPU2	Port1E	OCP 3.0 specifications

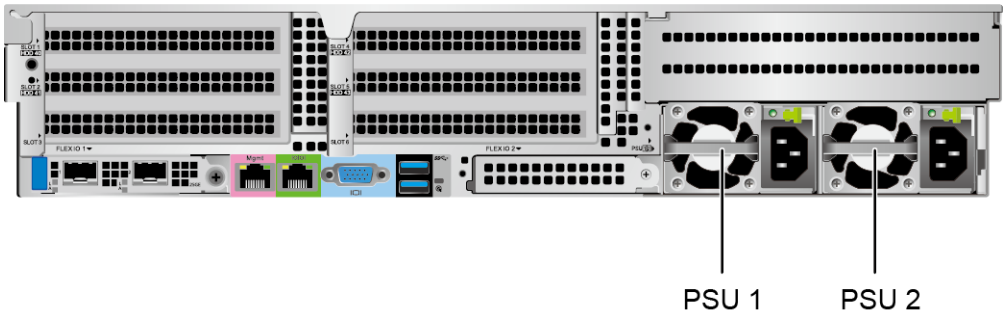
PCIe Riser Card	PCIe Riser Card Installation Position	PCIe Slot on the PCIe Riser Card	PCIe Slot and Port Description	Standby CPU	PCIe Port Number	PCIe Devices Supported by the PCIe Slot or Port
-	Air duct/ built-in support/ rear IO module 1	RAID controller cable card	x8e (PCIe5 x8[e])	CPU1	Port2E	-

- a: PCIe 5.0 refers to the PCIe of the fifth generation, and x16 refers to the physical slot width.
- b: x16 in parentheses indicates that the signal link bandwidth is x16.
- c: FLEX I/O card slot 1, with a default running bandwidth of x8, which can be extended to x16 or x8+x8 using cables.
- c: The OCP 3.0 network adapter is not supported by default. Dedicated cabling is required for expansion to x8 to enable OCP 3.0 NIC.
- e: When the link bandwidth of FlexIO card 1 is x16, the RAID controller cable card is not available.

5.8 PSUs

- Supports two PSUs.
- Supports AC or DC PSUs.
- The server supports hot swap.
- When two PSUs are configured, 1+1 redundancy is supported.
- PSUs of the same P/N code must be used in a server.
- Short-circuit protection is provided, and bipolar fuses are provided for PSUs that support dual live wire input.
- The rated power of the power supply unit is related to the input voltage. Please refer to the technical manual of the relevant power supply for the detailed relation between voltage and power.
- If the DC power supply is used, purchase the DC power supply that meets the requirements of the safety standards or the DC power supply that has passed the CCC certification.
- For details about the optional components, consult the local sales representative.

Figure 5-59 Position of the PSU



5.9 Fan Modules

Supports four 8038+ fan modules.

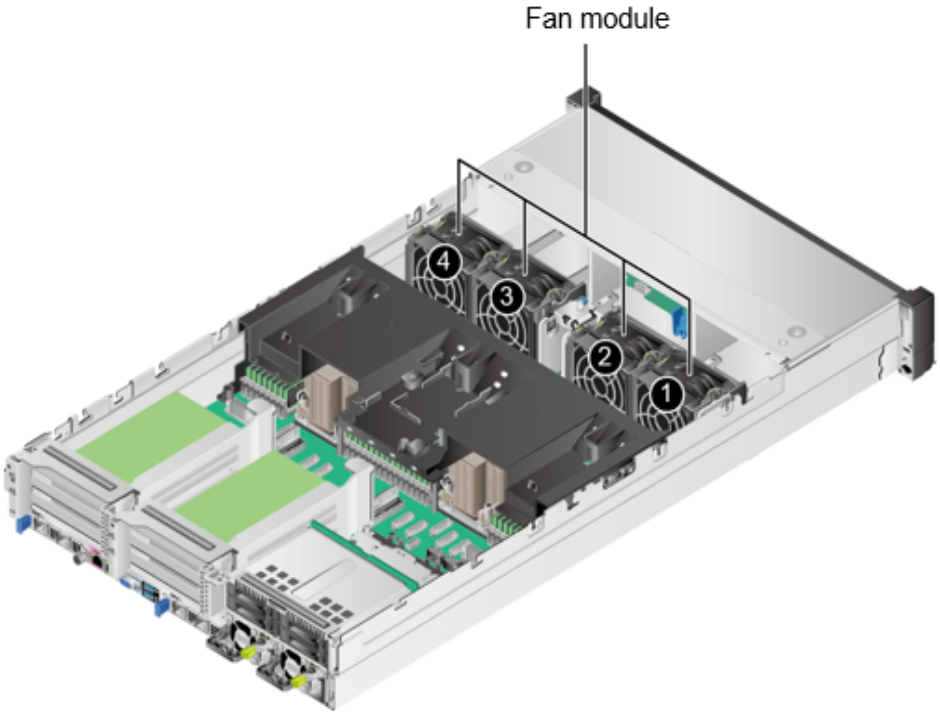
- Supports four or six fan modules.
  - The server supports four 8038+ or 8056+ fan modules.
  - The server supports six 6056 fan modules.

Table 5-53 Fan configuration rules

Fan model	Application Scenario
8056+/8038+	Select a value based on the actual configuration.
6056+	• Rear 4GPU server configuration • Server with 600 W GPU

- Supports hot swap.
- Supports N+1 redundancy. The server runs properly when one fan fails.
- Supports intelligent fan speed adjustment.
- Fan modules of the same part number (P/N code) must be used in a server.

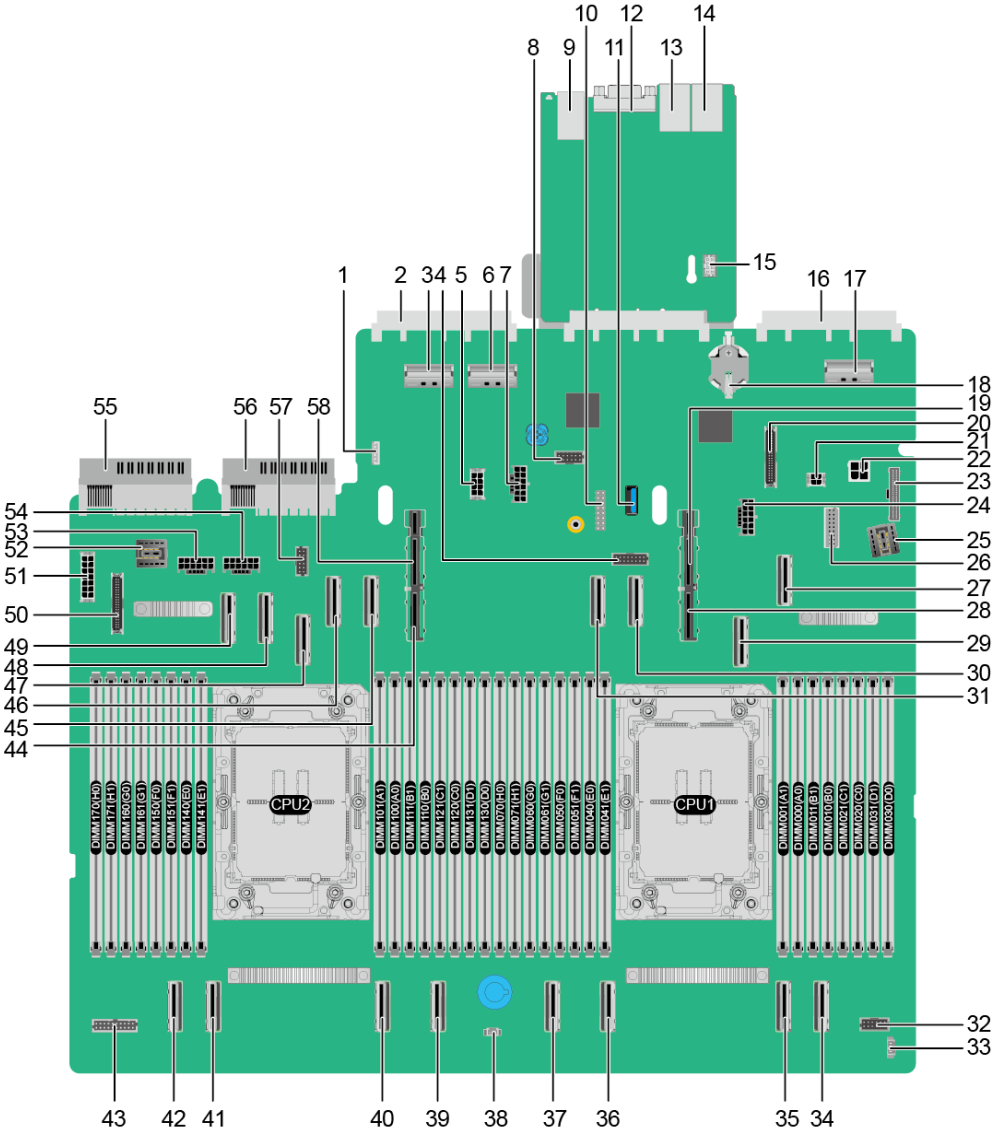
Figure 5-60 The position of the fan module (Example: 8038+ fan module)



5.10 Board

5.10.1 Mainboard

Figure 5-61 Mainboard



1	VROC Key connector (VROC KEY/J6903)	2	OCP 3.0 NIC 2 connector (OCP2 CONN/J6201)
3	High-speed MCIO connector (MCIO OCP2-L/ J6103)	4	Built-in drive backplane low-speed connector (INNER BP/J7001)
5	DPU power connector (DPU CEM/J85)	6	High-speed MCIO connector (MCIO OCP2-H/J6301)
7	GPU power connector for I/O module 2 (IO2 GPU PWR/J81)	8	NC-SI connector (NCSI CONN/ J6902)

9	Two USB 3.0 ports (USB3.0 CONN/J88)	10	TPM/TCM connector (TPM CONN/ J44)
11	Built-in USB 3.0 connector (INNER USB3.0/J6901)	12	Rear VGA port (VGA CONN/J1501)
13	Serial port (COM/J1701)	14	BMC management port (BMC_GE/ J6019)
15	Reserved	16	OCP 3.0 NIC 1 connector (OCP1 CONN/J6001)
17	High-speed MCIO connector (MCIO OCP1-H/ J6101)	18	RTC battery connector (RTC BAT/ U72)
19	CPU 0 MT connector (CPU0 MT MCIO 001/J70)	20	OCP 3.0 NIC 3 low-speed connector (OCP3 CONN/J7402)
21	Front I/O module auxiliary power connector (NIC1 PWR/J9103)	22	OCP 3.0 NIC power connector (OCP PWR/J35)
23	Right mounting ear connector (R_EAR CONN/ J9704)	24	GPU power connector for I/O module 1 (IO1 GPU PWR/J55)
25	Fan board power connector (FAN PWR/J7005)	26	RAID & M.2 mezzanine card signal connector (RAID & M.2/J82)
27	High-speed MCIO connector (MCIO 021/J69)	28	CPU 0 MT connector (CPU0 MT MCIO 000/J70)
29	Reserved	30	High-speed MCIO connector (MCIO 030/J77)
31	High-speed MCIO connector (MCIO 031/J86)	32	Fan board low-speed connector (FAN BOARD/J7006)
33	Central temperature sensor connector (TMP SENSOR/ 9706)	34	High-speed MCIO connector (MCIO 041/J67)
35	High-speed MCIO connector (MCIO 040/J66)	36	High-speed MCIO connector (MCIO 050/J68)
37	High-speed MCIO connector (MCIO 051/J65)	38	Intrusion sensor connector (INTRUDER CONN/S1)
39	High-speed MCIO connector (MCIO 140/J71)	40	High-speed MCIO connector (MCIO 141/J72)
41	High-speed MCIO connector (MCIO 150/J74)	42	High-speed MCIO connector (MCIO 151/J75)

43	Left mounting ear connector (L_EAR BOARD/ J7202)	44	CPU 1 MT connector (CPU1 MT MCIO 120/J78)
45	High-speed MCIO connector (MCIO 100/J79)	46	High-speed MCIO connector (MCIO 101/J87)
47	High-speed MCIO connector (MCIO 110/J73)	48	High-speed MCIO connector (MCIO 130/J50)
49	High-speed MCIO connector (MCIO 131/J56)	50	Front-drive backplane low-speed connector (HDD CONN/J43)
51	Front-drive backplane power connector (BBU PWR/J9701)	52	Front-drive backplane power connector (FRONT HDD PWR/ J9703)
53	Power connector for I/O module 3 (IO3 PWR/J46)[a/b]	54	Built-in backplane power connector (INNER PWR/J9702)[b]
55	PSU 2 connector (PSU2/ J9001)	56	PSU 1 connector (PSU1/J9002)
57	Rear I/O module 3 drive backplane signal connector (PSU HDD BP/J7003)	58	CPU 1 MT connector (CPU1 MT MCIO 121/J78)
• a: The power connector of IO module 3 supports a maximum power supply capacity of 450 W. • b: The total power supply capacity of the power connector of I/O module 3 and the power connector of the built-in backplane supports a maximum of 900 W.			

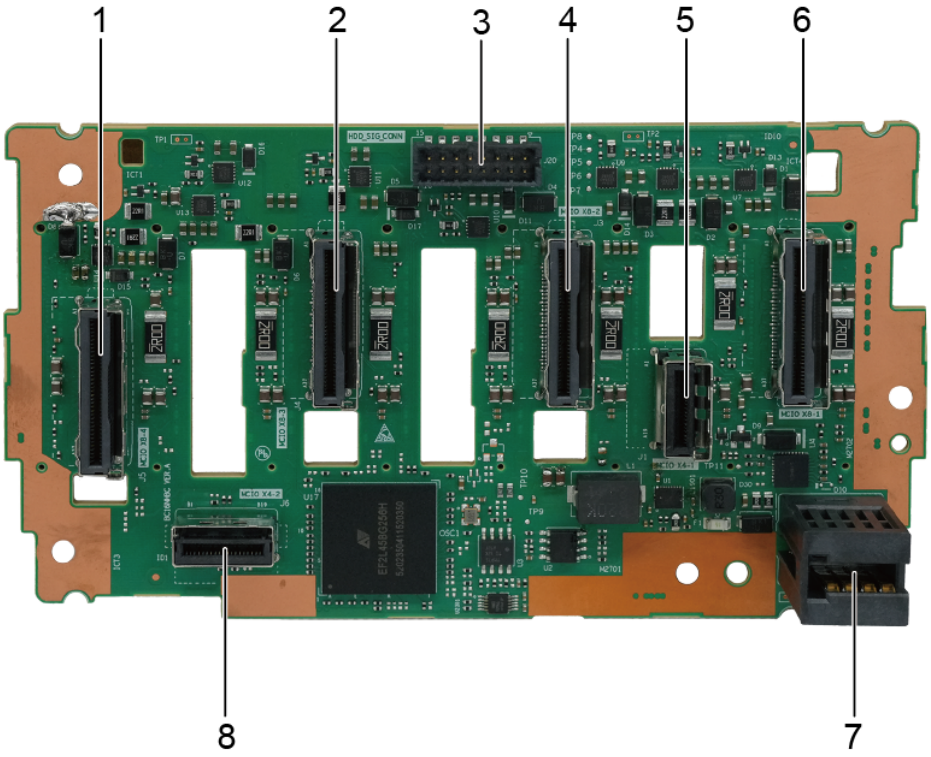
5.10.2 Drive Backplane

Front-Drive Backplane

- 8 x 2.5" SAS/SATA/NVMe 3cage drive backplane
  - This backplane is supported in 8 x 2.5" SAS/SATA/NVMe drive pass-through configuration (dedicated for dual CPUs), 8 x 2.5" SAS/SATA/NVMe drive pass-through configuration (dedicated for a single CPU), and 8 x 2.5" NVMe drive pass-through configuration (dedicated for dual CPUs), and 8 x 2.5" NVMe drive pass-through configuration (dedicated for a single CPU) in the **5.5.1.2.1 8 x 2.5" Pass-Through Configurations** section.
  - This backplane is supported in 16 x 2.5" (8 x SAS/SATA + 8 x NVMe) drive pass-through configuration (dedicated for dual CPU),16 x 2.5" (8 x SAS/ SATA + 8 x NVMe) drive pass-through configuration (for a single CPU), 16 x 2.5" NVMe drive pass-through configuration, and 16x2.5" (8 x SAS/SATA/ NVMe + 8 x NVMe) drive pass-through configuration in the **5.5.1.2.3 16 x 2.5" Pass-Through Configurations** section.
  - This backplane is supported in 24 x 2.5" (8 x SAS/SATA + 16 x NVMe) drive pass-through configuration (dedicated for dual CPU), 24 x 2.5" (8 x SAS/ SATA + 16 x NVMe) drive pass-through configuration (for a single CPU), 24

x 2.5" (16 x SAS/SATA + 8 x NVMe) drive pass-through configuration, 24 x 2.5" NVMe drive pass-through configuration, and 24 x 2.5" (8 x SAS/SATA/NVMe + 16 x NVMe) drive pass-through configuration in the **5.5.1.2.4 24 x 2.5" Pass-Through Configurations** section.

Figure 5-62 8 x 2.5" SAS/SATA/NVMe 3cage drive backplane

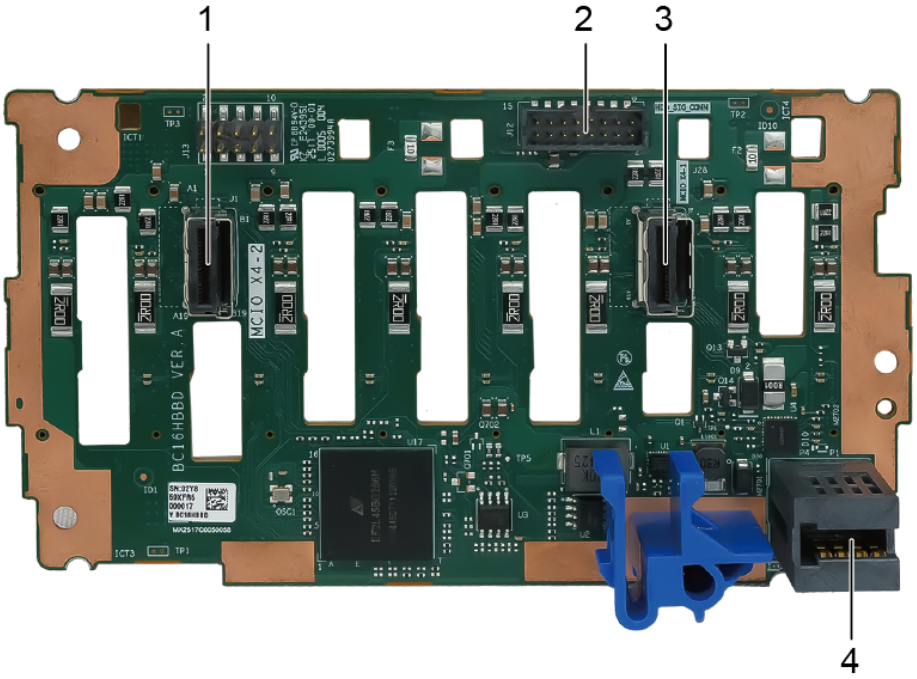


No.	Connector	Managed Drive Slot
1	MCIO x8 connector (MCIO x8_4/J5)	NVMe: Slot 6 and Slot 7
2	MCIO x8 connector (MCIO x8_3/J4)	NVMe: Slot 4 and slot 5
3	Backplane signal cable connector (HDD_SIG_CONN/ J20)	-
4	MCIO x8 connector (MCIO x8_2/J3)	NVMe: Slot 2 and slot 3
5	MCIO x 4 connector (PORT A/J1)	SATA: Slot 0 to slot 3
6	MCIO x8 connector (MCIO x8_1/J2)	NVMe: Slot 0 and slot 1
7	Power connector (HDD_POWER/J21)	-

No.	Connector	Managed Drive Slot
8	MCIO x4 connector (PORT B/J6)	SATA: Slot 4 to slot 7

- 8 x 2.5" SAS/SATA 3cage drive backplane
  - This backplane is supported in the 16 x 2.5" SAS/SATA drive pass-through configuration in the **5.5.1.1.3 16 x 2.5" Pass-Through Configuration** section.
  - This backplane is supported in the 16x2.5" (8 x SAS/SATA + 8 x NVMe) drive pass-through configuration and 16 x 2.5" (8 x SAS/SATA + 8 x NVMe) drive hardware RAID configuration (for dual-RAID controller card) in **5.5.1.2.3 16 x 2.5" Pass-Through Configurations**.
  - This backplane is supported in the 24 x 2.5" (8 x SAS/SATA + 16 x NVMe) drive pass-through configuration and 24 x 2.5" (16 x SAS/SATA + 8 x NVMe) drive pass-through configuration in **5.5.1.2.4 24 x 2.5" Pass-Through Configurations**.
  - This backplane is supported in the 16 x 2.5" (8 x SAS/SATA + 8 x NVMe) drive hardware RAID configuration (dual RAID controller cards) in the **5.5.1.3.2 16 x 2.5" Hardware RAID Configurations** section.

Figure 5-63 8 x 2.5" SAS/SATA 3cage drive backplane

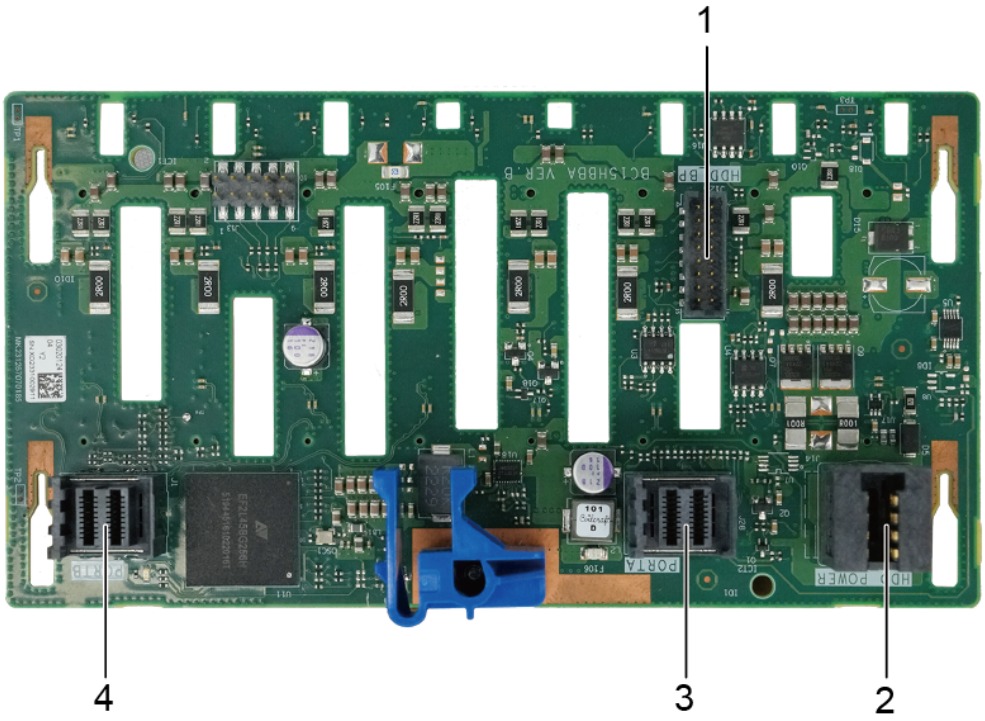


No.	Connector	Managed Drive Slot
1	MCIO x 4 connector (PORT B/J1)	SAS/SATA Slot4~7
2	Backplane signal cable connector (HDD_SIG_CONN/ J12)	-
3	MCIO x 4 connector (PORT A/28)	SAS/SATA Slot0~3
4	Power connector (HDD_POWER/J14)	-

- 8 x 2.5" SAS/SATA common drive backplane

  This backplane is supported in the 8 x 2.5" SAS/SATA drive pass-through configuration in the section **5.5.1.1.1 8 x 2.5" Pass-Through Configuration**.

Figure 5-64 8 x 2.5" SAS/SATA common drive backplane

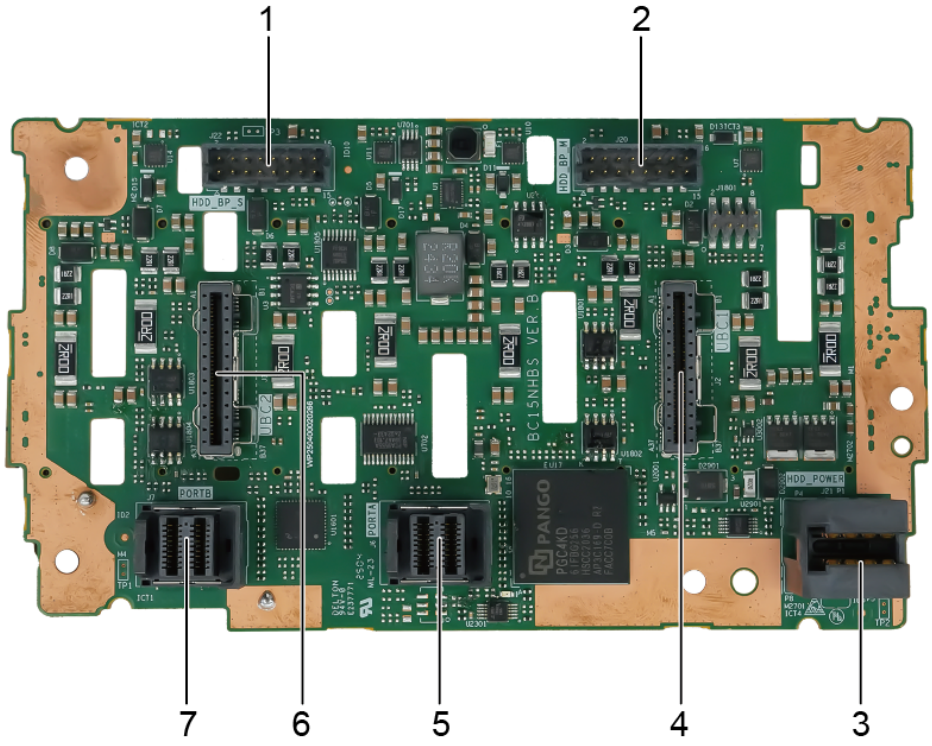


No.	Connector	Managed Drive Slot
1	Backplane signal cable connector (HDD BP/ J12)	-
2	Power connector (HDD_POWER/J14)	-

No.	Connector	Managed Drive Slot
3	Mini-SAS HD connector (PORT A/J28)	Slot 0~Slot 3
4	Mini-SAS HD connector (PORT B/J1)	Slot 4~Slot 7

- 8 x 2.5" SAS/SATA/NVMe drive backplane (supporting hardware RAID)
  - This backplane is supported in 8 x 2.5 NVMe hardware RAID configurations in **5.5.1.3.1 8 x 2.5" Pass-Through Configuration**.
  - This backplane is supported in the 16 x 2.5" NVMe drive hardware RAID configuration (dual RAID controller cards) and the 16 x 2.5" 8 x SAS/SATA + 8 x NVMe drive hardware RAID configuration (dual RAID controller cards) in the **5.5.1.3.2 16 x 2.5" Hardware RAID Configurations** section.
  - This backplane is supported in the 24 x 2.5" NVMe drive hardware RAID configuration (3 x RAID controller cards) in **5.5.1.3.3 24 x 2.5" Hardware RAID Configurations**.

Figure 5-65 8 x 2.5" SAS/SATA/NVMe backplane (supporting hardware RAID)



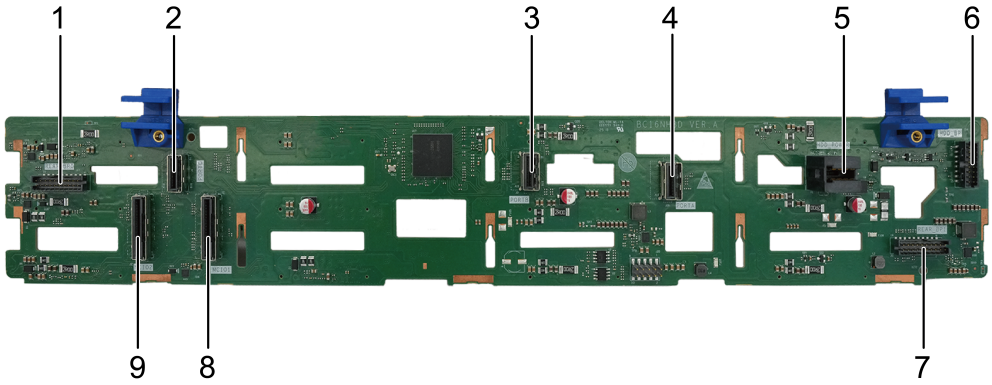
No.	Connector	Managed Drive Slot
1	Cascade backplane low-speed connector (HDD_BP_S/J22)	-

No.	Connector	Managed Drive Slot
2	Backplane low-speed connector (HDD_BP_M/J20)	-
3	Power connector (HDD_POWER/J21)	-
4	UBC connector 1 (UBC1/J2)	NVMe: Slot 0 to 3
5	Mini-SAS HD connector (PORT A/J6)	SAS/SATA: Slot 0 to 3
6	UBC connector 2 (UBC2/J3)	NVMe: Slots 4 to 7
7	Mini-SAS HD connector (PORT B/J7)	SAS/SATA: Slots 4 to 7

- 12 x 3.5" 8 x SAS/SATA + 4 x SAS/SATA/NVMe drive backplane

  This backplane is supported in all drive configurations in **5.5.1.1.2 12 x 3.5" Pass-Through Configuration** and **5.5.1.2.2 12 x 3.5" Pass-Through Configurations**.

Figure 5-66 12 x 3.5" 8 x SAS/SATA + 4 x SAS/SATA/NVMe drive backplane



No.	Connector	Managed Drive Slot
1	IO/1 rear backplane low-speed connector (REAR_BP0/J17)	-
2	MCIO x 4 connector (PORTC/J4)	SAS/SATA: Slot 8 to 11
3	MCIO x 4 connector (PORTB/J3)	SAS/SATA: Slots 4 to 7
4	MCIO x 4 connector (PORTA/J28)	SAS/SATA: Slot 0 to 3
5	Power connector (HDD_POWER/J21)	-
6	Backplane low-speed connector (HDD_BP/J19)	-

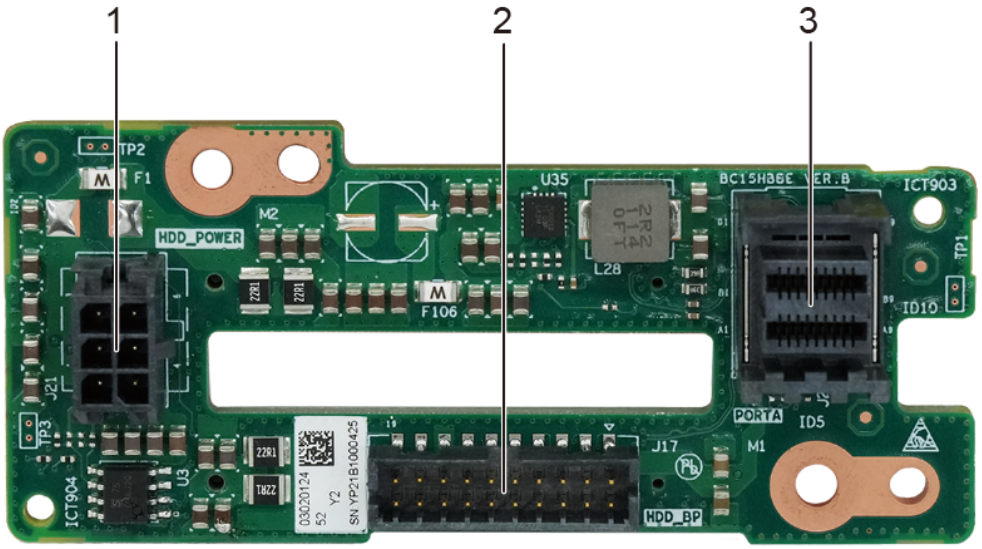
No.	Connector	Managed Drive Slot
7	IO/1 rear backplane low-speed connector (REAR_BP1/J18)	-
8	MCIO x8 connector (MCIO1/J1)	NVMe: Slot 8 to 9
9	MCIO x8 connector (MCIO2/J2)	NVMe: Slot 10 to 11

Rear-Drive Backplane

- 2 x 2.5" drive backplane

  Supports a rear 2x2.5" drive module or a 2x2x2.5" drive +PCIe riser module.

  Figure 5-67 2 x 2.5" drive backplane

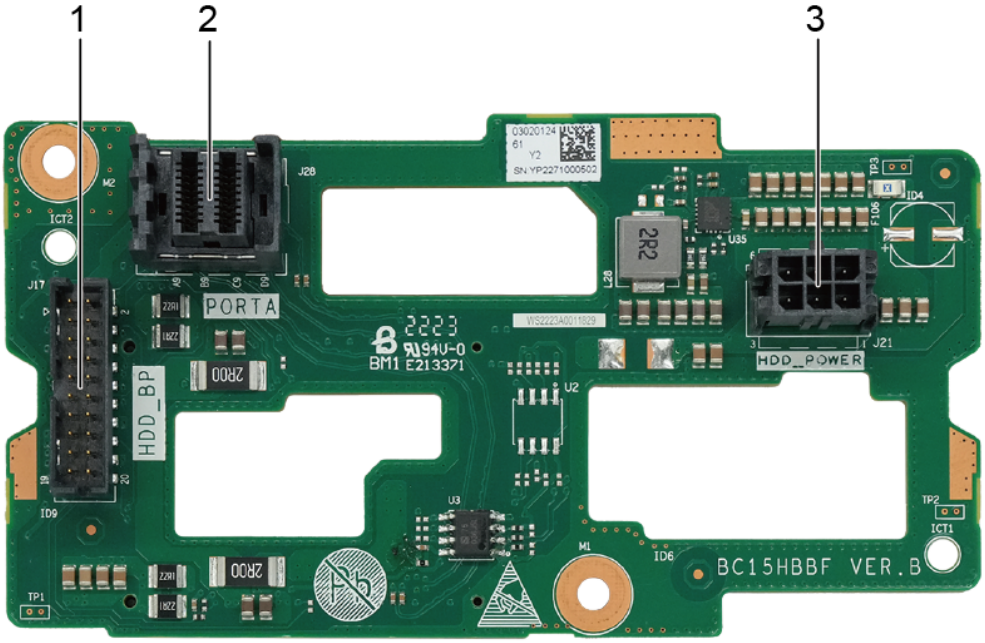


No.	Connector	Managed Drive Slot
1	Power connector (HDD PWR/J21)	-
2	Backplane signal cable connector (HDD BP/ J17)	-
3	Mini-SAS HD connector (PORT A/J28)	• IO1: SAS/SATA slots 40 to 41 • IO2: SAS/SATA slots 42 to 43

- 2 x 3.5" drive backplane

  Supports a rear 2x3.5" drive module.

Figure 5-68 2 x 3.5" drive backplane

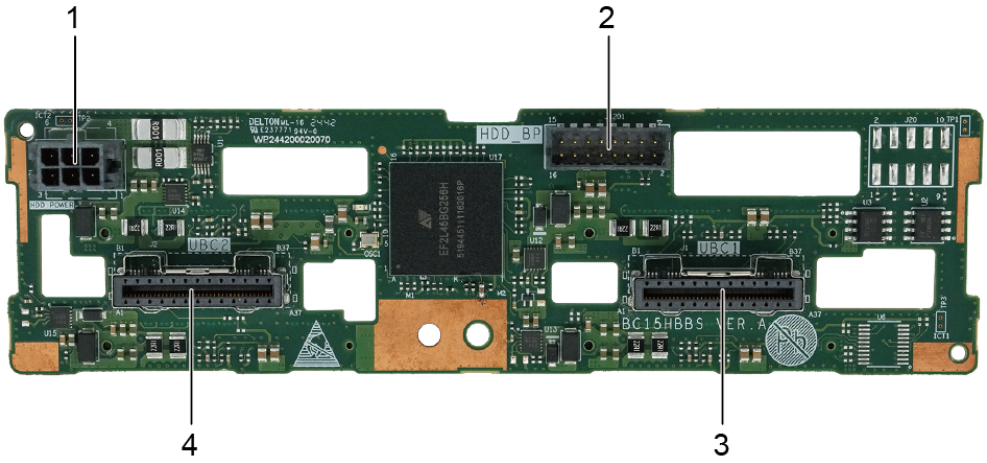


No.	Connector	Managed Drive Slot
1	Backplane signal cable connector (HDD BP/ J17)	-
2	Mini-SAS HD connector (PORT A/J28)	• IO1: SAS/SATA slots 40 to 41 • IO2: SAS/SATA slots 42 to 43
3	Power connector (HDD PWR/J21)	-

- 4 x 2.5" drive backplane 1

  Supports rear 4x2.5" NVMe drive modules (supporting NUMA and non-NUMA).

Figure 5-69 4x 5" drive backplane 1

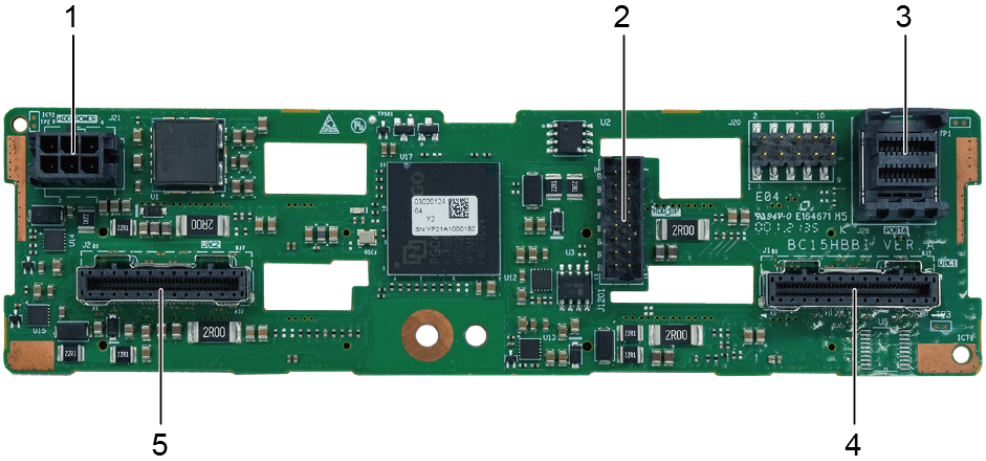


No.	Connector	Managed Drive Slot
1	Power connector (HDD_POWER/J21)	-
2	Backplane signal cable connector (HDD BP/J1201)	-
3	UBC connector 1 (UBC1/J1)	Slot 44, Slot 45
4	UBC connector 2 (UBC2/J2)	Slot 46, Slot 47

- 4 x 2.5" drive backplane 2

  Supports a rear 4x2.5" SAS/SATA drive module.

Figure 5-70 4 x 2.5" drive backplane 2

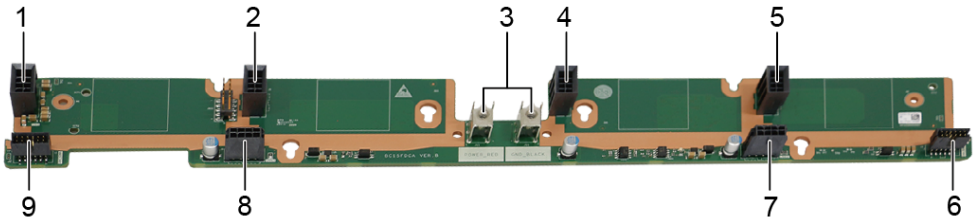


No.	Connector	Managed Drive Slot
1	Power connector (HDD PWR/J21)	-
2	Backplane signal cable connector (HDD BP/ J1201)	-
3	Mini-SAS HD connector (PORT A/J28)	SAS/SATA: Slots 44 to 47
4	UBC connector 1 (UBC1/J1)	-
5	UBC connector 2 (UBC2/J2)	-

5.10.3 Fan Board

General-purpose server

Figure 5-71 Fan board



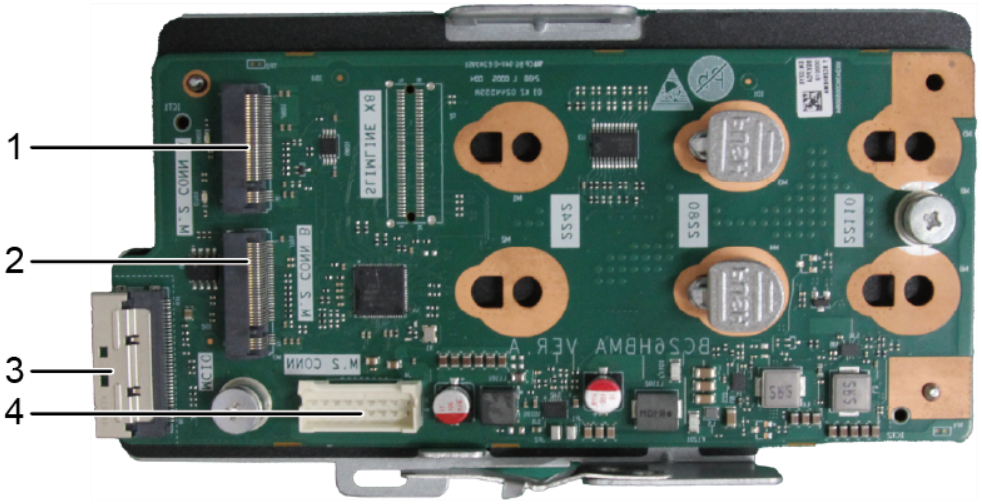
1	Fan connector (FAN1/J7)	2	Fan connector (FAN2/J6)
3	Fan board power connector (J10 GND_BLACK/J11 POWER_RED)	4	Fan connector (FAN3/J5)
5	Fan connector (FAN4/J4)	6	Fan board signal connector (FAN_BOARD/J3)
7	Reserved and unavailable currently	8	Reserved and unavailable currently
9	Reserved and unavailable currently	-	-

5.10.4 Built-in M.2 Adapter Card

NOTE

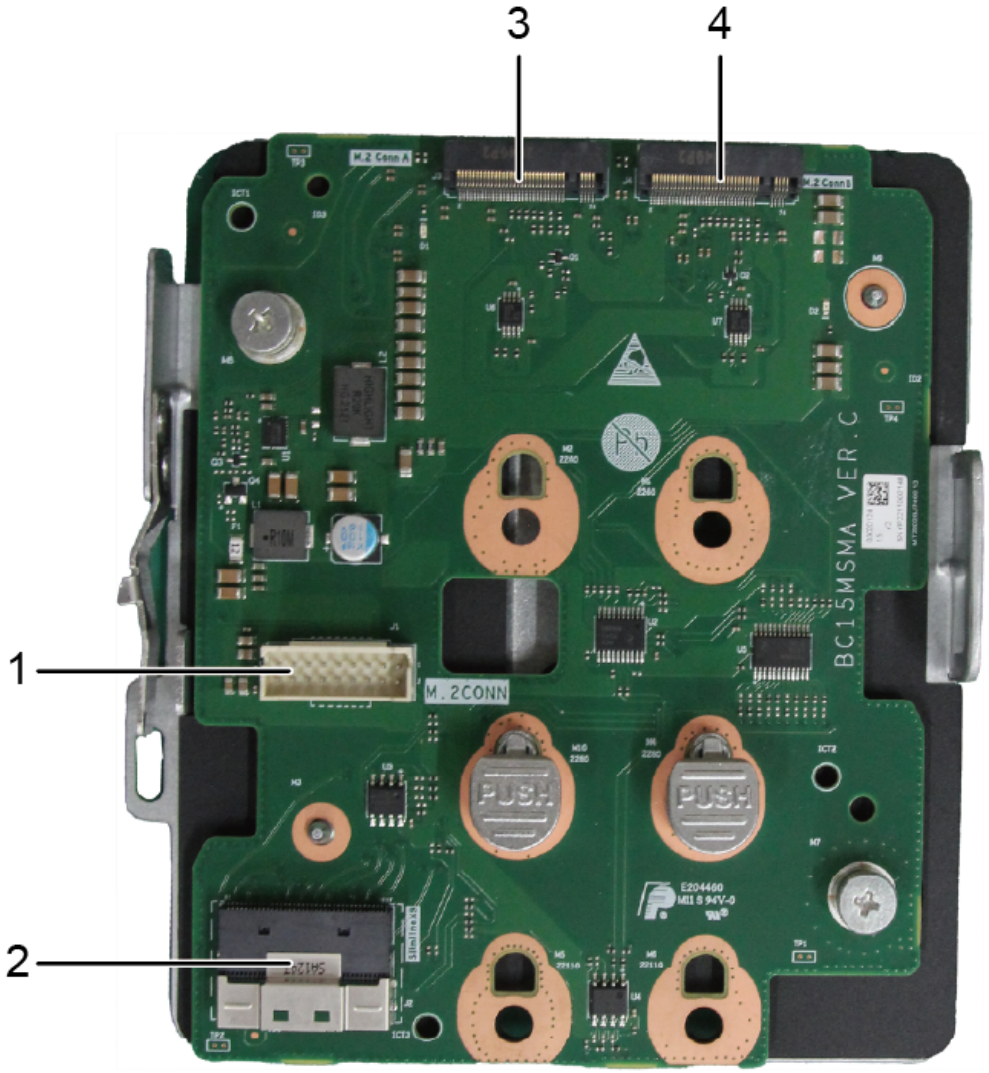
The built-in M.2 adapter card does not support RAID functionality.

Figure 5-72 PCIe-SATA M.2 adapter card



1	M.2 slot (M.2 CONN A)	2	M.2 slot (M.2 CONN B)
3	MCIO connector (J1)	4	M.2 CONN connector (J4)

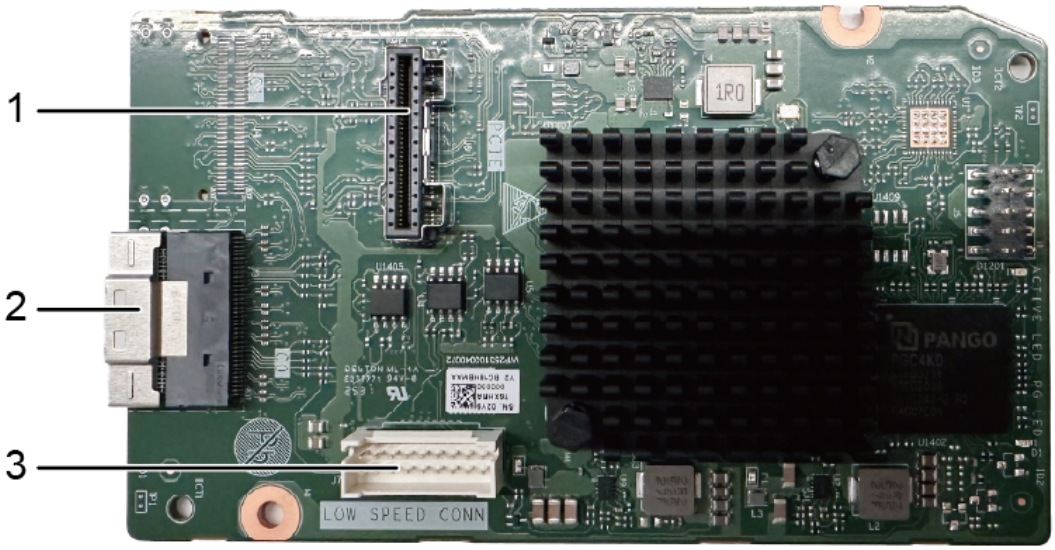
Figure 5-73 M.2 adapter card integrated in CPU



1	Signal connector (J1)	2	High-speed connector (J2)
3	M.2 slot (M.2 Conn A)	4	M.2 slot (M.2 Conn B)

5.10.5 SATA Pass-through Card

Figure 5-74 SATA Pass-through Card-8i



1	UBC PCIe connector	2	SlimSAS connector (port1)
3	PWR connector	-	-

6 Specifications

6.1 Technical Specifications
6.2 Environmental Specifications
6.3 Physical Specifications

6.1 Technical Specifications

Table 6-1 Technical specifications

Component	Specifications
Form factor	2U 2-socket rack server

Component	Specifications
Processor	The server supports one or two processors. ● Intel® Xeon® 6 Processors: 6500P/6700P-series – Built-in memory controller and 8 memory channels per processor. – Built-in PCIe controller, supporting PCIe 5.0 and 88 lanes per processor. – Up to 86 cores. – Max. 3.8 GHz turbo frequency. – Max. 336 MB L3 cache per CPU. – Max. 350 W TDP. ● Intel® Xeon® 6 Processors: 6700E-series – Built-in memory controller and 8 memory channels per processor. – Built-in PCIe controller, supporting PCIe 5.0 and 88 lanes per processor. – Up to 144 cores. – Max. 3.0 GHz turbo frequency. – Max. 108 MB L3 cache per CPU. – Max. 330 W TDP. **NOTE** The preceding information is for reference only. R1S series and Socket Scalable series processors are not supported. For details, see "Search Parts" in the compatibility list on the technical support website.
DIMM	Supports 32 DIMM slots ● Supports a maximum of 32 x 6400 MT/s DDR5 RDIMMs, with a maximum memory transfer rate of 6400 MT/s (1DPC) and 5200 MT/s (2DPC). ● Supports a maximum of 16 x 8800 MT/s MRDIMMs with a maximum memory transfer rate of 8000 MT/s (1DPC). ● The DDR5 memory modules of different types (RDIMM and LRDIMM) and specifications (capacity, bit width, rank, and height) cannot be used together. ● A server must use DDR5 memory modules of the same P/N code. **NOTE** The preceding information is for reference only. For details, see "Search Parts" in the compatibility list on the technical support website.

Component	Specifications
Storage	Supports a variety of drive configurations. For details, see **5.5.1 Drive Configuration and Drive Numbering**. ● Supports two M.2 SSDs. – When configuring MARVELL/88SE9235A1 BootCard, it supports CPU PCIe to SATA M.2 SSD pass-through configuration. – When configured with the BRADCOM SAS3808-BootCard, it supports SATA M.2 SSD RAID 0/1 configuration, and supports hot-swap without opening the chassis cover. **NOTE** ● The M.2 SSD is used only as a boot device for installing the OS. Small-capacity (32 GB or 64 GB) M.2 SSDs do not support logging due to poor endurance. If a small-capacity M.2 SSD is used as the Boot device, a dedicated log drive or log server is required for logging. For example, you can dump VMware logs in either of the following ways: ● Redirect **/scratch**. For details, see **https://kb.vmware.com/s/article/1033696**. ● Configure syslog. For details, see **https://kb.vmware.com/s/article/2003322**. ● The M.2 SSD cannot be used to store service data due to poor endurance. In write-intensive applications, the M.2 SSD will wear out in a short time. If you want to use SSDs or HDDs as data storage devices, use enterprise-level SSDs or HDDs with high DWPD. ● The M.2 SSD is not recommended for write-intensive service software due to poor endurance. ● Do not use M.2 SSDs for cache. ● Supports hot-swap of SAS/SATA/NVMe U.2 drives. **NOTE** When NVMe drives are configured: ● Before using the VMD function, contact technical support engineers of the OS vendor to check whether the OS supports the VMD function. If yes, check whether the VMD driver needs to be manually installed and check the installation method. ● When the VMD function is enabled and the latest VMD driver is installed, surprise hot swap is supported. ● When the VMD function is disabled, orderly hot swap is supported. ● Supports a variety of RAID controller cards. For details, see "Search Parts" in the Compatibility List on the support website. – The RAID controller card supports RAID configuration, RAID level migration, and drive roaming.

Component	Specifications
	– The RAID controller card supports a supercapacitor for power-off protection to ensure user data security. – The RAID controller card occupies one standard PCIe slot. For details about the RAID controller card, see the server *RAID Controller Card User Guide*.
Network	The OCP 3.0 NICs provide network expansion capabilities. ● 2 x OCP 3.0 NICs, which can be configured as required ● Supports orderly hot swap. ● Supports a variety of OCP 3.0 NICs. For details, see "Search Parts" in the compatibility list on the technical support website.
I/O expansion	Ten PCIe slots. ● Supports two FLEX IO expansion slots dedicated to the OCP 3.0 network card on the back, and eight rear PCIe expansion slots. For details, see **5.7.2 PCIe Slots** and **5.7.3 PCIe Slot Description**. **NOTE** The preceding information is for reference only. For details, see "Search Parts" in the compatibility list on the technical support website.
Ports	A variety of ports. ● Ports on the front panel: – One USB Type-C iBMC direct connect management port – One DB15 VGA port – Two USB 3.0 ports ● Ports on the rear panel: – Two USB 3.0 ports – One DB15 VGA port – One RJ45 serial port – One RJ45 management network port ● Built-in ports: – One USB 3.0 port **NOTE** You are not advised to install the OS on the USB storage media.

Component	Specifications
Graphics card	Supports an integrated graphics chip (SM750) on the mainboard, providing 32 MB video memory. The maximum resolution at 60 Hz with 16 M colors is 1920 x 1200 pixels. **NOTE** The integrated graphics card can provide the maximum display resolution (1920 x 1200) only after the graphics card driver matching the OS version is installed. Otherwise, only the default resolution supported by the OS is provided.
System management	● UEFI ● iBMC ● NC-SI ● Integration with third-party management systems
Security feature	● Secure boot ● Firmware resilience. ● TPM 2.0 and TCM. ● SPDM. ● BMC/BIOS secure storage and write protection. ● Intrusion detection. ● Supports account security such as password complexity, validity period, and anti-brute force attack. ● The BMC supports central authentication and two-factor authentication. ● The BMC supports role-based access control. ● The BIOS supports hierarchical password protection. ● The BMC supports certificate management, session management, security protocol, and hierarchical key management. ● Optional front bezel ● Supports Intel® Trusted Execution Technology (Intel® TXT). ● Supports Intel® Trusted Domain Extensions (Intel® TDX) and Intel® Software Guard Extensions (Intel® SGX). ● Supports Intel® Total Memory Encryption (Intel® TME) and Intel® Total Memory Encryption – Multi-Tenant (Intel® TME-MT). ● Supports Intel® Control-Flow Enforcement Technology (Intel® CET) and Intel® Data Execution Prevention (Intel® DEP), Executable Disable Bit (EDB).

6.2 Environmental Specifications

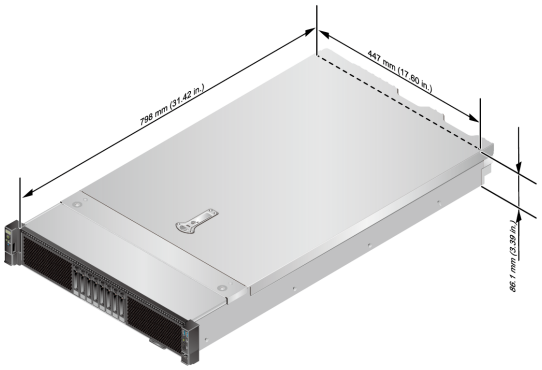
Table 6-2 Environmental specifications

Item	Specifications
Temperature	• Operating temperature: 5°C to 45°C (41°F to 113°F) (ASHRAE Classes A1 to A4 compliant) • Storage temperature (within three months): –30ºC to +60ºC (–22ºF to +140ºF) • Storage temperature (within six months): –15ºC to +45ºC (5ºF to 113ºF) • Storage temperature (within one year): -10ºC to +35ºC (14ºF to 95ºF) • Maximum temperature change rate: 20ºC (36ºF) per hour and 5ºC (9ºF) per 15 minutes **NOTE** The operating temperature limitation varies depending on the server configuration. For details, see **A.4 Operating Temperature Limitations**.
Relative humidity (RH, non-condensing)	• Operating humidity: 8% to 90% • Storage humidity (within three months): 8% to 85% • Storage humidity (within six months): 8% to 80% • Storage humidity (within one year): 20% to 75% • Maximum humidity change rate: 20% /hour • Operational climatic range: ASHRAE Class A4 8% RH with -12°C (10.4°F) minimum dew point to 90% RH with 24°C (75.2°F) maximum dew point
Air volume	120 CFM-320 CFM
Operating altitude	≤ 3050 m (10006.56 ft) • When the configuration complies with ASHRAE Class A1 and A2, and the altitude is above 900 m (2952.76 ft), the operating temperature decreases by 1ºC (1.8ºF) for every increase of 300 m (984.25 ft). • When the configuration complies with ASHRAE Class A3, and the altitude is above 900 m (2952.76 ft), the operating temperature decreases by 1ºC (1.8ºF) for every increase of 175 m (574.15 ft.). • When the configuration meets the ASHRAE Class A4 and the altitude is above 900 m (2952.76 ft), the operating temperature decreases by 1°C (1.8°F) for every increase of 125 m (410.10 ft). • HDDs cannot be used at an altitude of over 3050 m (10,006.56 ft).

Item	Specifications
Corrosive airborne contaminants	Maximum growth rate of the corrosion product thickness: ● Copper corrosion rate test: 300 Å/month (meeting level G1 requirements of the ANSI/ISA-71.04-2013 standard on gaseous corrosion) ● Silver corrosion rate test: 200 Å/month
Particle contaminant	● The equipment room environment meets the requirements of ISO 14664-1 Class 8. ● There is no explosive, conductive, magnetic, or corrosive dust in the equipment room. **NOTE** It is recommended that the particulate pollution in the equipment room be monitored by a professional organization.
Acoustic noise	The declared A-weighted sound power levels (LWAd) and declared average bystander position A-weighted sound pressure levels (LpAm) listed are measured at 23°C (73.4°F) in accordance with ISO 7779 (ECMA 74) and declared in accordance with ISO 9296 (ECMA 109). ● Idle: – LWAd: 5.6Bels – LpAm: 46.6 dBA ● Operating: – LWAd: 6.1 Bels – LpAm: 47.8 dBA **NOTE** Actual sound levels generated during operation vary depending on the configuration, load, and ambient temperature.

6.3 Physical Specifications

Table 6-3 Physical specifications

Category	Description
Dimensions (H x W x D)	● Chassis with 2.5" drive: 86.1 mm x 447 mm x 798 mm (3.39 in. x 17.60 in. x 31.42 in.) ● Chassis with 3.5" drives: 86.1 mm x 447 mm x 798 mm (3.39 in. x 17.60 in. x 31.42 in.) **Figure 6-1** Physical dimensions (example: a chassis with 2.5" drive)  **NOTE** ● See **Figure 6-1** for methods in measuring physical dimensions of the chassis. ● The measuring method for chassis with 3.5" drives and that for chassis with 2.5" drives are the same. The chassis with 3.5" drives is used as an example.
Installation space	● Requirements for cabinet installation: Use a standard cabinet that complies with the International Electrotechnical Commission 297 (IEC 297) standard. – Cabinet width: 482.6 mm (19.00 in.) – Cabinet depth ≥ 1000 mm (39.37 in.) ● Requirements for guide rail installation: – L-shaped guide rails: apply only to xFusion cabinets. – Adjustable L-shaped guide rails: apply to cabinets with a distance of 543.5 mm to 848.5 mm (21.40 in. to 33.41 in.) between the front and rear mounting bars. – Ball bearing rail kit: applies to cabinets with a distance of 609 mm to 950 mm (23.98 in. to 37.40 in.) between the front and rear mounting bars.

Category	Description
Weight in full configuration	● Net weight: – Maximum weight for a server with a 8 x 2.5" pass-through chassis: 22.2 kg (48.94 lb) – Maximum weight for a server with a 12 x 3.5" pass-through chassis: 35.5 kg (78.26 lb) – Maximum weight for a server with a 16 x 2.5" pass-through chassis: 24 kg (52.91lb) – Maximum weight for a server with a 24 x 2.5" pass-through chassis: 25.5 kg (56.22 lb) ● Packaging materials: 6.0 kg (13.23 lb)
Power consumption	The power consumption parameters vary with hardware configurations (including the configurations complying with EU ErP). For details, see Power Calculator on the technical support website.

7 Software and Hardware Compatibility

For details about the OS and hardware, see the compatibility list on the technical support website.

NOTICE

- If incompatible components are used, the device may be abnormal. Such a fault is beyond the scope of technical support and warranty.
- The performance of servers is closely related to application software, basic middleware software, and hardware. The slight differences of the application software, middleware basic software, and hardware may cause performance inconsistency between the application layer and test software layer.
  - If the customer has requirements on the performance of specific application software, contact technical support to apply for proof of concept (POC) tests in the pre-sales phase to determine detailed software and hardware configurations.
  - If the customer has requirements on hardware performance consistency, specify the specific configuration requirements (for example, specific drive models, RAID controller cards, or firmware versions) in the presales phase.

8 Safety Instructions

8.1 Security
8.2 Maintenance and Warranty

8.1 Security

General Statement

- Comply with local laws and regulations when installing equipment. These safety instructions are only a supplement.
- Observe the safety instructions that accompany all "DANGER", "WARNING", and "CAUTION" symbols in this document.
- Observe all safety instructions provided on device labels.
- Operators of special types of work (such as electricians, operators of electric forklifts, and so on.) must be certified or authorized by the local government or authority.

⚠ WARNING

In a household scenario, operation of this device may cause radio interference.

Human Safety

- This device is not suitable for use in places where children may be present.
- Only certified or authorized personnel are allowed to install equipment.
- Discontinue any dangerous operations and take protective measures. Report anything that could cause personal injury or device damage to a project supervisor.
- Do not move devices or install cabinets and power cables in hazardous weather conditions.
- Do not carry the weight that exceeds the maximum load per person allowed by local laws or regulations. Before moving a device, check the maximum device weight and arrange required personnel.

- Wear clean protective gloves, ESD clothing, a protective hat, and protective shoes, as shown in **Figure 8-1**.

Figure 8-1 Safety work wear

- Before touching a device, wear ESD clothing and gloves (or wrist strap), and remove any conductive objects (such as watches and jewelry). **Figure 8-2** shows conductive objects that must be removed before you touch a device.

Figure 8-2 Removing conductive objects

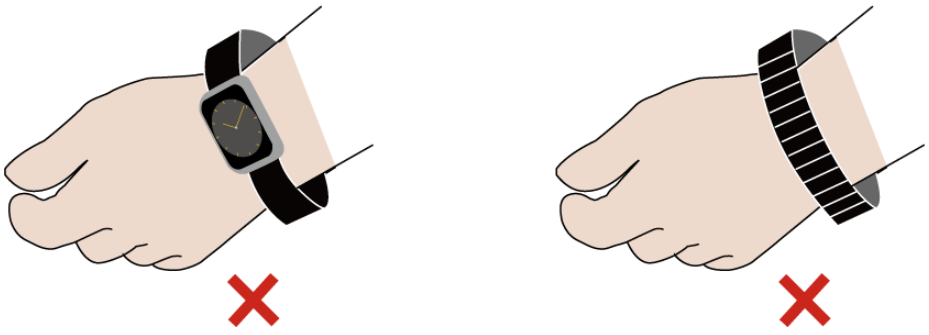


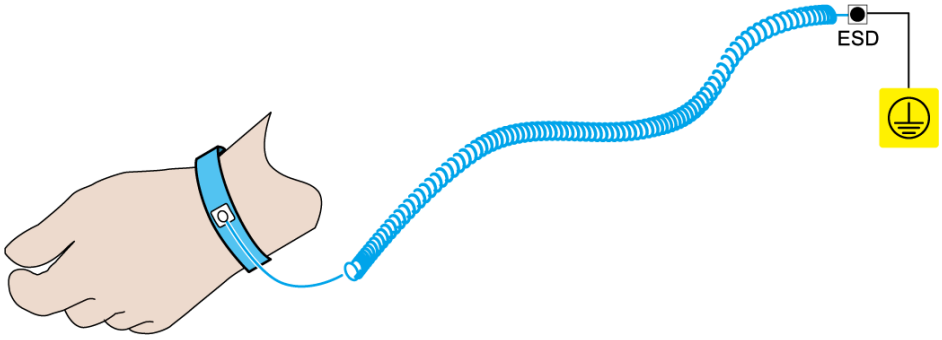
Figure 8-3 shows how to wear an ESD wrist strap.

a. Secure the ESD wrist strap around your wrist.

b. Fasten the strap buckle and ensure that the ESD wrist strap is in contact with your skin.

c. Insert the ground terminal attached to the ESD wrist strap into the jack on the grounded cabinet or chassis.

Figure 8-3 Wearing an ESD wrist strap



- Exercise caution when using tools that could cause personal injury.
- If the installation position of a device is higher than the shoulders of the installation personnel, use a vehicle such as a lift to facilitate installation. Prevent the device from falling down and causing personal injury or damage to the device.
- The equipment is powered by high-voltage power sources. Direct or indirect contact (especially through damp objects) with high-voltage power sources may result in serious injury or death.
- Ground a device before powering it on. Otherwise, high voltage leakage current may cause personal injury.
- When a ladder is used, ensure that another person holds the ladder steady to prevent accidents.
- Do not look into optical ports without eye protection when installing, testing, or replacing optical cables.

Equipment Safety

- Use the recommended power cables at all times.
- Power cables are used only for dedicated servers. Do not use them for other devices.
- Before operating equipment, wear ESD clothes and gloves to prevent electrostatic-sensitive devices from being damaged by ESD.
- When moving a device, hold the bottom of the device. Do not hold the handles of the installed modules, such as the PSUs, fan modules, drives, and the mainboard. Handle the equipment with care.
- Exercise caution when using tools that could cause damage to devices.
- Connect the primary and secondary power cables to different power distribution units (PDUs) to ensure reliable system operation.
- Ground a device before powering it on. Otherwise, high voltage leakage current may cause device damage.

Transportation Precautions

Improper transportation may damage equipment. Contact the manufacturer for precautions before attempting transportation.

Transportation precautions include but are not limited to:

- The logistics company engaged to transport the device must be reliable and comply with international standards for transporting electronics. Ensure that the equipment being transported is always kept upright. Take necessary precautions to prevent collisions, corrosion, package damage, damp conditions and pollution.
- Transport each device in its original packaging.
- If the original packaging is unavailable, package heavy, bulky parts (such as chassis and blades) and fragile parts (such as PCIe cards and optical modules) separately.

  NOTE

  For details about components supported by the server, see "Search Parts" in the compatibility list on the technical support website.
- Power off all devices before transportation.

Maximum Weight Carried by a Person

CAUTION

The maximum weight allowed to be carried by a single person is subject to local laws or regulations. The markings on the device and the descriptions in the documentation are for reference only.

Table 8-1 lists the maximum weight one person is permitted to carry as stipulated by a number of organizations.

Table 8-1 Maximum weight carried per person

Organization	Weight (kg/lb)
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

For more information about security instructions, see the server *Safety Information*.

8.2 Maintenance and Warranty

For details about maintenance, visit the **Technical Support Website** > **Service Support Center** > **Customer Support Service**.

For details about warranty, visit the **Technical Support Website** > **Service Support Center** > **Warranty**.

9 System Management

This product integrates the new-generation iBMC, which complies with Intelligent Platform Management Interface (IPMI) 2.0 and provides highly reliable hardware monitoring and management.

The iBMC intelligent management system has the following features:

- Various management interfaces

  The BMC provides the following standard interfaces to meet various system integration requirements:

  – DCMI 1.5 interface
  – IPMI 1.5/IPMI 2.0 interface
  – Command-line interface
  – Redfish interface
  – Hypertext Transfer Protocol Secure (HTTPS)
  – Simple Network Management Protocol (SNMP)

- Fault monitoring and diagnosis

  The CloudBMC detects hidden risks and ensures stable, uninterrupted 24/7 system operation by providing the following features:

  – The iBMC allows screenshots and videos to be created when the system breaks down, facilitating cause analysis of the system breakdown.
  – The iBMC offers screen snapshots and videos, simplifying routine preventive maintenance, recording, and auditing.
  – The CloudBMC supports the reporting of alarms through syslog packets, trap packets, and emails, helping the upper-layer NMS platform to collect the fault information about the server.

- Security management methods

  – Software image backup improves system security. Even if the running software breaks down, the system can be started from the backup image.
  – Diversified user security control interfaces are provided to ensure user login security.
  – Multiple certificates can be imported and replaced to ensure data transmission security.

- System maintenance interface
  - The virtual KVM and virtual media functions facilitate remote maintenance.
  - Out-of-band RAID monitoring and configuration improve RAID configuration efficiency and management capability.
  - Smart Provisioning implements DVD-free OS installation, RAID configuration, and upgrades to simplify server installation and configuration.
- Various network protocols
  - Supports NTP to improve the device time configuration capability and synchronizes the network time.
  - The iBMC supports domain management and directory services to simplify the server management network.
- Intelligent power management
  - Power capping technology helps you easily increase deployment density.
  - The iBMC uses dynamic power saving to reduce operational expenditure (OPEX).
- License management

  By managing licenses, you can use the features of the iBMC advanced edition in authorization mode.

  The advanced edition of the iBMC provides the following features:
  - Deploy OS through the Redfish interface.
  - Collect the original data of intelligent diagnosis using Redfish.

10 Certifications

Country/Region	Certification	Standard
Europe	CE	Safety: EN 62368-1:2014+A11:2017 EMC: EN 55032:2015+A11:2020 EN IEC 61000-3-2:2019+A1:2021 EN 61000-3-3:2013+A2:2021 EN 55035:2017+A11:2020 CISPR 32:2015+A1:2019 CISPR 35:2016 ETSI EN 300 386 V2.2.1:2022 RoHS: EN IEC 63000:2018 ErP: Commission Regulation(EU) No 2019/424
Europe	REACH	(EC) No 1907/2006
Europe	POPs	(EU) 2019/1021
Europe	WEEE	2012/19/EU
Europe	Packaging and Packaging Waste	94/62/EC
China	CCC	GB 17625.1-2022 GB 4943.1-2022 GB/T 9254.1-2021
China	RoHS	SJ/T-11364 GB/T 26572

Country/Region	Certification	Standard
Global	CB	IEC 62368-1:2014 IEC 62368-1:2018
Japan	VCCI	VCCI 32-1
US	FCC	FCC PART 15

11 Waste Product Recycling

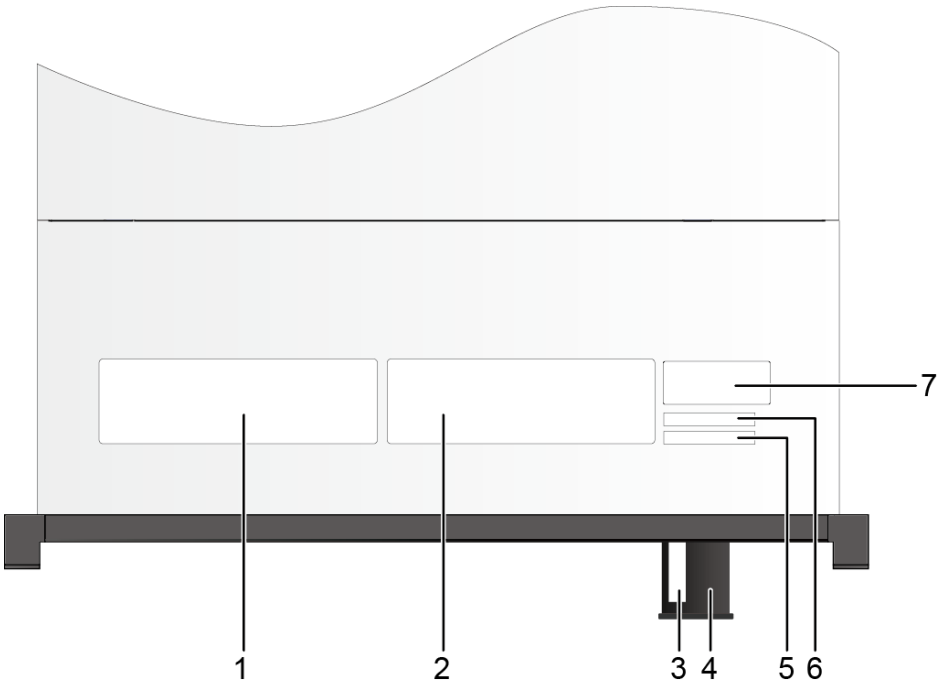
To obtain the product recycling service from xFusion after products are scrapped, contact 400-009-8999 for technical support.

A Appendix

A.1 Chassis Label Information

A.1.1 Chassis Head Label

Figure A-1 Chassis head label



1	Nameplate	2	Certificate and Quick Access Label

3	Product SN **NOTE** For details, see **A.3 Product SN**.	4	Slide-out label plate **NOTE** The location of the slide-out label plate varies depending on the server model or configuration. For details, see **5.1.1 Appearance**.
5	Product SN **NOTE** For details, see **A.3 Product SN**.	6	Reserved space for the customized label
7	Pressure-proof label **NOTE** This label warns users not to place any objects on top of a rack-mounted device.	-	-

A.1.1.1 Nameplate

Figure A-2 Nameplate example

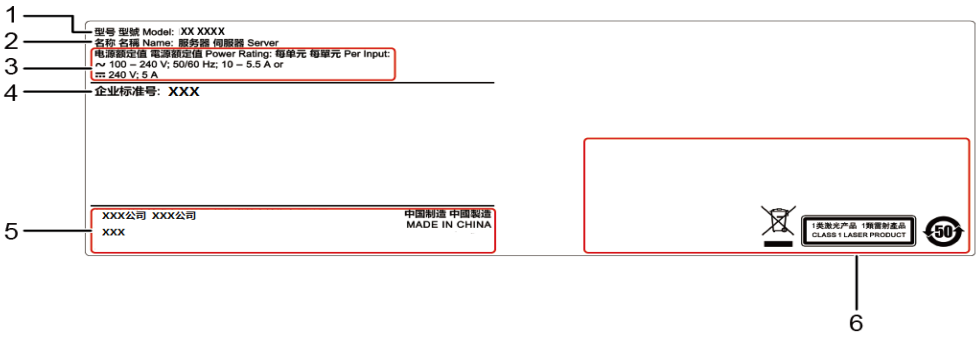


Table A-1 Nameplate description

No.	Description
1	Server model **NOTE** For details, see **A.5 Nameplate**.
2	Device name
3	Power supply requirements
4	Enterprise standard number
5	Vendor information
6	Certification marks

A.1.1.2 Certificate and Quick Access Label

Figure A-3 Samples of the certificate and quick access label

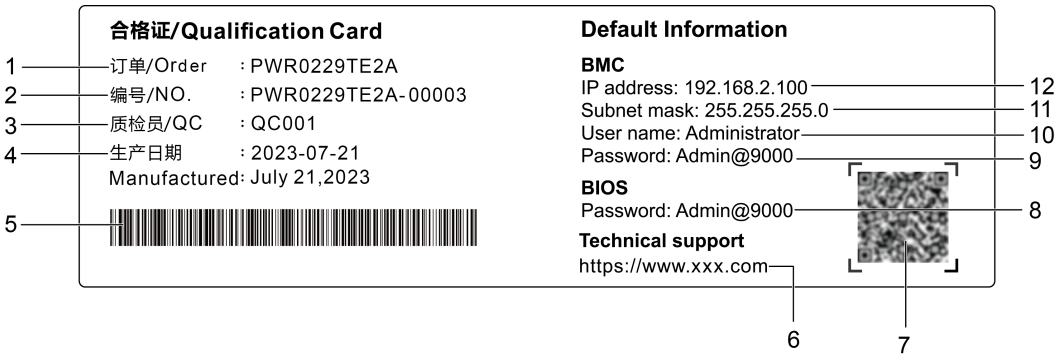


Table A-2 Certificate description

No.	Description
1	Order
2	No. **NOTE** For details, see **Figure A-3** and **Table A-3**.
3	QC inspector
4	Production date
5	No. barcode
6	Technical support website
7	QR code **NOTE** Scan the QR code to obtain technical support resources.
8	Default BIOS password
9	Default BMC Password
10	Default BMC User Name
11	BMC management network port subnet mask
12	BMC management network port IP address

Figure A-4 Certificate number example

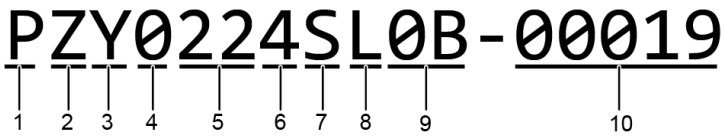
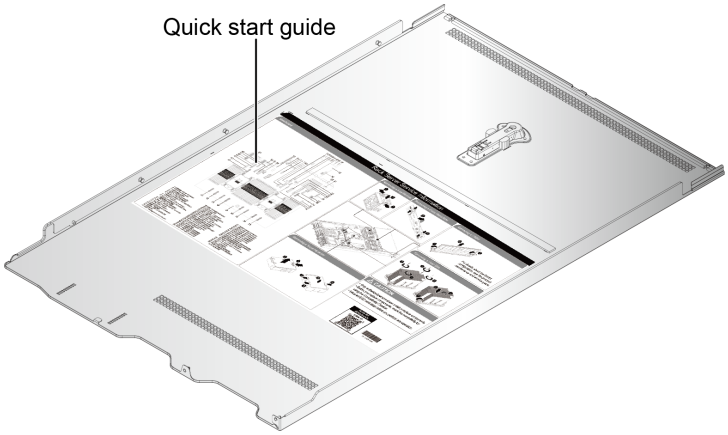


Table A-3 Certificate number description

No.	Description
1	**P**: a fixed value for this digit
2	**Z**: a fixed value for this digit
3	● **Y**: a server ● **B**: a semi-finished server ● **N**: a spare part
4	**0**: a value for the reserved digit
5	Year (two characters)
6	Month (one character) ● Digits 1 to 9 indicate January to September respectively. ● Letters A to C indicate October to December respectively.
7	Day (one character) ● Digits 1 to 9 indicate the 1st to 9th. ● Letters A to H indicate the 10th to 17th. ● Letters J to N indicate the 18th to 22nd. ● Letters P to Y indicate the 23rd to 31st.
8	Hour (one character) ● Digits 0 to 9 indicate 0:00 to 9:00. ● Letters A to H indicate 10:00 to 17:00. ● Letters J to N indicate 18:00 to 22:00. ● Letters P to Q indicate 23:00 to 24:00.

A.1.2 Chassis Internal Label

Figure A-5 Chassis internal label

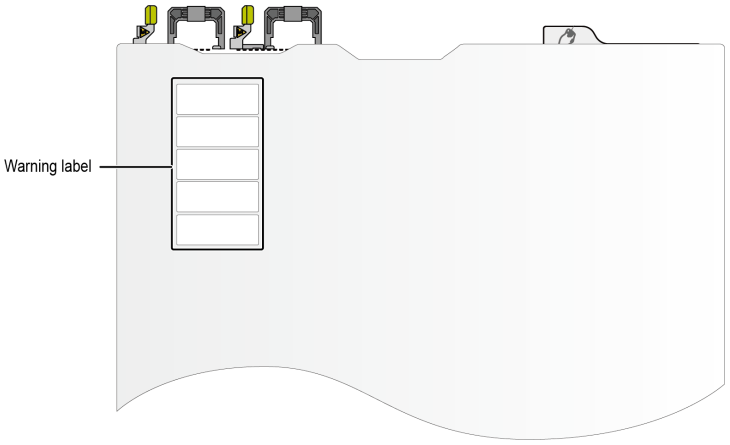


NOTE

- The quick start guide is located on the inside of the chassis cover. It describes how to remove the mainboard components, important components of the chassis, precautions, and QR codes of technical resources. The pictures are for reference only. For details, see the actual product.
- The quick start guide is optional. For details, see the actual product.

A.1.3 Chassis Tail Label

Figure A-6 Chassis tail label



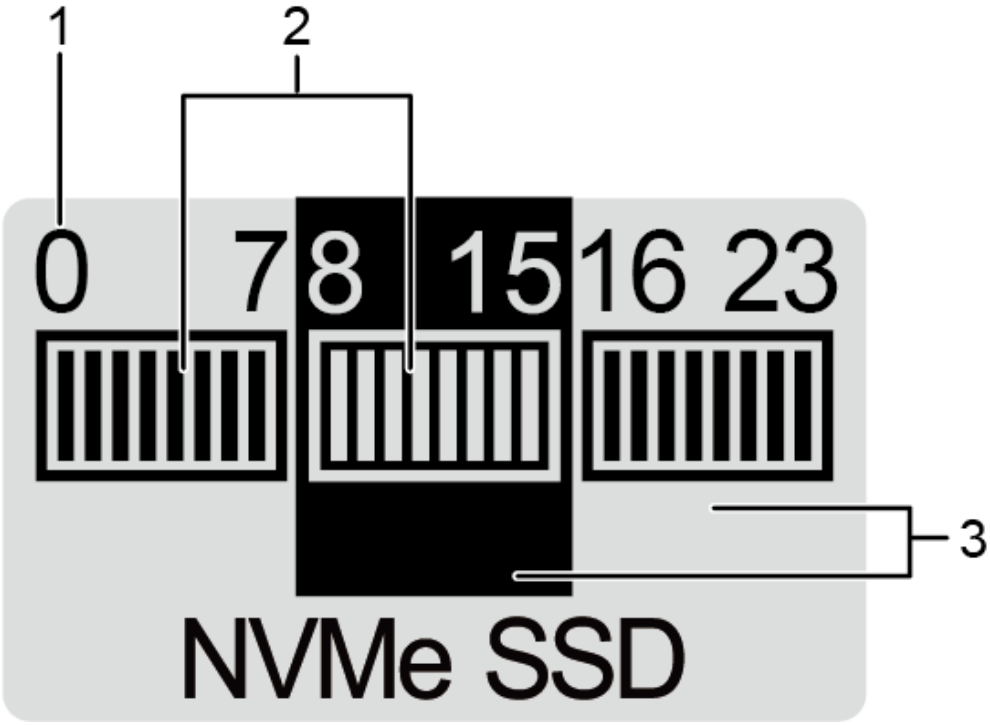
NOTE

For details about the warning label, see the server *Safety Information*.

A.2 Drive ID

The drive ID is located on the right mounting ear, indicating the slot where the NVMe drive can be inserted to avoid system problems caused by incorrect insertion.

Figure A-7 Drive ID



Labeling	Description
1	Drive ID *N*. The value ranges from 0 to 23.
2	Drive ID. Black represents NVMe drive, and gray represents SAS/SATA drive.
3	The gray background represents an NVMe drive, and the black background represents a SAS/SATA drive.
Note: The drive ID only displays the current drive type. For the mixed drive configuration, see **5.5.1 Drive Configuration and Drive Numbering**	

A.3 Product SN

The serial number (SN) on the label plate uniquely identifies a server. The SN is required when users contact xFusion technical support.

Figure A-8 SN example

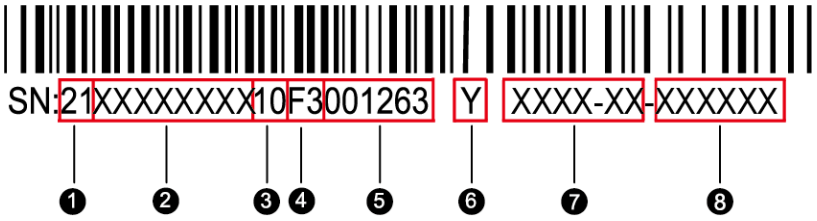


Table A-4 SN description

No.	Description
1	SN ID (two characters), which is **21**.
2	Material identification code (eight characters), that is, the processing code.
3	Vendor code (two characters), that is, the code of the processing place.
4	Year and month (two characters) ● The first character indicates the year. – Digits 1 to 9 indicate years 2001 to 2009 respectively. – Letters A to H indicate years 2010 to 2017 respectively. – Letters J to N indicate years 2018 to 2022 respectively. – Letters P to Y indicate years 2023 to 2032 respectively. **NOTE** The years from 2010 are represented by upper-case letters excluding I, O, and Z because the three letters are similar to the digits 1, 0, and 2. ● The second character indicates the month. – Digits 1 to 9 indicate January to September respectively. – Letters A to C indicate October to December respectively.
5	Serial number (six characters)
6	RoHS compliance (one character). **Y** indicates RoHS compliant.
7	Nameplate (six characters).
8	Serial number. The number of digits depends on the actual product.

A.4 Operating Temperature Limitations

Table A-5 Operating temperature limitations

Configuration	Maximum Operating Temperature 30 °C (86 °F)	Maximum Operating Temperature 35 °C (95 °F)	Maximum Operating Temperature 40 ºC (104 °F)	Maximum Operating Temperature 45 ºC (113 ºF)
• 8 x 2.5" drive SAS/ SATA/NVMe configuration • 8 x 2.5" drive SAS/ SATA • 8 x 2.5" NVMe drive pass-through configuration • 8 x 2.5" NVMe hardware RAID configuration	Unlimited	Unlimited	The L20 GPU cards are not supported.	• Rear NICs with 400 GE or higher are not supported. • The rear GPU cards are not supported. • The OCP NICs with 100 GE or higher are not supported.

Configuration	Maximum Operating Temperature 30 °C (86 °F)	Maximum Operating Temperature 35 °C (95 °F)	Maximum Operating Temperature 40 ºC (104 °F)	Maximum Operating Temperature 45 ºC (113 ºF)
• 16 x 2.5" SAS/SATA drive pass-through configuration • 16 x 2.5" (8 x SAS/SATA + 8 x NVMe) drive pass-through configuration (dedicated for a single CPU) • 16 x 2.5" NVMe drive pass-through configuration • 16 x 2.5" (8 x SAS/SATA/NVMe + 8 x NVMe) drive pass-through configuration • 16 x 2.5" (8 x SAS/SATA + 8 x NVMe) drive hardware RAID configuration (dedicated for dual RAID controller cards) • 16 x 2.5" NVMe drive hardware RAID configuration (dedicated for dual RAID controller cards)	Unlimited	Unlimited	• Rear NICs with 200 GE or higher are not supported. • The rear GPU cards are not supported. • The rear HDDs are not supported. • The OCP NICs with 100 GE or higher are not supported.	• The CPUs above 250 W are not supported. • The memory modules each of which has a capacity of 64 GB or above are not supported. • Rear NICs with 100 GE or higher are not supported. • The rear GPU cards are not supported. • The rear GPU cards are not supported. • The OCP of 100 GE or higher is not supported.

Configuration	Maximum Operating Temperature 30 °C (86 °F)	Maximum Operating Temperature 35 °C (95 °F)	Maximum Operating Temperature 40 ºC (104 °F)	Maximum Operating Temperature 45 ºC (113 ºF)
12 x 3.5" pass-through configuration	● Rear NICs with 400 GE or higher are not supported. ● The rear GPU cards are not supported.	● Rear NICs with 200GE or higher speed are not supported. ● The rear GPU cards are not supported. ● The rear 2.5" HDDs are not supported. ● The rear I/O 3 does not support the PS1030 with	● Rear NICs with 100 GE or higher are not supported. ● The rear GPU cards are not supported. ● The rear HDDs are not supported. ● The I/O 3 does not support NVMe. ● The OCP NICs with 25 GE or higher are not supported. ● The rear NVMe M.2 is not supported.	● The CPUs above 250 W are not supported. ● The memory modules each of which has a capacity of 64 GB or above are not supported. ● The rear GPU cards are not supported. ● Rear NICs with 25 GE or higher are not supported. ● The rear HDDs are not supported. ● The rear I/O 3 does not support NVMe. ● The OCP NICs with 25 GE or higher are not supported. ● The rear NVMe M.2 is not supported.

Configuration	Maximum Operating Temperature 30 °C (86 °F)	Maximum Operating Temperature 35 °C (95 °F)	Maximum Operating Temperature 40 ºC (104 °F)	Maximum Operating Temperature 45 ºC (113 ºF)
		a capacity greater than 3.2T or higher, and does not support the PM9D3a.		

Configuration	Maximum Operating Temperature 30 °C (86 °F)	Maximum Operating Temperature 35 °C (95 °F)	Maximum Operating Temperature 40 ºC (104 °F)	Maximum Operating Temperature 45 ºC (113 ºF)
• 24 x 2.5" NVMe drive pass-through configuration • 24 x 2.5" (8 x SAS/SATA/NVMe + 16 x NVMe) drive pass-through configuration • 24 x 2.5" (8 x SAS/SATA + 16 x NVMe) drive pass-through configuration • 24 x 2.5" NVMe drive hardware RAID configuration (dedicated for 3 x RAID controller cards)	• Rear NICs with 400GE or higher speed are not supported. • The rear GPU cards are not supported.	• Rear NICs with 200GE or higher speed are not supported. • The rear GPU cards are not supported. • The rear 2.5" HDDs are not supported. • The rear I/O 3 does not support the PS1030 with	• Rear NICs with 100 GE or higher are not supported. • The rear GPU cards are not supported. • The rear HDDs are not supported. • The rear I/O 3 does not support NVMe. • The OCP NICs with 25 GE or higher are not supported. • The rear NVMe M.2 is not supported.	• The CPUs above 250 W are not supported. • The memory modules each of which has a capacity of 64 GB or above are not supported. • The rear GPU cards are not supported. • Rear NICs with 25 GE or higher are not supported. • The rear HDDs are not supported. • The rear I/O 3 does not support NVMe. • The OCP NICs with 25 GE or higher are not supported. • The rear NVMe M.2 is not supported.

Configuration	Maximum Operating Temperature 30 °C (86 °F)	Maximum Operating Temperature 35 °C (95 °F)	Maximum Operating Temperature 40 ºC (104 °F)	Maximum Operating Temperature 45 ºC (113 ºF)
		a capacity greater than 3.2T or higher, and does not support the PM9D3a.		

Configuration	Maximum Operating Temperature 30 °C (86 °F)	Maximum Operating Temperature 35 °C (95 °F)	Maximum Operating Temperature 40 ºC (104 °F)	Maximum Operating Temperature 45 ºC (113 ºF)
• 24 x 2.5" SAS/SATA drive dual-RAID configuration • 24 x 2.5" (16 x SAS/SATA + 8 x NVMe) drive pass-through configuration (dedicated for a single CPU) • 24 x 2.5" (16 x SAS/SATA + 8 x NVMe) drive pass-through configuration (dedicated for dual CPUs)	Unlimited	• The rear NICs with 400 GE are not supported. • The rear L20 GPU cards are not supported. • The rear I/O 3 does not support the PS1030 with a capacity greater than 3.2T or higher,	• Rear NICs with 100 GE or higher are not supported. • The rear GPU cards are not supported. • The OCP NICs with 25 GE or higher are not supported. • The rear HDDs are not supported. • The rear I/O 3 does not support NVMe. • The rear NVMe M.2 is not supported.	• The CPUs above 250 W are not supported. • The memory modules each of which has a capacity of 32 GB or above are not supported. • Rear NICs with 100 GE or higher are not supported. • The rear GPU cards are not supported. • The OCP NICs with 25 GE or higher are not supported. • The rear HDDs are not supported. • The rear I/O 3 does not support NVMe. • The rear NVMe M.2

Configuration	Maximum Operating Temperature 30 °C (86 °F)	Maximum Operating Temperature 35 °C (95 °F)	Maximum Operating Temperature 40 ºC (104 °F)	Maximum Operating Temperature 45 ºC (113 ºF)
		and does not support the PM9D3a.		is not supported.

NOTE

- When a single fan is faulty, the highest operating temperature is 5 °C (41 °F) lower than the rated value.
- When a single fan is faulty, the system performance may be affected.
- It is recommended that servers be deployed at an interval of 1U (the cold and hot aisles containment is required) to reduce server noise and improve server energy efficiency.

A.5 Nameplate

Certified Model	Remarks
2288 V8	Global

A.6 Names and Content of Hazardous Substances

Table A-6 Names and Content of Hazardous Substances

Component		PCBA	Cables	Metal parts
Hazardous Substances	**Pb**	X	X	X
	Hg	O	O	O
	Cd	O	O	O
	Cr(VI)	O	O	O
	PBBS	O	O	O

	PBDES	O	O	O
	DBP	O	O	O
	DIBP	O	O	O
	BBP	O	O	O
	DEHP	O	O	O

- Note 1:
  - O: Indicate that the content of the hazardous substance contained in all of the homogenous materials in the component is within the limits of the national standard for hazardous substances in electric and electronic products.
  - X: Indicate that the content of the hazardous substance contained in at least one homogenous material exceeds the limits of the national standard for hazardous substances in electric and electronic products.
- Note 2: For components not listed above, their hazardous substance content is within the limits of national standard of hazardous substances in electrical and electronic products.

A.7 Sensor List

Sensor	Description	Component
Inlet Temp	Air inlet temperature	Right mounting ear
Outlet Temp	Air outlet temperature	BMC card
1711 Core Temp	Core temperature of the 1711 chip	BMC card
NVMe Max Temp	Maximum temperature of the NVMe SSD drive	NVMe SSD drive
SSD Max Temp	Maximum temperature of the SAS/SATA SSD drives	SAS/SATA SSD drives
CPUN Core Temp	CPU core temperature	CPUN
CPUN DTS	Difference between the real-time CPU temperature and the CPU core temperature threshold	CPUN
CpuN Margin	Difference between the real-time CPU temperature and the CPU Tcontrol threshold	CPUN

Sensor	Description	Component
CPUN MEM Temp	CPU memory module temperature	Memory module corresponding to CPU N
CPUN 12V	12 V voltage supplied by the mainboard to the CPU	Mainboard
CPUN Status	CPU status detection	CPUN
CPUN Memory	CPU memory status check	Memory module corresponding to CPU N
CPUN UPI Link	CPU UPI link fault diagnosis health status	Mainboard or CPU N
CPUN Prochot	CPU Prochot	CPUN
CPUN VCCIN	CPU VCCIN voltage	Mainboard
CPUN FIVRA	CPU FIVRA voltage	Mainboard or CPU *N*
CPUN VCCFA	CPU VCCFA voltage	CPUN
CPUN VCCINF	CPU VCCINF voltage	CPUN
CPUN VCCD0	CPU VCCD0 voltage	CPUN
CPUN VCCD1	CPU VCCD1 voltage	CPUN
CPUN VNN MAIN 1V	CPU VNN MAIN 1 V voltage	CPUN
CPUN VRD Temp	CPU VRD temperature	Mainboard
CPU Power	Total CPU power	CPU
MEM Power	Total memory power	DIMM
PSN VIN	PSU *N* input voltage	PSU *N*
PSN Iin	PSU input current	PSU *N*
PSN IOut	PSU output current	PSU *N*
PSN POut	PSU output power	PSU *N*
PSN Temp	Maximum internal temperature of the PSU	PSU *N*
PSN Inlet Temp	PSU air inlet temperature	PSU *N*
PSN Status	PSU fault status	PSU *N*
PSN Fan Status	PSU fan fault status	PSU *N*
PSN Temp Status	PSU presence status	PSU *N*
PS Redundancy	Redundancy failure due to PSU removal	PSU

Sensor	Description	Component
Power	Server input power	PSU
Disks Temp	Maximum temperature of SAS/SATA drives	SAS/SATA drives:
PowerN	PSU input power	PSU *N*
FANN F Speed	Fan speed	Fan module *N*
FANN R Speed		
FANN Status	Fan fault status	Fan module *N*
FANN Presence	Fan presence	Fan module *N*
FAN Power	Total power of the fan	Fan board
FanBoard Temp	Fan board temperature	Fan board
DIMM	DIMM status	DIMM *N*
STBY 5V	5 V voltage of the mainboard in standby state	Mainboard
SYS 3.3V	3.3 V voltage of the mainboard in the power-on state	Mainboard
STBY 1.05V	1.05 V voltage of the main board in standby state	Mainboard
STBY 1.8V	1.8 V voltage of the mainboard in standby state	Mainboard
STBY 3.3V	3.3 V voltage of the mainboard in standby state	Mainboard
VCC 12V MB 3	12 V voltage of the MB3 on the power-on mainboard	Mainboard
VCC 12V MB 4	12 V voltage of the MB4 on the power-on mainboard	Mainboard
RTC Battery	RTC battery status. An alarm is generated when the voltage is lower than 1 V.	RTC battery on the mainboard
Power Button	Power button pressed status	Mainboard and power button

Sensor	Description	Component
Watchdog2	Watchdog	Mainboard
Mngmnt Health	Management subsystem health status	Management module
UID Button	UID button status	Mainboard
PwrOk Sig. Drop	Voltage dip status	Mainboard
PwrOn TimeOut	Power-on timeout	Mainboard
PwrCap Status	Power capping status	Mainboard
Disk Power	Total power of the drive backplane	Drive backplane
Disk BP$ Power	Drive backplane power	Drive backplane
Disk BP$ Temp	Drive backplane temperature	Drive backplane
Riser$ Temp	Riser card temperature	Riser card
DISK$	Drive status	Drive
RAID Temp	Temperature of the RAID controller card	RAID Control Card
Raid BBU Temp	BBU temperature of the RAID controller card	Supercapacitor of the RAID controller card
PCIE Status	PCIe status error	PCIe card
PCIe$ OP Temp	PCIe card optical module temperature	PCIe card
PCIe$ Temp	PCIe card chip temperature	PCIe card
PCIe RAID$ Temp	PCIe RAID controller card temperature	PCIe RAID controller card
PCIe$ Card BBU	BBU status of the PCIe RAID controller card	PCIe RAID controller card
PCIe NIC$ Temp	PCIe card chip temperature	PCIe card
PCIe FC$ Temp	PCIe card chip temperature	PCIe card
IB$ Temp	IB NIC temperature	IB card
M2 Adapter Temp	M.2 adapter temperature	M.2 riser card
M2Disk1	M.2 drive status on M.2 riser card	M.2 riser card

Sensor	Description	Component
M2Disk2	M.2 drive status on M.2 riser card	M.2 riser card
AreaIntrusion	Listening to the unpacking action	Mainboard
OCP$ OP Temp	OCP card optical module temperature	OCP 3.0 NIC
OCP$ Temp	OCP card chip temperature	OCP 3.0 NIC
SSD Disk$ Temp	SSD temperature	SSD
EXP$ Temp	EXP chip temperature	Drive backplane
GPU$ Power	GPU power	GPU card
GPU$ Temp	GPU temperature	GPU card
GPU$ HBM Temp	HBM chip temperature of the GPU	GPU card
System Notice	Hot restart reminder and fault diagnosis program information collection	N/A
System Error	System suspension or restart. Check the backend logs.	
ACPI State	ACPI status	
SysFWProgress	Software processes and system startup errors	
SysRestart	System restart causes	
Boot Error	Boot error	
CPU Usage	CPU usage	
Memory Usage	Memory usage	
BMC Boot Up	BMC startup event	
SEL Status	Event of SEL being about to be full or being cleared	

B Glossary

B.1 A-E

B

BMC	The baseboard management controller (BMC) complies with the Intelligent Platform Management Interface (IPMI). It collects, processes, and stores sensor signals, and monitors the operating status of components. The BMC provides the hardware status and alarm information about the managed objects to the management system so that the management system can implement unified management of the devices.

E

ejector lever	A part on the panel of a device used to facilitate installation or removal of the device.
Ethernet	A baseband local area network (LAN) architecture developed by Xerox Corporation by partnering with Intel and DEC. Ethernet uses the Carrier Sense Multiple Access/Collision Detection (CSMA/CD) access method and allows data transfer over various cables at 10 Mbit/s. The Ethernet specification is the basis for the IEEE 802.3 standard.

B.2 F-J

G

Gigabit Ethernet (GE)	An extension and enhancement of traditional shared media Ethernet standards. It is compatible with 10 Mbit/s and 100 Mbit/s Ethernet and complies with IEEE 802.3z standards.

H

hot swap	Replacing or adding components without stopping or shutting down the system.

B.3 K-O

K

KVM	A hardware device that provides public keyboard, video and mouse (KVM).

B.4 P-T

P

panel	An external component (including but not limited to ejector levers, indicators, and ports) on the front or rear of the server. It seals the front and rear of the chassis to ensure optimal ventilation and electromagnetic compatibility (EMC).
Peripheral Component Interconnect Express (PCIe)	A computer bus PCI, which uses the existing PCI programming concepts and communication standards, but builds a faster serial communication system. Intel is the main sponsor for PCIe. PCIe is used only for internal interconnection. A PCI system can be transformed to a PCIe system by modifying the physical layer instead of software. PCIe delivers a faster speed and can replace almost all AGP and PCI buses.

R

redundancy	A mechanism that allows a backup device to automatically take over services from a faulty device to ensure uninterrupted running of the system.
redundant array of independent disks (RAID)	A storage technology that combines multiple physical drives into a logical unit for the purposes of data redundancy and performance improvement.

S

server	A special computer that provides services for clients over a network.
Standby 12V Out (SV12)	Standby 12V output of the PSU.
system event log (SEL)	Event records stored in the system used for subsequent fault diagnosis and system recovery.

B.5 U-Z

U

U	A unit defined in International Electrotechnical Commission (IEC) 60297-1 to measure the height of a cabinet, chassis, or subrack. 1U = 44.45 mm (1.75 in).
UltraPath Interconnect (UPI)	A point-to-point processor interconnect developed by Intel.

C Acronyms and Abbreviations

C.1 A-E

A

AC	alternating current
AES	Advanced Encryption Standard New Instruction Set
ARP	Address Resolution Protocol
AVX	Advanced Vector Extensions

B

BBU	backup battery unit
BIOS	Basic Input/Output System
BMC	baseboard management controller

C

CCC	China Compulsory Certification
CD	calendar day
CE	Conformite Europeenne
CIM	Common Information Model
CLI	command-line interface

D

DC	direct current
DDR5	Double Data Rate 5
DDDC	double device data correction
DEMT	Dynamic Energy Management Technology
DIMM	dual in-line memory module
DRAM	dynamic random-access memory
DVD	digital video disc

E

ECC	error checking and correcting
ECMA	European Computer Manufacturer Association
EDB	Execute Disable Bit
EID	enclosure ID
EN	European Efficiency
ERP	enterprise resource planning
ETS	European Telecommunication Standards

C.2 F-J

F

FB-DIMM	Fully Buffered DIMM
FC	Fiber Channel
FCC	Federal Communications Commission
FCoE	Fibre Channel over Ethernet
FTP	File Transfer Protocol

G

GE	Gigabit Ethernet

GPIO	General Purpose Input/Output
GPU	graphics processing unit

H

HA	high availability
HBM	high bandwidth memory
HDD	hard disk drive
HPC	high-performance computing
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure

I

iBMC	intelligent baseboard management controller
IC	Industry Canada
ICMP	Internet Control Message Protocol
IDC	Internet Data Center
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IGMP	Internet Group Message Protocol
IOPS	input/output operations per second
IP	Internet Protocol
IPC	Intelligent Power Capability
IPMB	Intelligent Platform Management Bus
IPMI	Intelligent Platform Management Interface

C.3 K-O

K

KVM	keyboard, video, and mouse

L

LC	Lucent Connector
LRDIMM	load-reduced dual in-line memory module
LED	light emitting diode
LOM	LAN on motherboard

M

MAC	media access control
MMC	module management controller

N

NBD	next business day
NC-SI	Network Controller Sideband Interface

O

OCP	Open Compute Project

C.4 P-T

P

PCIe	Peripheral Component Interconnect Express
PDU	power distribution unit
PHY	physical layer
PMBUS	power management bus
POK	Power OK
PWM	pulse-width modulation
PXE	Preboot Execution Environment

R

RAID	redundant array of independent disks
RAS	reliability, availability and serviceability
RDIMM	registered dual in-line memory module
REACH	Registration Evaluation and Authorization of Chemicals
RJ45	registered jack 45
RoHS	Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment

S

SAS	Serial Attached Small Computer System Interface
SATA	Serial Advanced Technology Attachment
SCM	supply chain management
SDDC	single device data correction
SERDES	serializer/deserializer
SGMII	serial gigabit media independent interface
SMI	serial management interface
SMTP	Simple Mail Transfer Protocol
SNMP	Simple Network Management Protocol
SOL	serial over LAN
SONCAP	Standards Organization of Nigeria-Conformity Assessment Program
SSD	solid-state drive
SSE	Streaming SIMD Extension

T

TACH	tachometer signal
TBT	Turbo Boost Technology
TCG	Trusted Computing Group
TCM	trusted cryptography module
TCO	total cost of ownership

TDP	thermal design power
TELNET	Telecommunication Network Protocol
TET	Trusted Execution Technology
TFM	TransFlash module
TFTP	Trivial File Transfer Protocol
TOE	TCP offload engine
TPM	trusted platform module

C.5 U-Z

U

UBC	Union Bus Connector
UBC DD	Union Bus Connector Double Density
UDIMM	unbuffered dual in-line memory module
UEFI	Unified Extensible Firmware Interface
UID	unit identification light
UL	Underwriter Laboratories Inc.
UPI	UltraPath Interconnect
USB	Universal Serial Bus

V

VCCI	Voluntary Control Council for Interference by Information Technology Equipment
VGA	Video Graphics Array
VLAN	virtual local area network
VRD	voltage regulator-down
VROC	Virtual RAID on CPU

W

WEEE	waste electrical and electronic equipment

WSMAN	Web Service Management