FusionServer X6000 V6 Server

Technical White Paper

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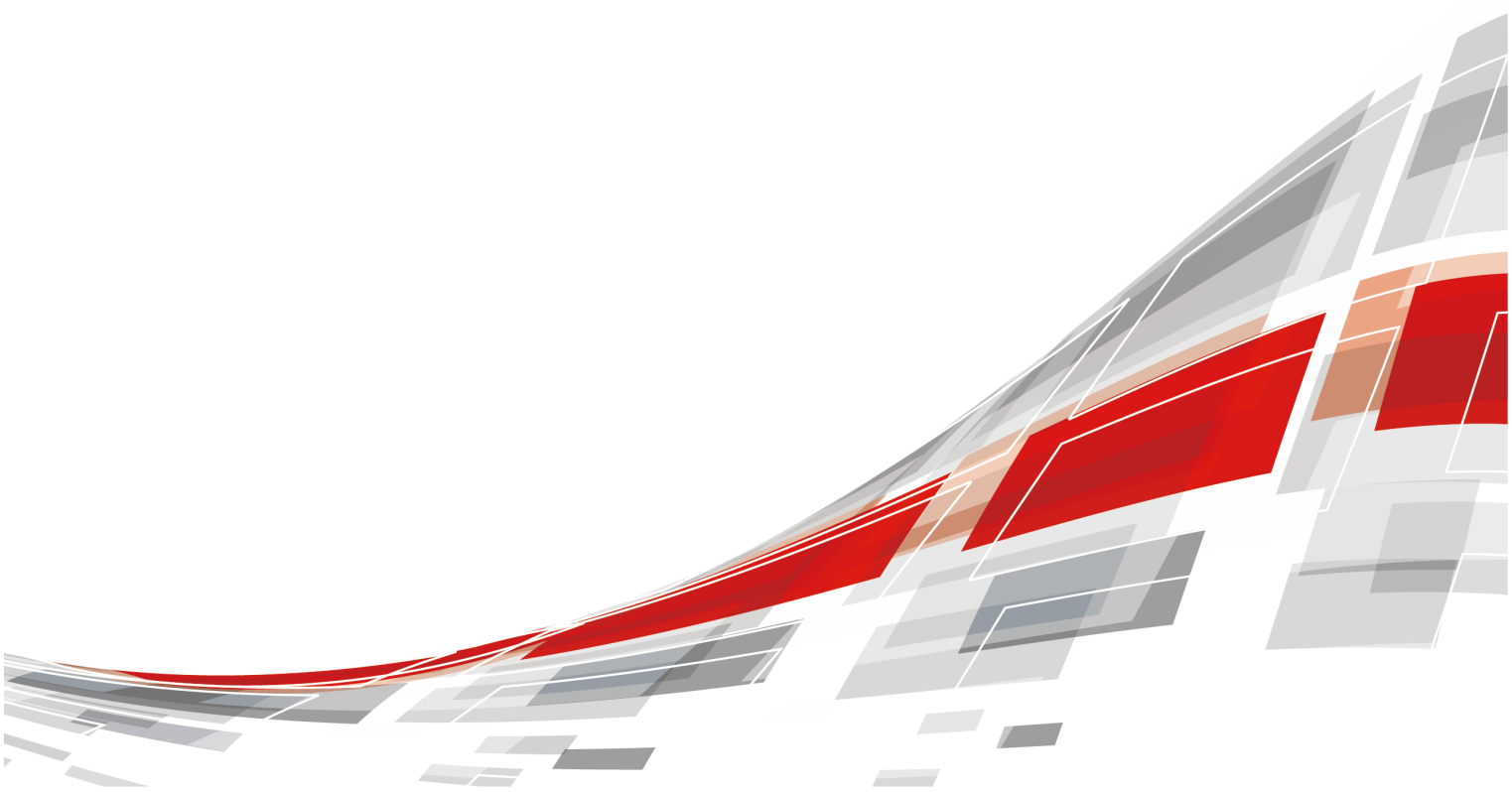

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About This Document

Purpose

This document describes the FusionServer X6000 V6 servers in terms of appearance, system architecture, and component hardware and software compatibility.

Intended Audience

This document is intended for pre-sales engineers.

Symbol Conventions

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

Symbol	Description
DANGER	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated 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	Date	Description
08	2023-12-12	• Updated **10 Certifications**. • Updated **A.1.1.1 Nameplate**.
07	2023-11-30	• Updated **10 Certifications**. • Added **11 Waste Product Recycling**.
06	2023-03-31	• Updated **4 Physical Structure**. • Updated **10 Certifications**.
05	2023-02-10	Updated: • **1 Product Overview** • **3.3 Management System** • **4 Physical Structure**
04	2022-11-03	Updated **8.1 Security**.
03	2022-09-10	Updated: • **6.2 Environmental Specifications** • **6.3 Physical Specifications** • **A.3 Operating Temperature Limitations**
02	2022-03-18	Updated **6.3 Physical Specifications**.
01	2021-07-16	This issue is the first official release.

Contents

1 Product Overview

The FusionServer X6000 V6 server (X6000 V6) is a next-generation 2 U high-density server designed for ISPs, Internet, high-performance computing (HPC), cloud computing, and data center applications. Built on an architecture optimized for software-defined storage (SDS), big data, and software-defined infrastructure (SDI), it is ideal for large-scale server deployment.

X6000 V6 servers feature flexible expansion, high density, reliability, energy efficiency, and easy O&M.

- For Internet and data center applications, X6000 V6 servers provide customized solutions that offer rapid deployment, easy maintenance, and low power consumption.
- For HPC, cloud computing, and ISP applications, X6000 V6 servers provide a hardware platform to meet requirements for high reliability and virtualization performance.

The X6000 V6 supports only XH321 V6 air-cooled server nodes or XH321C V6 liquid-cooled server nodes. A chassis supports only PSUs of the same model and hardware configuration.

NOTE

For details about the X6000 V6 nameplate information, see **A.4 Nameplate**.

Figure 1-1 X6000 V6 server with 24 x 2.5" drives (example)

2 Features

Ultra-High Density and Small Footprint

X6000 V6 servers provide higher density than conventional rack servers, reducing the footprint in equipment rooms.

- The X6000 V6 server provides computing density twice that of a conventional 1 U rack server and four times that of a conventional 2 U rack server in the same cabinet space, which greatly improves space utilization in equipment rooms.
- The X6000 V6 server is 2 U high and supports a maximum of four server nodes in two configurations:
  - 8 x 2.5" front SAS/SATA drives: Each server node supports 2 x 2.5" SAS/SATA drives. The ventilation rate is optimized to meet heat dissipation requirements of higher specifications.
  - 24 x 2.5" front SAS/SATA/NVMe drives: Each server node supports 6 x 2.5" SAS/SATA/NVMe drives in any mixed configuration ratio.

Unified Management and Easy Maintenance

X6000 V6 servers use high-density system architecture, and support maintenance in the cold air area.

- Server node management network port supports aggregated management, so that iBMCs of each server node can work collaboratively to manage fans, PSUs, and other system assets, combining the benefits of blade and rack servers. You can have out-of-band management for the entire system by connecting to the management network port on any server node.

  NOTE

  If only one management network cable is connected to a node, restarting the node will interrupt the management network of the server. The management network will be restored after the iBMC of the node is restarted. If two or more management network cables are connected to any two nodes, this problem can be avoided.
- Server nodes are installed in the rear area and cables are connected to the rear panel, facilitating maintenance.
- X6000 V6 servers adopt the modular design. Drives, fan modules, server nodes, PSUs, and OCP 3.0 network adapters are hot-swappable, greatly improving O&M efficiency.

Shared Architecture and High Energy Efficiency

All server nodes share the system power supply and heat dissipation, improving the power conversion efficiency and reducing energy consumption of heat dissipation. This maximizes the energy efficiency.

- Server nodes share four PSUs in 1+1 or 2+2 redundancy mode based on power consumption, improving power supply capability.
- Server nodes share four counter-rotating fan modules with high wind pressure, which simplifies deployment, improves fan utilization, and enhances the heat dissipation capability of the entire system.
- X6000 V6 servers use Dynamic Energy Management Technology (DEMT) to minimize system energy consumption.
- X6000 V6 servers do not have drive backplanes or system backplanes. This allows ideal system ventilation for processors with the highest specifications.

Redundancy and Reliability

X6000 V6 servers use reliable system architecture that ensures stable and long-term service running.

- Supports four PSUs in 1+1 or 2+2 redundancy based on different power consumption configurations.

  Supports four fan modules in N+1 redundancy mode to improve system reliability.
- Provides RAID controller cards and supercapacitors for power-off protection, ensuring zero service interruption and data loss.
- Carrier-class components and manufacturing processes provide higher stability and longer lifecycle.

3 System Architecture

3.1 Heat Dissipation System

- Air is drawn from the front panel and exhausts from the rear panel. Cool air enters the front panel and passes through the drives, fan modules, middle modules, four server nodes, processors, and DIMMs, and then exits from the rear panel. Air vents are provided on the top, bottom, and side of the server to help heat dissipation.

Figure 3-1 Top view of the X6000 V6 air flow

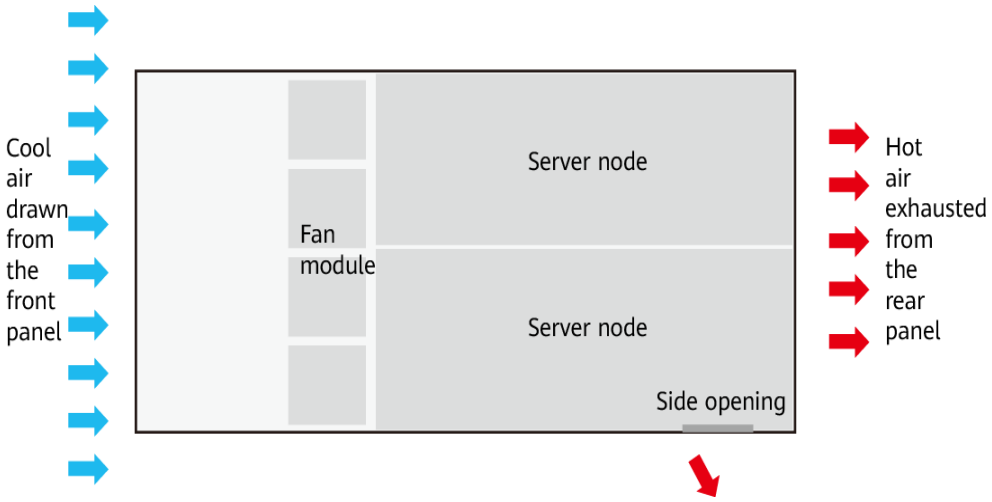
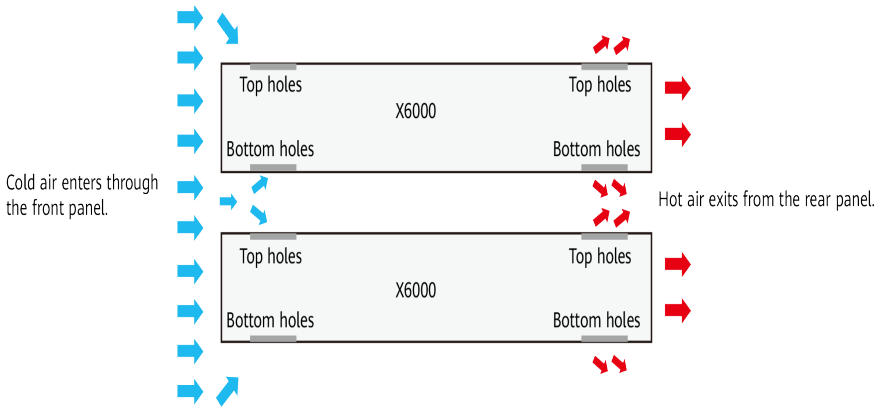


Figure 3-2 Side view of the X6000 V6 air flow



NOTICE

- Ensure that heat is dissipated from the cabinet in time. Heat accumulation and air reflow affect the heat dissipation of the server.
- To prevent device damage due to insufficient heat dissipation, do not block air vents.

- The server uses four 8080/8080+ counter-rotating fans with high wind pressure to improve the heat dissipation capability of X6000 V6 servers, achieving the maximum configuration, power consumption density, and temperature specifications in the industry.
- System energy efficiency optimization: DTS 2.0 intelligently adjusts the fan speed to save energy and achieve optimal energy efficiency.
- With speed adjustment, shock absorption, and noise isolation design, X6000 V6 servers can minimize noise while dissipating heat efficiently.
- Optimized heat dissipation design:
  - Counter-rotating fans with high wind pressure: 20% higher capability of 8080+ fans compared with the last-generation 8080 fans.
  - The refined ventilation channel design concentrates the heat dissipation on heat-sensitive components, improving the heat dissipation efficiency.
  - Reasonable layout of temperature sensors, full coverage of hot spots, and precise speed adjustment.
  - The cellular board increases the porosity by 10% compared with the square hole design.
  - The fan modules use the proportional–integral–derivative (PID) algorithm to ensure that the system can run stably at 35°C (95°F) for a long time.

3.2 Power Supply System

The X6000 V6 server supports two or four hot-swappable PSUs. Based on the relationship between the rated power of the PSUs and that of the server, there are different redundancy modes to ensure that the system performance is not affected

and the system does not break down when a power supply or PSU fault occurs. For details, see **Table 3-1**.

You can use the **Power Calculator** to estimate the configured load power to determine whether the PSUs meet service requirements and the required PSU working mode.

Table 3-1 PSU and power supply redundancy

Number of PSUs	PSU Rated Power and Server Rated Power	PSU Redundancy	Power Supply Redundancy
2	Server < Single PSU	1+1	1+1
	Single PSU ≤ Server	MSPP is used to enable redundancy.	
4	Server < 2 PSUs	2+2	1+1
	2 PSUs ≤ Server < 3 PSUs	3+1	MSPP is used to enable redundancy.
	3 PSUs ≤ Server	MSPP is used to enable redundancy.	
• MSPP is a multi-node power capping function. If the power supply or a PSU fails, MSPP is triggered (see **Table 3-2**) to lower the power consumption upper limit of the server, ensuring that the system's power does not exceed the total rated power of the remaining normal PSUs. In this case, the upper limit of the system performance is affected. • "+N" redundancy of PSUs indicates that the server performance is not affected when *N* PSUs fail. • "+N" redundancy of power supply indicates that the server performance is not affected when *N* power supplies fail. • In typical configuration, the power of an X6000 V6 PSU is 2000 W. The total rated server power is rarely greater than the total rated power of three PSUs.			

Power Capping Mode

The X6000 V6 server supports the following power capping modes:

- MSPP

  The system automatically enables or disables MSPP based on the relationship between the rated power of the server and that of PSUs as described in **Table 3-2**.

  If MSPP is enabled, when a system power supply or PSU fault occurs, MSPP is triggered (see **Table 3-2**). After MSPP is triggered, the system sets the power consumption upper limit for the server node based on the total rated power of the remaining normal PSUs to ensure that the power of the entire system does not exceed the total rated power. In this case, the upper limit of the system performance is affected.

NOTE

- After MSPP is enabled, the server performance will deteriorate. The performance deteriorates more as the gap between the server rated power and the capped power becomes larger.
- MSPP cannot eliminate server breakdowns in some extreme scenarios:
  - Improper maintenance operations, such as removing a PSU without removing the cable first, will cause system power failure because MSPP cannot be triggered before other PSUs are overloaded. To prevent this problem, remove the cable before removing a PSU.
  - If a PSU short circuit fault occurs, the power supply cannot remain for 10 ms for MSPP to be triggered and a system breakdown will occur. According to historical statistics, the failure rate of PSU short circuits is less than 0.0002%.

- User-defined power capping mode

  This mode enables you to set a power capping value for the server or a server node to adjust the power distribution of the cabinet or equipment room. User configuration modes are classified into the following types:

  – User-defined server power capping:

    You can enable the power capping function for a server using the iBMC CLI and set the power capping value as required. After the configuration is successful, the power of the server does not exceed the configured power.

  – User-defined server node power capping:

    You can enable the power capping function for a server node on the iBMC WebUI and set the power capping value as required. After the configuration is successful, the power of the server node does not exceed the configured power.

NOTE

- MSPP and user-defined power capping cannot be enabled together.
- Before using the MSPP or user-defined power capping mode, enable EIST on the BIOS. For details, see the ***FusionServer X6000 Server iBMC User Guide***.
- For details about how to configure the power capping mode, see the ***FusionServer X6000 Server iBMC User Guide***.

When different number of PSUs are configured, the system automatically enables the MSPP or user-defined power capping mode based on the rated power of the server and that of the PSUs. For details, see **Table 3-2**.

Table 3-2 Status of the MSPP or user-defined power capping mode

Number of PSUs	PSU Rated Power and Server Rated Power	Power Capping Mode Status (Set by the System)
2	Server < Single PSU	• MSPP disabled • User-defined power capping disabled
	Single PSU ≤ Server	• MSPP enabled (triggered by a single PSU failure) • User-defined power capping disabled

Number of PSUs	PSU Rated Power and Server Rated Power	Power Capping Mode Status (Set by the System)
4	Server < 2 PSUs	• MSPP disabled • User-defined power capping disabled
	2 PSUs ≤ Server < 3 PSUs	• MSPP enabled (triggered by failure of two PSUs) • User-defined power capping disabled
	3 PSUs ≤ Server	• MSPP enabled (triggered by a single PSU failure) • User-defined power capping disabled

NOTE

After modifying the configuration or adding optional components, you need to recalculate the total power of the server to check whether the current PSUs meet the requirements of the new system.

PSU Working Mode

The X6000 V6 server supports the following PSU working modes:

- Active/Standby mode:
  - 1+1 active/standby mode: This mode is supported when the X6000 V6 server is configured with two PSUs and the real-time power of the server is less than the rated power of a single PSU. In this mode, the active PSU bears the system load, and the standby PSU works in the hot standby state.
  - 2+2 active/standby mode: This mode is supported when the X6000 V6 server is configured with four PSUs and the real-time power of the server is less than the total rated power of two PSUs. In this mode, two active PSUs bear the system load, and the two standby PSUs work in hot standby state.

    NOTE

    After a PSU enters the hot standby state, the output current decreases and the power indicator is steady green, which is the same as the normal state. You can query the PSU status by running the **ipmcget -d psuinfo** command on the iBMC CLI. For details, see the ***FusionServer X6000 Server iBMC User Guide***.

    In active/standby mode:
  - If the real-time power of the server exceeds the total rated power of active PSUs, the standby PSUs are woken up and the system enters the load balancing mode.
  - If any PSU is removed or the input is lost, the standby PSU is woken up and enters the normal output state to ensure that the entire system is not powered off.
- Load balancing mode: In this mode, each PSU evenly bears the system load, and their output power is similar.

PSUs work in load balancing mode by default. To set the PSUs to work in active/standby mode, log in to the iBMC WebUI, choose **System** > **Power** > **Power Supply Info** > **Power Supply Settings** to set the Work Mode to **Active/Standby**. Table 3-3 describes PSU working modes based on the relationship between the real-time power of the server and that of PSUs when different number of PSUs are configured.

Table 3-3 Active/Standby and load balancing modes

Number of PSUs	MSPP Status Note	Total PSU Rated Power and Real-Time Server Power	PSU Working Mode
2	Triggered	-	Load balancing mode
	Not triggered	Server < Single PSU	By default, the load balancing mode is used. You can change it to 1+1 active/standby mode. When the real-time power of the server exceeds the rated power of a single PSU, the system automatically switches to the load balancing mode.
		Single PSU ≤ Server	Load balancing mode
4	Triggered	-	Load balancing mode
	Not triggered	Server < 2 PSUs	By default, the load balancing mode is used. You can change it to 2+2 active/standby mode. When the real-time power of the server exceeds the total rated power of two PSUs, the system automatically switches to the load balancing mode.
		2 PSUs ≤ Server < 3 PSUs	Load balancing mode
		3 PSUs ≤ Server	Load balancing mode
Note: For details about the MSPP triggering conditions, see Table 3-2.			

3.3 Management System

The X6000 V6 server management system uses the iBMC collaborative management architecture. Customers can manage server nodes and the chassis through the management network port of any server node.

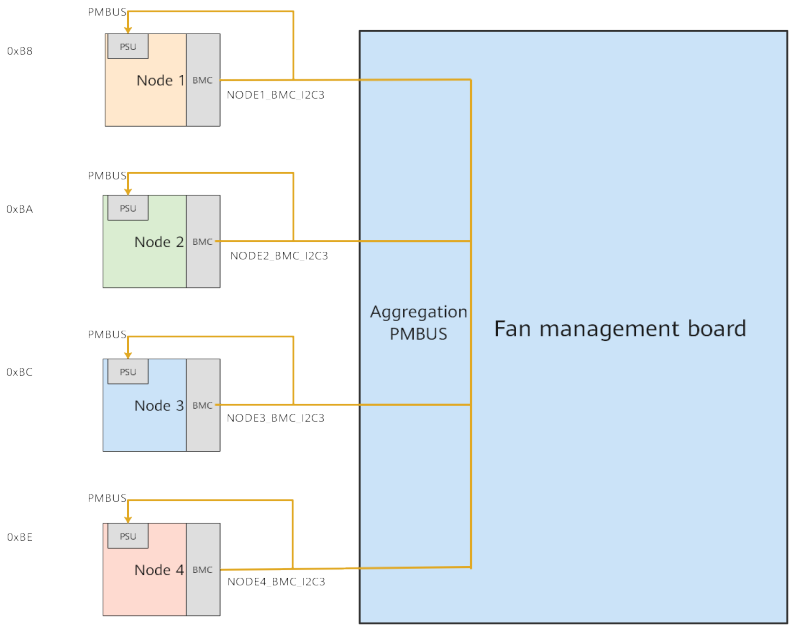
- Each server node iBMC manages the server node through the IPMI, KVM, or virtual CD-ROM drive.

- The iBMCs of server nodes collaboratively manage the chassis, including the fan modules, power supplies, and chassis assets.

NOTE

- To avoid the switch loop problem, when the multi-node management system is running through cables, only the node with the smallest slot number functions as the master node for server node and chassis access management, and other node connections cannot be used for management as backup connections.
- If the management system of the active node stops running or the connection fails, the system automatically selects the new node with the smallest slot number from the nodes that have been connected as the active node for the access management of server nodes and the chassis.

Figure 3-3 X6000 V6 monitoring and management design



Server Node

The iBMC of each X6000 V6 server node provides an independent IP address for external access. You can access the iBMC of any server node to manage an X6000 V6 server.

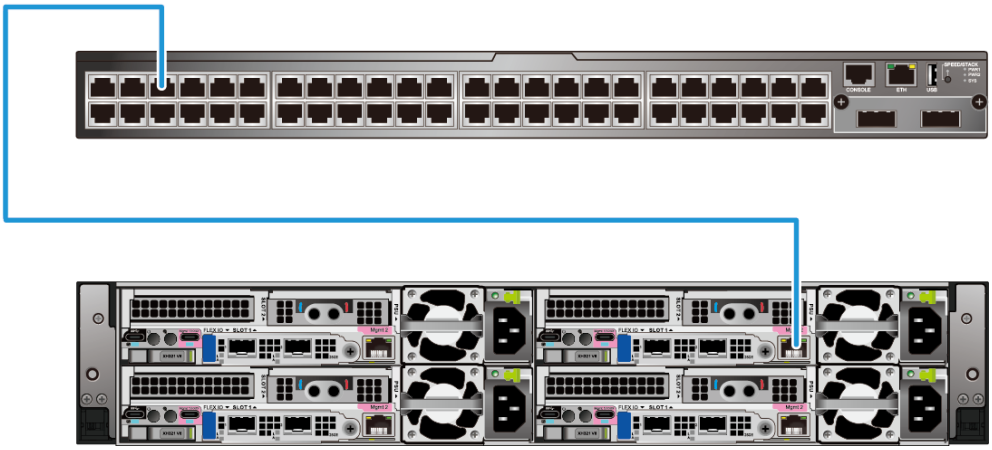
You can access the iBMC of a server node in the following ways:

- Access the iBMC through the management network port of a server node. (You can access iBMCs of the four server nodes through the management network port of any server node.)
- Access the iBMC of a server node through the direct connection management port.

- Access the iBMC in NC-SI mode through the service network port of the NIC that supports NC-SI.

  The out-of-band management network cables are connected to a server node (the default configuration on the BIOS menu). For details, see **Figure 3-4**.

Figure 3-4 Point-to-point cabling



NOTE

In NC-SI mode, the management network cable can be used as a service network cable and connected to a service network port.

Fan Module

The server node iBMCs and fan management board work together to monitor and manage fan modules.

- The server node iBMC determines a proper speed based on speed adjustment algorithms and delivers the speed to the fan management board in the middle module to control the fan speed. The fan management board detects the operating status of the fan modules through the rotation speed feedback signals, and reports to server node iBMCs for the fan module health management.
- The fan management board of the middle module provides four independent pulse-width modulation (PWM) control signals for controlling the fan speed and eight TACH signals for detecting the fan speed.

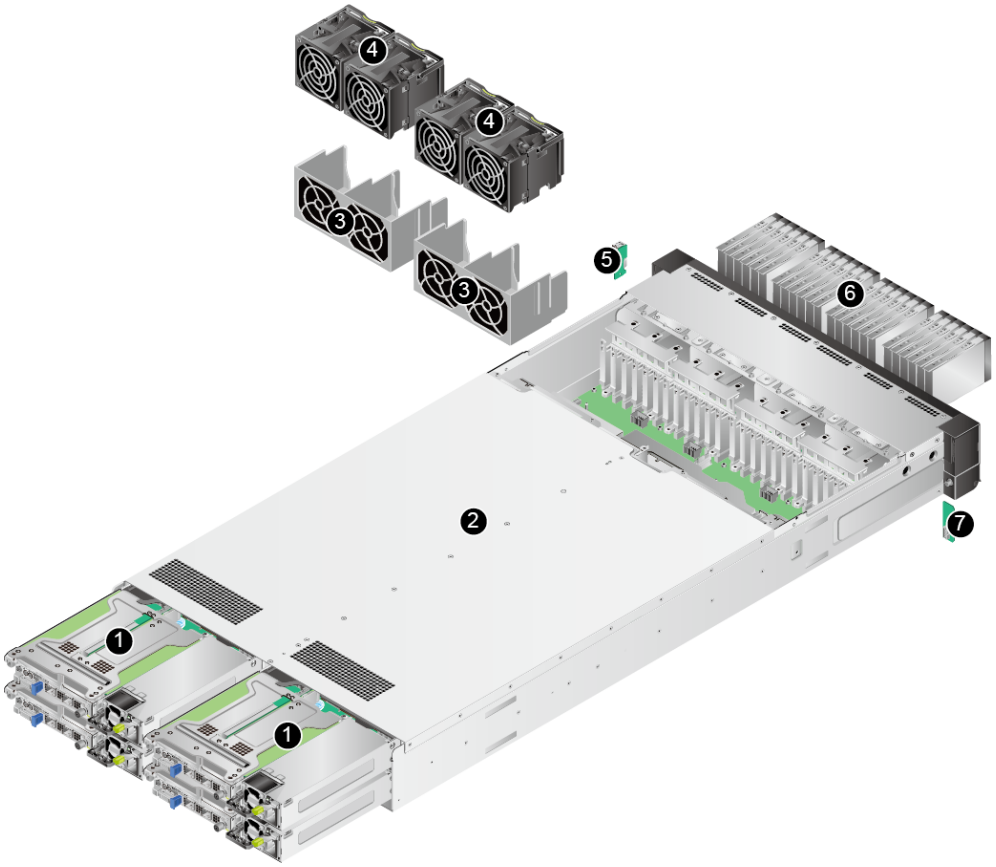
PSU

The server node iBMCs and fan management board work together to monitor and manage PSUs.

- Each server node provides an I^2C bus to manage all PSUs. The iBMC of each server node supports input power queries, installation status detection, and PSU alarm reporting.
- The iBMC of each server node and the CPLD of the fan management board in the middle module provide the GPIO to detect the presence and PWROK of PSUs.

4 Physical Structure

Figure 4-1 Physical structure of an X6000 V6 server with 24 x 2.5" drives (example)



1	Server nodes	2	Chassis module (chassis + middle module)
3	Fan module bracket	4	Fan modules
5	Right mounting ear plate	6	Drives
7	Left mounting ear plate	-	-

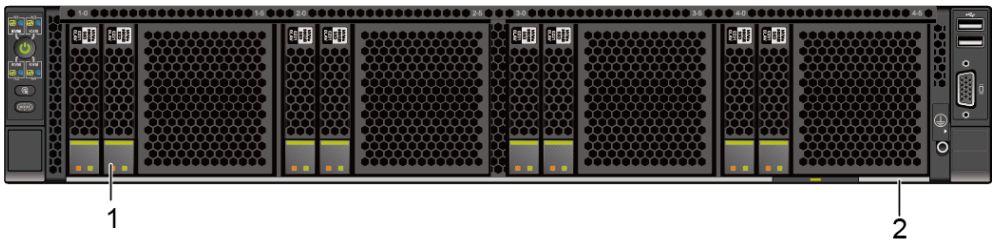
5 Hardware Description

5.1 Front Panel

5.1.1 Appearance

- 8 x 2.5" drive configuration

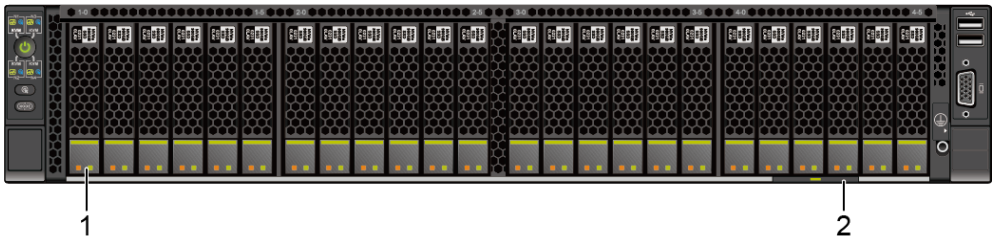
Figure 5-1 Front panel of a server with 8 x 2.5" drives



1	Drives	2	Slide-out label plate (with an SN label)

- 24 x 2.5" drive configuration

Figure 5-2 Front panel of a server with 24 x 2.5" drives



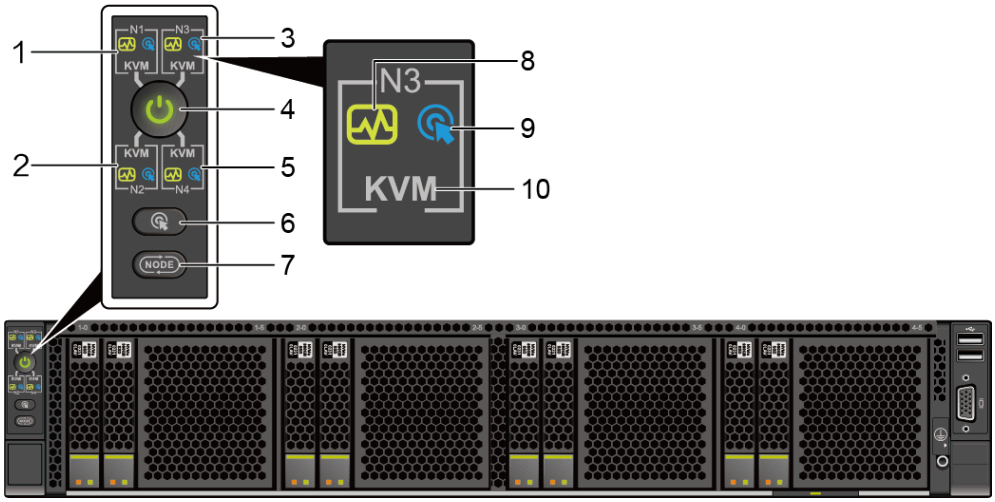
1	Drives	2	Slide-out label plate (with an SN label)

5.1.2 Indicators and Buttons

Indicator and Button Positions

- 8 x 2.5" drive configuration

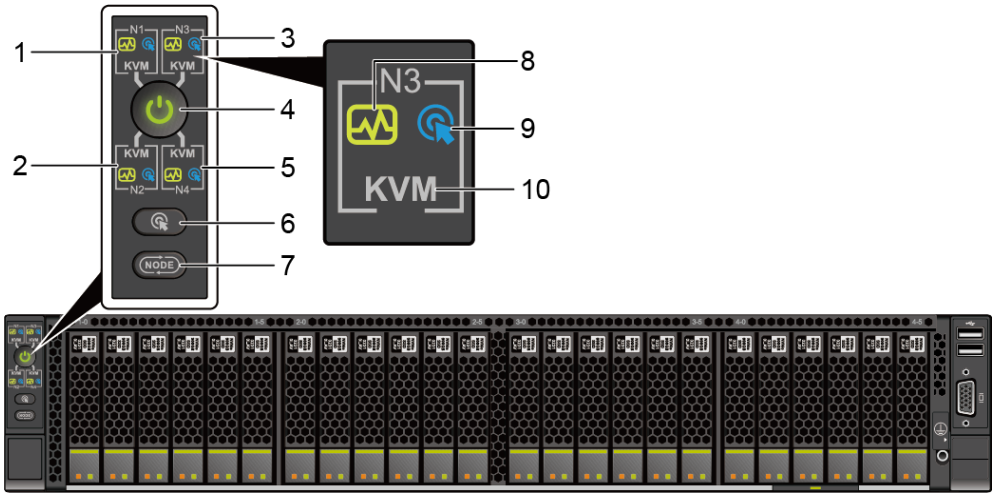
Figure 5-3 Indicators and buttons on the front panel



1	Indicators of server node 1	2	Indicators of server node 2
3	Indicators of server node 3	4	Power button/indicators
5	Indicators of server node 4	6	Unit Identification Light (UID) button
7	Server node switchover button	8	Server node health indicator
9	Server node UID indicators	10	Server node indicators

- 24 x 2.5" drive configuration

Figure 5-4 Indicators and buttons on the front panel



1	Indicators of server node 1	2	Indicators of server node 2
3	Indicators of server node 3	4	Power button/indicators
5	Indicators of server node 4	6	Unit Identification Light (UID) button
7	Server node switchover button	8	Server node health indicator
9	Server node UID indicators	10	Server node indicators

Indicator and Button Description

Table 5-1 Description of indicators and buttons on the front panel

Silkscreen	Name	Description
	Power button/ Indicator	Indicates the power status of the selected server node. For details, see the server node indicator descriptions. ● Off: The device is not powered on. ● 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 is steady yellow. ● Steady yellow: The device is standby. Power button description: ● 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	The UID button is used to locate the server node to be operated. UID button: ● You can press the UID button or use the iBMC remote control to turn on or off the UID indicator of a server node. ● You can press the UID button to turn on or off the UID indicator of a server node. ● You can press and hold down the UID button for 4 to 6 seconds to reset the iBMC of the server node.
	Server node UID indicator	The UID indicator is used to locate the server node to be operated. ● Off: The device is not being located. ● Blinking or steady blue: The device is being located.

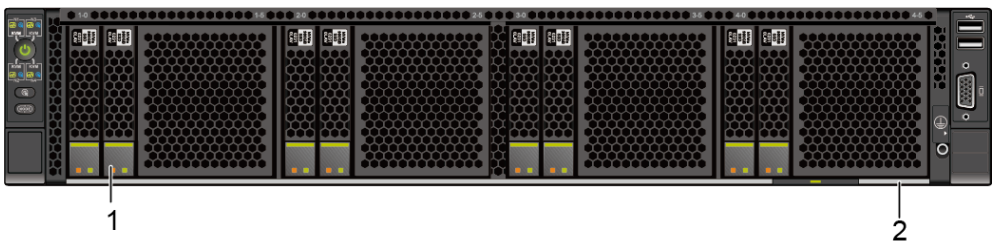
Silkscreen	Name	Description
	Server node switchover button	Press the server node switchover button to switch to the selected server node. When a server node is selected, its indicator is steady white. **NOTE** If the server is not fully configured with server nodes, the system automatically skips vacant server node positions after you press the node switchover button, and switches among detected server nodes. If there are only three server nodes (server node 1, server node 2, and server node 4), server node 3 is skipped automatically when a switchover is initiated.
	Server node health indicator	Indicates the health status of each server node. ● Off: There is no power supply, or the server node is 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.
	Server node indicator	Indicates whether a server node is selected. ● Off: The server node is not selected. ● Steady white: The server node is selected. **NOTE** ● Press the server node switchover button to switch to the selected server node. ● When a server node is selected, connection to the server node is switched to the power button/indicator and UID button on the left mounting ear as well as the VGA and USB ports on the right mounting ear.

5.1.3 Ports

Port Positions

- 8 x 2.5" drive configuration

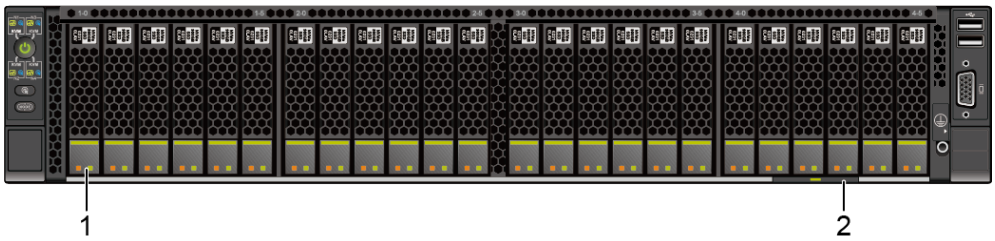
Figure 5-5 Ports on the front panel



1	USB 2.0 port	2	VGA Port

- 24 x 2.5" drive configuration

Figure 5-6 Ports on the front panel



1	USB 2.0 port	2	VGA Port

Port Description

Table 5-2 Description of ports on the front panel

Name	Type	Quantity	Description
USB ports	USB 2.0	2	Used to connect to a USB 2.0 device. **NOTICE** • A connected external USB device supports a maximum current of 1.2 A. • Before connecting an external USB device, ensure that the USB device functions properly; otherwise, it may adversely impact the server.
VGA ports	DB15	1	Used to connect a display terminal, such as a monitor or KVM.

5.2 Rear Panel

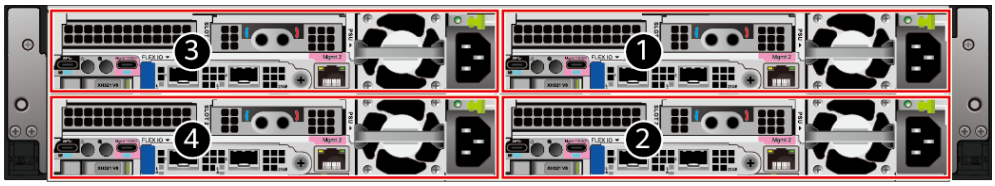
- Air-cooled server node configuration

Figure 5-7 Rear panel of a server with four XH321 V6 server nodes

1	Air-cooled server node 1	2	Air-cooled server node 2
3	Air-cooled server node 3	4	Air-cooled server node 4

- Liquid-cooled server node configuration

Figure 5-8 Rear panel of a server with four XH321C V6 server nodes



1	Liquid-cooled server node 1	2	Liquid-cooled server node 2
3	Liquid-cooled server node 3	4	Liquid-cooled server node 4

5.3 Storage

5.3.1 Drive Configurations

Drive Configuration

Table 5-3 Drive Configuration

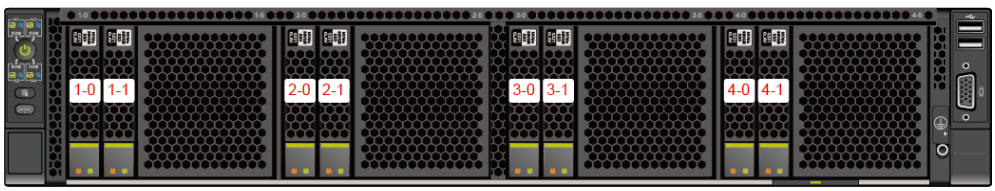
Configuration	Front Drive	Drive Management Mode
8 x 2.5" drive configuration 1	• Front drive: 8 x 2.5" – Slots 1-0 to 4-1 support only SATA drives. – Each node supports a maximum of two drives.	• PCH pass-through

Configuration	Front Drive	Drive Management Mode
8 x 2.5" drive configuration 2	• Front drive: 8 x 2.5" – Slots 1-0 to 4-1 support SAS/SATA drives. – Each node supports a maximum of two drives.	• Screw-in RAID controller card
24 x 2.5" drive configuration 1	• Front drive: 24 x 2.5" – Slots 1-0 to 4-5 support SATA/ NVMe drives. – Each node supports a maximum of six drives.	• SATA drive: PCH • NVMe drive: CPU
24 x 2.5" drive configuration 2	• Front drive: 24 x 2.5" – Slots 1-0 to 4-5 support SAS/SATA/ NVMe drives. – Each node supports a maximum of six drives.	• SAS/SATA drive: screw-in RAID controller card • NVMe drive: CPU
Contact your local sales representative or see "Search Parts" in the **Compatibility Checker** to determine the components to be used.		

Slot numbers

- **Table 5-3** shows drive slot numbers of 8 x 2.5" drive configuration 1 and 8 x 2.5" drive configuration 2

Figure 5-9 Slot numbers



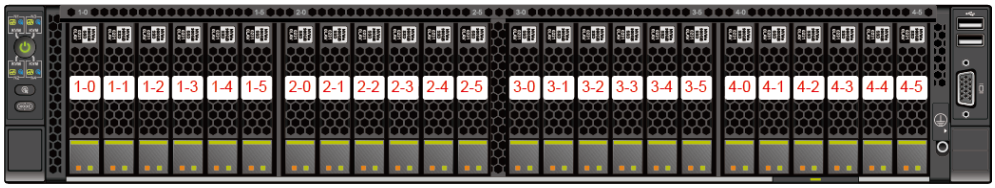
Each server node manages two drives. Drives from left to right are managed by server node 1, server node 2, server node 3, and server node 4 in sequence.

Table 5-4 Slot numbers

Server Node	Drive No.	Drive Number Displayed on the iBMC WebUI
Server node 1	1-0	0
	1-1	1
Server node 2	2-0	0
	2-1	1
Server node 3	3-0	0
	3-1	1
Server node 4	4-0	0
	4-1	1

- Table 5-3 shows drive slot numbers of 24 x 2.5" drive configuration 1 and 24 x 2.5" drive configuration 2

Figure 5-10 Slot numbers



Each server node manages six drives. Drives from left to right are managed by server node 1, server node 2, server node 3, and server node 4 in sequence.

Table 5-5 Slot numbers

Server Node	Drive No.	Drive Number Displayed on the iBMC WebUI
Server node 1	1-0	0
	1-1	1
	1-2	2
	1-3	3
	1-4	4
	1-5	5
Server node 2	2-0	0

Server Node	Drive No.	Drive Number Displayed on the iBMC WebUI
	2-1	1
	2-2	2
	2-3	3
	2-4	4
	2-5	5
Server node 3	3-0	0
	3-1	1
	3-2	2
	3-3	3
	3-4	4
	3-5	5
Server node 4	4-0	0
	4-1	1
	4-2	2
	4-3	3
	4-4	4
	4-5	5

5.3.2 Drive Indicators

SAS/SATA Drive Indicators

Figure 5-11 SAS/SATA drive indicators

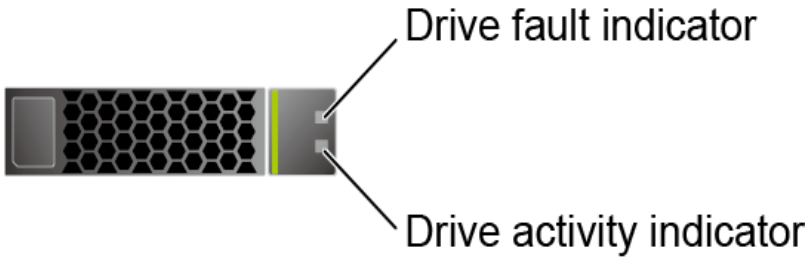
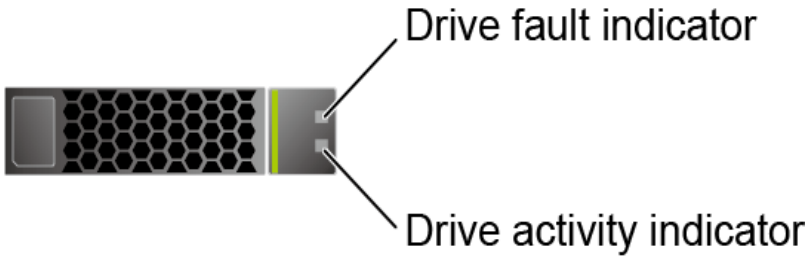


Table 5-6 SAS/SATA drive indicators

Activity Indicator (Green)	Fault Indicator (Yellow)	Description
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 at 1 Hz	The drive is being located.
Blinking at 1 Hz	Blinking at 1 Hz	Data on the secondary drive is being rebuilt.
Off	Steady on	A drive in a RAID array is removed.
Steady on	Steady on	The drive is faulty.

NVMe Drive Indicators

Figure 5-12 NVMe drive indicators



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

Table 5-7 NVMe drive indicators (VMD enabled)

Activity Indicator (Green)	Fault Indicator (Yellow)	Description
Off	Off	The NVMe drive is not detected.
Steady on	Off	The NVMe drive is detected and operating properly.
Blinking at 2 Hz	Off	Data is being read from or written to the NVMe drive.
Off	Blinking at 2 Hz	The NVMe drive is being located.
Off	Blinking at 8 Hz	The data on the secondary NVMe drive is being rebuilt.

Activity Indicator (Green)	Fault Indicator (Yellow)	Description
Steady on/Off	Steady on	The NVMe drive is faulty.

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

Table 5-8 NVMe drive indicators (VMD disabled)

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

NOTE

Hot swap refers to inserting or removing a component without cutting off the power supply to the device.

- Surprise hot swap: inserting or removing a component directly without any notice.
- Orderly hot swap: inserting or removing a component after sending a notice.

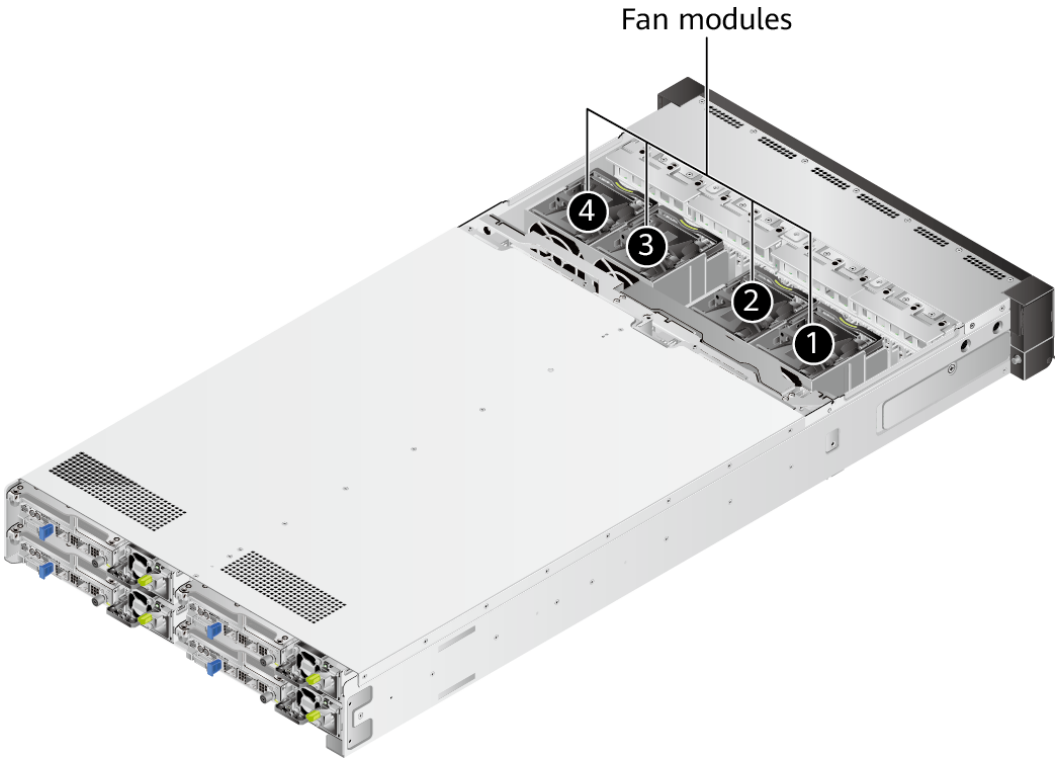
5.4 Fan Modules

- Supports four 8080/8080+ counter-rotating fan modules with high wind pressure.
- The fan modules are hot-swappable.
- N+1 redundancy is supported. That is, the server can work properly when a single fan rotor fails.

  NOTE

  When one fan fails, the supported maximum operating temperature is reduced by 5°C (9°F).
- The fan speed can be adjusted.
- Fan modules of the same part number (P/N code) must be used in a server.

Figure 5-13 Positions of fan modules



5.5 Middle Modules

The middle module consists of the drive cable module, fan management board, and middle column.

- Drive cable module supplies power to drives and provides data transmission channels.
- Fan management board supplies power to fans and drives fans.
- Middle column secures high-speed cable terminals.

Figure 5-14 Middle module (8 x 2.5" drive configuration)

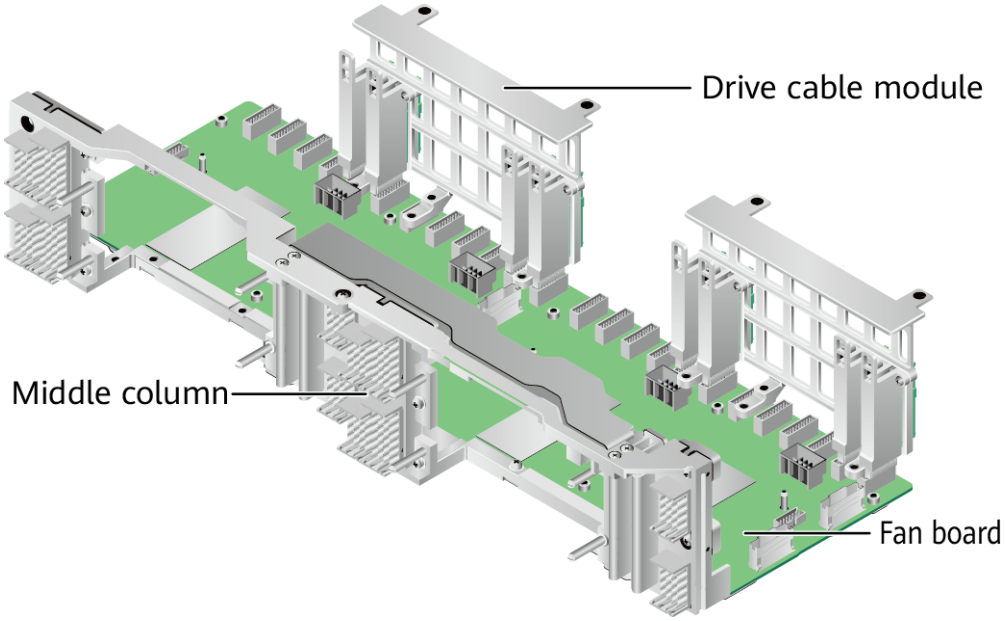


Figure 5-15 Middle module (24 x 2.5" drive configuration)

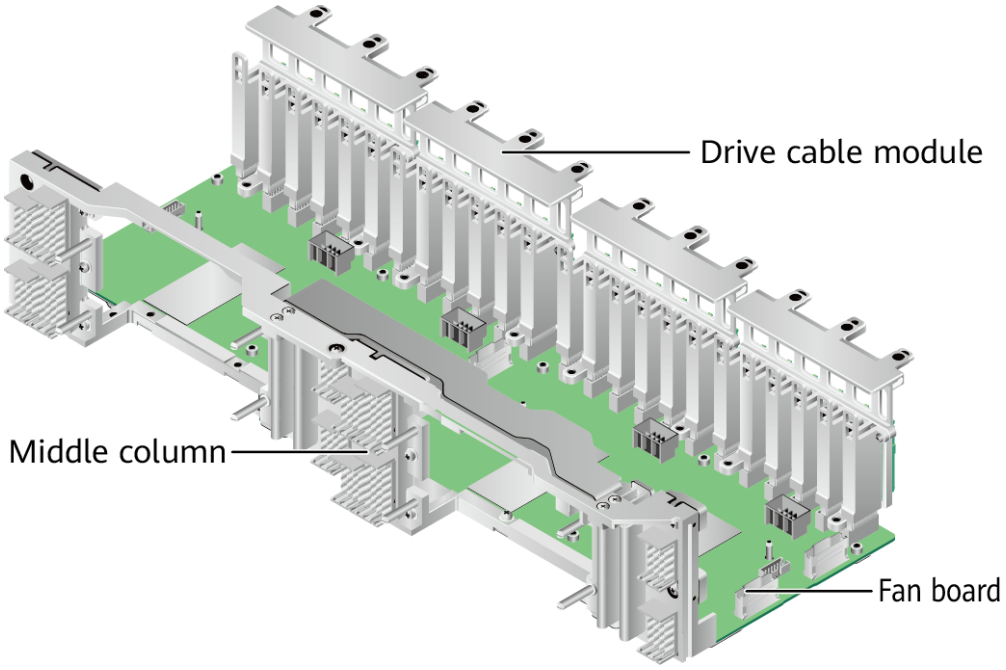
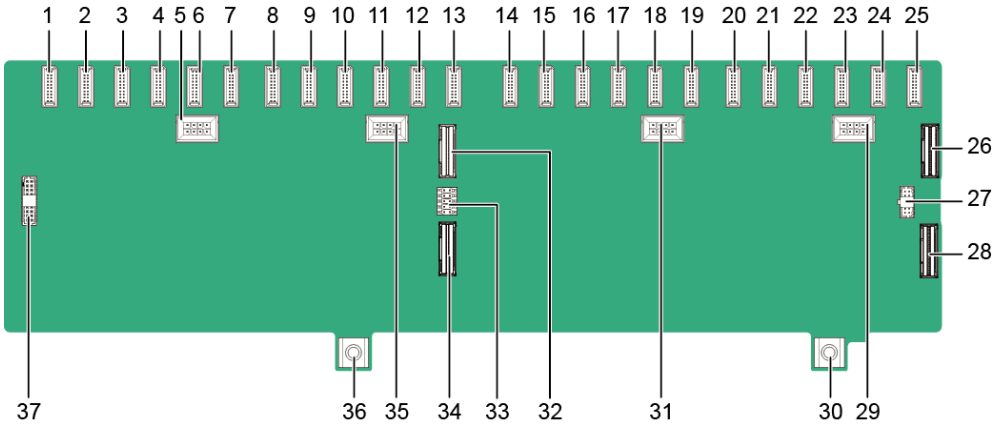


Figure 5-16 Fan management board



1	Drive cable module connector (J46)	2	Drive cable module connector (J43)
3	Drive cable module connector (J42)	4	Drive cable module connector (J41)
5	Fan module connector 4 (FAN_4/J42)	6	Drive cable module connector (J44)
7	Drive cable module connector (J45)	8	Drive cable module connector (J38)
9	Drive cable module connector (J35)	10	Drive cable module connector (J36)
11	Drive cable module connector (J37)	12	Drive cable module connector (J40)
13	Drive cable module connector (J39)	14	Drive cable module connector (J34)
15	Drive cable module connector (J31)	16	Drive cable module connector (J30)
17	Drive cable module connector (J29)	18	Drive cable module connector (J32)
19	Drive cable module connector (J33)	20	Drive cable module connector (J24)
21	Drive cable module connector (J26)	22	Drive cable module connector (J27)
23	Drive cable module connector (J28)	24	Drive cable module connector (J25)
25	Drive cable module connector (J23)	26	Server node 1 connector (J12)
27	Left mounting ear connector (J9)	28	Server node 2 connector (J13)

29	Fan module connector 1 (FAN_1/J62)	30	Power connector (J9)
31	Fan module connector 2 (FAN_2/J61)	32	Server node 3 connector (J21)
33	JTAG connector (J17)	34	Server node 4 connector (J22)
35	Fan module connector 3 (FAN_3/J60)	36	Power connector (J10)
37	Right mounting ear connector (J48)	-	-

5.6 Server Node

The X6000 V6 supports a maximum of four server nodes (XH321 V6 or XH321C V6).

- For details about the XH321 V6 server node, see the ***FusionServer XH321 V6 Server Node User Guide***.
- For details about the XH321C V6 server node, see the ***FusionServer XH321C V6 Liquid-cooled Server Node User Guide***.

Figure 5-17 Appearance of the XH321 V6

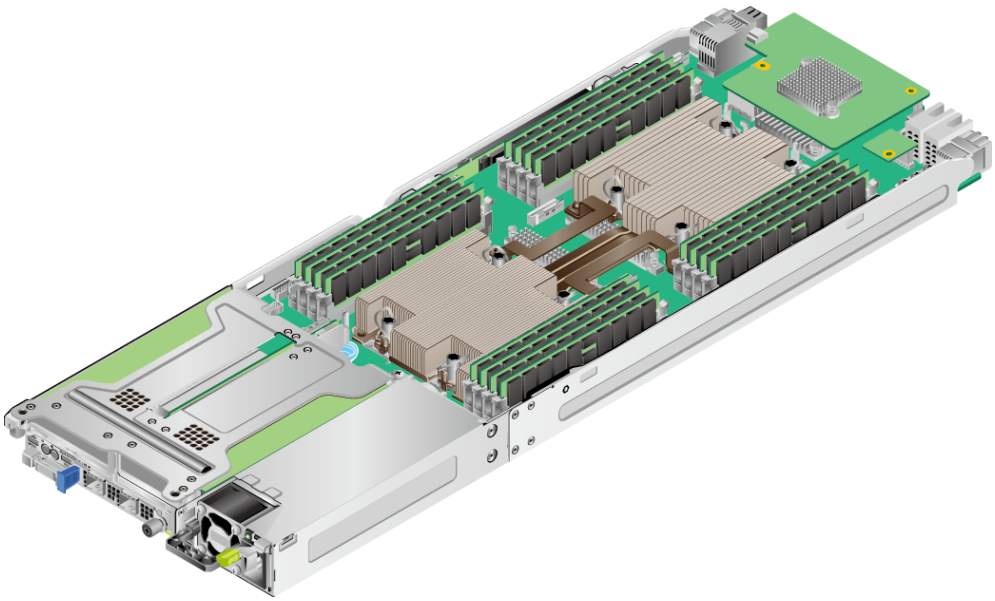
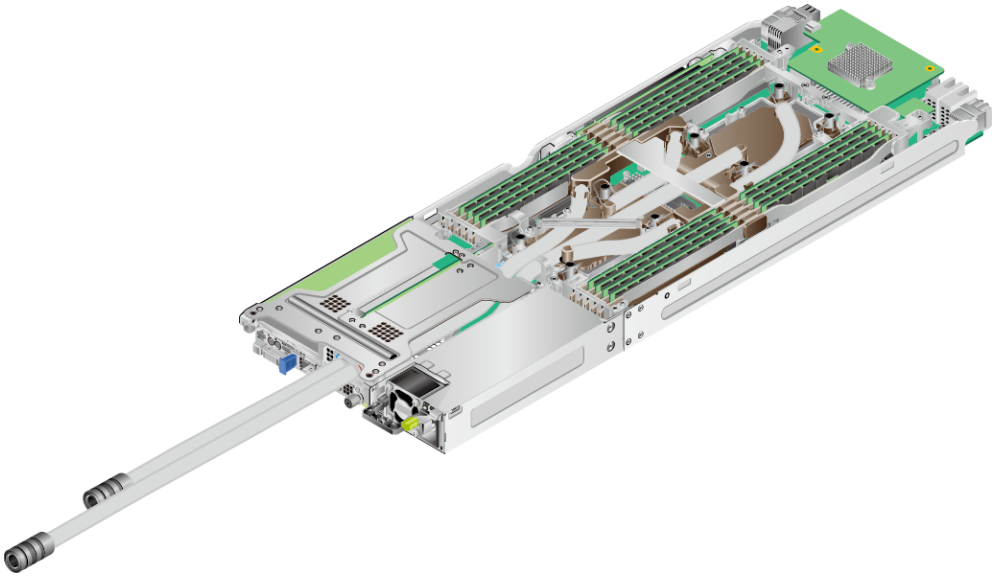


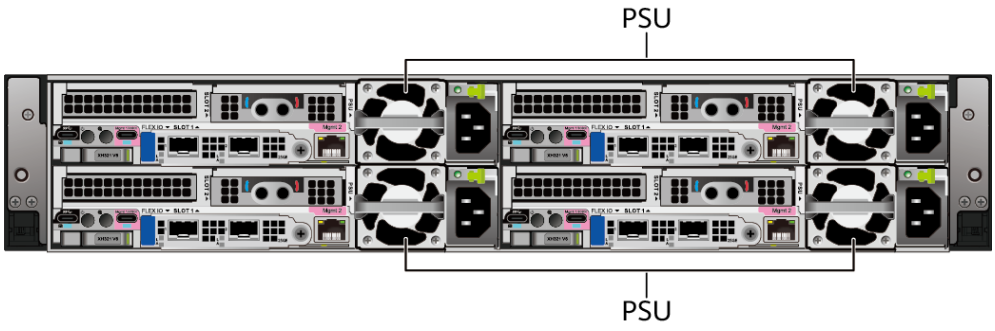
Figure 5-18 Appearance of the XH321C V6



5.7 PSUs

- PSUs are installed in server nodes, so the power consumption of a server varies depending on the server configuration:
  - When two server nodes are configured, the PSUs work in 1+1 redundancy mode.
  - When four server nodes are configured, the PSUs work in 2+2 redundancy mode.
- PSUs of the same part number (P/N code) must be used in a server.
- The PSUs are protected against short circuit. Double-pole fuse is provided for the PSUs with dual input live wires.
- If the DC power supply is used, purchase the DC power supply that meets the requirements of the corresponding safety standards or the DC power supply that has passed the CCC certification.
- Contact your local sales representative or see "Search Parts" in the **Compatibility Checker** to determine the components to be used.

Figure 5-19 PSU positions



6 Product Specifications

6.1 Technical Specifications

Table 6-1 Technical specifications

Component	Description
Form factor	2 U 4-node high-density server
Server nodes	Supports a maximum of four server nodes, including XH321 V6 and XH321C V6 server nodes. **NOTE** All server nodes in a chassis must have the same model and the same hardware configuration.
Storage	Supports a variety of drive configurations. For details, see **5.3.1 Drive Configurations**. ● Supports hot swap of SAS/SATA/NVMe U.2 drives. **NOTE** The NVMe drives support: ● 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. ● Surprise hot swap if the VMD function is enabled and the latest Intel VMD driver is installed. ● Orderly hot swap if the VMD function is disabled. ● If OS is installed on an NVMe SSD, BIOS can only be set to the UEFI mode.

Component	Description
Fan modules	• Provides four fan modules. • Supports N + 1 redundancy. • Supports hot swap (in non-stacking installation scenarios).
Middle modules	Provides a maximum of 24-drive cable module connectors, four fan module connectors, and two mounting ear cable connectors.
Ports	Supports a variety of ports. • Ports on the front panel: – Two USB 2.0 ports – One DB15 VGA port • Ports on the rear panel: – For details about the XH321 V6, see ***FusionServer XH321 V6 Server Node User Guide***. – For details about the XH321C V6, see ***FusionServer XH321C V6 Liquid-cooled Server Node User Guide***.

6.2 Environmental Specifications

Table 6-2 Environmental specifications

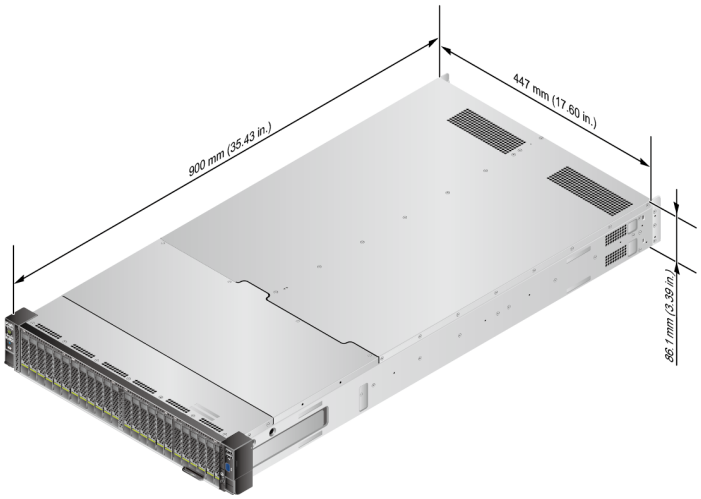
Item	Description
Temperature	• Operating temperature: 5°C to 45°C (41°F to 113°F) (ASHRAE Classes A1 to A4 compliant) • Storage temperature (within three months): –30°C to +60°C (–22°F to +140°F) • Storage temperature (within six months): –15°C to +45°C (5°F to 113°F) • Storage temperature (within one year): –10°C to +35°C (14°F to 95°F) • Maximum rate of temperature change: 20°C (36°F) per hour, 5°C (9°F) per 15 minutes **NOTE** The highest operating temperature varies depending on the server configuration. For details, see **A.3 Operating Temperature Limitations**.

Item	Description
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%/h
Air volume	≥350 CFM
Operating altitude	≤ 3050 m (10006.44 ft) ● If the server complies with ASHRAE Classes A1 and A2, the maximum operating temperature decreases by 1°C (1.8°F) for every increase of 300 m (984.25 ft) in altitude above 900 m (2952.76 ft). ● When the server configuration complies with ASHRAE Class A3 and the altitude is above 900 m (2952.76 ft), the highest operating temperature decreases by 1°C (1.8°F) for every increase of 175 m (574.14 ft). ● When the server configuration complies with ASHRAE Class A4 and the altitude is above 900 m (2952.76 ft), the highest operating temperature decreases by 1°C (1.8°F) for every increase of 125 m (410.1 ft). ● HDDs cannot be used at an altitude of over 3,050 m (10,006.44 ft).
Corrosive air pollutant	Maximum corrosion product thickness growth rate: ● 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 pollutant	● 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 pollutants in the equipment room be monitored by a professional organization.

Item	Description
Acoustic noise	The data listed in the following is the declared A-weighted sound power level (LWAd) and declared average bystander position A-weighted sound pressure level (LpAm) when the server is operating in a 23°C (73.4°F) ambient environment. Noise emissions are measured in accordance with ISO 7999 (ECMA 74) and declared in accordance with ISO 9296 (ECMA 109). Idle: ● LWAd: 6.55 Bels ● LpAm: 51.2 dBA Operating: ● LWAd: 7.24 Bels ● LpAm: 58.1 dBA **NOTE** Actual sound levels generated during server operation vary depending on server configuration, load, and ambient temperature.

6.3 Physical Specifications

Table 6-3 Physical specifications

Indicator	Description
Dimensions (H x W x D)	• 86.1 mm x 447 mm x 900 mm (3.39 in. x 17.60 in. x 35.43 in.) **NOTE** The chassis depth refers to the horizontal distance from the front panel of the chassis to the I/O board of the server node. **Figure 6-1** Physical dimensions (example: 24 x 2.5" drive chassis)  **NOTE** • Figure 6-1 shows how to measure the physical dimensions of the chassis. • The measuring method for chassis with 8 x 2.5" drives and that for chassis with 24 x 2.5" drives are the same. The chassis with 24 x 2.5" drives is used as an example.

Indicator	Description
Installation space	● Requirements for cabinet installation: 19-inch standard cabinet compliant with the International Electrotechnical Commission (IEC) 297 standard. – Cabinet width: 482.6 mm (19.00 in.) – Cabinet depth ≥ 1100 mm (43.31 in.) ● Requirements for liquid-cooled cabinet installation: Use X6000 V6 1225 mm (48.23 in.) liquid-cooled cabinet. A liquid-cooled door is optional. The total depth of the cabinet with a liquid-cooled door is 1375 mm (54.13 in.). ● Requirements for guide rail installation: – L-shaped guide rails: For details about the installation requirements, contact technical support. – Adjustable L-shaped guide rails: apply to cabinets with a distance of 590 mm to 900 mm (23.22 in. to 35.43 in.) between the front and rear mounting bars. **NOTE** For a 1100 mm deep cabinet, a distance of 70 mm to 110 mm (2.75 in. to 4.33 in.) between the front mounting bar and the front cabinet door is recommended.
Weight in full configuration	● 8 x 2.5" drive configuration: – Net weight of a fully configured XH321 V6: 40.5 kg (89.28 lb) – Net weight of a fully configured XH321C V6: 50.5 kg (111.33 lb) ● 24 x 2.5" drive configuration: – Net weight of a fully configured XH321 V6: 43.7 kg (96.34 lb) – Net weight of a fully configured XH321C V6: 53.7 kg (118.39 lb) ● Packing material weight: 13.5 kg (29.76 lb)
Power consumption	The power consumption parameters vary with server configurations, including the configurations complying with energy-related products (ErP) requirements. Use the **Power Calculator** to obtain specific information.

7 Software and Hardware Compatibility

Use the **Compatibility Checker** to obtain information about the supported OS and hardware types.

NOTICE

- If incompatible components are used, the device may be abnormal. This 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 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 pre-sales phase.

8 Safety Instructions

8.1 Security

General Statement

- Comply with local laws and regulations when installing devices. These Safety Instructions are only a supplement.
- The "DANGER", "WARNING", and "CAUTION" information in this document does not represent all the safety instructions, but supplements to the safety instructions.
- Observe all safety instructions provided on device labels.
- Only qualified personnel are allowed to perform special tasks, such as high-voltage operations and driving a forklift.

⚠ WARNING

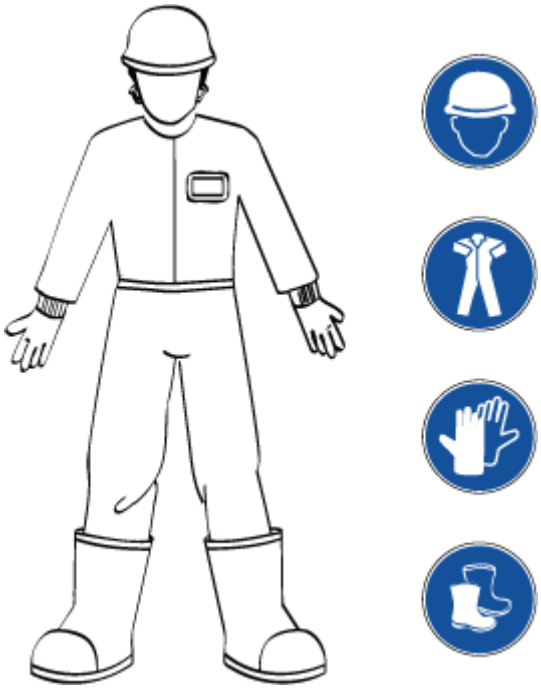
If this device works in a residential environment, the wireless interference may be generated.

Personal Safety

- This equipment is not suitable for use in places where children may be present.
- Only personnel certified or authorized 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 racks and power cables in hazardous weather conditions.

- For lifting or carrying hardware, ensure load limits and manpower provisions conform to legal specifications. 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



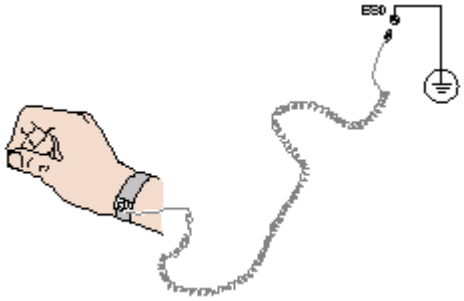
- Before touching a device, wear ESD clothing and gloves (or wrist strap), and remove any conductive objects (such as watches and jewelry). **Figure 8-2** shows conductive objects that must be removed before you touch a device.

Figure 8-2 Removing conductive objects

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

a. Put your hands into the ESD wrist strap.
b. Tighten 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 rack or chassis.

Figure 8-3 Wearing an ESD Wrist Strap



- Exercise caution when using tools.
- 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 the equipment before powering it on. Otherwise, personal injury may be caused by high electricity leakage.
- Do not use the ladder unsupervised. Have someone else hold the ladder steady to prevent accidents.
- Do not look into optical ports without eye protection.

Device Security

- 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 devices with care.
- Exercise caution when using tools.
- 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 leakage current may cause device damage.

Transportation Precautions

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 device 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 the components supported by the server, see "Compatibility" in the **Compatibility Checker**.
- Power off all devices before transportation.

Maximum Weight Carried by a Person

CAUTION

Comply with local regulations for the maximum load per person.

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 by per person

Organization Name	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

For more information about safety instructions, see the ***Server Safety Information***.

8.2 Maintenance and Warranty

For details about the maintenance policy, visit **Customer Support Service**.

For details about the warranty policy, visit **Warranty**.

9 System Management

9.1 iBMC

The intelligent Baseboard Management Controller (iBMC) provides various management functions.

- Various management interfaces

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

  – DCMI 1.5 interface
  – IPMI 1.5/IPMI 2.0 interface
  – CLI
  – Redfish interface
  – HTTPS
  – SNMP
- Fault detection and alarm management

  Faults can be detected and rectified in advance to ensure 24/7 stable running of the device.

  – 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 Fault Diagnose Management (FDM) function supports component-based precise fault diagnosis, facilitating component fault locating and replacement.
  – The iBMC supports the reporting of alarms through syslog packets, trap packets, and emails, helping the upper-layer NMS to collect the fault information about the server.
- Security management

  - 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 types of 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 are supported to improve RAID configuration efficiency and management capability.
  - Smart Provisioning provides a convenient operation interface for installing the OS, configuring RAID, and performing the upgrade without a CD-ROM.
- Various network protocols
  - The NTP synchronizes network time to optimize time configuration.
  - The iBMC supports domain name system (DNS) and Lightweight Directory Application Protocol (LDAP) to implement domain management and directory service.
- Intelligent power management
  - The power capping technology helps you easily improve 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.

  Compared with the standard edition, the iBMC advanced edition provides more advanced features, such as:
  - Redfish-enabled OS deployment
  - Redfish-enabled original data collection for intelligent diagnosis

9.2 Server Management System

The entire server management system consists of iBMCs on each server node. **Table 9-1** lists main features of the server management system.

Table 9-1 Features of the management system

Feature	Description
Management port	Supports the following management ports integrated with any standard management system: ● IPMI ● CLI ● WebUI

Feature	Description
Fault detection	Detects and accurately locates faults in server and node components.
Alarm management	Supports alarm management and reports alarms in various ways, such as the syslog service, to ensure uninterrupted 24/7 system operation.
Asset management	Supports intelligent asset management.
Intelligent power management	Uses the power capping technology to increase deployment density and uses the dynamic energy saving technology to lower the operation and maintenance costs.
Aggregation port	The management port of each server node is an aggregation port, which can be connected to the iBMC of another node. This reduces the cabling of the management network and shortens the system maintenance time.

10 Certifications

NOTE

The following table lists the certifications that the server (chassis and node) has passed.

- If the XH321 V6 air-cooled node is configured, the passed certifications are as follows.

Country/Region	Certification	Standards
Europe	WEEE	2012/19/EU
Europe	REACH	EC NO. 1907/2006
Europe	CE	Safety: EN 62368-1:2014+A11:2017 EMC: EN 55032:2015+A11:2020 CISPR 32:2015+A1:2019 EN IEC 61000-3-2:2019+A1:2021 EN 61000-3-3:2013+A1:2019 EN 55035:2017+A11:2020 CISPR 35:2016 EN 55024:2010+A1:2015 CISPR 24:2010+A1:2015 ETSI EN 300 386 V1.6.1:2012 ETSI EN 300 386 V2.1.1:2016 RoHS: EN IEC 63000:2018 ErP: Commission Regulation(EU) 424/2019

Country/Region	Certification	Standards
UK	UKCA	Safety: EN 62368-1:2014+A11:2017 EMC: EN 55032:2015+A11:2020 CISPR 32:2015+A1:2019 EN IEC 61000-3-2:2019+A1:2021 EN 61000-3-3:2013+A1:2019 EN 55035:2017+A11:2020 CISPR 35:2016 EN 55024:2010+A1:2015 CISPR 24:2010+A1:2015 ETSI EN 300 386 V1.6.1:2012 ETSI EN 300 386 V2.1.1:2016 RoHS: BS EN IEC 63000:2018 ErP: Commission Regulation(EU) 424/2019
China	CCC	GB 17625.1-2012 GB 4943.1-2011 GB/T 9254.1-2021 (Class A)
China	RoHS	SJ/T-11364 GB/T 26572
North America	NRTL	UL 62368-1:2014 CAN/CSA-C22.2 NO.62368-1-14
US	FCC	FCC PART 15
Canada	IC	ICES-003
Japan	VCCI	VCCI 32-1
Global	CB	IEC 62368-1:2014

- If the XH321C V6 liquid-cooled node is configured, the passed certifications are as follows:

Country/Region	Certification	Standard
Europe	WEEE	2012/19/EU
Europe	REACH	EC NO. 1907/2006

Country/Region	Certification	Standard
China	CCC	GB 17625.1-2012 GB 4943.1-2011 GB/T 9254.1-2021 (Class A)
China	RoHS	SJ/T-11364 GB/T 26572
US	FCC	FCC PART 15
Canada	IC	ICES-003
Japan	VCCI	VCCI 32-1

11 Waste Product Recycling

If product users need product recycling service provided by xFusion after products are scrapped, contact technical support for services.

A Appendix

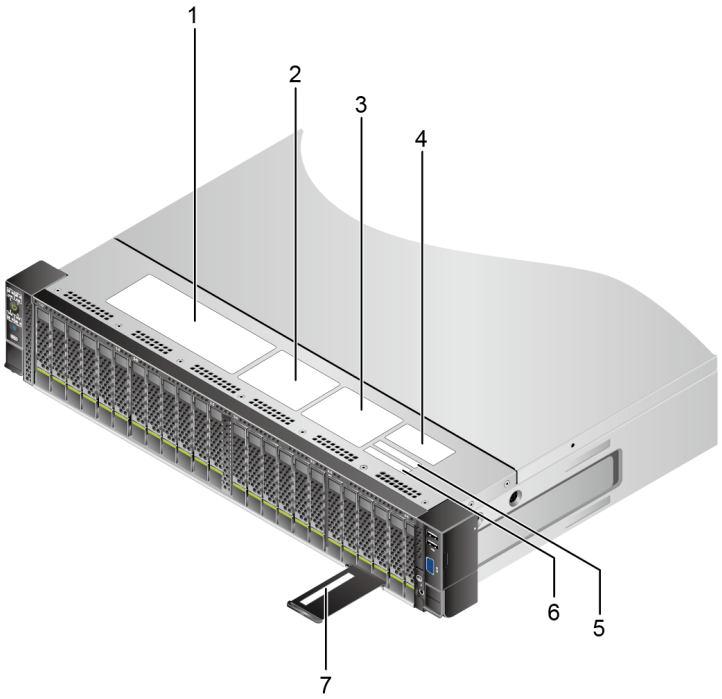
A.1 Chassis Label

NOTE

The information on labels and label positions are for reference only. For details, see the actual product.

A.1.1 Chassis Head Label

Figure A-1 Chassis head label



1	Nameplate	2	Certificate

3	Quick access tag	4	Pressure-proof label **NOTE** This label warns users not place any objects on top of a rack-mounted device.
5	Reserved space for custom label	6	SN **NOTE** For details, see **A.2 Product SN**.

A.1.1.1 Nameplate

Figure A-2 Nameplate example

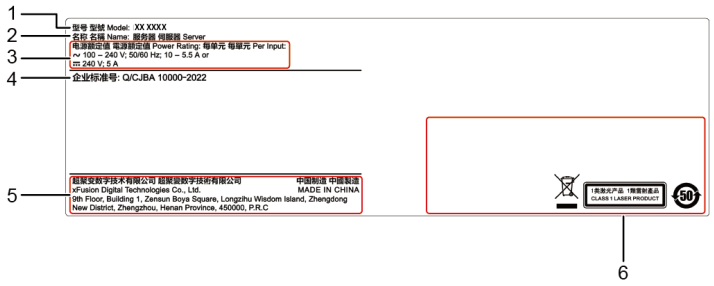


Table A-1 Nameplate description

No.	Description
1	Server Model For details, see **A.4 Nameplate**.
2	Device names
3	Power Supply Requirements
4	Enterprise Standard No.
5	Vendor Information
6	Authentication ID

A.1.1.2 Certificate

Figure A-3 Sample certificate

Table A-2 Certificate description

No.	Description
1	Order
2	No. **NOTE** For details, see **Figure A-4** and **Table A-3**.
3	QC inspector
4	Production date
5	No. barcode

Figure A-4 Sample certificate No.

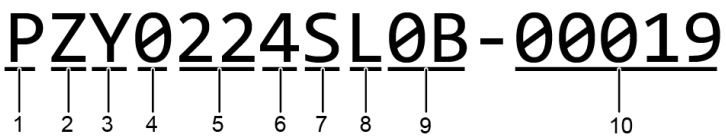


Table A-3 Certificate No. description

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

No.	Description
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.
9	Serial number (two characters)
10	Manufacturing serial number (five characters)

A.1.1.3 Quick Access Tag

Figure A-5 Sample quick access tag

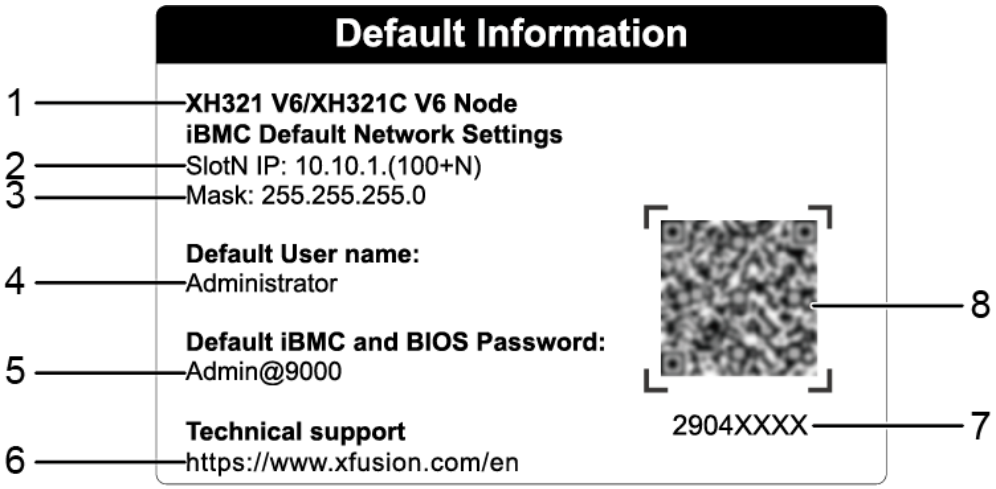
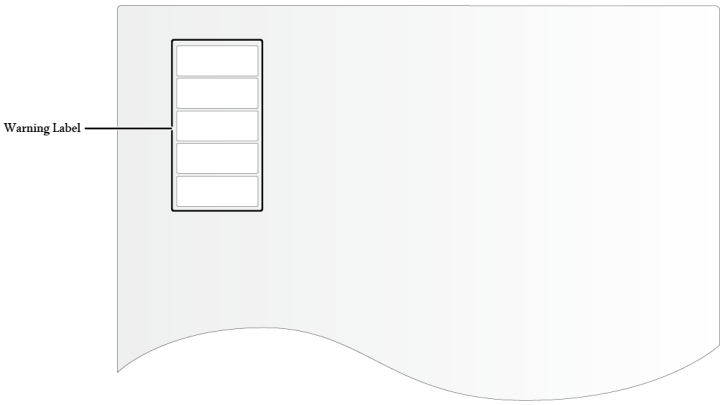


Table A-4 Quick access tag description

No.	Description
1	Server node name
2	IP address of the iBMC management network port
3	Subnet mask of the iBMC management network port
4	Default iBMC user name
5	Default iBMC and BIOS password
6	Technical support website
7	P/N code
8	QR code **NOTE** Scan the QR code to obtain technical support resources.

A.1.2 Chassis Tail Label

Figure A-6 Chassis tail label



NOTE

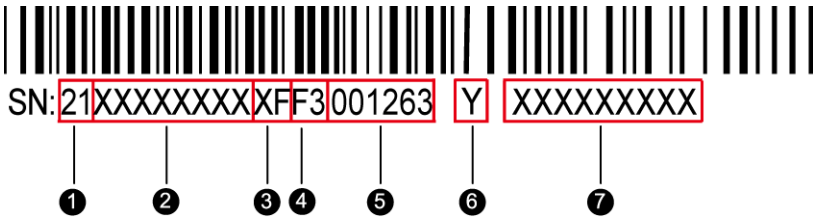
For details about the warning labels, see the ***Server Safety Information***.

A.2 Product SN

The serial number (SN) on the slide-out label plate uniquely identifies a device. The SN is required when you contact technical support. There are two types of SN, as shown in **Figure A-7** and **Figure A-8**.

- SN example 1

Figure A-7 SN example 1



- SN example 2

Figure A-8 SN example 2

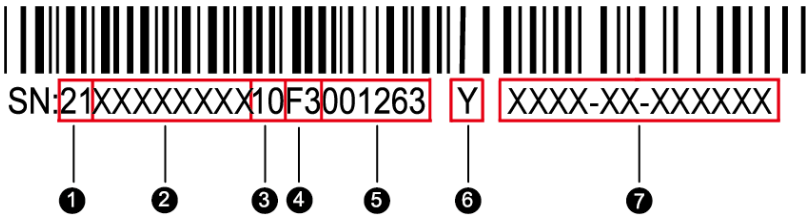


Table A-5 SN description

SN	Description
1	ESN ID (two digits), which can only be **21**.
2	Material ID (eight characters), that is, the processing code.
3	Vendor code (two digits), 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 digits).
6	RoHS compliance (one character). **Y** indicates RoHS compliant.
7	Internal model (product name) of the board. The model format varies according to the actual situation.

A.3 Operating Temperature Limitations

Table A-6 Operating temperature limitations (server with 8 x 2.5" SAS/SATA drives)

Drive Configuration	Number of Standard PCIe Cards	Number of OCP 3.0 Network Adapters	Number of RAID Controller Cards	Fan Configuration	CPU Configuration	Maximum Temperature
0 < drives ≤ 8	2	0	0	8080+	205 W < P ≤ 270 W	35°C
					P ≤ 205 W	35°C
	2	0	1	8080+	205 W < P ≤ 270 W	35°C
					P ≤ 205 W	35°C
	2	1	1	8080+	205 W < P ≤ 270 W	32°C
					P ≤ 205 W	35°C
	1	1	0	8080+	120W < P ≤ 150 W	45°C
	1	1	1	8080+	P ≤ 120 W	45°C
0 < drives ≤ 8	2	0	0	8080	205 W < P ≤ 270 W	32°C
					P ≤ 205 W	35°C
	2	0	1	8080	205 W < P ≤ 270 W	30°C
					P ≤ 205 W	35°C
	2	1	1	8080	205 W < P ≤ 270 W	29°C
					P ≤ 205 W	35°C

Drive Configuration	Number of Standard PCIe Cards	Number of OCP 3.0 Network Adapters	Number of RAID Controller Cards	Fan Configuration	CPU Configuration	Maximum Temperature
● By default, all configurations include optical modules. ● XH321 V6 does not support the 8368Q processor. ● When the server is configured with high-frequency, less-core processors such as 6346 and 6354, the supported operating temperature decreases. For details, consult the local sales representatives. ● For configurations not listed in the table, the operating temperature range is 5°C (41°F) to 35°C (95°F). For special configuration and temperature requirements, contact technical support.						

Table A-7 Operating temperature limitations (server with 24 x 2.5" SAS/SATA drives)

Drive Configuration	Number of Standard PCIe Cards	Number of OCP 3.0 Network Adapters	Number of RAID Controller Cards	Fan Configuration	CPU Configuration	Maximum Temperature
16 ≤ drives ≤ 24	2	0	0	8080+	185 W < P ≤ 205 W	35°C
					P ≤ 185 W	35°C
	2	0	1	8080+	185 W < P ≤ 205 W	35°C
					P ≤ 185 W	35°C
	2	1	1	8080+	185 W < P ≤ 205 W	35°C
					P ≤ 185 W	35°C
	2	0	0	8080	185 W < P ≤ 205 W	35°C
					P ≤ 185 W	35°C
	2	0	1	8080	185 W < P ≤ 205 W	33°C
					P ≤ 185 W	35°C

Drive Configuration	Number of Standard PCIe Cards	Number of OCP 3.0 Network Adapters	Number of RAID Controller Cards	Fan Configuration	CPU Configuration	Maximum Temperature
	2	1	1	8080	185 W < P ≤ 205 W	32°C
					P ≤ 185 W	35°C
● By default, all configurations include optical modules. ● When the server is configured with high-frequency, less-core processors such as 6346 and 6354, the supported operating temperature decreases. For details, consult the local sales representatives. ● For configurations not listed in the table, the operating temperature range is 5°C (41°F) to 35°C (95°F). For special configuration and temperature requirements, contact technical support.						

Table A-8 Operating temperature limitations (server with 24 x 2.5" SAS/SATA/NVMe drives)

Drive Configuration	Number of Standard PCIe Cards	Number of OCP 3.0 Network Adapters	Number of RAID Controller Cards	Fan Configuration	CPU Configuration	Maximum Temperature
16 ≤ drives ≤ 24	2	0	0[a]	8080+	185 W < P ≤ 205 W	35°C
					P ≤ 185 W	35°C
	2	1	0[a]	8080+	185 W < P ≤ 205 W	34°C
					P ≤ 185 W	35°C
	2	0	0[a]	8080	185 W < P ≤ 205 W	32°C
					P ≤ 185 W	35°C
	2	1	0[a]	8080	185 W < P ≤ 205 W	31°C
					P ≤ 185 W	35°C

Drive Configuration	Number of Standard PCIe Cards	Number of OCP 3.0 Network Adapters	Number of RAID Controller Cards	Fan Configuration	CPU Configuration	Maximum Temperature
● a: When NVMe drives are used, and the RAID controller card is configured for SAS/SATA drives, the supported operating temperature may decrease. ● By default, all configurations include optical modules. ● When the server is configured with high-frequency, less-core processors such as 6346 and 6354, the supported operating temperature decreases. For details, consult the local sales representatives. ● For configurations not listed in the table, the operating temperature range is 5°C (41°F) to 35°C (95°F). For special configuration and temperature requirements, contact technical support.						

Table A-9 X6000 V6 server heat dissipation and air volume requirements

X6000 V6 Power	Environment and Air Volume Requirement of a Single-Chassis Server
3000 W-4000 W	● Air inlet temperature: ≤ 35°C (95°F) ● Air volume supplied in the equipment room for a single device: ≥ 350 CFM ● Cooling capacity supplied in the equipment room for a single device: ≥ 4000 W
Lower than 3000 W	● Air inlet temperature: ≤ 35°C (95°F) ● Air volume supplied in the equipment room for a single device: – 8080 fans: ≥ 270 CFM – 8080+ fans: ≥ 300 CFM ● Cooling capacity supplied in the equipment room for a single device:: ≥ 3000 W

A.4 Nameplate

Certified Model	Description
X6000	Global

A.5 RAS Features

The server supports a variety of Reliability, Availability, and Serviceability (RAS) features. You can configure these features for better performance.

For details about the RAS features, see the *FusionServer Ice Lake Platform RAS Technical White Paper*.

A.6 Sensor List

- For details about the XH321 V6, see the ***FusionServer XH321 V6 Server Node User Guide***.
- For details about the XH321C V6, see the ***FusionServer XH321C V6 Liquid-cooled Server Node User Guide***.

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 upper-level management system, so that the management system can manage the objects.

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 video, keyboard 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.

Proportional–integral–derivative	Proportional-integral-derivative (PID) algorithm is the most common control algorithm in industry. In PID control, the algorithm calculates the proportion, integral, derivative response, and the sum of the three, thus to calculate the actual output.

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.
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. 1 U = 44.45 mm
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

CD	calendar day
CE	Conformite Europeenne
CIM	Common Information Model
CLI	command-line interface

D

DC	direct current
DDR4	Double Data Rate 4
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
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
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
PID	Proportional-integral-derivative
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

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

W

WEEE	waste electrical and electronic equipment
WSMAN	Web Service Management

