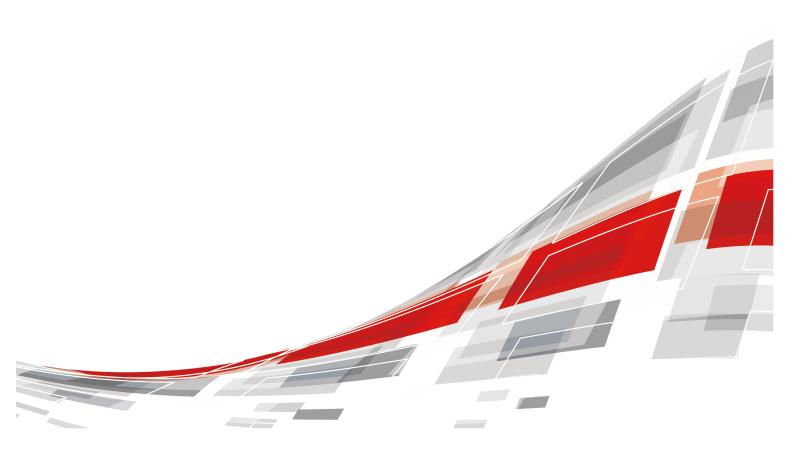
# FusionServer 5885H V5 Server

# **Technical White Paper**

Issue 11

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# **About This Document**

# **Purpose**

This document describes the FusionServer 5885H V5 rack server in terms of features, structure, specifications, 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.
<b>⚠ WARNING</b>	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
<b>⚠</b> CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
<b>NOTICE</b>	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
11	2024-05-11	Updated 5.11.3 Drive Backplane.
10	2024-03-29	Updated 6.1 Technical Specifications.
09	2023-11-30	<ul> <li>Updated 10 Certifications.</li> <li>Added 11 Waste Product Recycling.</li> <li>Updated A.4 Nameplate .</li> </ul>
08	2023-08-31	<ul> <li>Updated 5.3 Processor.</li> <li>Updated 5.8 PSUs .</li> </ul>
07	2023-04-30	Updated 6.1 Technical Specifications.
06	2023-02-03	<ul><li>Updated 5.3 Processor.</li><li>Updated 5.11.1 Mainboard .</li></ul>
05	2022-11-11	<ul> <li>Updated 5.11.3 Drive Backplane.</li> <li>Updated 6.3 Physical Specifications .</li> <li>Updated 8.1 Security.</li> </ul>
04	2022-08-12	Optimized 6.3 Physical Specifications .
03	2022-06-25	Added a figure that shows how to measure dimensions.
		<ul> <li>Updated 6.1 Technical Specifications and claimed support for U.2 drives.</li> </ul>
		Updated CE, UKCA, and CCC certification standards in 10 Certifications.
00	0000 00 40	Added A.1 Chassis Label.  A LL L Continue FEOGELL VE BB1
02	2022-03-18	Added Certifications [5885H V5-BP].
01	2021-12-20	This issue is the first official release.

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# Product Introduction

FusionServer 5885H V5 (5885H V5) is a 4U 4-socket rack server developed for Internet data center (IDC), cloud computing, enterprise, and telecom service applications.

The 5885H V5 is ideal for various applications such as databases, cloud computing, virtualization, and in-memory computing.

The 5885H V5 is a highly expandable server delivering high-performance computing, large storage capacity, low power consumption, and high density. It is easy to deploy and manage and supports virtualization.

#### **◯** NOTE

For details about the 5885H V5 nameplate information, see  ${\bf A.4~Nameplate}$  .

**Figure 1-1** 5885H V5 (with 25 drives)



# **2** Features

#### **Performance and Scalability**

- Powered by Intel<sup>®</sup> Xeon<sup>®</sup> Scalable Skylake or Cascade Lake processors, the server provides up to 28 cores, 3.8 GHz frequency, a 38.5 MB L3 cache, and three 10.4 GT/s UPI links between the processors, which deliver supreme processing performance.
  - It supports four processors with 112 cores and 224 threads to maximize the concurrent execution of multithreaded applications.
  - The layered architecture of the processor cache is optimized. The L2 cache capacity is increased to process memory data directly, which greatly improves the memory access performance. Each core can exclusively use 1 MB of L2 cache, reducing the load on L3 cache. A single processor can share a maximum of 38.5 MB L3 cache.
  - Intel Turbo Boost Technology 2.0 allows processor cores to run faster than the frequency specified in the Thermal Design Power (TDP) configuration if they are operating below power, current, and temperature specification limits.
  - Intel Hyper-Threading Technology enables each processor core to run up to two threads, improving parallel computation capability.
  - The hardware-assisted Intel® Virtualization Technology (Intel® VT) allows operating system (OS) vendors to better use hardware to address virtualization workloads.
  - With Intel® Advanced Vector Extensions 512 (AVX-512), applications can pack 32 double-precision and 64 single-precision floating-point operations per second in a clock cycle within the 512-bit vectors, as well as eight 64-bit and sixteen 32-bit integers, with up to two 512-bit fused multiply-add (FMA) units. Compared with Intel® Advanced Vector Extensions 2.0 (Intel® AVX2), Intel® AVX-512 doubles the width and number of data registers and the width of FMA units.
  - The Cascade Lake processors support Intel® Deep Learning Boost vector neural network instructions (VNNI) to improve the performance of deep learning applications.
- The server supports double data rate 4 (DDR4) registered dual in-line memory modules (RDIMMs) and load-reduced DIMMs (LRDIMMs) with error checking and correcting (ECC). A server fully configured with forty-eight 2933 MT/s

memory modules (only available with Cascade Lake processors) provides 6144 GB memory space and the maximum theoretical memory bandwidth of 549.9 GB/s.

- Flexible drive configurations cater to a variety of business requirements and ensure high elasticity and scalability of storage resources.
- The use of all solid-state drives (SSDs) is supported. An SSD supports up to 100 times more I/O operations per second (IOPS) than a typical hard disk drive (HDD). The use of all SSDs provides higher I/O performance than the use of all HDDs or a combination of HDDs and SSDs.
- The use of 12 Gbit/s SCSI (SAS) serial connection for internal storage provides 2x data transmission rate than the use of 6 Gbit/s SAS connection, maximizing the performance of I/O-intensive applications.
- With Intel integrated I/O, the Intel<sup>®</sup> Xeon<sup>®</sup> Scalable processors integrate the PCle 3.0 controller to shortens I/O latency and improve overall system performance.
- The server supports up to 15 PCle 3.0 slots.

#### **Availability and Serviceability**

- Carrier-class components with process expertise ensure high system reliability and availability.
- The server uses hot-swappable SAS/SATA/NVMe drives. It supports RAID 0, 1, 1E, 10, 5, 50, 6, and 60, depending on the RAID controller card used. It also uses a supercapacitor to protect the RAID cache data against power failures.
- The server provides simplified O&M and efficient troubleshooting through the UID/HLY LED indicators on the front panel, fault diagnosis LED, touch LCD diagnosis panel, and iBMC WebUI.
- The SSDs offer better reliability than HDDs, ensuring continued system performance.
- The iBMC monitors system parameters in real time, triggers alarms, and performs recovery actions in case of failures, minimizing system downtime.
- For more information about the warranty in the Chinese market, see Warranty.

#### Manageability and Security

- The built-in iBMC monitors server operating status and provides remote management.
- A password is required for accessing the BIOS, ensuring system boot and management security.
- The Network Controller Sideband Interface (NC-SI) allows a network port to serve as a management port and a service port for maximized return on investment (ROI) for customers. The NC-SI feature is disabled by default and can be enabled through the iBMC or BIOS.
- The integrated Unified Extensible Firmware Interface (UEFI) improves setup, configuration, and update efficiency and simplifies fault handling.
- Lockable server chassis panel ensures security of local data.
- Intel Execute Disable Bit (EDB) function prevents certain types of malicious buffer overflow attacks when working with a supported OS.

- Intel Trusted Execution Technology enhances security using hardware-based defense against malicious software attacks, allowing applications to run independently.
- The trusted platform module (TPM) and trusted cryptography module (TCM) provide advanced encryption functions, such as digital signatures and remote authentication.
- The following requirements in NIST SP 800-147B are met:
  - 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 memory in the OS.

#### **◯** NOTE

The service port with NC-SI enabled supports the following configuration:

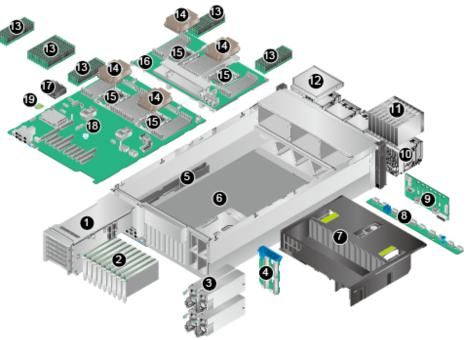
- Configuring any LOM port of the server as the service port with NC-SI enabled. Host port 1 is configured by default.
- Enabling, disabling, and setting a virtual local area network (VLAN) ID for this port. The VLAN ID is 0 and disabled by default.
- Configuring IPv4 addresses (IPv4 address, subnet mask, and gateway) and IPv6 addresses (IPv6 address, prefix length, and gateway) for this port.

#### **Energy Efficiency**

- The 80 Plus Platinum power supply units (PSUs) of multiple power ratings provide 94% power efficiency at 50% load.
- Efficient voltage regulator-down (VRD) power supplies for boards minimize the energy loss from DC/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.
- The server is protected with power capping and power control measures.
- Staggered spin-up for drives reduces the server boot power consumption.
- Intel® Intelligent Power Capability allows a processor to be powered on or off based on requirements.
- Low-voltage Intel<sup>®</sup> Xeon<sup>®</sup> Scalable processors consume less energy, ideally suited for data centers and telecommunications environments constrained by power and thermal limitations.
- SSDs consume 80% less power than HDDs.

# 3 Physical Structure

**Figure 3-1** 5885H V5 physical structure (example: 8 x 2.5" drives)

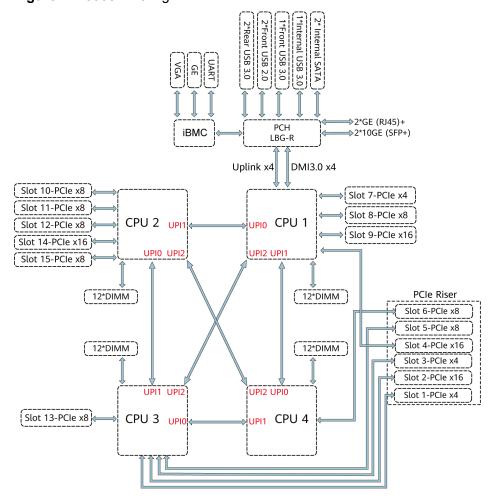


1	Riser card	2	PCle card
3	Power supply unit (PSU)	4	PSU backplane
5	Cable organizer	6	Chassis
7	Air duct	8	Fan adapter board
9	Drive Backplane	10	Fan module
11	Drive	12	DVD drive (or LCD)
13	Memory	14	Heat sink
15	Processor	16	Daughter board

17	Supercapacitor	18	Mainboard
19	TPM/TCM	-	-

# 4 Logical Structure

Figure 4-1 5885H V5 logical structure



- The server supports two or four Intel® Xeon® Scalable processors.
- The server supports up to 48 memory modules.
- The CPUs (processors) interconnect with each other through three UPI links at a speed of up to 10.4 GT/s.
- The server provides 15 standard PCle 3.0 slots of various specifications.

- The server provides low-speed I/O ports, such as the VGA port, USB 3.0 ports, and serial ports (RJ45).
- The server provides four LOM ports, including two 10GE optical ports and two GE electrical ports.

# 5 Hardware Description

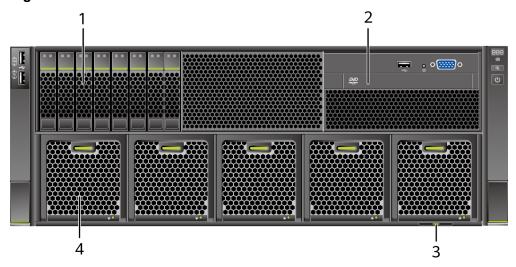
- 5.1 Front Panel
- 5.2 Rear Panel
- 5.3 Processor
- 5.4 Memory
- 5.5 Storage
- 5.6 Network
- 5.7 I/O Expansion
- 5.8 PSUs
- 5.9 Fans
- 5.10 LCD
- 5.11 Boards

# **5.1 Front Panel**

# 5.1.1 Appearance

• 8 x 2.5" SAS/SATA drive configuration

Figure 5-1 Front view



1	Drives	2	Built-in DVD drive or touchable LCD
3	Slide-out label plate (with an SN label)	4	Fan modules

 24 x 2.5" (24 x SAS/SATA, 24 x NVMe, or 16 x SAS/SATA + 8 x NVMe) driver configuration

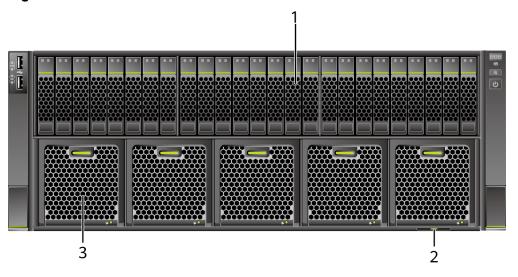
Figure 5-2 Front view



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

• 25 x 2.5" SAS/SATA drive configuration

Figure 5-3 Front view



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

# 5.1.2 Indicators and Buttons

#### **Indicator and Button Positions**

• 8 x 2.5" SAS/SATA drive configuration

Figure 5-4 Indicators and buttons on the front panel



	1		T
1	Connection status indicator for 10GE LOM port 1	2	Connection status indicator for 10GE LOM port 2
3	Connection status indicator for GE LOM port 1	4	Connection status indicator for GE LOM port 2
5	Non-Maskable Interrupt (NMI) button	6	Fault diagnosis LED
7	Health status indicator	8	UID button/indicator
9	Power button/indicator	10	Fan Indicator

 24 x 2.5" (24 x SAS/SATA, 24 x NVMe, or 16 x SAS/SATA + 8 x NVMe) drive configuration

Figure 5-5 Indicators and buttons on the front panel

1	Connection status indicator for 10GE LOM port 1	2	Connection status indicator for 10GE LOM port 2
3	Connection status indicator for GE LOM port 1	4	Connection status indicator for GE LOM port 2
5	Fault diagnosis LED	6	Health status indicator
7	UID button/indicator	8	Power button/indicator
9	NMI button	10	Fan Indicator

## • 25 x 2.5" SAS/SATA drive configuration

Figure 5-6 Indicators and buttons on the front panel



1	Connection status indicator for 10GE LOM port 1	2	Connection status indicator for 10GE LOM port 2
3	Connection status indicator for GE LOM port 1	4	Connection status indicator for GE LOM port 2
5	Fault diagnosis LED	6	Health status indicator
7	UID button/indicator	8	Power button/indicator
9	Fan module status indicator	-	-

# **Indicator and Button Descriptions**

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

Sign	Indicator and Button	Description
888	Fault diagnosis LED	<ul> <li>: The device is operating properly.</li> <li>Error code: A component is faulty.         For details about error codes, see the FusionServer Rack Server iBMC Alarm Handling.     </li> </ul>
		NOTE  If multiple error codes are generated at the same time, the error codes are displayed in a loop. Each error code is displayed for 5 seconds.

Sign	Indicator and Button	Description
<b>(</b> )	Power button/	Power indicator:
	indicator	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:
		<ul> <li>When the device is powered on, you can press this button to gracefully shut down the OS.</li> </ul>
		NOTE For different OSs, you may need to shut down the OS as prompted.
		<ul> <li>When the device is powered on, holding down this button for 6 seconds will forcibly power off the device.</li> </ul>
		When the power indicator is steady yellow, you can press this button to power on the device.
<b>@</b>	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 description:
		<ul> <li>You can control the UID indicator status by pressing the UID button or using the iBMC.</li> </ul>
		<ul> <li>You can press this button to turn on or off the UID indicator.</li> </ul>
		<ul> <li>You can press and hold down this button for 4 to 6 seconds to reset the iBMC.</li> </ul>
AN .	Health status	Off: The device is powered off or is faulty.
_	indicator	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.

Sign	Indicator and Button	Description
	NMI button	A non-maskable interrupt (NMI) is generally triggered to stop the OS for debugging. To trigger an NMI, press this button or click the button on the iBMC WebUI.  NOTICE  Press the NMI button only when the OS is abnormal. Do not press this button when the server is operating properly. An NMI does not gracefully shut down the OS and causes service interruption and data loss.  Before pressing the NMI button, ensure that the OS has the NMI processing program. Otherwise, the OS may crash. Exercise caution when pressing this button.
8	LOM port connection status indicator	<ul> <li>Each indicator shows the connection status of an Ethernet LOM port.</li> <li>Off: The network port is not in use or has failed.</li> <li>Steady green: The network port is properly connected.</li> <li>NOTE</li> <li>The indicators correspond to two 10GE and two GE network ports on the mainboard.</li> <li>The LOM has a standby power supply and will not be powered off even if the service system is powered off. As long as the LOM ports are properly connected to other working network devices, the network ports will remain connected and the indicators are on.</li> </ul>
*	Fan indicator	<ul> <li>Off: The fan module is powered off.</li> <li>Blinking red: An alarm has been generated on the fan module.</li> <li>Steady green: The fan module is working properly.</li> </ul>

# **5.1.3 Ports**

## **Port Positions**

• 8 x 2.5" SAS/SATA drive configuration

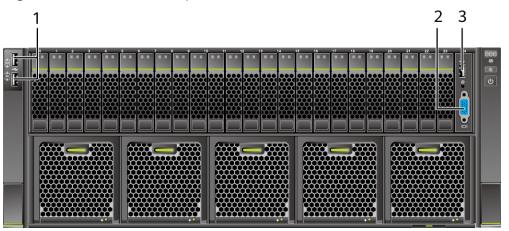
Figure 5-7 Ports on the front panel



1	USB 2.0 ports	2	USB 3.0 port
3	VGA port	-	-

 24 x 2.5" (24 x SAS/SATA, 24 x NVMe, or 16 x SAS/SATA + 8 x NVMe) driver configuration

Figure 5-8 Ports on the front panel



1	USB 2.0 ports	2	VGA port
3	USB 3.0 port	-	-

• 25 x 2.5" SAS/SATA drive configuration

1 USB 2.0 ports - -

Figure 5-9 Ports on the front panel

## **Port Description**

Table 5-2 Ports on the front panel

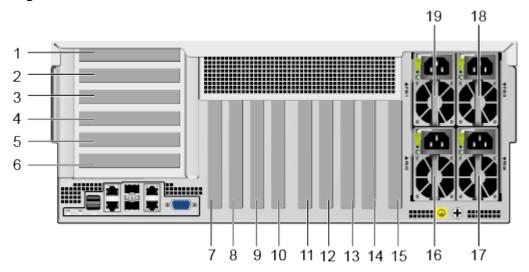
Port	Туре	Quantity <sup>Note</sup>	Description
VGA port	DB15	1	Used to connect a display terminal, such as a monitor or KVM.
USB port	USB 2.0	2	Used to connect to a USB
	USB 3.0	1	device.  NOTICE  Before connecting an external  USB device, check that the USB  device functions properly. The  server may operate abnormally if  an abnormal USB device is  connected.

Note: The number of ports varies depending on server configuration. This table lists the maximum number of ports in different configurations.

# 5.2 Rear Panel

# 5.2.1 Appearance

Figure 5-10 Rear view

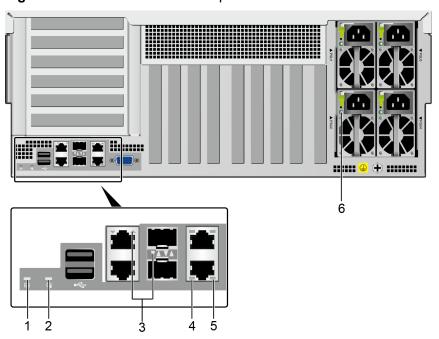


1	PCIe slot 1	2	PCIe slot 2
3	PCIe slot 3	4	PCIe slot 4
5	PCIe slot 5	6	PCIe slot 6
7	PCIe slot 7	8	PCIe slot 8
9	PCIe slot 9	10	PCIe slot 10
11	PCIe slot 11	12	PCIe slot 12
13	PCIe slot 13	14	PCIe slot 14
15	PCIe slot 15	16	PSU 2
17	PSU 4	18	PSU 3
19	PSU 1	-	-

#### 5.2.2 Indicators

#### **Indicator Positions**

Figure 5-11 Indicators on the rear panel



1	Health status indicator	2	UID Indicator
3	LOM port indicator	4	Data transmission status indicator of the management network port
5	Connection status indicator of the management network port	6	PSU indicator

# **Indicator Description**

Table 5-3 Description of indicators on the rear panel

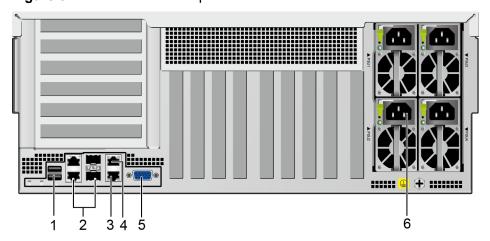
Indicator	Description
LOM port indicator	For details, see 5.6.1 LOMs .

Indicator	Description
PSU indicator	<ul> <li>Off: No power is supplied.</li> <li>Blinking green at 1 Hz: <ul> <li>The input is normal, and the server is standby.</li> <li>The input is overvoltage or undervoltage.</li> <li>The PSU is in deep hibernation mode.</li> </ul> </li> <li>Blinking green at 4 Hz: The firmware is being upgraded online.</li> <li>Steady green: The power input and output are normal.</li> <li>Steady orange: The input is normal, but no power output is supplied.</li> <li>NOTE  <ul> <li>The possible causes of no power output are as follows:</li> <li>Power supply overtemperature protection</li> <li>Power output overcurrent or short-circuit</li> <li>Output overvoltage</li> <li>Short-circuit protection</li> <li>Device failure (excluding failure of all devices)</li> </ul> </li> </ul>
UID Indicator	<ul> <li>The UID indicator helps identify and locate a device.</li> <li>Off: The device is not being located.</li> <li>Blinking or steady blue: The device is being located.</li> <li>NOTE  You can turn on or off the UID indicator by pressing the UID button or remotely running a command on the iBMC CLI.</li> </ul>
Health status indicator	<ul> <li>Off: The device is powered off or is faulty.</li> <li>Blinking red at 1 Hz: A major alarm has been generated on the system.</li> <li>Blinking red at 5 Hz: A critical alarm has been generated on the system.</li> <li>Steady green: The device is operating properly.</li> </ul>
Data transmission status indicator of the management network port	<ul><li>Off: No data is being transmitted.</li><li>Blinking yellow: Data is being transmitted.</li></ul>
Connection status indicator of the management network port	<ul> <li>Off: The network port is not connected.</li> <li>Steady green: The network port is properly connected.</li> </ul>

#### **5.2.3 Ports**

#### **Port Positions**

Figure 5-12 Ports on the rear panel



1	USB 3.0 port	2	LOM port
3	Management network port	4	Serial port
5	VGA port	6	PSU socket

## **Port Description**

Table 5-4 Description of ports on the rear panel

Tool	Туре	Quantity	Description
LOM port	10GE SFP+ and 1000BASE-T	4	10GE LOM service port (optical) and GE service port (electrical). For details, see <b>5.6.1 LOMs</b> .
VGA port	DB15	1	Used to connect a display terminal, such as a monitor or KVM.
Serial port	RJ45	1	Default operating system serial port used for debugging. You can also set it as the iBMC serial port by using the iBMC command.
			NOTE The port uses 3-wire serial communication interface, and the default baud rate is 115,200 bit/s.

Tool	Туре	Quantity	Description	
Management network port	1000BASE-T	1	Used for server management.  NOTE	
			The management network port is a GE port that supports 100 Mbit/s and 1000 Mbit/s auto- negotiation.	
USB port	USB 3.0	2	Used to connect to a USB device.	
			NOTICE  Before connecting an external USB device, check that the USB device functions properly. The server may operate abnormally if an abnormal USB device is connected.	
PSU socket	-	4	Used to connect to the power distribution unit (PDU) in the cabinet. You can select the number of power supply units (PSUs) as required.	
			<ul> <li>When determining the quantity of PSUs, ensure that the rated power of the PSUs is greater than that of the server.</li> </ul>	
			If only one PSU is used,     Predicted PSU Status cannot     be set to Active/Standby on     the iBMC WebUI.	

## **5.3 Processor**

- The server supports two or four processors.
- If only one processor is required, install it in socket CPU1. If two processors are required, install them in sockets CPU1 and CPU2.
- The same model of processors must be used in a server.
- Contact your local sales representative or use the Compatibility List to determine the components to be used.

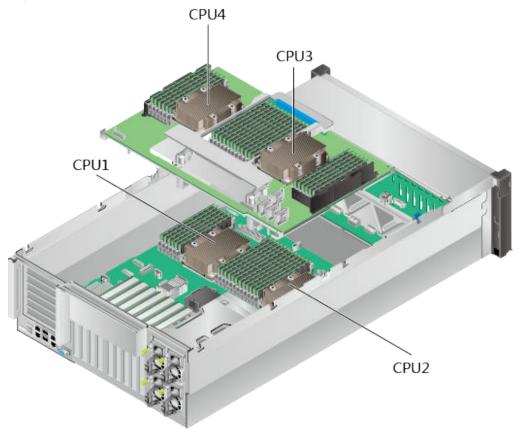


Figure 5-13 Processor positions

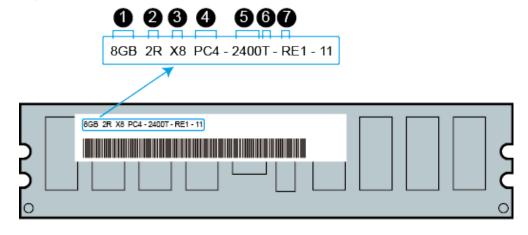
# **5.4 Memory**

# 5.4.1 DDR4 Memory

## **5.4.1.1 Memory Identifier**

You can determine the memory module properties based on the label attached to the memory module.

Figure 5-14 Memory identifier



Callout	Description	Definition
1	Capacity of the memory module	<ul> <li>8 GB</li> <li>16 GB</li> <li>32 GB</li> <li>64 GB</li> <li>128 GB</li> </ul>
2	Number of ranks of the memory module	<ul><li>1R: single-rank</li><li>2R: dual-rank</li><li>4R: quad-rank</li><li>8R: octal-rank</li></ul>
3	Data width on the DRAM	<ul><li>X4: 4-bit</li><li>X8: 8-bit</li></ul>
4	Type of the memory interface	<ul><li>PC3: DDR3</li><li>PC4: DDR4</li></ul>
5	Maximum memory speed	<ul> <li>2133 MT/S</li> <li>2400 MT/S</li> <li>2666 MT/S</li> <li>2933 MT/S</li> <li>3200 MT/S</li> </ul>
6	Column Access Strobe (CAS) latency	<ul><li>P: 15</li><li>T: 17</li></ul>
7	DIMM type	R: RDIMM L: LRDIMM

## **5.4.1.2 Memory Subsystem Architecture**

The 5885H V5 provides 48 memory slots. Each processor integrates six 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

СРИ	Memory Channel	Memory Slot
CPU 1	A (primary)	DIMM000(A)
	А	DIMM001(G)
	B (primary)	DIMM010(B)

CPU	Memory Channel	Memory Slot
	В	DIMM011(H)
	C (primary)	DIMM020(C)
	С	DIMM021(I)
	D (primary)	DIMM030(D)
	D	DIMM031(J)
	E (primary)	DIMM040(E)
	Е	DIMM041(K)
	F (primary)	DIMM050(F)
	F	DIMM051(L)
CPU 2	A (primary)	DIMM100(A)
	А	DIMM101(G)
	B (primary)	DIMM110(B)
	В	DIMM111(H)
	C (primary)	DIMM120(C)
	С	DIMM121(I)
	D (primary)	DIMM130(D)
	D	DIMM131(J)
	E (primary)	DIMM140(E)
	Е	DIMM141(K)
	F (primary)	DIMM150(F)
	F	DIMM151(L)
CPU 3	A (primary)	DIMM200(A)
	А	DIMM201(G)
	B (primary)	DIMM210(B)
	В	DIMM211(H)
	C (primary)	DIMM220(C)
	С	DIMM221(I)
	D (primary)	DIMM230(D)
	D	DIMM231(J)
	E (primary)	DIMM240(E)

СРИ	Memory Channel	Memory Slot
	Е	DIMM241(K)
	F (primary)	DIMM250(F)
	F	DIMM251(L)
CPU 4	A (primary)	DIMM300(A)
	А	DIMM301(G)
	B (primary)	DIMM310(B)
	В	DIMM311(H)
	C (primary)	DIMM320(C)
	С	DIMM321(I)
	D (primary)	DIMM330(D)
	D	DIMM331(J)
	E (primary)	DIMM340(E)
	Е	DIMM341(K)
	F (primary)	DIMM350(F)
	F	DIMM351(L)

#### 5.4.1.3 Memory Compatibility

Observe the following rules when configuring DDR4 DIMMs:

#### NOTICE

- A server must use the same model of DDR4 DIMMs, and all the DIMMs operate at the same speed, which is the smallest value of:
  - Memory speed supported by a processor
  - Maximum operating speed of a DIMM
- The DDR4 DIMMs of different types (RDIMM and LRDIMM) and specifications (capacity, bit width, rank, and height) cannot be used together.
- Contact your local sales representative or use the Compatibility List to determine the components to be used.
- The memory can be used with Intel<sup>®</sup> Xeon<sup>®</sup> Scalable Skylake and Cascade Lake processors. The maximum memory capacity supported varies depending on the processor model.
  - Skylake processors

M processors: 1.5 TB/socket

Other processors: 768 GB/socket

Cascade Lake processors

L processors: 4.5 TB/socket

M processors: 2 TB/socket

Other processors: 1 TB/socket

• The total memory capacity is the sum of the capacity of all DDR4 DIMMs.

#### NOTICE

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

- Use the Compatibility List to determine the capacity type of a single memory module.
- The maximum number of DIMMs supported by a server varies depending on the CPU type, memory type, rank quantity, and operating voltage.

#### **NOTE**

Each memory channel supports a maximum of 8 ranks. The number of DIMMs supported by each channel varies depending on the number of ranks supported by each channel:

Number of DIMMs supported by each channel ≤ Number of ranks supported by each memory channel/Number of ranks supported by each DIMM

A memory channel supports more than eight ranks for LRDIMMs.

#### □ NOTE

A quad-rank LRDIMM generates the same electrical load as a single-rank RDIMM on a memory bus.

Table 5-6 DDR4 memory specifications

Parameter	Specifications	
Maximum capacity per DDF	128	
Rated speed (MT/s)	2933	
Operating voltage (V)	1.2	
Maximum number of DDR4	48	
Maximum DDR4 memory c	6144	
Maximum operating speed (MT/s)	1DPC°	2933 <sup>d</sup>
	2DPC	2666

#### Parameter Specifications

• a: The maximum number of DDR4 memory modules is based on four-processor configuration. The value is halved for a server with two processors.

- b: The maximum DDR4 memory capacity varies depending on the processor type. The value listed in this table is based on the assumption that DIMMs are fully configured.
- c: DPC (DIMM per channel) indicates the number of DIMMs per channel.
- d: If the Cascade Lake processor is used, the maximum operating speed of a DIMM can reach 2933 MT/s. If the Skylake processor is used, the maximum operating speed of a DIMM can reach 2666 MT/s only. Different CPUs possess different specifications, For details about the CPU parameters, see the Intel official website.
- The information listed in this table is for reference only. For details, consult the local sales representative.

#### 5.4.1.4 DIMM Installation Rules

- Observe the following when configuring DDR4 memory modules:
  - Install memory modules only when corresponding processors are installed.
  - Do not install LRDIMMs and RDIMMs in the same server.
  - Install filler memory modules in vacant slots.
- Observe the following when configuring DDR4 memory modules in specific operating mode:
  - Memory sparing mode
    - Comply with the general installation guidelines.
    - Each memory channel must have a valid online spare configuration.
    - The channels can have different online spare configurations.
    - Each populated channel must have a spare rank.
  - Memory mirroring mode
    - Comply with the general installation guidelines.
    - Each processor supports two integrated memory controllers (IMCs). At least two channels of each IMC are used for installing memory modules (channels 1 and 2, or channels 1, 2, and 3). The installed memory modules must be identical in size and organization.
    - For a multi-processor configuration, each processor must have a valid memory mirroring configuration.
  - Memory scrubbing mode
    - Comply with the general installation guidelines.

#### **5.4.1.5 Memory Installation Positions**

A 5885H V5 supports a maximum of 48 DDR4 DIMMs. To maximize the performance, balance the total memory capacity between the installed processors and load the channels similarly whenever possible.

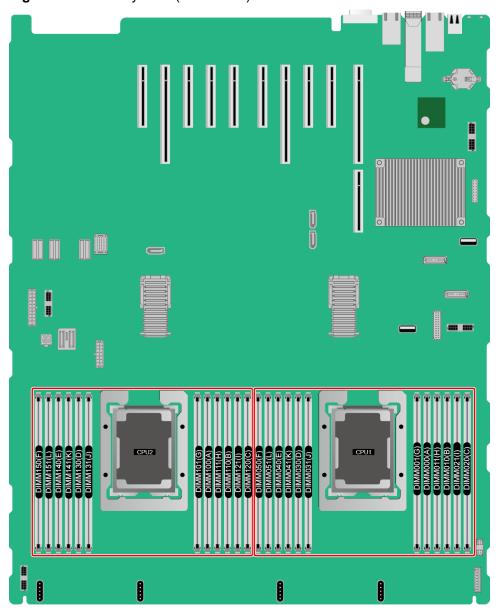
#### NOTICE

At least one DDR4 DIMM must be installed in the memory slots corresponding to CPU 1.

CPUs 1 and 2 are located on the mainboard, and CPUs 3 and 4 are located on the daughter board.

Memory slots on the mainboard

Figure 5-15 Memory slots (mainboard)



Memory slots on the daughter board

Figure 5-16 Memory slots (daughter board)

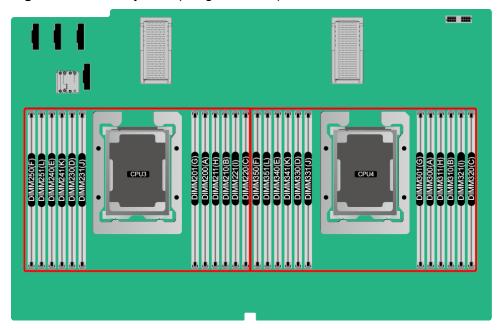
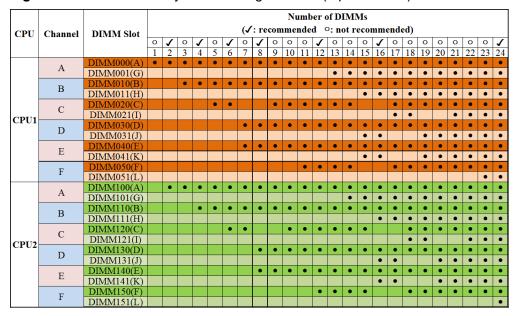


Figure 5-17 DDR4 memory installation guidelines (2 processors)



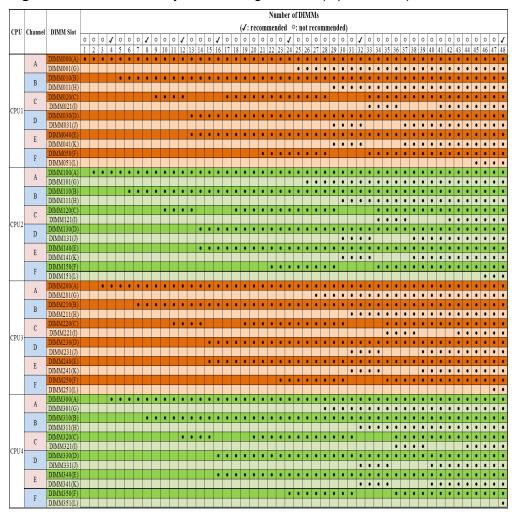


Figure 5-18 DDR4 memory installation guidelines (4 processors)

## **5.4.1.6 Memory Protection Technologies**

The following memory protection technologies are supported:

- ECC
- Full mirroring
- Address range mirroring
- SDDC
- SDDC+1
- Rank sparing mode
- Static virtual lockstep
- Faulty DIMM isolation
- Memory thermal throttling
- Memory address parity protection
- Memory demand/patrol scrubbing
- Device tagging
- Data scrambling

- Adaptive double device data correction (ADDDC)
- ADDDC+1

# 5.5 Storage

# **5.5.1 Drive Configurations**

Table 5-7 Drive Configuration

Configuration	Maximum Front Hard Disks	Drive Management Mode
8 x 2.5" SAS/SATA drive configuration	<ul> <li>Front drive: 8 x 2.5"</li> <li>Slots 0 to 7 support only SAS/SATA drives.</li> </ul>	1 x PCIe RAID controller card PCIe RAID controller card: must be installed in slot 8.
24 x 2.5" SAS/SATA drive configuration	<ul> <li>Front drives: 24 x 2.5"</li> <li>Slots 0 to 23 support only SAS/ SATA drives.</li> </ul>	3 x PCIe RAID controller cards PCIe RAID controller card: must be installed in slots 8, 10, and 12.
24 x 2.5" (16 x SAS/SATA + 8 x NVMe) drive configuration	<ul> <li>Front drives: 24 x 2.5"</li> <li>Slots 0 to 3 and slots 20 to 23 support only NVMe drives.</li> <li>Slots 4 to 19 support only SAS/SATA drives.</li> </ul>	<ul> <li>SAS/SATA drive: 1 x         PCIe RAID controller         card         PCIe RAID controller         card: must be installed         in slot 8.</li> <li>NVMe drive: CPU</li> </ul>
Server with 24 x 2.5" NVMe Drives	<ul> <li>Front drives: 24 x 2.5"</li> <li>Slots 0 to 23 support NVMe drives.</li> </ul>	CPU
25 x 2.5" SAS/SATA drive configuration	<ul> <li>Front drives: 25 x 2.5"</li> <li>Slots 0 to 24 support only SAS/SATA drives.</li> </ul>	1 x PCIe RAID controller card PCIe RAID controller card: must be installed in slot 8.

Note: Contact your local sales representative or use the **Compatibility List** to determine the components to be used.

# 5.5.2 Drive Numbering

• 8 x 2.5" SAS/SATA drive configuration

Figure 5-19 Drive numbering



• 24 x 2.5" (24 x SAS/SATA, 24 x NVMe, or 16 x SAS/SATA + 8 x NVMe) driver configuration

Figure 5-20 Drive numbering



• 25 x 2.5" SAS/SATA drive configuration

Figure 5-21 Drive numbering



#### 5.5.3 Drive Indicators

#### **SAS/SATA Drive Indicators**

Figure 5-22 SAS/SATA drive indicators

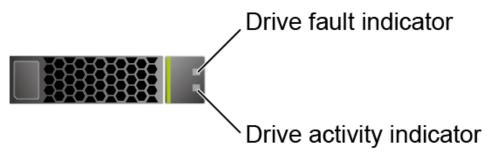
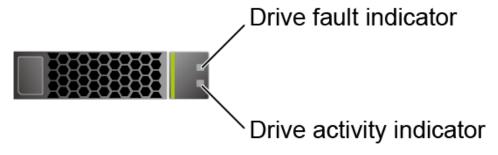


Table 5-8 Description of SAS/SATA drive indicators

Activity Indicator (Green)	Fault Indicator (Yellow)	Description
Off	Off	The drive is not in position.
Steady on	Off	The drive is detected.
Blinking at 4 Hz	Off	Data is being read or written normally, 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 member drive in the RAID array is removed.
Steady on	Steady on	The drive is faulty.

#### **NVMe Drive Indicators**

Figure 5-23 NVMe drive indicators



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

**Table 5-9** NVMe drive indicators (VMD enabled)

Activity Indicator (Green)	Fault Indicator (Yellow)	Description
Off	Off	The NVMe drive cannot be detected.
Steady on	Off	The NVMe drive is working properly.
Blinking at 2 Hz	Off	Data is being read from or written to the NVMe SSD.
Steady on	Blinking at 2 Hz	The NVMe drive is being located.
Steady on/Off	Steady on	The NVMe drive is faulty.

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

**Table 5-10** NVMe drive indicators (VMD disabled)

Activity Indicator (Green)	Fault Indicator (Yellow)	Description
Off	Off	The NVMe drive cannot be detected.
Steady on	Off	The NVMe drive is working 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 hot removal process is complete, and the NVMe drive is removable.
Steady on/Off	Steady on	The NVMe drive is faulty.

#### M.2 FRU Indicators

Figure 5-24 M.2 FRU indicators



Table 5-11 M.2 FRU indicator description

Indicator	Description
M.2 FRU fault indicator	<ul> <li>Off: The M.2 FRU is running properly.</li> <li>Blinking yellow: The M.2 FRU is being located, or RAID is being rebuilt.</li> </ul>
	Steady yellow: The M.2 FRU is faulty or not detected.
M.2 FRU activity	Off: The M.2 FRU is not in position or is faulty.
indicator	Blinking green or light green: Data is being read, written, or synchronized.
	Steady green or light green: The M.2 FRU is inactive.

# 5.5.4 RAID Controller Card

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

- Contact your local sales representative or use the Compatibility List to determine the components to be used.
- For details about the RAID controller card, see V5 Server RAID Controller Card User Guide.

# 5.6 Network

# 5.6.1 LOMs

LOMs provide network expansion capabilities.

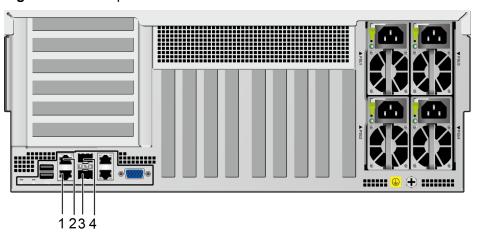
Table 5-12 LOM description

NIC Type	Chip Model	Port Type	Numb er of Ports	Rate Negotiatio n Mode	Supported Rates	Rates Not Supported
LOM s	X722	10GE optical port	2	Auto- negotiation 10,000 Mbit/s (full duplex)	10000M	10/100/100 OM
		GE electrical port	2	Auto- negotiation 1000 Mbit/s (full duplex)	1000M	10/100M

NIC Type	Chip Model	Port Type	er of	Rate Negotiatio n Mode	Supported Rates	Rates Not Supported
-------------	---------------	-----------	-------	------------------------------	--------------------	------------------------

- Use Compatibility List to obtain information about the cables and optical modules supported by the LOM ports.
- The LOM ports support NC-SI and PXE.
- The LOM ports do not support forced rates.
- The electrical LOM ports cannot be connected to power over Ethernet (PoE) devices (such as a switch with PoE enabled). Connecting a LOM port to a PoE device may cause link communication failure or even damage the NIC.
- The electrical LOM ports (GE electrical ports) do not support SR-IOV.
- Forcibly powering off a server will cause intermittent NC-SI disconnection and disable the WOL function of the LOM ports. To restore the NC-SI connection, refresh the iBMC WebUI.

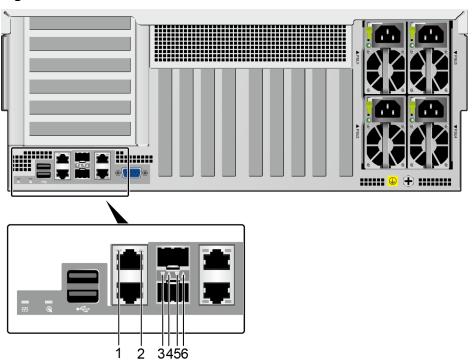
Figure 5-25 LOM port



1	GE electrical port (LOM port 2)	2	GE electrical port (LOM port 1)	
3	10GE optical port (LOM port 4)	4	10GE optical port (LOM port 3)	

## **Indicator Positions**

Figure 5-26 LOM indicators



1	Connection status indicator/Data transmission status indicator for GE electrical port 1	2	Connection status indicator/Data transmission status indicator for GE electrical port 2
3	Connection status indicator/Data transmission status indicator for 10GE optical port 4	4	Connection status indicator/Data transmission status indicator for 10GE optical port 3
5	Data transmission rate indicator for 10GE optical port 4	6	Data transmission rate indicator for 10GE optical port 3

#### **Indicator Description**

Table 5-13 LOM indicators

Indicator	Description
Connection status indicator/Data transmission status indicator for a 10GE optical port	<ul> <li>Off: The network port is not connected.</li> <li>Blinking green: Data is being transmitted.</li> <li>Steady green: The network port is properly connected.</li> </ul>
Data transmission rate indicator for a 10GE optical port	<ul> <li>Off: The network port is not connected.</li> <li>Steady green: The data transmission rate is 10 Gbit/s.</li> </ul>
Connection status indicator/Data transmission status indicator for a GE electrical port	<ul> <li>Off: The network port is not connected.</li> <li>Blinking green: Data is being transmitted.</li> <li>Steady green: The network port is properly connected.</li> </ul>

# 5.7 I/O Expansion

## 5.7.1 PCIe Cards

PCIe cards provide ease of expandability and connection.

- The electrical ports provided by PCle NICs cannot be connected to power over Ethernet (PoE) devices (such as a switch with PoE enabled). Connecting such an electrical port to a PoE device may cause link communication failure or even damage the NIC.
- Contact your local sales representative or use the Compatibility List to determine the components to be used.
- 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 are the same. For details, contact technical support.

#### 5.7.2 PCIe Slots

#### **PCle Slots**

Figure 5-27 PCIe slots



- Slots 1 to 6 are provided by the PCIe riser modules.
- Slots 7 to 15 are provided by the mainboard.

# **5.7.3 PCIe Slot Description**

□ NOTE

The PCIe slots mapping to a vacant CPU socket are unavailable.

Table 5-14 PCle slot description

PCIe Slot	CPU	PCIe Standa rds	Connec tor Width	Bus Width	Port No.	B/D/F	Slot Size
LOM	CPU 1	PCle 3.0	-	x4	Port2D	0x24/0x 03/0x00	-
Slot 1	CPU 3	PCle 3.0	x8	x4	Port1A	0x83/0x 00/0x00	FHFL
Slot 2	CPU 3	PCle 3.0	x16	x16	Port3A	0xB1/0x 00/0x00	FHFL
Slot 3	CPU 3	PCle 3.0	x8	x4	Port1B	0x83/0x 00/0x08	FHFL
Slot 4	CPU 1	PCle 3.0	x16	X16	Port3A	0x32/0x 00/0x00	FHFL
Slot 5	CPU 3	PCIe 3.0	x8	x8	Port1C	0x83/0x 00/0x10	FHHL
Slot 6	CPU 4	PCle 3.0	x8	x8	Port2A	0xE2/0x 00/0x00	FHHL

PCIe Slot	CPU	PCIe Standa rds	Connec tor Width	Bus Width	Port No.	B/D/F	Slot Size
Slot 7	CPU 1	PCle 3.0	x8	x4	Port2C	0x24/0x 00/0x10	FHHL
Slot 8	CPU 1	PCle 3.0	x8	x8	Port2A	0x24/0x 00/0x00	FHHL
Slot 9	CPU 1	PCle 3.0	x16	x16	Port1A	0x08/0x 00/0x00	FHHL
Slot 10	CPU 2	PCle 3.0	x8	x8	Port2C	0x62/0x 00/0x10	FHHL
Slot 11	CPU 2	PCle 3.0	x8	x8	Port2A	0x62/0x 00/0x00	FHHL
Slot 12	CPU 2	PCle 3.0	x8	x8	Port1A	0x43/0x 00/0x00	FHHL
Slot 13	CPU 3	PCle 3.0	x8	x8	Port2A	0xA2/0x 00/0x00	FHHL
Slot 14	CPU 2	PCle 3.0	x16	x16	Port3A	0x71/0x 00/0x00	FHHL
Slot 15	CPU 2	PCle 3.0	x8	x8	Port1C	0x43/0x 00/0x10	FHHL

- The B/D/F (Bus/Device/Function Number) values are the default values when the server is fully configured with PCIe devices. The values may vary if the server is not fully configured with PCIe devices or if a PCIe card with a PCI bridge is configured.
- The PCIe x16 slots are backward compatible with PCIe x8, PCIe x4, and PCIe x1 cards. The PCIe cards are not forward compatible. That is, the PCIe slot width cannot be smaller than the PCIe card link width.
- Full-height full-length PCIe slots are backward compatible with full-height half-length and half-height half-length PCIe cards. Full-height half-length PCIe slots are backward compatible with half-height half-length PCIe cards.
- All slots support PCIe cards of up to 75 W. The power of a PCIe card varies depending on its model.

# **5.8 PSUs**

- The server supports two or four PSUs.
- The server supports AC or DC PSUs.
- The PSUs are hot-swappable.
- The server supports two PSUs in 1+1 redundancy.

#### **NOTE**

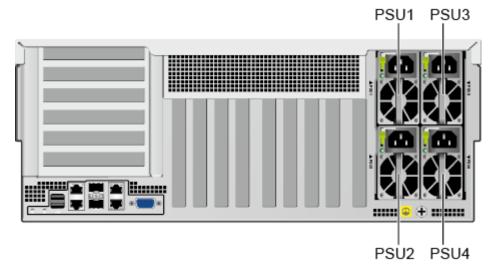
When the output power of the server is lower than the rated output power of a PSU, the server supports PSUs in 1+1 redundancy mode.

- The server supports four PSUs in 2+2 redundancy.
- The same model of PSUs 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 safety standards or the DC power supply that has passed the CCC certification.
- Contact your local sales representative or use the Compatibility List to determine the components to be used.

#### □ NOTE

When one or two 1500 W AC Platinum PSUs are configured, When the input voltage ranges from 100 V AC to 127 V AC, the output power decreases to 1000 W.

Figure 5-28 PSU positions



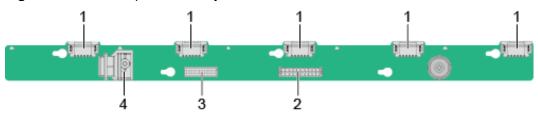
# 5.9 Fans

- The server supports five fan modules.
- The fan modules are hot-swappable.
- The server tolerates failure of a single fan.
- The fan speed can be adjusted.
- The same model of fan modules must be used in a server.

Fan1 Fan2 Fan3 Fan4 Fan5

Figure 5-29 Fan module positions

Figure 5-30 Fan adapter board layout



1	Fan connectors	2	Fan adapter board power connector
3	Fan adapter board signal connector	4	Fan adapter board buckle

# 5.10 LCD

#### **Function**

The LCD displays the installation status and running status of server components and enables users to set the IP address of the iBMC management network port on the server.

The LCD and the server iBMC form an LCD subsystem. The LCD directly obtains device information from the iBMC. The LCD subsystem does not store device data.

iBMC

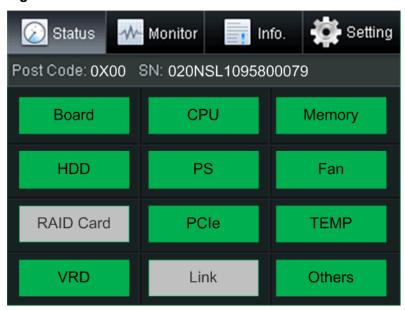
TTL serial port

LCD

Figure 5-31 LCD subsystem working principle

UI

Figure 5-32 LCD screen



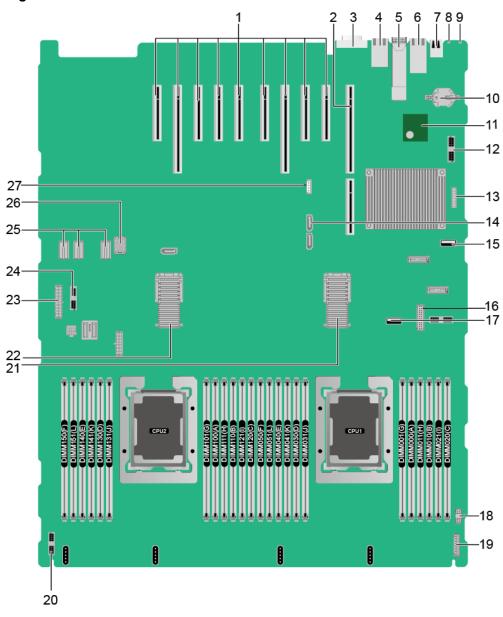
Tab	Function
Status	Displays the port 80 status, serial number, component status, and component alarms of the server.
Monitor	Displays the current power, CPU temperature, and inlet temperature of the server.
Info.	Displays the IP address and MAC address of the iBMC management network port, MAC addresses of host LOM ports, device SNs, asset information, and firmware version.
Setting	Sets the IP address of the iBMC management network port.

For details about how to use the LCD, see *FusionServer 5885H V5 Server LCD User Guide*.

# 5.11 Boards

## 5.11.1 Mainboard

Figure 5-33 5885H V5 mainboard



1	PCIe card slots (7 to 15 from right to left)	2	PCIe riser slot (J207 for CPU 1 and J230 for CPU 4)
			'/

3	VGA connector (VGA CONN/J169)	4	System serial port and management network port (J242) <sup>a</sup>
5	10GE optical port (10GE PORT0&PORT1/J140)	6	GE electrical port (GE PORT2&PORT3/J138)
7	USB 3.0 port (REAR USB 3.0/J172)	8	UID Indicator
9	Health status indicator	10	RTC battery (U4042)
11	TPM/TCM port (TPM CONN/J55)	12	Right mounting ear connector (J131)
13	Jumper (J93) <sup>b</sup>	14	SATA DVD drive connector (J130)
15	USB 3.0 port (FRONT USB3.0/J190) <sup>c</sup>	16	Fan adapter board signal connector (J249)
17	USB 3.0 port (INNER USB3.0/J182)	18	VGA connector (J233)
19	LCD connector (LCD CONN/J87)	20	Signal connector for the drive backplane (HDD BP/ J235)
21	High-speed backplane connector (J244) <sup>d</sup>	22	High-speed backplane connector (J243) <sup>d</sup>
23	Drive backplane power connector (BP PWR/J237)	24	Left mounting ear connector (LEFT EAR CONN BOARD/J115)
25	PSU backplane power connector (J225/J226/ J239)	26	Signal connector for the PSU backplane (J238)
27	VROC key port (J144) <sup>e</sup>	-	-
	•	•	•

- a: The upper one is an RJ45 serial port, and the lower one is an RJ45 management port.
- b: BMC\_SER\_MANUAL PIN is used to change the connection direction of the physical serial port. CLEAR\_BMC\_PW PIN is used to restore the default iBMC configuration (for iBMC V350 and later versions, restoring the default iBMC configuration through a jumper is not supported).
- c: The built-in USB 3.0 port can be connected to the front USB 3.0 port through a USB cable. It cannot be used directly.
- d: CPUs 1 and 2 are on the mainboard, and CPUs 3 and 4 are on the daughter board. The mainboard and daughter board are interconnected through high-speed backplane connectors.
- e: The port is reserved.

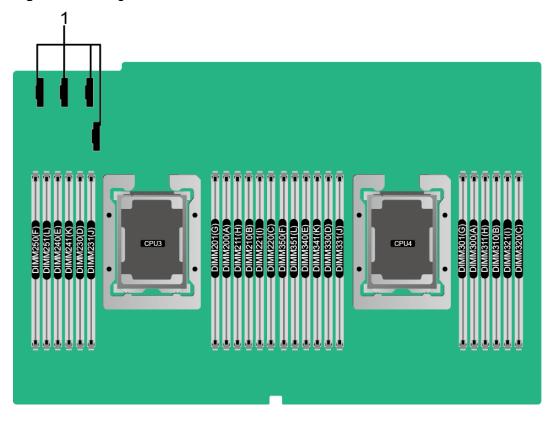
# 5.11.2 Daughter Board

**Figure 5-34** shows the daughter board of the 5885H V5. **Figure 5-35** shows the connection between the daughter board and the mainboard.

#### **◯** NOTE

CPUs 1 and 2 are on the mainboard, and CPUs 3 and 4 are on the daughter board. The mainboard and daughter board are interconnected through high-speed backplane connectors.

Figure 5-34 Daughter board



1	Slimline connectors for connecting the daughter	-	-
	board and the riser card		

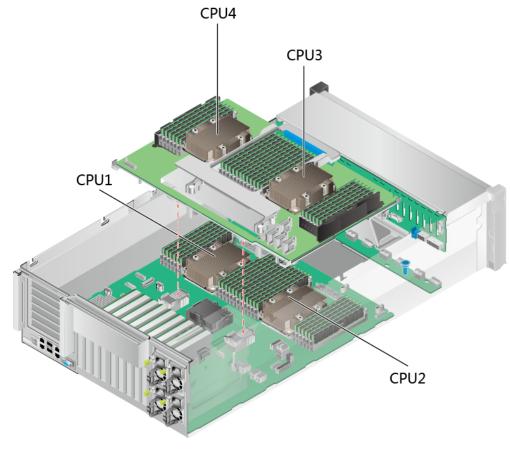


Figure 5-35 Connection between the daughter board and the mainboard

# 5.11.3 Drive Backplane

• 8 x 2.5" SAS/SATA drive pass-through backplane

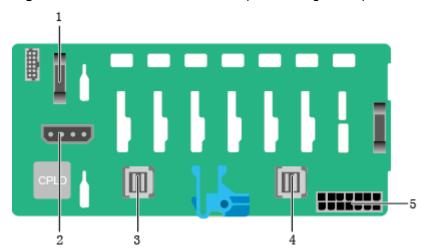
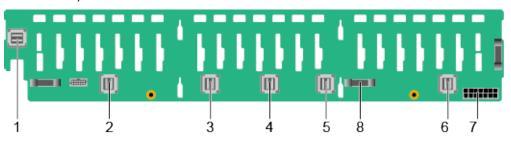


Figure 5-36 8 x 2.5" SAS/SATA drive pass-through backplane

No.	Connector	No.	Connector
1	Signal cable connector (J1)	2	DVD drive power connector (J11)
3	SAS cable connector (PORT B/J29)	4	SAS cable connector (PORT A/J28)
5	Backplane power connector (J24)	-	-

• 24 x 2.5" SAS/SATA drive pass-through backplane

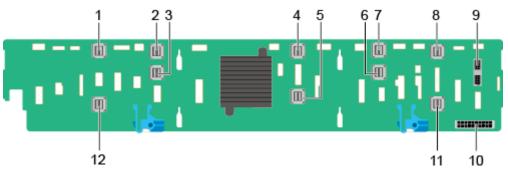
**Figure 5-37** 24 x 2.5" SAS/SATA drive pass-through backplane (BOM: 03022JWW)



No.	Connector	No.	Connector
1	Mini-SAS HD connector (PORT 3B/J33)	2	Mini-SAS HD connector (PORT 3A/J39)
3	Mini-SAS HD connector (PORT 2B/J31)	4	Mini-SAS HD connector (PORT 2A/J30)
5	Mini-SAS HD connector (PORT 1B/J29)	6	Mini-SAS HD connector (PORT 1A/J28)
7	Backplane power connector (J24)	8	Backplane signal cable connector (J1)

• 24 x 2.5" (16 x SAS/SATA + 8 x NVMe) drive EXP backplane

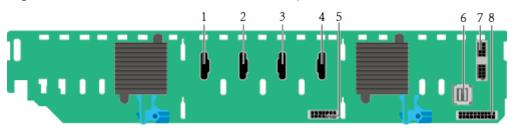
Figure 5-38 24 x 2.5" (16 x SAS/SATA + 8 x NVMe) drive EXP backplane



No.	Connector	No.	Connector
1	NVMe (PORT B_N2/J26)	2	NVMe (PORT B_N0/J24)
3	NVMe (PORT B_N1/J25)	4	SAS cable connector (PORT C_0/J28)
5	SAS cable connector (PORT C_1/J29)	6	NVMe (PORT A_N1/J21)
7	NVMe (PORT A_N0/J20)	8	NVMe (PORT A_N2/J22)
9	Backplane signal cable connector (J1)	10	Backplane power connector (J3)
11	NVMe (PORT A_N3/J23)	12	NVMe (PORT B_N3/J27)

• 24 x 2.5" drive NVMe Switch backplane

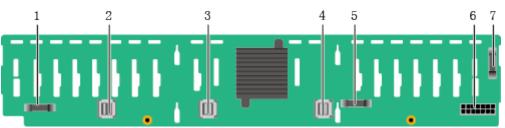
Figure 5-39 24 x 2.5" drive NVMe Switch backplane



No.	Connector	No.	Connector
1	Slimline A connector (J6)	2	Slimline B connector (J5)
3	Slimline C connector (J7)	4	Slimline D connector (J8)
5	Power connector 2 (J34)	6	mini-SAS HD connector (PORT A/J52)
7	Backplane signal cable connector (J3)	8	Power connector 1 (J2)

• 25 x 2.5" SAS/SATA drive EXP backplane

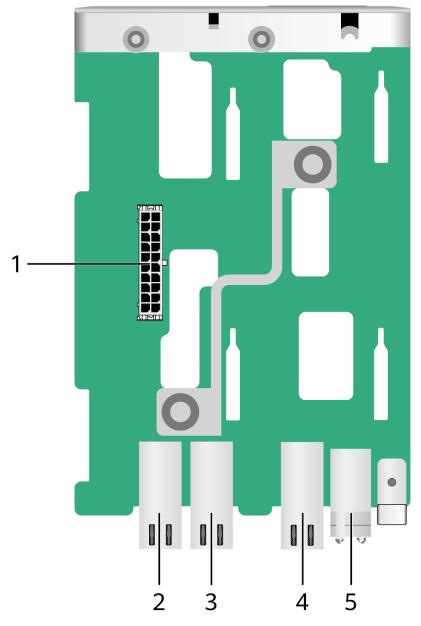
Figure 5-40 25 x 2.5" SAS/SATA drive EXP backplane (BOM: 03024MSH, 03029TDQ, and 0302Y071)



No.	Connector	No.	Connector
1	Indicator signal cable connector (J32)  NOTE  The connector is reserved.	2	Mini-SAS HD connector (PORT A/J28)
3	Mini-SAS HD connector (PORT B/J29)	4	Mini-SAS HD connector (REAR PORT/J31)
5	Backplane signal cable connector (J1)	6	Power connector (J24)
7	Indicator signal cable connector (J35)  NOTE  The connector is reserved.	-	-

# 5.11.4 PSU Backplane





1	Common socket (J9)	2	Power connector (J1)
3	Power connector (J2)	4	Power connector (J3)
5	Signal cable connector (J10)	-	-

# 6 Product 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	4U rack server	
Chipset	Intel® C622	
Processor	<ul> <li>Supports two or four processors.</li> <li>Intel<sup>®</sup> Xeon<sup>®</sup> Scalable (Skylake and Cascade Lake) processors</li> <li>Built-in memory controller and six memory channels</li> <li>Built-in PCle controller, supporting PCle 3.0 and 48 lanes per processor</li> <li>Three UPI buses between processors, providing up to 10.4GT/s transmission per channel</li> <li>Up to 28 cores per processor</li> <li>Max. 3.8 GHz</li> <li>Min. 1.375 MB L3 cache per core</li> <li>Max. 205 W TDP</li> <li>NOTE</li> </ul>	
	The preceding information is for reference only. Use the Compatibility List to obtain specific information.	

Component	Specifications
DIMM	Supports 48 memory modules of the following types:
	Up to 48 DDR4 memory modules
	Compatible with 3200 MT/s DDR4 memory modules. The actual memory speed is subject to Intel CPU specifications.
	RDIMM and LRDIMM support
	The DDR4 memory modules of different types (RDIMM and LRDIMM) and specifications (capacity, bit width, rank, and height) cannot be used together.
	NOTE  The preceding information is for reference only. Use the Compatibility List to obtain specific information.

Component	Specifications
Storage	Supports a variety of drive configurations. For details, see <b>5.5.1 Drive Configurations</b> .
	Supports two M.2 SSDs.
	<ul> <li>M.2 SSDs are supported for RAID 0/1 and hot swap without opening the chassis cover is supported when the server is configured with an Avago SAS3004iMR RAID controller card.</li> </ul>
	<ul> <li>The drive letter of the M.2 SSDs managed by the Avago SAS3004iMR RAID controller card can be set to <b>sda</b> by modifying the GRUB parameters only when the RAID controller card is used with a SmartRAID 3152-8i or SmartHBA 2100-8i RAID controller card.</li> </ul>
	NOTE
	The M.2 SSD module is used only as the boot device when the OS is installed. 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:
	<ul> <li>Redirect /scratch. For details, see https:// kb.vmware.com/s/article/1033696.</li> </ul>
	<ul> <li>Configure syslog. For details, see <a href="https://kb.vmware.com/s/article/2003322">https://kb.vmware.com/s/article/2003322</a>.</li> </ul>
	<ul> <li>The M.2 SSD cannot be used to store data due to poor endurance. In write-intensive applications, the M.2 SSD will wear out in a short time.</li> <li>Use enterprise-level high endurance (HE) SSDs or HDDs for data storage.</li> </ul>
	<ul> <li>The M.2 SSD is not recommended for write-intensive service software due to poor endurance.</li> </ul>
	Do not use the M.2 SSD as the cache.
	Supports hot swap of SAS/SATA drives.
	Supports hot swap of SAS/SATA/NVMe U.2 drives.
	NOTE The NVMe drives support:
	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.
	Supports a variety of RAID controller cards. Use the Compatibility List to obtain information about the specific RAID controller cards supported.
	<ul> <li>The RAID controller card supports RAID configuration, RAID level migration, and drive roaming.</li> </ul>
	The PCIe RAID controller card occupies one standard PCIe slot.

Component	Specifications
	For details about the RAID controller card, see <i>V5</i> Server RAID Controller Card User Guide.
	<ul> <li>Supports a SAS RAID controller card (with a 1 GB, 2 GB, or 4 GB cache) and a supercapacitor (providing power-off protection) to improve storage performance and data security.</li> </ul>
Network	Supports LOM.
	Supports two 10GE optical ports and two GE electrical ports via the NIC chip integrated on the mainboard.
	The LOM ports support NC-SI and PXE.
	NOTE  The electrical ports provided by LOMs and PCle NICs cannot be connected to PoE devices (such as a switch with PoE enabled).  Connecting such an electrical port to a PoE device may cause link communication failure or even damage the NIC.
I/O expansion	15 PCle 3.0 slots:
	<ul> <li>Six slots for riser cards and nine onboard slots.</li> <li>For details, see 5.7.2 PCle Slots and 5.7.3 PCle Slot Description.</li> </ul>
	<ul> <li>Support PCIe SSD cards to bolster I/O performance for applications such as searching, caching, and download services.</li> </ul>
	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 are the same. For details, contact technical support.
	NOTE  The preceding information is for reference only. Use the  Compatibility List to obtain specific information.

Component	Specifications
Port	Supports a variety of ports.
	Ports on the front panel:
	- Two USB 2.0 ports
	<ul><li>One USB 3.0 port</li></ul>
	<ul><li>One DB15 VGA port</li></ul>
	NOTE
	For the server that uses 25 x 2.5" drive configuration, the front panel provides only two USB 2.0 ports.
	Ports on the rear panel:
	<ul><li>Two USB 3.0 ports</li></ul>
	<ul><li>One DB15 VGA port</li></ul>
	<ul><li>One RJ45 serial port</li></ul>
	<ul> <li>One RJ45 system management port</li> </ul>
	Two GE electrical ports
	<ul> <li>Two 10GE optical ports</li> </ul>
	Built-in ports:
	<ul><li>Two USB 3.0 ports</li></ul>
	NOTE In the 8 x 2.5" or 24 x 2.5" drive configuration, only one USB3.0 built-in port is provided.
	NOTE You are not advised to install the operating system on the USB storage media.
Video card	An SM750 video chip with 32 MB display memory is integrated on the mainboard. The maximum display resolution is 1920 x 1200 at 60 Hz with 16 M colors.
	SM750 is not supported by servers running the Windows Server 2019 or Windows Server 2019 Hyper-V operating systems that are in secure boot mode.
	<ul> <li>The integrated video card can provide the maximum display resolution (1920 x 1200) only after the video card driver matching the operating system version is installed. Otherwise, only the default resolution supported by the operating system is provided.</li> </ul>
	<ul> <li>If the chassis provides the front and rear VGA ports but only one VGA port is connected to a monitor, the display effect may be affected.</li> </ul>
System management	Supports UEFI.
	Supports iBMC.
	Supports NC-SI.
	Supports integration with third-party management systems.

Component	Specifications
Security feature	Power-on password
	Administrator password
	TCM (only in China)/TPM
	Secure boot
	Front bezel (optional)

# **6.2 Environmental Specifications**

Table 6-2 Environmental specifications

Category	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): –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)
	<ul> <li>Storage temperature (within one year): -10°C to +35°C (14°F to 95°F)</li> </ul>
	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.
Relative humidity (RH,	Operating humidity: 8% to 90%
non-condensing)	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 change rate: 20%/h
Air volume	≥412CFM

Category	Specifications
Operating altitude	≤3050m
	When the server configuration complies with ASHRAE Classes A1 and A2 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 300 m (984.25 ft).
	When the configuration complies with ASHRAE Class A3 standards 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.).
	<ul> <li>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).</li> <li>HDDs cannot be used at an altitude of over 3050 m</li> </ul>
	(10006.44 ft).
Corrosive gaseous	Maximum corrosion product thickness growth rate:
contaminant	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 agency.
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 reported in accordance with ISO 9296 (ECMA 109).
	• Idle:
	- LWAd: 5.3 Bels
	– LpAm: 40.1 dBA
	Operating:
	- LWAd: 6.1 Bels
	– LpAm: 50.4 dBA
	NOTE  The noise generated during operation varies depending on the server configuration, load, and ambient temperature.

#### **◯** NOTE

SSDs and HDDs (including NL-SAS, SAS, and SATA) cannot be preserved for a long time in the power-off state. Data may be lost or faults may occur if the preservation duration exceeds the specified maximum duration. When drives are preserved under the storage temperature and humidity specified in the preceding table, the following preservation time is recommended:

- Maximum preservation duration of SSDs:
  - 12 months in power-off state without data stored
  - 3 months in power-off state with data stored
- Maximum preservation duration of HDDs:
  - 6 months in unpacked/packed and powered-off state
- The maximum preservation duration is determined according to the preservation specifications provided by drive vendors. For details, see the manuals provided by drive vendors.

# 6.3 Physical Specifications

Table 6-3 Physical specifications

Item	Description
Dimensions (H x W x D)	175 mm x 447 mm x 790 mm (6.89 in. x 17.60 in. x 31.10 in.)
	Figure 6-1 Physical dimensions
	790 mm (31.70 m.)  790 mm (31.70 m.)
	NOTE See Figure 6-1 for methods in measuring physical dimensions of the chassis.

Item	Description
Installation dimension requirements	Requirements for cabinet installation:     19-inch standard cabinet compliant with the     International Electrotechnical Commission (IEC) 297     standard
	<ul><li>Cabinet width: 482.6 mm (19.00 in.)</li></ul>
	<ul> <li>Cabinet depth ≥ 900 mm (35.43 in.)</li> </ul>
	Requirements for guide rail installation:
	<ul> <li>L-shaped guide rails: apply only to our company's cabinets.</li> </ul>
	<ul> <li>Adjustable L-shaped guide rail: 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.</li> </ul>
	<ul> <li>Ball bearing rail kit: applies to cabinets with a distance of 610 mm to 914 mm (24.02 in. to 35.98 in.) between the front and rear mounting bars.</li> </ul>
Fully equipped weight	Net weight:
	<ul> <li>Maximum weight for server with 8 x 2.5" drives: 42 kg (92.59 lb)</li> </ul>
	<ul> <li>Maximum weight for server with 24 x 2.5" drives:</li> <li>44 kg (97.00 lb)</li> </ul>
	<ul> <li>Maximum weight for server with 25 x 2.5" drives:</li> <li>45 kg (99.21 lb)</li> </ul>
	Packaging materials: 9 kg (19.84 lb)
Energy consumption	The power consumption parameters vary with server configurations, including the configurations complying with energy-related products (ErP) requirements. Use the <b>Power Calculator</b> to obtain specific information.

# Software and Hardware Compatibility

Use the **Compatibility List** to obtain information about the operating systems and hardware supported.

#### 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 sales personnel 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
- 8.2 Maintenance and Warranty

# 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 the device labels when installing hardware. Follow them in conjunction with these Safety Instructions.
- Only qualified personnel are allowed to perform special tasks, such as performing high-voltage operations and driving a forklift.

# **MARNING**

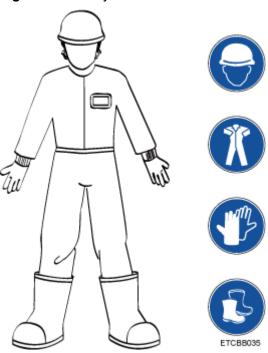
If this device works in a residential environment, the wireless interference may be generated.

#### **Human Safety**

- This equipment is not suitable for use in places where children may be present.
- Only certified or authorized personnel are allowed to install the device.
- 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.

- Do not carry the weight that is over the maximum load per person allowed by local laws or regulations. Before moving or installing equipment, check the maximum equipment 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.

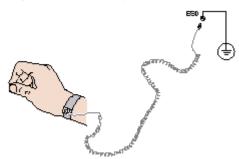
Figure 8-2 Removing conductive objects



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 the device is higher than the shoulders of the
  installation personnel, use a vehicle such as a lift to facilitate installation. Prevent
  the equipment from falling down and causing personal injury or damage to the
  equipment.
- 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.
- When a ladder is used, ensure that another person holds the ladder steady to prevent accidents.
- When connecting, testing, or replacing an optical cable, do not look into the optical port without eye protection.

#### **Equipment Safety**

- Use the recommended power cables at all times.
- Use power cables 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 personal injury.
- If the device is configured with active and standby PSUs, connect power cables
  of active and standby PSUs to different power distribution units (PDUs) to
  ensure reliable system operating.
- Ground the equipment before powering it on.

## **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 the equipment 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 GPUs and SSDs) separately.

#### □ NOTE

Use **Compatibility List** to obtain information abut the components supported by a node or server.

Power off all devices before transportation.

#### Maximum Weight Carried by a Person



To reduce the risk of personal injury, comply with local regulations with regard to the maximum weight one person is permitted to carry.

**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

For more information about safety instructions, see **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

The server uses the next-generation Intelligent Baseboard Management Controller (iBMC) to implement remote server management. The iBMC complies with IPMI 2.0 and provides highly reliable hardware monitoring and management.

#### **Features**

The iBMC supports the following features and protocols:

- KVM and text console redirection
- Remote virtual media
- IPMI
- SNMP
- Common information model (CIM)
- Redfish
- Browser-based login

#### **Specifications**

Table 9-1 iBMC specifications

Specifications	Description	
Management interface	Integrates with any standard management system through the following interfaces:  • IPMI  • CLI	
	<ul><li>HTTPS</li><li>SNMP</li><li>Redfish</li></ul>	
Fault Detection	Detects and accurately locates faults in a field replaceable unit (FRU).	

Specifications	Description	
System watchdog	Supports BIOS POST, OS watchdog, and automatic system reset after fault timeout. Users can enable or disable these features individually.	
Setting of boot device	Supports out-of-band configuration for the boot device.	
Alarm management	Supports alarm management and reports alarms using the SNMP trap, SMTP, and syslog service to ensure 24/7 operating.	
Integrated virtual KVM	Provides remote maintenance measures and VNC service for troubleshooting.	
Integrated virtual media	Virtualizes local media devices, images, USB keys, and folders into media devices on a remote server, simplifying OS installation. (The virtual DVD-ROM drive supports a maximum transmission rate of 8 MB/s.)	
WebUI	Provides a user-friendly graphical user interface (GUI), which simplifies users' configuration and query operations.	
Fault reproduction	Reproduces faults to facilitate fault diagnosis.	
Screen snapshots and videos	Allows users to view screenshots and videos without login, facilitating routine preventive maintenance inspection (PMI).	
Black Box	Allows users to enable or disable the black box function and download black box data.	
DNS/LDAP	Supports domain management and directory services, which significantly simplify network and configuration management.	
Dual-image backup	Allows a boot from the backup image when the active software crashes.	
Device asset management	Provides intelligent asset management, supporting unified management and stocktaking of assets in use.	
Intelligent power management	Uses the power capping technology to increase deployment density, and uses dynamic energy saving to lower operating expenses.	
IPv6	Supports IPv6 to help build an all-IPv6 environment.	
Network Controller Sideband Interface (NC-SI)	Supports NC-SI, allowing access to the iBMC through the service network port.	

# 10 Certifications

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 17625.1-2022
		GB 4943.1-2022
		GB/T 9254.1-2021 (Class A)
China	RoHS	SJ/T-11364
		GB/T 26572
Japan	VCCI	VCCI 32-1
Global	СВ	IEC 62368-1:2014

# 1 1 Waste Product Recycling

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



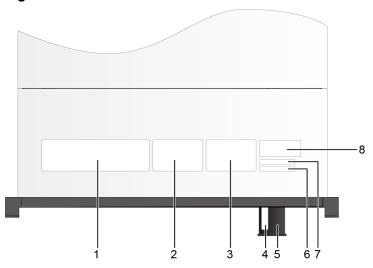
# A.1 Chassis Label

**◯** NOTE

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

# A.1.1 On the Front Top

Figure A-1 Chassis head label



1	Nameplate	2	Certificate
3	Quick access tag	4	SN
			NOTE For details, see A.2 Product SN.

5	Slide-out label plate	6	SN
	NOTE  The label locations vary with server models or configurations. For details, see 5.1.1  Appearance.		NOTE For details, see A.2 Product SN.
7	Reserved space for custom label	8	Pressure-proof label  NOTE  This label indicates that do not place any objects on top of a rackmounted device.

# A.1.1.1 Nameplate

Figure A-2 Nameplate example

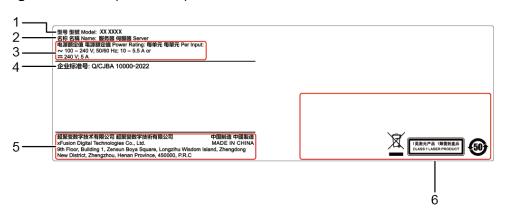


Table A-1 Nameplate description

No.	Description
1	Server Model
	For details, see <b>A.4 Nameplate</b> .
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.

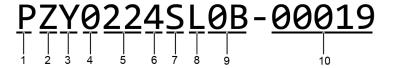


Table A-3 Certificate No. Description

No.	Description
1	The value for this digit is <b>P</b> , which is fixed.
2	The value for this digit is <b>Z</b> , which is fixed.
3	<ul> <li>Y: indicates a server.</li> <li>B: indicates a semi-finished server.</li> <li>N: indicates a spare part.</li> </ul>

No.	Description
4	The value is <b>0</b> . This digit is a reserved digit.
5	Indicates the year (two digits).
6	Indicates the month (one digit).  • Digits 1 to 9 indicate January to September, respectively.  • Letters A to C indicate October to December, respectively.
7	Indicates the day (one digit).  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	Indicates the hour (one digit).  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	Indicates the serial number (two digits).
10	Indicates the manufacturing serial number (five digits).

## A.1.1.3 Sample Quick Access Tags

Figure A-5 Sample quick access tags

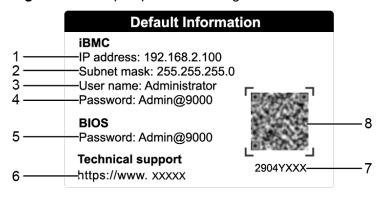


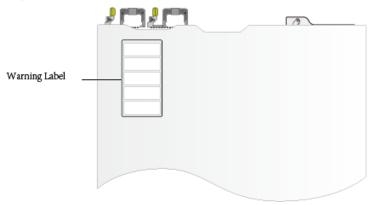
Table A-4 Quick access tab description

No.	Description
1	IP address of the iBMC management network port
2	Subnet mask of the iBMC management network port

No.	Description
3	Default iBMC user name
4	Default iBMC password
5	Default 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

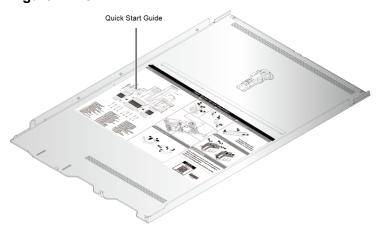


**◯** NOTE

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

# A.1.3 Chassis Internal Label

Figure A-7 Chassis internal label



#### 

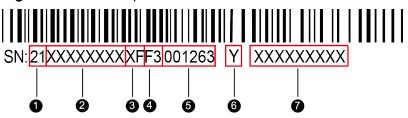
- The quick guide is located on the inside of the chassis cover. It describes how to remove
  the mainboard components, important components of the chassis, precautions, and QR
  codes of technical resources. The pictures are for reference only. For details, see the
  actual product.
- The quick guide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

### 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. **Figure A-8** and **Figure A-9** show the SN formats.

• SN example 1

Figure A-8 SN example 1



• SN example 2

Figure A-9 SN example 2

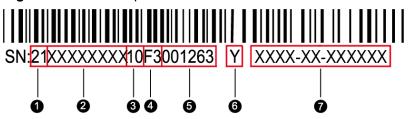


Table A-5 SN example description

No.	Description
1	ESN ID (two characters), which can only be 21.
2	Material ID (eight characters), that is, the processing code.
3	Vendor code (two characters), that is, the code of the processing place.

No.	Description
4	Year and month (two characters).
	The first character indicates the year.
	<ul> <li>Digits 1 to 9 indicate years 2001 to 2009, respectively.</li> </ul>
	<ul> <li>Letters A to H indicate years 2010 to 2017, respectively.</li> </ul>
	<ul> <li>Letters J to N indicate years 2018 to 2022, respectively.</li> </ul>
	<ul> <li>Letters P to Y indicate years 2023 to 2032, respectively.</li> </ul>
	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.
	<ul> <li>Digits 1 to 9 indicate January to September, respectively.</li> </ul>
	Letters A to C indicate October to December, respectively.
5	Serial number (six digits).
6	RoHS compliance (one character). <b>Y</b> 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

Configuratio n	Max. 35°C (95°F)	Max. 40°C (104°F)	Max. 45°C (113°F)
8 x 2.5" SAS/ SATA drive configuration	All options supported	Options supported: processors of up to 205 W	Options supported: processors of up to 140 W
		Options not supported: GPU cards	Options not supported:  PCle SSD cards
			GPU cards
24 x 2.5" SAS/ SATA drive configuration	All options supported	Options supported: processors of up to 205 W	Not supported
		Options not supported: GPU cards	

Configuratio n	Max. 35°C (95°F)	Max. 40°C (104°F)	Max. 45°C (113°F)
24 x 2.5" (16 x SAS/SATA + 8 x NVMe) drive	All options supported	Options supported: processors of up to 205 W	Not supported
configuration		Options not supported: GPU cards	
24 x 2.5" NVMe drive configuration	All options supported	Options supported: processors of up to 205 W	Not supported
		Options not supported: GPU cards	
25 x 2.5" SAS/ SATA drive configuration	All options supported	Options supported: processors of up to 205 W	Not supported
		Options not supported: GPU cards	

#### **◯** NOTE

- If a single fan is faulty, the maximum operating temperature is 5°C (9°F) lower than the rated value.
- If the V100 GPU card is configured, the maximum operating temperature supported is 30°C (86°F).

# A.4 Nameplate

Certified Model	Usage Restrictions	
H58H-05	Global	
5885H V5	Global	
Note: The nameplate depends on the actual product.		

# 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 how to configure these features, see the **Server Purley Platform BIOS Parameter Reference**.

Table A-7 Supported RAS features

Module	Feature	Description
CPU	Corrected Machine Check Interrupt (CMCI)	Corrects error-triggered interrupts.
Memory	Failed DIMM Isolation	Identifies faulty DIMMs to facilitate isolation and replacement of the faulty DIMMs.
	Memory Thermal Throttling	Automatically adjusts the memory temperature to prevent the memory from being damaged due to overheat.
	Rank Sparing	Uses some memory ranks for backup to prevent the system from breaking down due to uncorrectable errors.
	Memory Address Parity Protection	Detects memory command and address errors.
	Memory Demand and Patrol Scrubbing	Corrects correctable errors upon detection. If these errors are not corrected in a timely manner, uncorrectable errors may occur.
	Memory Mirroring	Provides high reliability for the system via mirroring.
	Single Device Data Correction (SDDC)	Corrects single-chip multi-bit errors to improve memory reliability.
	Device Tagging	Degrades and rectifies memory faults to improve memory availability.
	Data Scrambling	Optimizes data flow distribution to reduce the error probability and improve memory data flow reliability and address error detection.
PCle	PCIe Advanced Error Reporting	Provides a PCIe advanced error reporting mechanism to improve server serviceability.
UPI	Intel UPI Link Level Retry	Provides a retry mechanism to improve the reliability of UPI links.
	Intel UPI Protocol Protection via CRC	Provides cyclic redundancy check (CRC) protection for UPI data packets to improve system reliability.
System	Core Disable For FRB (Fault Resilient Boot)	Isolates a faulty CPU core during startup to improve system reliability and availability.

Module	Feature	Description
	Corrupt Data Containment Mode	Marks the memory storage unit when a data error occurs to limit the impact on the running program and improve system reliability.
	Socket disable for FRB (Fault Resilient Boot)	Isolates a faulty socket during the BIOS startup process to improve system reliability.
	Architected Error Records	With the features such as eMCA, the BIOS collects error information recorded in hardware registers in compliance with UEFI specifications, notifies the OS through the APEI interface of the ACPI, and locates the error unit, improving system availability.
	Error Injection Support	Implements fault injection to verify RAS features.
	Machine Check Architecture (MCA)	Provides a software repair function to rectify uncorrectable errors to improve system availability.
	Enhanced Machine Check Architecture (eMCA): Gen2	Improves system availability.
	OOB access to MCA registers	The out-of-band system can access MCA registers through the PECI. When a fatal error occurs in the system, the out-of-band system can collect onsite data to facilitate subsequent fault analysis and locating and improve system serviceability.
	BIOS Abstraction Layer for Error Handling	The BIOS processes errors and reports error information to the OS based on specifications, improving system serviceability.
	BIOS-based Predictive Failure Analysis (PFA)	The OS takes the lead. The BIOS provides information about physical memory error units. The OS tracks, predicts, and handles the errors.

# A.6 Sensor List

Sensor	Description	Component
Inlet Temp	Air inlet temperature	Left mounting ear

Sensor	Description	Component
Outlet Temp	Air outlet temperature	Component in position U60 on the mainboard.
PCH Temp	PCH bridge temperature	Component in position U4014 on the mainboard.
CPUN Core Rem	CPU core temperature	CPU. N indicates the
CPUN DTS	CPU DTS value	CPU number. The value ranges from <b>1</b> to <b>4</b> .
CpuN Margin	CPU1 Margin temperature	
CPUN Prochot	CPU Prochot	
CPUN VDDQ Temp	CPU VDDQ temperature	CPU 1: Components in positions U4333 and U4339 on the mainboard.
		CPU 2: Components in positions U4443 and U4447 on the mainboard.
		CPU 3: Components in positions U4351 and U4408 on the mainboard.
		CPU 4: Components in positions U4411 and U4414 on the mainboard.
		N indicates the CPU number. The value ranges from 1 to 4.
CPUN VRD Temp	CPU VRD temperature	CPU 1: Component in position U4316 on the mainboard.
		CPU 2: Component in position U4430 on the mainboard.
		CPU 3: Component in position U4370 on the mainboard.
		CPU 4: Component in position U4401 on the mainboard.
		N indicates the CPU number. The value ranges from <b>1</b> to <b>4</b> .

Sensor	Description	Component	
CPUN MEM Temp	CPU DIMM temperature	DIMMs of CPU <i>N</i> . <i>N</i> indicates the CPU number. The value ranges from <b>1</b> to <b>4</b> .	
SSD Disk <i>N</i> Temp	SSD temperature	SSD. <i>N</i> indicates the physical drive slot number.	
FANN F Speed	Fan speed	Fan module. N indicates	
FANN R Speed		the fan module ID. The value ranges from <b>1</b> to <b>5</b> .	
Power	Server input power	Total PSU power.	
Power <i>N</i>	PSU input power	PSU. <i>N</i> indicates the PSU ID. The value ranges from <b>1</b> to <b>4</b> .	
CPUN Status	CPU status	CPU. <i>N</i> indicates the CPU number. The value ranges from <b>1</b> to <b>4</b> .	
CPUN Memory	DIMM status	DIMMs of CPU <i>N</i> . <i>N</i> indicates the DIMM number. The value ranges from <b>1</b> to <b>4</b> .	
PSN Fan Status	PSU fan status	PSU. N indicates the PSU	
PSN Temp Status	PSU presence	number. The value ranges from <b>1</b> to <b>4</b> .	
PSN Status	PSU status		
Power Button	Power button	Right mounting ear	
UID Button	UID button status		
DISKN	Drive status	Drive. <i>N</i> indicates the physical drive slot number.	
FANN F Presence	Fan presence	Fan module. N indicates	
FANN R Presence		the fan module number. The value ranges from 1	
FANN F Status	Fan status	to <b>5</b> .	
FANN R Status			
RTC Battery	RTC battery status. An alarm is generated when the voltage is lower than 1 V.	CMOS battery	

Sensor	Description	Component
DIMMN	DIMM status	DIMM. <i>N</i> indicates the DIMM slot number.
PCH Status	PCH chip fault diagnosis health status	Component in position U4014 on the mainboard.
LCD Presence	LCD presence	LCD
LCD Status	LCD health status	
PS Redundancy	Redundancy failure due to PSU removal	PSU. <i>N</i> indicates the PSU number. The value is <b>1</b> or
PSN Inlet Temp	PSU air inlet temperature	<b>2</b> .
PSN VIN	Input voltage	N/A
PwrOk Sig. Drop	Voltage dip status	N indicates the number of the component.
ACPI State	ACPI status	
SysFWProgress	Software processes and system startup errors	
SysRestart	System restart causes	
Boot Error	Boot error	
Watchdog2	Watchdog	
Mngmnt Health	Management subsystem health status	
Riser1 Card	Entity presence	
SAS Cable	Entity presence	
PCIe RAIDN Temp	LSI SAS3508 RAID controller card temperature	
PCIe RAIDN Temp	Avago SAS3004 RAID controller card temperature	
M2 Temp(PCIeN)	Maximum temperature of all M.2 drives of the RAID controller card	
PCIe Status	PCIe status	
PwrOn TimeOut	Power-on timeout	
PwrCap Status	Power capping status	
HDD Backplane	Drive backplane entity presence	

Sensor	Description	Component
HDD BP Status	Drive backplane health status	
PortN Link Down (N 1. 2. 3. 4)	Network port link status	
CPUN UPI Link (N 1. 2. 3.4)	CPU UPI link fault diagnosis health status	
System Notice	Hot restart reminder and fault diagnosis program information collection	
System Error	System suspension or restart. Check the background logs	
BMC Boot Up	iBMC startup events	
SEL Status	SEL full or clearing events	
Op. Log Full	Operation log full or clearing events	
Sec. Log Full	Security log full or clearing events	
CPU Usage	CPU usage	
Memory Usage	Memory usage	
PCleN Card BBU	BBU fault or low voltage on a PCle card	
BMC Time Hopping	Time hopping	
NTP Sync Failed	NTP synchronization failure and recovery events	
Host Loss	System monitoring software (iBMA) link loss detection	
PCIeN Inlet Temp	PCIe smart card air inlet temperature	
PCIeN Cpu Temp	PCIe smart card CPU temperature	
GPUN Temp	GPU temperature	
P100GPUN Temp		
P4GPUN Temp		

Sensor	Description	Component
P40GPUN Temp		
SYS 3.3V	Mainboard 3.3 V voltage	
SYS 5V	Mainboard 5.0 V voltage	
SYS 12V_1	Mainboard 12.0 V voltage (the first output 12 V voltage detection for soft- start (CPU1 +PCle Slot))	
SYS 12V_2	Mainboard 12.0 V voltage (the second output 12 V voltage detection for soft- start (CPU2 + CPU3))	
SYS 12V_3	Mainboard 12.0 V voltage (the third output 12 V voltage detection for soft- start (CPU4 + fan module))	
SYS 12V_4	Mainboard 12.0 V voltage (the fourth output 12 V output voltage detection for soft-start (drive backplane module))	
SYS 12V_5	Mainboard 12.0 V voltage (the fourth output 12 V output voltage detection for soft-start (drive backplane module))	
Standby 5V	Mainboard standby 5.0 V voltage	
Standby 3.3V	Mainboard standby 3.3 V voltage	
Standby 1.8V	Mainboard standby 1.8 V voltage	
Standby 1.5V	Mainboard standby 1.5 V voltage	
CPUN VCore	1.8 V CPU voltage	
CPUN DDR VDDQ	CPU DIMM voltage	
CPUN DDR VDDQ2	CPU DIMM voltage	
CPUN VSA	CPU VSA voltage	
CPUN VCCIO	CPU VCCIO voltage	

Sensor	Description	Component
PCH VPVNN	PCH PVNN voltage	
PCH PRIM 1V05	PCH 1.05 V voltage	
SSDN Temp	SSD temperature	



### **B.1 A-E**

Ε

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 10M and 100M Ethernet and complies with IEEE 802.3z
	standards.

Н

•	Replacing or adding components without stopping or shutting down the system.
	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**

Ρ

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 one 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.
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 or chassis. 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**

Α

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

В

BBU	backup battery unit
BIOS	Basic Input/Output System

C

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

#### D

DC	direct current
DCPMM	DC persistent memory module
DDR3	Double Data Rate 3
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

### Ε

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

### Н

НА	high availability
HDD	hard disk drive
HPC	high-performance computing
НТТР	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
ммс	module management controller

Ν

NBD	next business day
NC-SI	Network Controller Sideband Interface

# **C.4 P-T**

Ρ

PCIe	Peripheral Component Interconnect Express
PDU	power distribution unit
PHY	physical layer
PMBUS	power management bus
РОК	power OK
PWM	pulse-width modulation

PXE	Preboot Execution Environment
-----	-------------------------------

# Q

QPI Quick Path Interconnect	QPI
-----------------------------	-----

# 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 Extensions

Т

TACH	tachometer signal
ТВТ	Turbo Boost Technology
TCG	Trusted Computing Group
TCM	trusted cryptography module
тсо	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
ТРМ	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.
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