FusionServer G560 V5 Compute Node

Technical White Paper

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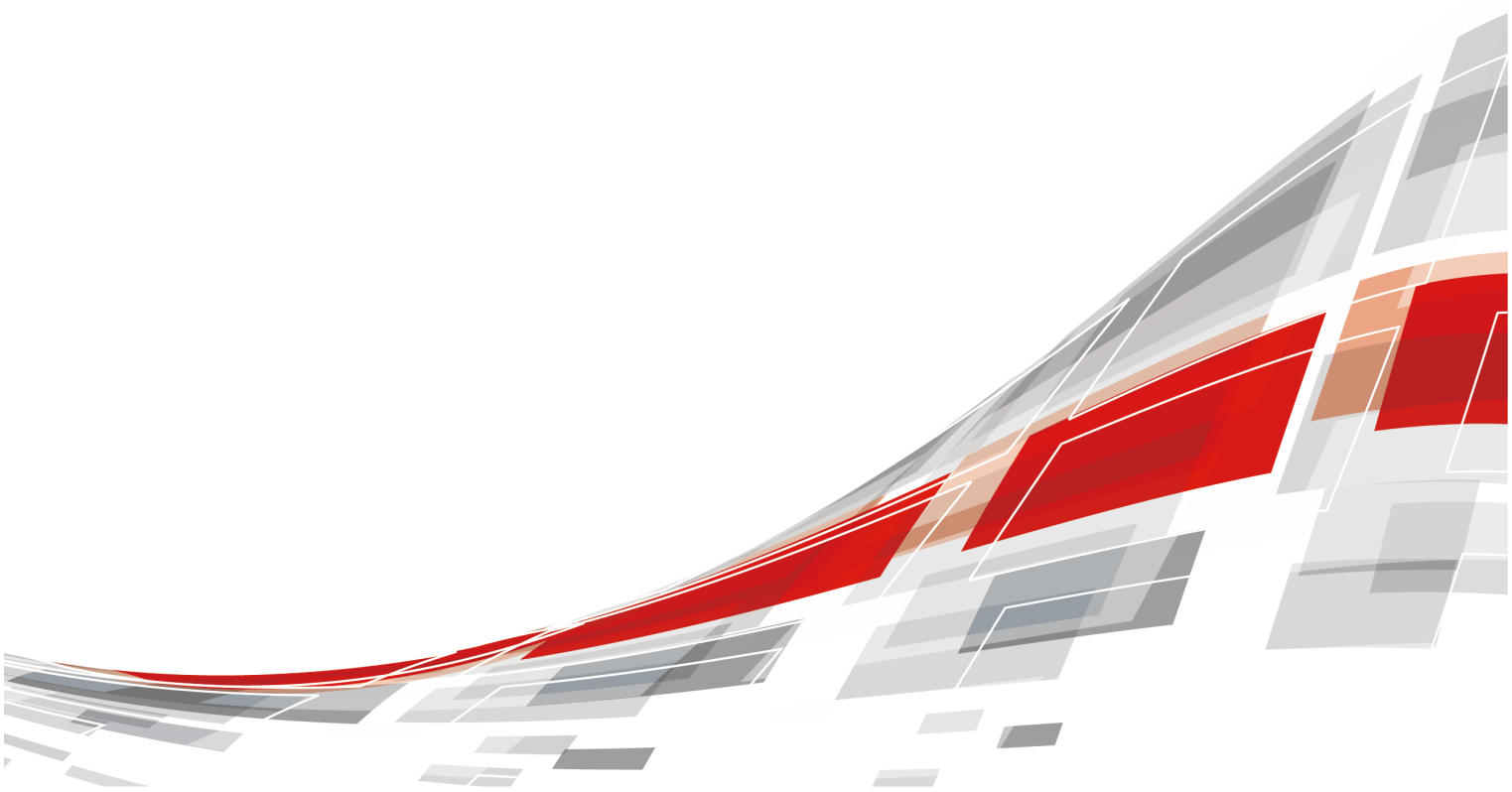

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About This Document

Purpose

This document describes the appearance, features, specification, and configuration of the general-purpose compute module G560 V5 and the heterogeneous compute modules GP608 and GS608 of FusionServer G5500 server.

NOTE

In this document, a compute node consists of one G560 V5 and one GP608 or GS608.

Intended Audience

This document is intended for pre-sales engineers.

Symbol Conventions

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

Symbol	Description
DANGER	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.

Symbol	Description
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
02	2023-10-24	Added **7 Waste Product Recycling**.
01	2021-10-22	This issue is the first official release.

Contents

1 About the G560 V5, GP608, and GS608

1.1 Overview

This section describes the features, appearances, and installation positions of the G560 V5, GP608, and GS608.

Introduction

The G560 V5 is a full-width general-purpose compute module of the FusionServer G5500 server. It is powered by the new-generation Intel® Xeon® Scalable Skylake, and Cascade Lake processors. It delivers large memory capacity and powerful computing capabilities.

- Supports a maximum of 6 x 2.5" SAS/SATA/NVMe drives and 2 x 2.5" SAS/SATA/M.2 drives, which are hot swappable (scheduled hot swap for NVMe PCIe SSDs).
- The GP608 supports a maximum of 8 x 3.5" SAS/SATA drives and 8 x FHFL dual-slot general-purpose GPUs. The GS608 supports a maximum of 8 x 2.5" SAS/SATA drives and eight SXM2 GPUs.

- The I/O modules support a maximum of four half-height half-length single-slot PCIe 3.0 x16 cards.
- The PCH is embedded with the Intel X722 NIC and provides two 10GE SFP+ LOM ports through the management module in the chassis.

The GP608 is used with the G560 V5 to expand the computing capability.

- Supports eight PCIe 3.0 x16 slots. Each slot can be configured with one FHFL dual-slot GPU card.
- Supports eight hot-swappable 3.5" SAS/SATA drives to provide large storage capacity.

The GS608 is used with the G560 V5 to expand the computing capability.

- Supports up to eight SXM2 GPUs.
- Supports eight hot-swappable 2.5" SAS/SATA drives to provide large storage capacity.

The G560 V5 and GP608/GS608 are installed in a FusionServer G5500 chassis and managed by the management module.

Appearance

Figure 1-1 shows the appearance of the G560 V5.

Figure 1-1 G560 V5 appearance

Figure 1-2 shows the appearance of the GP608.

Figure 1-2 GP608 appearance

Figure 1-3 shows the appearance of the GS608.

Figure 1-3 GS608 appearance

Installation Position

Figure 1-4 and Figure 1-5 show the installation positions of the G560 V5 and GP608/GS608.

NOTE

Insert and remove the G560 V5 and GP608/GS608 in the following sequence:

- Install the GP608/GS608 and then the G560 V5.
- Remove the G560 V5 and then the GP608/GS608.

Figure 1-4 Installation positions of the G560 V5 and GP608

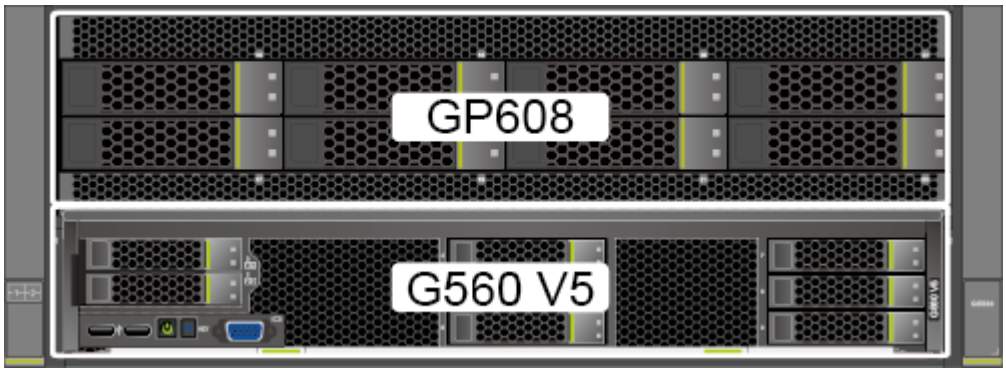
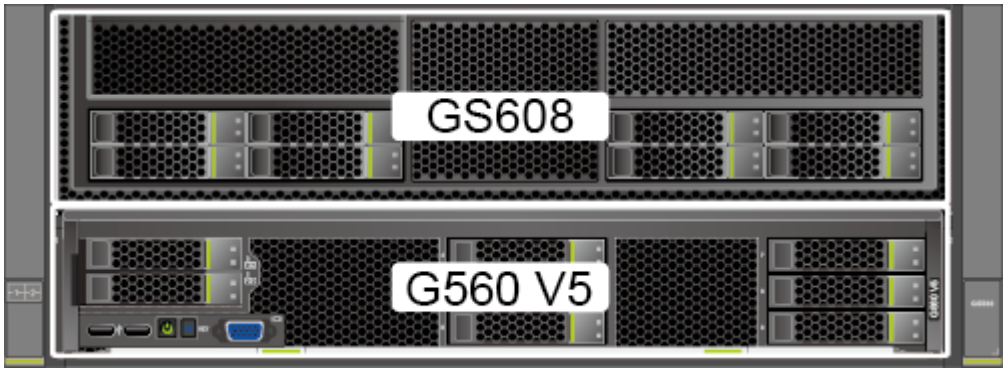


Figure 1-5 Installation positions of the G560 V5 and GS608

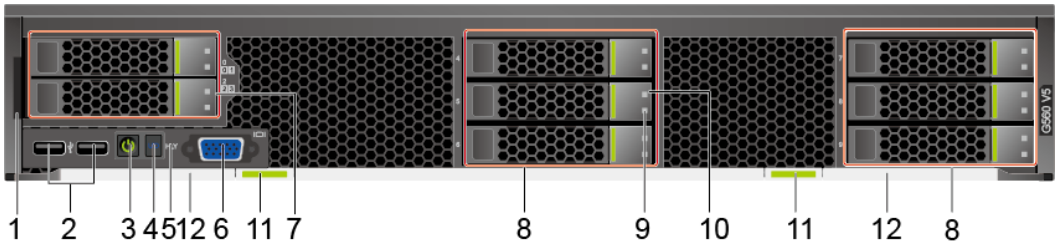


1.2 Front Panel

This section describes the front panels of the G560 V5, GP608, and GS608.

Figure 1-6, Figure 1-7, and Figure 1-8 show the front panels of the G560 V5, GP608, and GS608.

Figure 1-6 Front panel of the G560 V5



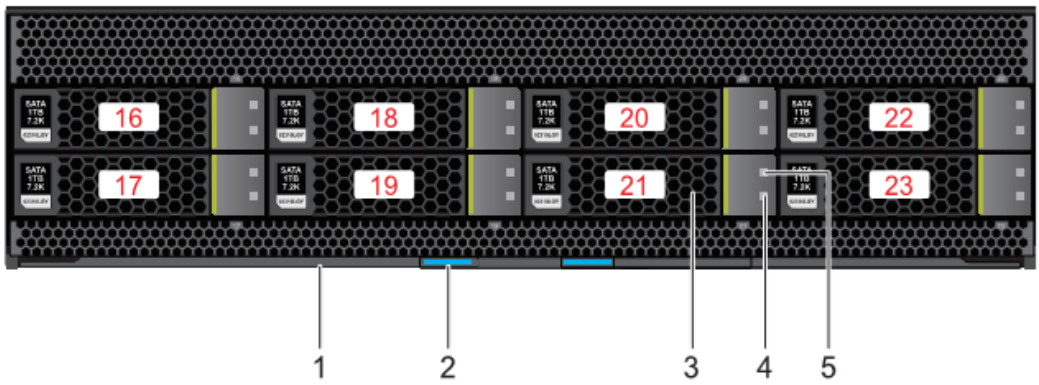
1	Customized label plate (including SN)	2	USB 3.0 port
3	Power button/indicator	4	UID button/indicator
5	HLY indicator	6	VGA port
7	2.5" SAS, SATA, or M.2 drive [a]	8	2.5" SAS, SATA, or NVMe drive [b]
9	Drive active indicator	10	Drive fault indicator
11	Ejector release buttons	12	Ejector lever

NOTE

a: The two slots support the 2.5" SAS/SATA/M.2 drives. Each 2.5" M.2 drive module supports two M.2 SSDs.

b: The six slots support the SAS, SATA, and NVMe drives, and mixed configuration of these drives is supported.

Figure 1-7 Front panel of the GP608

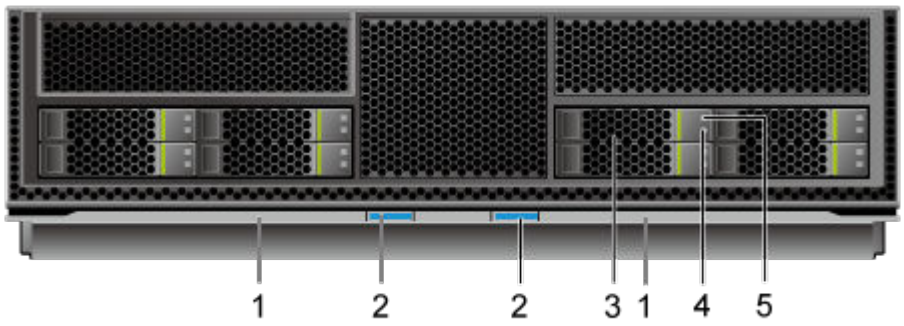


1	Ejector lever	2	Ejector release button
3	3.5-inch SAS or SATA hard disk	4	Hard disk activity indicator
5	Hard disk fault indicator	-	-

NOTE

The ejector lever and ejector release button on the GP608 are visible after the G560 V5 is removed.

Figure 1-8 GS608 front panel



1	Ejector lever	2	Ejector release button
3	2.5" SAS/SATA drives	4	Hard disk activity indicator
5	Hard disk fault indicator	-	-

NOTE

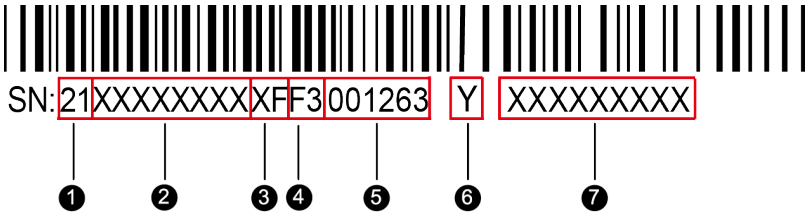
The ejector lever and ejector release button on the GS608 are visible after the G560 V5 is removed.

SN

A serial number (SN) is a string that uniquely identifies a server. A SN is required when you apply for technical support.

Figure 1-9 shows the SN format.

Figure 1-9 Example SN



No.	Description
1	ESN ID (two digits), which can only be **21**.
2	Indicates the item identification code (eight characters).
3	Vendor code (two digits), the code of the processing place.

No.	Description
4	Indicates the year and month (two characters). • The first character indicates the year. The digits 1 to 9 indicate 2001 to 2009, the letters A to H indicate 2010 to 2017, the letters J to N indicate 2018 to 2022, and the letters P to Y indicate 2023 to 2032, respectively. **NOTE** The years from 2010 are represented by upper-case letters excluding I, O, and Z because the three letters are similar to the digits 1, 0, and 2. • The second character indicates the month. Digits 1 to 9 indicate January to September, and letters A to C indicate October to December, respectively.
5	Indicates the sequence number (six digits).
6	Indicates RoHS compliance (one character). **Y** indicates compliance.
7	Internal model of the board, the product name.

1.3 Ports

Table 1-1 G560 V5 ports

Port	Type	Quantity	Description
USB port	USB 3.0 Type A	2	The panel provides two USB 3.0 ports, which are compatible with USB 2.0.
VGA port	DB15	1	The panel provides a DB15 VGA port for local maintenance of the compute node.

1.4 Indicators and Buttons

This section describes the indicators on the G560 V5 and GP608/GS608.

You can obtain the device status by observing the indicators.

Table 1-2, **Table 1-3**, and **Table 1-4** describe the indicators on the G560 V5, GP608, and GS608 panels.

Table 1-2 G560 V5 indicators

Silkscreen	Indicator/Button	Color	State Description
PWR 	Power button/ indicator	Yellow and green	● Off: The compute node is not connected to a power source. ● Blinking yellow: The power button is locked. The power button is locked when the iBMC is being started during the compute node startup. ● Steady yellow: The compute node is ready to be powered on. ● Steady green: The compute node is properly powered on. **NOTE** ● When the compute node is powered on, you can press this button for less than 1 second to shut down the OS. ● When the compute node is powered on, holding down this button for 6 seconds will forcibly power off the compute node. ● When the compute node is ready to be powered on, you can press this button for less than 1 second to start it.
UID	UID button/ indicator	Blue	The UID indicator is used to locate the compute node in a chassis. You can remotely control the UID indicator status (off, on, or blinking) by using the management module. ● Off: The compute node is powered off or not being located. ● On: The compute node is located. ● Blinking: The compute node is located and differentiated from other located compute nodes. **NOTE** ● You can press this button for less than 1 second to turn on or off the UID indicator. ● You can hold down the UID button for 4 to 6 seconds to reset the iBMC.

Silkscreen	Indicator/Button	Color	State Description
HLY	Health indicator	Red and green	• Off: The compute node is not powered on. • Steady green: The compute node hardware is operating properly. • Blinking red (at 1 Hz): A major alarm has been generated for the compute node. • Blinking red (at 5 Hz): A critical alarm has been generated for the compute node, or the compute node is not securely installed.
	NVMe SSD activity indicator	Green	• Off: The SSD is faulty or not detected. • Blinking green: Data is being read from or written to the SSD, or synchronized between SSDs. • Steady green: The SSD is not being accessed.
	NVMe SSD fault indicator	Yellow	• Off: The SSD is operating properly. • Blinking yellow (at 0.5 Hz): The SSD completes the hot swap process and is ready to be removed. • Blinking yellow (at 2 Hz): The hard disk is being located or ejected. • Steady yellow: The SSD is faulty or not detected.
	Drive or M.2 module activity indicator	Green	• Off: The hard disk is faulty or not detected. • Blinking green: Data is being read from or written to the hard disk, or synchronized between hard disks. • Steady green: The hard disk is not being accessed.
	Drive or M.2 module fault indicator	Yellow	• Off: The hard disk is operating properly. • Blinking yellow: The hard disk is being located, or RAID is being rebuilt. • Steady yellow: The hard disk is faulty or not detected.

Table 1-3 GP608 indicators

Silk Screen	Indicator	Color	State Description
	Hard disk activity indicator	Green	• Off: The hard disk is faulty or not detected. • Blinking green: Data is being read from or written to the hard disk, or synchronized between hard disks. • Steady green: The hard disk is not being accessed.
	Hard disk fault indicator	Yellow	• Off: The hard disk is operating properly. • Blinking yellow: The hard disk is being located, or RAID is being rebuilt. • Steady yellow: The hard disk is faulty or not detected.

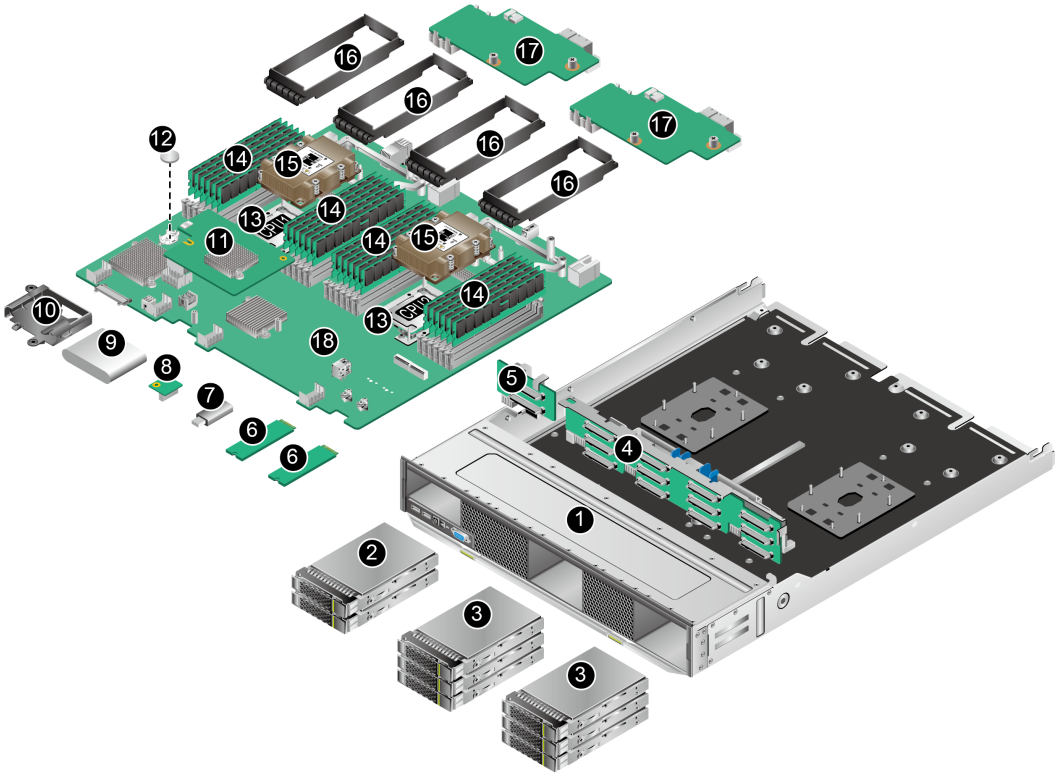
Table 1-4 GS608 indicator description

Silkscreen	Meaning	Color	Description
	Drive active indicator	Green	• Off: The hard disk is faulty or not detected. • Blinking green: Data is being read from or written to the hard disk, or synchronized between hard disks. • Steady green: The drive is inactive.
	Drive fault indicator	Yellow	• Off: The hard disk is operating properly. • Blinking yellow: The hard disk is being located, or RAID is being rebuilt. • Steady yellow: The hard disk is faulty or not detected.

1.5 Physical Structure

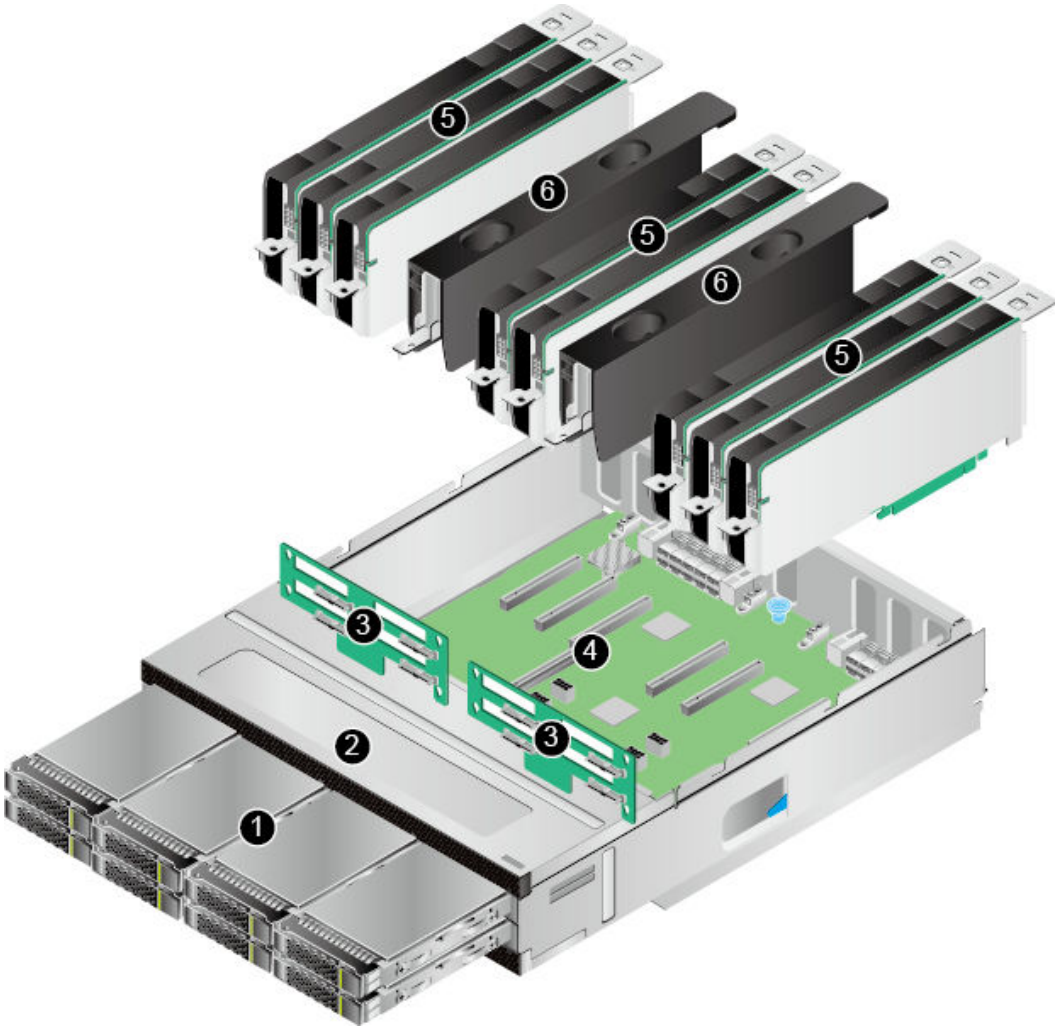
Figure 1-10, **Figure 1-11**, and **Figure3 GS608 components** show the components of the G560 V5, GP608, and GS608.

Figure 1-10 G560 V5 components



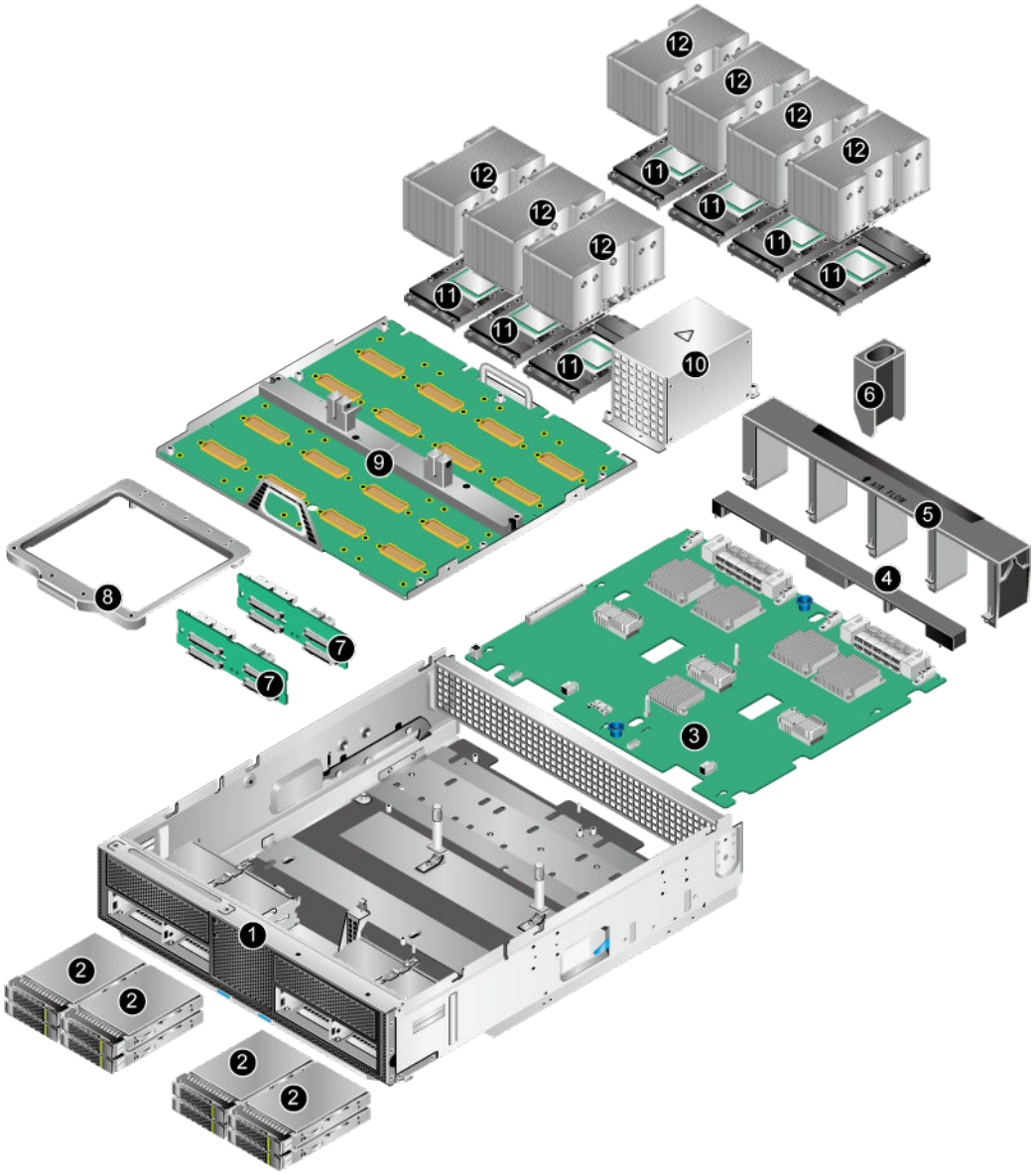
1	G560 V5 case	2	2.5-inch SAS/SATA/M.2 drives[a]
3	2.5-inch SAS/SATA/NVMe drives	4	SAS/SATA/NVMe drive backplane
5	SAS/SATA/M.2 drive backplane	6	M.2 SSDs (optional)
7	USB flash drive (optional)	8	TPM (optional)
9	Supercapacitor (optional)	10	Supercapacitor tray
11	RAID controller card	12	BIOS battery
13	CPUs	14	DIMMs
15	Heat sinks	16	DIMM air ducts
17	Mezzanine cards	18	Mainboard
a: The two slots support 2.5-inch SAS/SATA drives or M.2 drive modules. Each M.2 drive module supports two M.2 FRUs.			

Figure 1-11 GP608 components



1	SAS/SATA drives	2	GP608 case
3	Drive backplanes	4	PCIe board
5	FHFL dual-slot GPU cards	6	Filler modules

Figure 1-12 GS608 components



1	GS608 case	2	2.5-inch SAS/SATA drives
3	PCIe board	4	Board air duct
5	GPU air baffle	6	PCIe card air baffle
7	Drive backplanes	8	GPU board handle
9	GPU board	10	GPU filler module
11	GPU cards	12	Heat sinks

1.6 Product Specifications

Table 1-5, Table 1-6, and Table 1-7 describe the G560 V5, GP608, and GS608 specifications.

Table 1-5 G560 V5 specifications

No.	Item	Specifications
1	G560 V5 case	Other components of the G560 V5 are installed inside the case.
2	SAS/SATA/M.2 drive	A maximum of two 2.5-inch SAS/SATA drives or M.2 drive modules can be configured. Each M.2 drive module supports two M.2 SSDs. Each drive or module is hot-swappable and can be independently installed and removed.
3	SAS/SATA/NVMe drive	A maximum of six 2.5-inch HDDs or SSDs (including SAS, SATA, or NVMe SSDs) can be configured. Six SAS/SATA HDDs or SSDs are supported, or six PCIe 3.0 x4 slots are provided for NVMe SSDs. Each SAS/SATA drive is hot-swappable and can be independently installed and removed. Each NVMe SSD can be installed and removed independently and supports orderly hot-swap. Surprise hot-swap is not supported.
4	SAS/SATA/NVMe drive backplane	The backplane helps expand storage capacity and control SAS/SATA/NVMe drives in real time.
5	SAS/SATA/M.2 drive backplane	The backplane helps expand storage capacity and control SAS/SATA/M.2 drives in real time.
6	M.2 SSD (optional)	Each M.2 drive module supports two M.2 SSDs, including the 2242 and 2280 models.
7	USB flash drive (optional)	The mainboard provides one built-in USB port, which can connect to a USB 3.0 device. The dimensions of the device cannot exceed 31.75 mm (height) x 12.00 mm (length) x 4.50 mm (width).
8	TPM (optional)	The server supports TPM 2.0. The TPM is a cost-effective security solution that complies with the Trusted Computing Group (TCG) standards. It enhances platform security by preventing viruses or unauthorized operations.
9	Supercapacitor (optional)	Provides power-off protection for the Avago SAS3508 and LSI SAS3108 RAID controller cards.

No.	Item	Specifications
10	Supercapacitor tray	The supercapacitor tray protects a supercapacitor.
11	RAID controller card	The RAID controller card expands the storage capacity of the compute node through drives and ensures data security. LSI SAS3008, LSI SAS3108, Avago SAS3408, and Avago SAS3508 RAID controller cards are supported. The RAID controller card provides eight SAS or SATA ports for connecting to drives to support multiple RAID modes. ● LSI SAS3008: supports two RAID modes, RAID 0 and 1. ● Avago SAS3408: supports two RAID modes, RAID 0 and 1. ● LSI SAS3108 supports RAID 0, 1, 5, 6, 10, 50, and 60. ● Avago SAS3508: supports seven RAID modes, RAID 0, 1, 5, 6, 10, 50, and 60. The Avago SAS3508 and LSI SAS3108 can be configured with a supercapacitor to prevent cache data from being lost upon a power failure of the compute node and provide power failure protection for the RAID controller card.
12	BIOS battery	When the G560 V5 is not powered on, the BIOS battery supplies power to the real time clock (RTC).
13	CPU	The mainboard supports two processors. ● Intel® Xeon® Scalable Skylake and Cascade Lake processors are supported. For details about the supported models, see the **Compatibility Checker**. ● Each processor integrates memory controllers that can support six DDR4 memory channels. Each memory channel supports two DDR4 DIMMs at 2400 MT/s, 2666 MT/s, or 2933 MT/s. ● Each CPU integrates a PCIe controller with 48 lanes and supports PCIe 3.0. ● The two processors are interconnected through three UltraPath Interconnect (UPI) buses at 10.4 GT/s. ● The maximum frequency is 3.8 GHz. **NOTE** The G560 V5 does not support single-processor configuration, and the two processors must be of the same model.

No.	Item	Specifications
14	Memory	• Up to 24 DDR4 DIMM slots, supporting Registered Dual In-line Memory Modules (RDIMMs) and load-reduced DIMMs (LRDIMMs) • Maximum memory speed up to 2933 MT/s • Error Correcting Code (ECC), mirroring, and sparing • Single DIMM capacity of 8 GB, 16 GB, 32 GB, or 64 GB **NOTE** DIMMs of different specifications (such as the capacity, bit width, rank, and height) cannot be installed in one server. That is, all DIMMs on the same server must have the same part number (P/N code). For details about the supported DIMM models, see the **Compatibility Checker**.
15	Heat sink	Cools CPUs. Each CPU is configured with one heat sink.
16	DIMM air duct	Provides ventilation channels for DIMMs.
17	Mezzanine card	The G560 V5 supports two mezzanine cards. Each mezzanine card provides two PCIe 3.0 x16 channels and is connected to the mainboard through four connectors and to the GP608 through the chassis backplane. For details, see **1.9 Logical Structure**. In addition, mezzanine card 1 also provides the SAS channel between the RAID controller card and the GP608.
18	Mainboard	As the most important component of the G560 V5, the mainboard integrates basic components, such as the drive interface module, PSU, iBMC, logic module, chipset, and video card, and provides CPU sockets, DIMM slots, and slots for installing other components. The video card is integrated in the iBMC Hi1710 chipset to provide a 32 MB display memory. The maximum resolution is 1920 x 1200 at 60 Hz with 16 M colors.

Table 1-6 GP608 specifications

No.	Item	Specifications
1	SATA or SAS drive	Up to eight 3.5-inch SAS or SATA drives. The drives are hot-swappable and can be independently installed and removed.
2	GP608 case	Other components of the GP608 are installed inside the case.
3	Drive backplane	The GP608 is configured with two drive backplanes. Each drive backplane supports four drives.
4	PCIe board	Up to nine PCIe slots. For details, see **1.7 PCIe Slots**.

No.	Item	Specifications
5	GPU Cards	Up to eight FHFL dual-slot GPU cards. **NOTE** Install filler modules in vacant GPU card slots.
6	Filler module	Provides ventilation channels. If all eight GPU cards are installed and PCIe slot 9 is not used, two filler modules are required. If all eight GPU cards are installed and PCIe slot 9 is used, one filler module is required.

Table 1-7 GS608 specifications

No.	Item	Specifications
1	SATA or SAS drive	Up to eight 2.5-inch SAS or SATA drives. The drives are hot-swappable and can be independently installed and removed.
2	GS608 case	Other components of the GS608 are installed inside the case.
3	Drive backplane	The GS608 is configured with two drive backplanes. Each drive backplane supports four drives.
4	GPU board	Supports eight SXM2 GPU slots.
5	PCIe board	The PCIe board is configured with four PCIe switches. It can house four PCIe 3.0 x16 PCIe cards connecting to the G560 V5, four PCIe 3.0 x16 PCIe cards connecting to the I/O module, and eight PCIe 3.0 x16 PCIe cards connecting to the GPU board.
6	GPU card	A maximum of eight SXM2 GPUs can be configured. **NOTE** Install filler modules in vacant GPU card slots.
7	Filler module	Provides ventilation channels. Install filler modules in vacant GPU slots.

1.7 PCIe Slots

Table 1-8 describes the mapping between G560 V5 PCIe slots and CPUs, supported PCIe standards, and B/D/F information.

Table 1-9 and **Table 1-10** describe the mapping between GP608 PCIe slots and CPUs, supported PCIe standards, and B/D/F information.

Table 1-11 and **Table 1-12** describe the mapping between GS608 PCIe slots and CPUs, supported PCIe standards, and B/D/F information.

Table 1-8 G560 V5 PCIe slots

PCIe Device	CPU	PCIe Standard	Connector Width	Bus Width	Port Number	Root Port B/D/F	Device B/D/F	Slot Size
RAID controller card	CPU 1	PCIe 3.0	x8	x8	Port 1A	17/0/0	18/0/0	Non-standard device
Mezzanine card 1	CPU 1	PCIe 3.0	Two x16	Two x16	Port 2A, Port 3A	3A/0/0, 5D/0/0	3B/0/0, 5E/0/0	Non-standard device
Mezzanine card 2	CPU 2	PCIe 3.0	Two x16	Two x16	Port 2A, Port 3A	AE/0/0, D7/0/0	AF/0/0, D8/0/0	Non-standard device
NVMe PCIe SSD 4	CPU 1	PCIe 3.0	x4	x4	Port 1C	17/2/0	19/0/0	2.5-inch drive
NVMe PCIe SSD 5	CPU 1	PCIe 3.0	x4	x4	Port 1D	17/3/0	1A/0/0	2.5-inch drive
NVMe SSD 6	CPU 2	PCIe 3.0	x4	x4	Port 1A	85/0/0	86/0/0	2.5-inch drive
NVMe SSD 7	CPU 2	PCIe 3.0	x4	x4	Port 1B	85/1/0	87/0/0	2.5-inch drive
NVMe PCIe SSD 8	CPU 2	PCIe 3.0	x4	x4	Port 1C	85/2/0	88/0/0	2.5-inch drive
NVMe PCIe SSD 9	CPU 2	PCIe 3.0	x4	x4	Port 1D	85/3/0	89/0/0	2.5-inch drive

NOTE

- NVMe SSDs 4 and 5 are connected to CPU 1, and NVMe SSDs 6 to 9 are connected to CPU 2. It is recommended that NVMe SSDs are evenly installed to ensure bandwidth balance.
- The preceding B/D/F information is the default system configuration.

Table 1-9 GP608 PCIe slots in topology 1

PCIe Device	CPU	PCIe Standard	Connector Width	Bus Width	Port Number	Root Port B/D/F	Device B/D/F	Slot Size
PCIe slot 1	CPU 1	PCIe 3.0	x16	x16	Port 3A	53/00/0-55/08/0	6c/00/0	Full-height full-length dual-slot
PCIe slot 2	CPU 1	PCIe 3.0	x16	x16	Port 3A	53/00/0-55/14/0	78/00/0	Full-height full-length dual-slot
PCIe slot 3	CPU 1	PCIe 3.0	x16	x16	Port 3A	53/00/0-55/10/0	74/00/0	Full-height full-length dual-slot
PCIe slot 4	CPU 1	PCIe 3.0	x16	x16	Port 3A	53/00/0-55/0c/0	70/00/0	Full-height full-length dual-slot
PCIe slot 5	CPU 1	PCIe 3.0	x16	x16	Port 3A	53/00/0-55/04/0-57/08/0	5c/00/0	Full-height full-length dual-slot
PCIe slot 6	CPU 1	PCIe 3.0	x16	x16	Port 3A	53/00/0-55/04/0-57/14/0	68/00/0	Full-height full-length dual-slot
PCIe slot 7	CPU 1	PCIe 3.0	x16	x16	Port 3A	53/00/0-55/04/0-57/10/0	64/00/0	Full-height full-length dual-slot
PCIe slot 8	CPU 1	PCIe 3.0	x16	x16	Port 3A	53/00/0-55/04/0-57/0c/0	60/00/0	Full-height full-length dual-slot

PCIe Device	CPU	PCIe Standard	Connector Width	Bus Width	Port Number	Root Port B/D/F	Device B/D/F	Slot Size
PCIe Slot 9	-	PCIe 3.0	x16	x8	-	-	-	Full-height full-length single-slot
I/O slot 1	CPU 1	PCIe 3.0	x16	x16	Port 2A	26/00/0	27/00/0	Half-height half-length single-slot
I/O slot 2	-	PCIe 3.0	x16	x16	-	-	-	Half-height half-length single-slot
I/O slot 3	CPU 2	PCIe 3.0	x16	x16	Port 3A	d7/00/0	d8/00/0	Half-height half-length single-slot
I/O slot 4	CPU 1	PCIe 3.0	x16	x16	Port 3A	53/00/0-55/04/0-57/04/0	58/00/0	Half-height half-length single-slot

Table 1-10 GP608 PCIe slots in topology 2

PCIe Device	CPU	PCIe Standard	Connector Width	Bus Width	Port Number	Root Port B/D/F	Device B/D/F	Slot Size
PCIe slot 1	CPU 1	PCIe 3.0	x16	x16	Port 3A	53/00/0-55/08/0	5a/00/0	Full-height full-length dual-slot

PCIe Device	CPU	PCIe Standard	Connector Width	Bus Width	Port Number	Root Port B/D/F	Device B/D/F	Slot Size
PCIe slot 2	CPU 1	PCIe 3.0	x16	x16	Port 3A	53/00/0-55/14/0	66/00/0	Full-height full-length dual-slot
PCIe slot 3	CPU 1	PCIe 3.0	x16	x16	Port 3A	53/00/0-55/10/0	62/00/0	Full-height full-length dual-slot
PCIe slot 4	CPU 1	PCIe 3.0	x16	x16	Port 3A	53/00/0-55/0c/0	5e/00/0	Full-height full-length dual-slot
PCIe slot 5	CPU 2	PCIe 3.0	x16	x16	Port 2A	ae/00/0-b0/08/0	b5/00/0	Full-height full-length dual-slot
PCIe slot 6	CPU 2	PCIe 3.0	x16	x16	Port 2A	ae/00/0-b0/14/0	c1/00/0	Full-height full-length dual-slot
PCIe slot 7	CPU 2	PCIe 3.0	x16	x16	Port 2A	ae/00/0-b0/10/0	bd/00/0	Full-height full-length dual-slot
PCIe slot 8	CPU 2	PCIe 3.0	x16	x16	Port 2A	ae/00/0-b0/0c/0	b900/0	Full-height full-length dual-slot
PCIe Slot 9	-	PCIe 3.0	x16	x8	-	-	-	Full-height full-length single-slot

PCIe Device	CPU	PCIe Standard	Connector Width	Bus Width	Port Number	Root Port B/D/F	Device B/D/F	Slot Size
I/O slot 1	CPU 1	PCIe 3.0	x16	x16	Port 2A	26/00/0	27/00/0	Half-height half-length single-slot
I/O slot 2	CPU 1	PCIe 3.0	x16	x16	Port 3A	53/00/0-55/04/0	56/00/0	Half-height half-length single-slot
I/O slot 3	CPU 2	PCIe 3.0	x16	x16	Port 3A	d7/00/0	d8/00/0	Half-height half-length single-slot
I/O slot 4	CPU 2	PCIe 3.0	x16	x16	Port 2A	ae/00/0-b0/04/0	b1/00/0	Half-height half-length single-slot

NOTE

- The CPUs to which PCIe slots 5 to 8 and I/O slot 4 are connected vary depending on the logical topology. For details, see **1.9 Logical Structure**.
- PCIe slot 9 and I/O slot 1 are mutually exclusive and cannot be used at the same time. By default, I/O slot 1 is selected.
- I/O slot 2 is valid only in logical topology 2.
- A customized panel is required for installing PCIe cards in the PCIe Slot 1 - 9.
- The preceding B/D/F information is the system default configuration. If PCIe cards with the PCI bridge function are configured, the B/D/F allocation result will change.
- The B/D/F allocation result of an I/O card with two ports is used as an example. Each port corresponds to one B/D/F allocation result.

Table 1-11 Logical topology 1 of GS608 PCIe slots and GPU slots

PCIe Device	CPU	PCIe Standard	Connector Width	Bus Width	Port Number	Root Port B/D/F	Device B/D/F	Slot Size
GPU1	CPU 1	PCIe 3.0	x16	x16	Port 2A	28/08/00	2d/00/00	SXM2
GPU2	CPU 1	PCIe 3.0	x16	x16	Port 3A	55/0C/00	5b/00/00	SXM2
GPU3	CPU 1	PCIe 3.0	x16	x16	Port 2A	28/10/00	32/00/00	SXM2
GPU4	CPU 1	PCIe 3.0	x16	x16	Port 3A	55/10/00	5f/00/00	SXM2
GPU5	CPU 2	PCIe 3.0	x16	x16	Port 2A	B0/08/00	b5/00/00	SXM2
GPU6	CPU 2	PCIe 3.0	x16	x16	Port 3A	D9/0C/00	df/00/00	SXM2
GPU7	CPU 2	PCIe 3.0	x16	x16	Port 2A	B0/14/00	be/00/00	SXM2
GPU8	CPU 2	PCIe 3.0	x16	x16	Port 3A	D9/14/00	e7/00/00	SXM2
IO1	CPU1	PCIe 3.0	x16	X16	Port 2A	28/04/00	29/00/00	Half-height half-length single-slot
IO2	CPU1	PCIe 3.0	x16	x16	Port 3A	55/04/00	56/00/00	Half-height half-length single-slot
IO3	CPU2	PCIe 3.0	x16	x16	Port 2A	B0/04/00	B1/00/00	Half-height half-length single-slot

PCIe Device	CPU	PCIe Standard	Connector Width	Bus Width	Port Number	Root Port B/D/F	Device B/D/F	Slot Size
IO4	CPU2	PCIe 3.0	x16	x16	Port 3A	D9/04/00	DA/00/00	Half-height half-length single-slot
PCIe Slot	CPU 1	PCIe 3.0	X8	X8	Port 2A	28/14/00	36/00/00	Full-height full-length single-slot card

Table 1-12 Logical topology 2 of GS608 PCIe slots and GPU slots

PCIe Device	CPU	PCIe Standard	Connector Width	Bus Width	Port Number	Root Port B/D/F	Device B/D/F	Slot Size
GPU1	CPU 1	PCIe 3.0	x16	x16	Port 2A	28/08/00	2d/00/00	SXM2
GPU2	CPU 1	PCIe 3.0	x16	x16	Port 2A	32/0C/00	38/00/00	SXM2
GPU3	CPU 1	PCIe 3.0	x16	x16	Port 2A	28/10/00	44/00/00	SXM2
GPU4	CPU 1	PCIe 3.0	x16	x16	Port 2A	32/10/00	3c/00/00	SXM2
GPU5	CPU 2	PCIe 3.0	x16	x16	Port 2A	B0/08/00	b5/00/00	SXM2
GPU6	CPU 2	PCIe 3.0	x16	x16	Port 2A	ba/0C/00	c0/00/00	SXM2
GPU7	CPU 2	PCIe 3.0	x16	x16	Port 2A	B0/14/00	d0/00/00	SXM2
GPU8	CPU 2	PCIe 3.0	x16	x16	Port 2A	ba/14/00	c8/00/00	SXM2

PCIe Device	CPU	PCIe Standard	Connector Width	Bus Width	Port Number	Root Port B/D/F	Device B/D/F	Slot Size
IO1	CPU1	PCIe 3.0	x16	X16	Port 2A	28/04/00	29/00/00	Half-height half-length single-slot
IO2	CPU1	PCIe 3.0	x16	x16	Port 2A	32/04/00	34/00/00	Half-height half-length single-slot
IO3	CPU2	PCIe 3.0	x16	x16	Port 2A	B0/04/00	B1/00/00	Half-height half-length single-slot
IO4	CPU2	PCIe 3.0	x16	x16	Port 2A	ba/04/00	bc/00/00	Half-height half-length single-slot
PCIe Slot	CPU 1	PCIe 3.0	X8	X8	Port 2A	28/14/00	48/00/00	Full-height full-length single-slot card

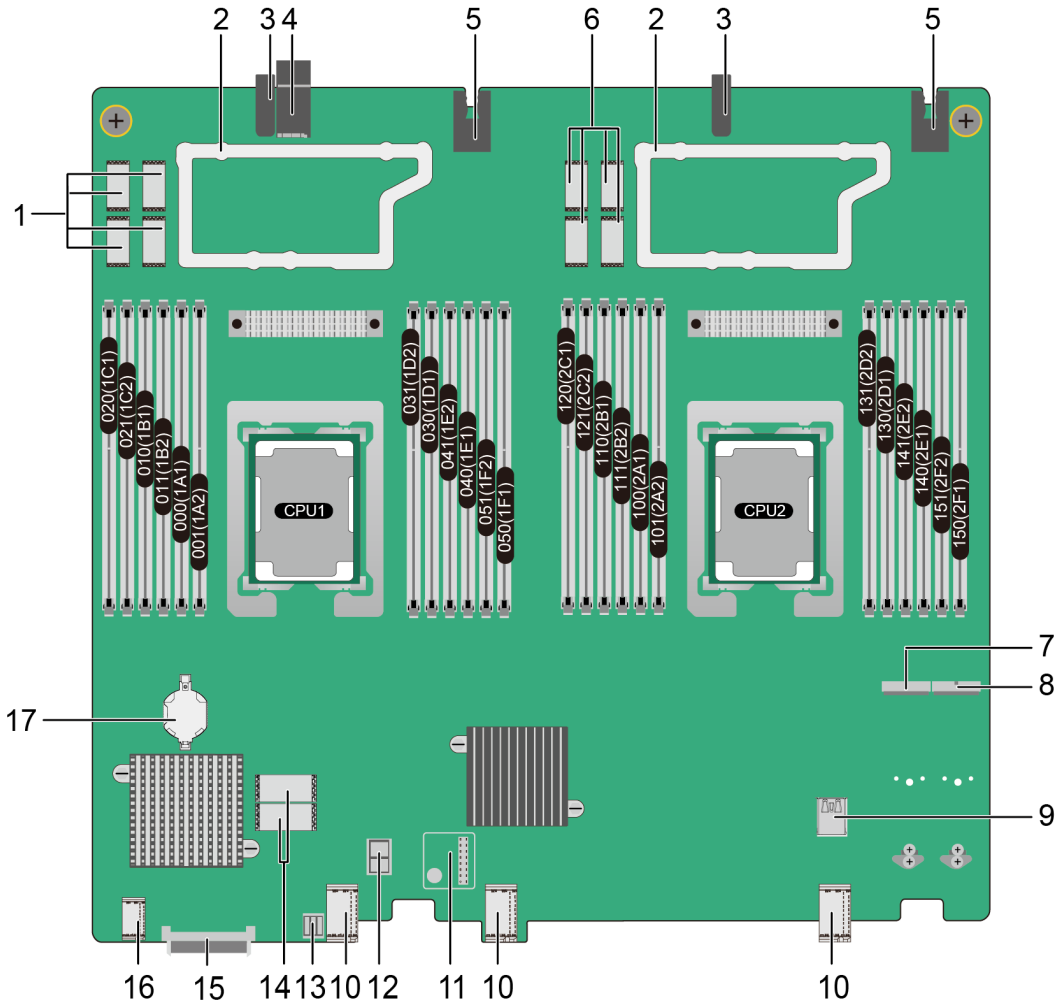
NOTE

PCIe Slot is a standard PCIe slot reserved in the GS608. For the specific position, see **Figure 1-17**.

1.8 Mainboard Layout

Figure 1-13 and **Figure 1-14** show the connectors and key components on the mainboard of the G560 V5 and the PCIe board of the GP608. **Figure 1-15**, **Figure 1-16**, and **Figure 1-17** show the connectors and key components on the GPU board and PCIe board of the GS608.

Figure 1-13 G560 V5 connectors and components

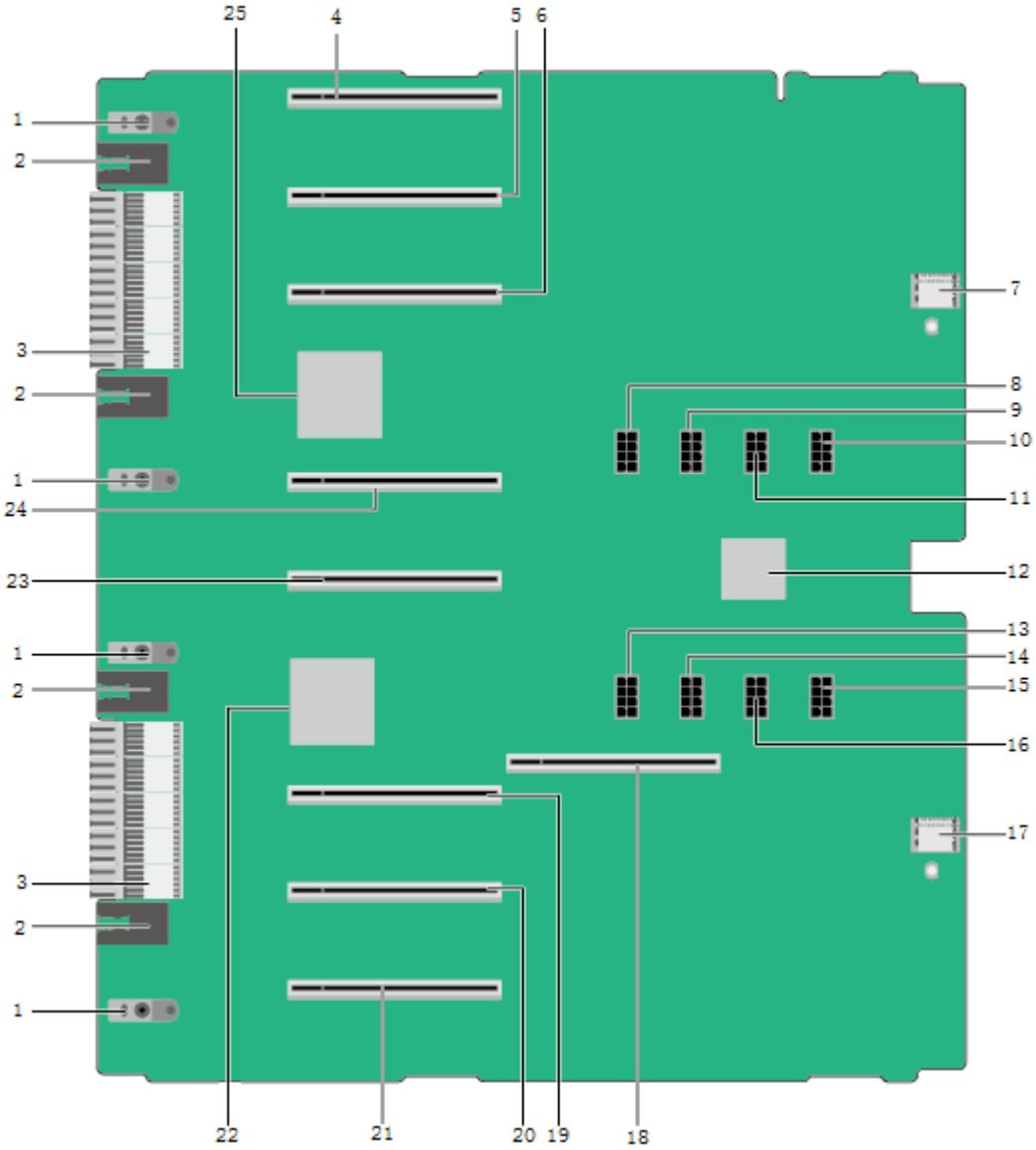


1	Connector of mezzanine card 1	2	Mezzanine card trays
3	Backplane guide sleeves	4	Backplane signal connector
5	Backplane power connectors	6	Mezzanine card 2 connectors
7	M.2 connector 1	8	M.2 connector 2
9	USB ports[a]	10	SAS/SATA/NVMe drive backplane connectors
11	TPM connector	12	Mini-SAS connector
13	SAS/SATA/NVMe drive backplane power connector	14	RAID controller card connectors
15	User interface board connector	16	SAS/SATA/M.2 drive backplane connector
17	BIOS battery	-	-

NOTE

a: There are two built-in USB ports. Only the upper USB port is available, and the lower USB port is not for use.

Figure 1-14 GP608 connectors and components



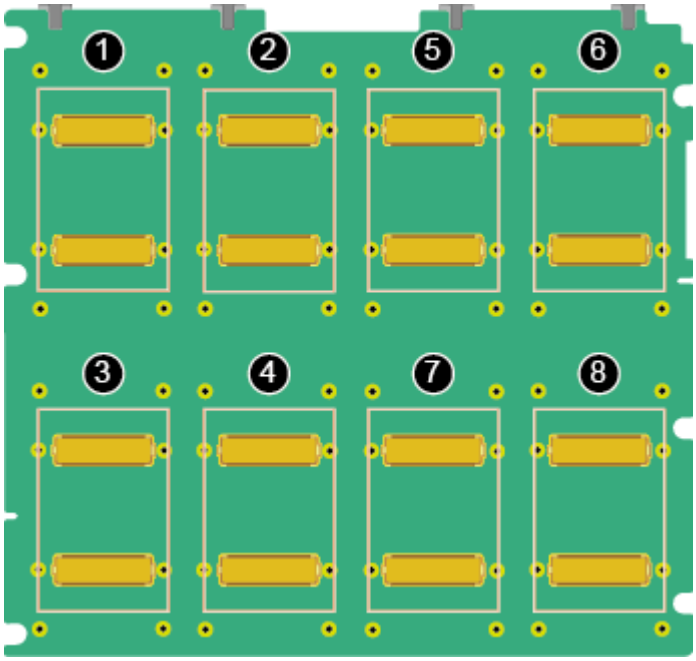
1	Backplane guide sleeves	2	Backplane power connector
3	Backplane signal connector	4	PCIe slot 8
5	PCIe slot 7	6	PCIe slot 6
7	Drive backplane 2 connector	8	PCIe slot 5 auxiliary power connector
9	PCIe slot 6 auxiliary power connector	10	PCIe slot 8 auxiliary power connector

11	PCIe slot 7 auxiliary power connector	12	SAS expander
13	PCIe slot 4 auxiliary power connector	14	PCIe slot 3 auxiliary power connector
15	PCIe slot 1 auxiliary power connector	16	PCIe slot 2 auxiliary power connector
17	Drive backplane 1 connector	18	PCIe slot 9 (reserved)
19	PCIe slot 3	20	PCIe slot 2
21	PCIe slot 1	22	PCIe switch 1
23	PCIe slot 4	24	PCIe slot 5
25	PCIe switch 2	-	-

NOTE

The auxiliary power supplies of the PCIe cards installed in PCIe slots 1 to 8 must be connected to PCIe slots 1 to 8 auxiliary power connectors on the GP608 PCIe board.

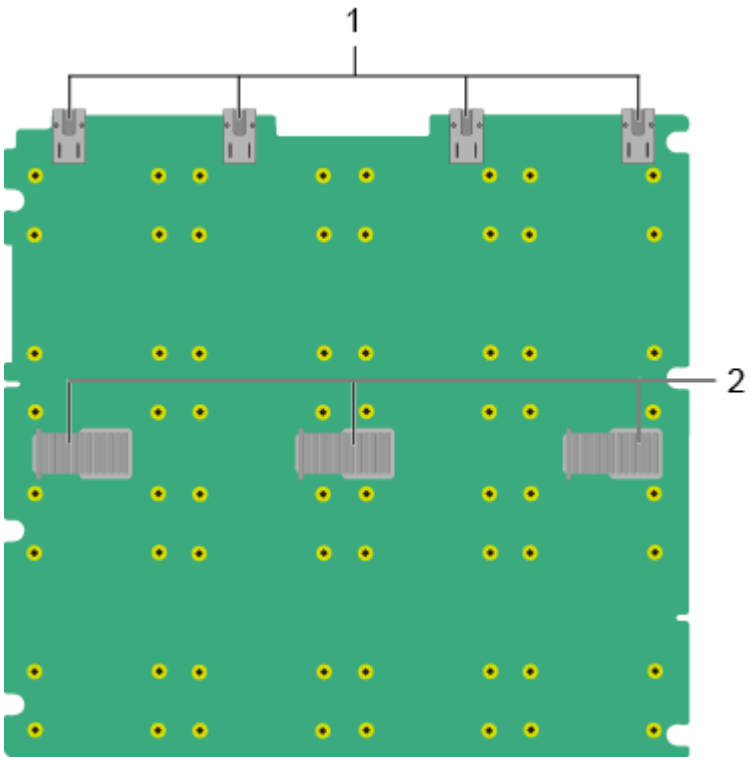
Figure 1-15 GS608 GPU board connectors and components (front view)



1	GPU slot 1	2	GPU slot 2
3	GPU slot 3	4	GPU slot 4
5	GPU slot 5	6	GPU slot 6

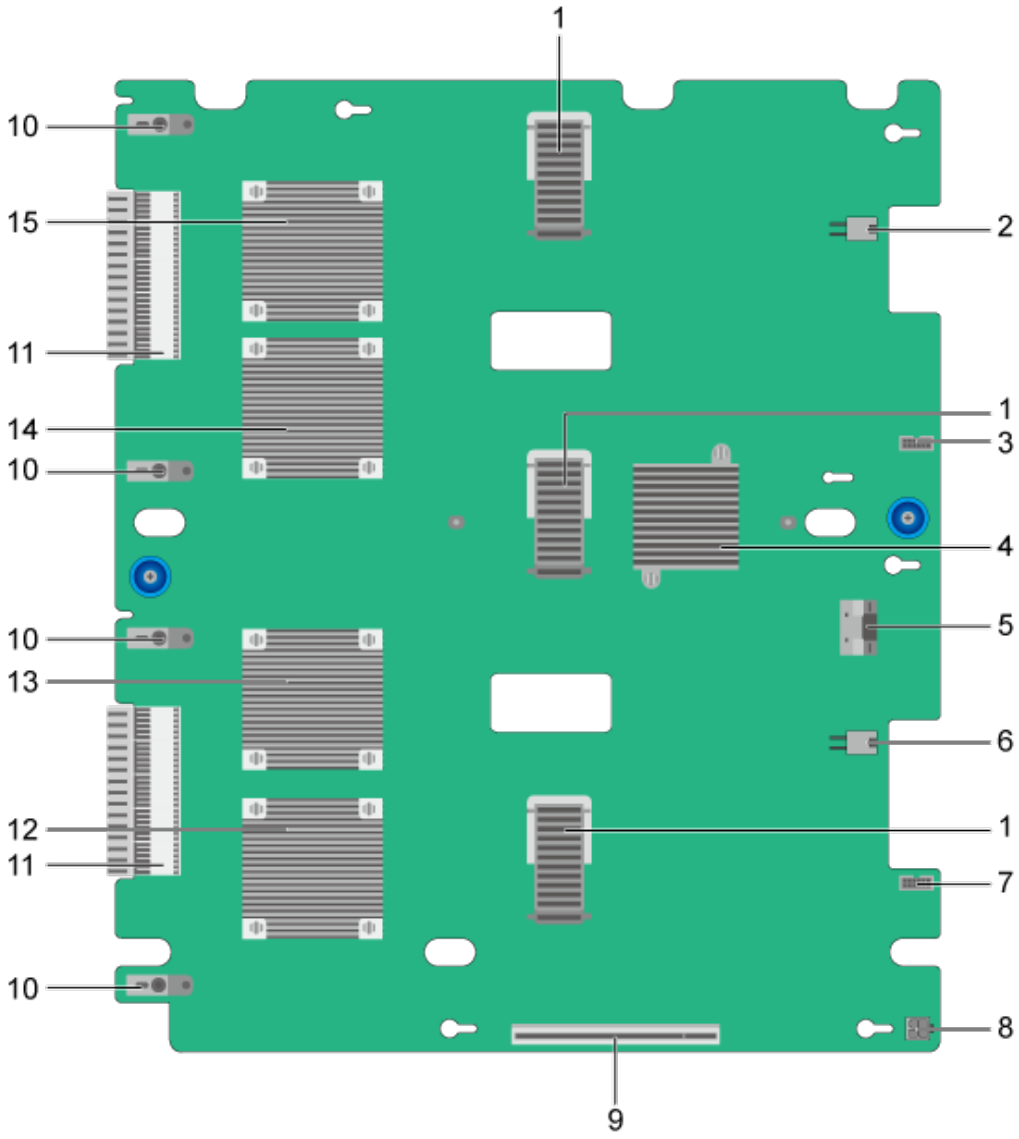
7	GPU slot 7	8	GPU slot 8

Figure 1-16 GS608 GPU board connectors and components (rear view)



1	GPU board power connectors	2	GPU board and PCIe board connectors

Figure 1-17 Positions of connectors and components on the GS608 PCIe plate



1	GPU board connectors	2	Drive backplane power connector 1
3	Drive backplane low-speed signal connector 1	4	SAS expander
5	Drive backplane high-speed signal connector	6	Drive backplane power connector 2
7	Drive backplane low-speed signal connector 2	8	Expansion slot power connector
9	PCIe Slot	10	Backplane guide sleeves
11	Backplane signal connectors	12	PCIe Switch1
13	PCIe Switch2	14	PCIe Switch3

15	PCIe Switch4	-	-

1.9 Logical Structure

Each CPU of the G560 V5 provides two PCIe x16 ports to connect to the two PCIe switches and I/O slots 1 and 3 in the GP608 through the mezzanine cards and chassis backplane.

The RAID controller card in the G560 V5 is connected to a mezzanine card and then to the SAS expander in the GP608 through SAS x4 cables. The RAID controller card is connected to the eight 3.5-inch SAS or SATA drives in the GP608, and the eight 2.5-inch SAS or SATA drives in the G560 V5 when there is no NVMe SSD.

The G560 V5 supports the following storage capability options:

- An LSI SAS3008 or Avago SAS3408 RAID controller card can be configured to support two 2.5-inch local SAS/SATA/M.2 drives and six local SAS/SATA/NVMe drives, supporting RAID 0 and 1.
- Avago SAS3508 or LSI SAS3108 RAID controller card: supports 2 x 2.5" SAS/SATA/M.2 drives, 6 x SAS/SATA/NVMe drives, and externally 8 x 3.5" SAS/SATA drives. RAID 0, 1, 5, 6, 10, 50 and 60 are supported.

The G560 V5 supports the following external ports:

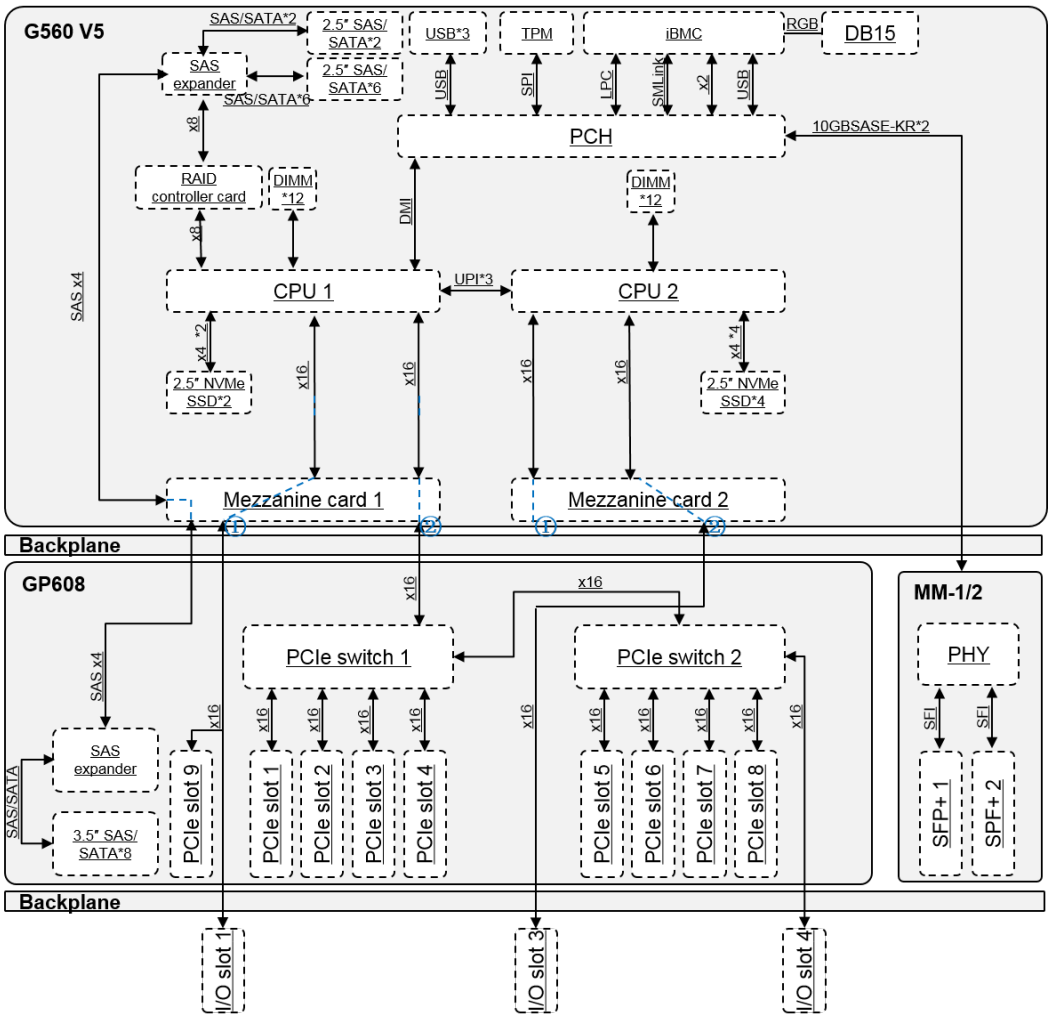
- Two USB 3.0 ports are provided on the front panel and one USB 3.0 port is provided on the mainboard.
- Two SFP+ Ethernet ports are provided by the 10GE NIC (Intel X722) that is integrated into the PCH and connected to the management module through the chassis backplane.
- One DB15 VGA port is provided on the front panel by the iBMC built-in video card. This port is used for the local maintenance of the compute node.

The two PCIe switches on the GP608 PCIe board are connected to eight PCIe x16 PCIe slots and two PCIe x16 I/O slots (I/O slots 2 and 4). The PCIe slots and I/O slots are used for installing GPU cards and I/O cards respectively. By means of programming control of the GP608, two logical topologies are available to meet requirements of different service models.

The GS608 GPU carrier provides eight slots for installing SXM2 GPUs. The PCIe board integrates four PCIe Switches for connecting to the eight GPU cards on the GPU board, four PCIe cards on the I/O module, and one I/O card on the PCIe board itself. By means of programming control of the GS608, two logical topologies are available to meet requirements of different service models.

Figure 1-18 and **Figure 1-19** show the logical topologies of the G560 V5 and GP608.

Figure 1-18 G560 V5 and GP608 logical topology 1

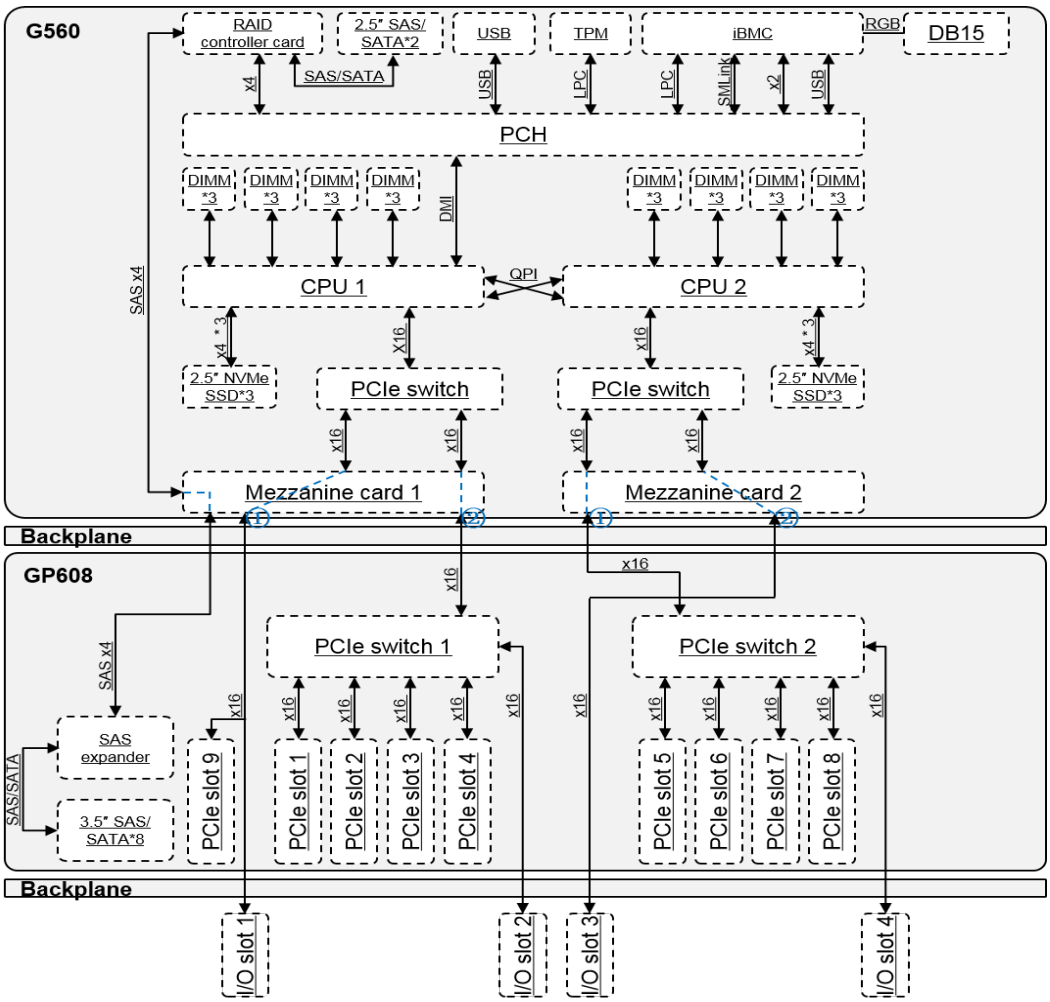


In this logical topology, the two PCIe switches in the GP608 are cascaded, and PCIe slots 1 to 8 belong to the same root port of the processors, supporting direct data transmission between a maximum of eight GPU cards with an optimal delay. This topology is ideal for machine learning. In this logical topology, I/O slot 2 is unavailable.

NOTE

If an InfiniBand (IB) NIC is used to support a GPU cluster, I/O slot 4 is recommended.

Figure 1-19 G560 V5 and GP608 logical topology 2

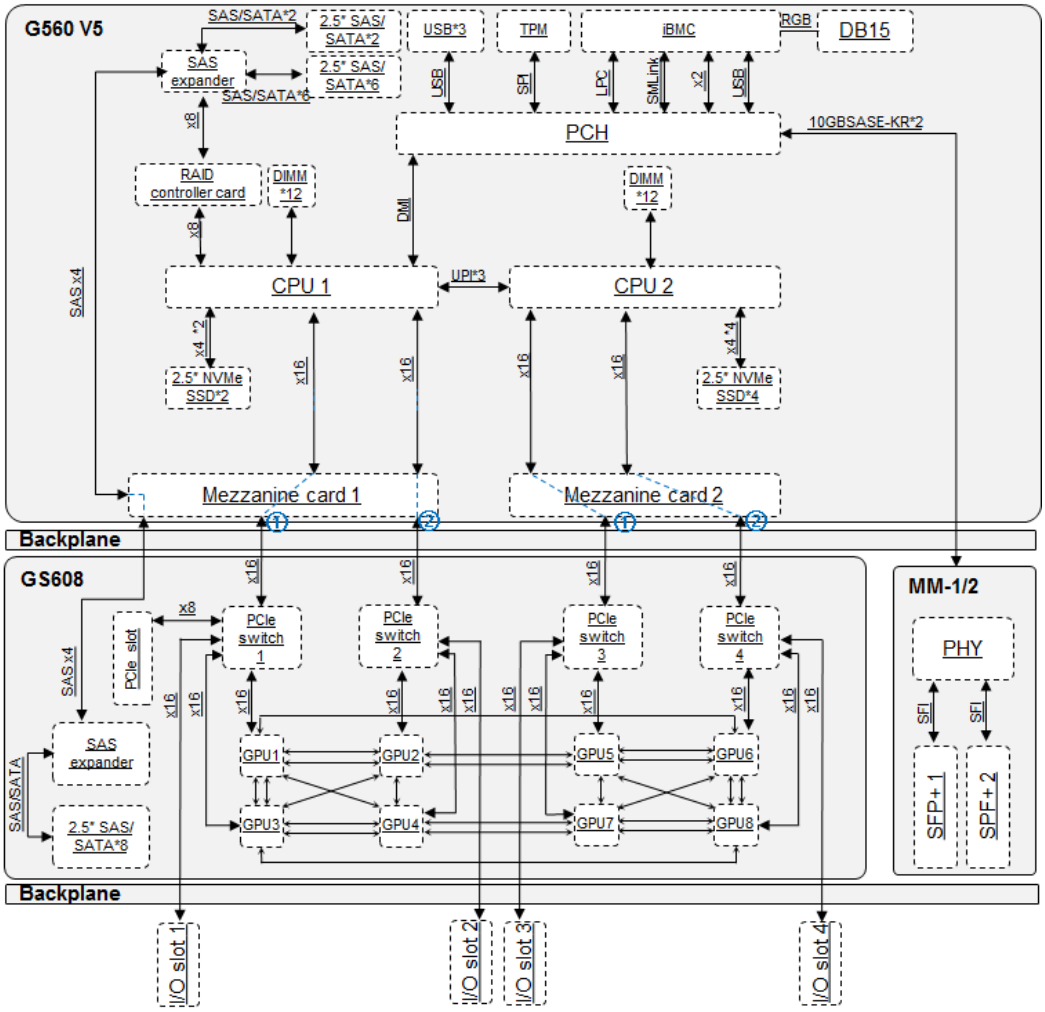


In this logical topology, the two PCIe switches of the GP608 are connected to the two CPUs respectively and provide higher uplink bandwidth for PCIe slots 1 to 8. This topology is ideal for HPC and public cloud scenarios. It is also suitable for direct data transmission between a maximum of four GPUs.

NOTE

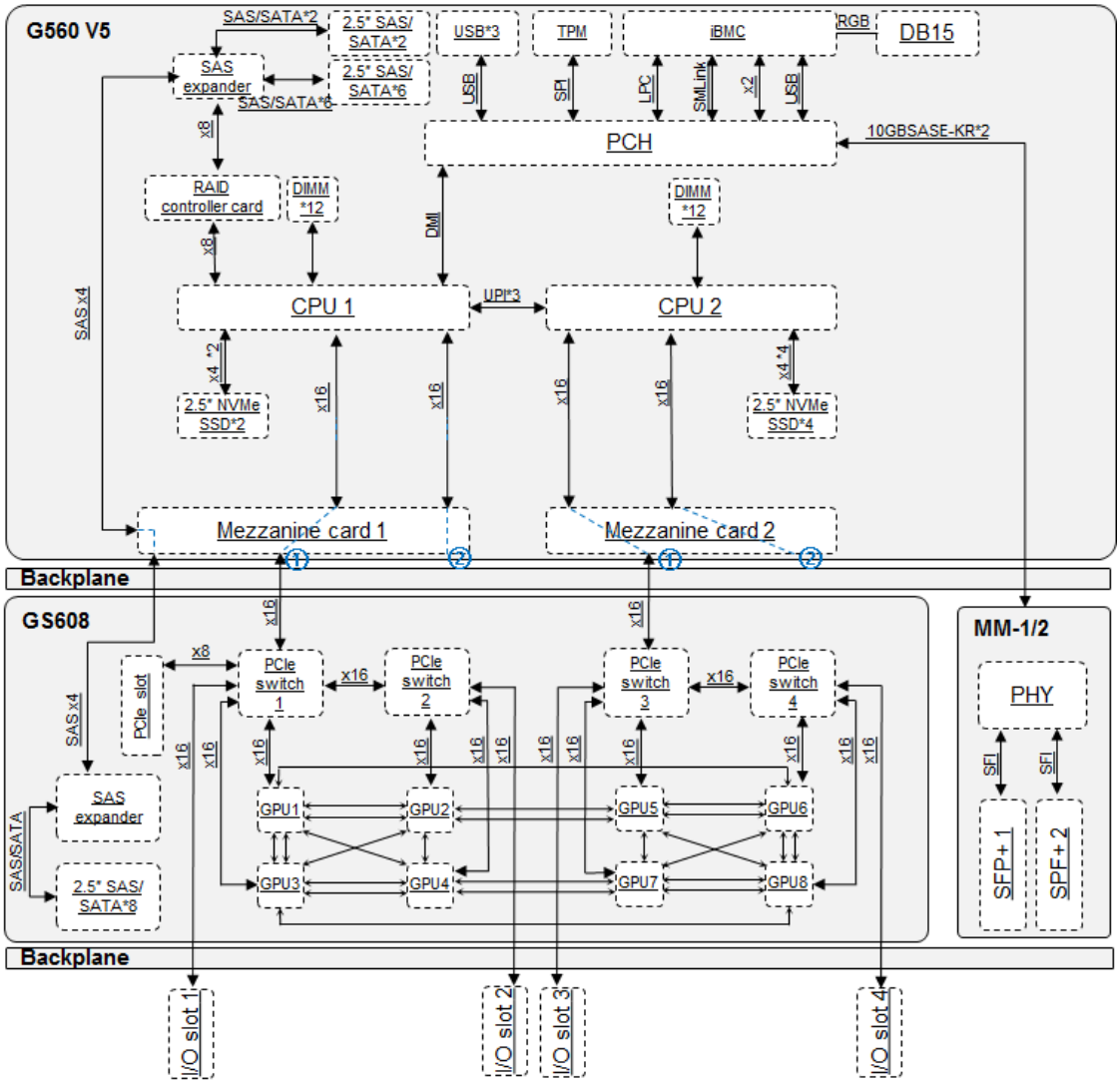
If IB NICs are used to support GPU clusters, I/O slots 2 and 4 are recommended.

Figure 1-20 G560 V5 and GS608 logical topology 1



In the logical topology, each of four switches in the GS608 has one PCIe x16 uplink port for connecting to the processors, providing a larger uplink bandwidth for the eight GPUs.

Figure 1-21 G560 V5 and GS608 logical topology 2



In this logical topology, four PCIe switches in the GS608 are cascaded. That is, PCIe switch 1 and PCIe switch 2 are cascaded, and PCIe switch 3 and PCIe switch 4 are cascaded.

NOTE

If IB NICs are used to support GPU clusters, I/O slots 1 and 3 or I/O slots 2 or 4 are recommended.

1.10 Technical Specifications

Table 1-13 lists the technical specifications of the G560 V5, GP608, and GS608.

Table 1-13 Technical specifications

Category	Item	Specifications
Physical specifications	Dimensions (H x W x D)	● G560 V5: 60.46 mm × 423 mm × 537.2 mm (2.38 in. × 16.65 in. × 21.15 in.) ● GP608: 122.85 mm × 437.4 mm × 540 mm (4.84 in. x 17.22 in. x 21.26 in.) ● GS608: 122.85 mm × 437.4 mm × 540 mm (4.84 in. × 17.22 in. × 21.26 in.)
	Color	● Front panel: black ● Casing: silver
	Weight	● G560 V5: – Net weight (fully configured with 8 drives): 12 kg (26.46 lb) – Packing materials: 3.42 kg (7.54 lb) ● GP608 – Net weight (fully configured with 8 drives and 8 GPUs): 22 kg (48.51 lb) – Packaging materials: 4.5 kg (9.92 lb) ● GS608: – Net weight (fully configured with 8 drives and 8 GPUs): 23 kg (50.71 lb) – Packaging materials: 4.5 kg (9.92 lb)
Environmental specifications	Temperature	● Operating temperature: 5°C to 35°C (41°F to 95°F) ● Storage temperature: -40°C to +65°C (-40°F to +149°F) ● Temperature change rate < 20°C (36°F)/hour
	Humidity	● Operating humidity: 8% to 90% RH (non-condensing) ● Storage humidity: 5% to 95% RH (non-condensing) ● Humidity change rate < 20% RH/hour
	Altitude	● ≤ 3048 m (9999.88 ft). For altitudes above 900 m (2952.72 ft), the operating temperature decreases by 1°C (1.8°F) every 300 m (984.24 ft). ● HDDs are not supported when the altitude is higher than 3000 m (9842.4 ft).
	Corrosive gaseous contaminant	● Copper corrosion rate test requirements: The corrosion product thickness growth rate is lower than 300 Å/month (meeting level G1 requirements of the ANSI/ISA-71.04-2013 standard on gaseous corrosion). ● Corrosion rate of the silver test piece: < 200 Å/month

Category	Item	Specifications
	Particle contaminant	• The equipment room environment meets the requirements of ISO 14664-1 Class 8. You are advised to hire a professional organization to monitor particle contaminants in the equipment room. • The equipment room is free from explosive, conductive, magnetic conductive, and corrosive dust.
Input power specifications	Rated input voltage	12 V DC
Power consumption	-	The power consumption parameters vary with server configurations, including the configurations complying with EU's energy-related products (ErP) requirements. For details, see the **Power Calculator**.

2 Product Features

- The G560 V5 supports two Intel® Xeon® Scalable (Skylake and Cascade Lake) processors. It provides up to 28 cores, 3.8 GHz frequency, a large L3 cache, and three 10.4 GT/s UltraPath Interconnect (UPI) links between the processors to deliver supreme processing performance.
- Supports multiple hard disk configuration schemes, enabling elastic and scalable storage capacity expansion.
  - Supports 6 x 2.5" SAS/SATA/NVMe drives for high-performance data storage and 2 x 2.5" SAS/SATA/M.2 drives for OS installation.
  - Provides 8 x 3.5" SAS/SATA drives to expand the storage capability of the compute node.
  - Supports LSI SAS3008, LSI SAS3108, Avago SAS3408, and Avago SAS3508 RAID controller cards.
- Supports eight FHFL dual-slot PCIe 3.0 x16 slots for installing GPU cards of 300 W each.
- The GS608 provides eight slots for installing eight SXM2 GPUs, each of which supports 300 W heat dissipation and power distribution.
- Flexible PCIe topology programming, meeting requirements of different service models
- The PCIe slots, SAS expander, SAS/SATA drives, PCIe Switch, and system I/O modules in the GP608 or GS608 are powered on synchronously with the G560 V5, minimizing power consumption when the G560 V5 is not powered on or installed.
- 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.

3 Components

For details about the software and hardware models supported by G560 V5, GP608, and GS608, see the **Compatibility Checker**.

CPU

The G560 V5 mainboard supports two processors.

- Intel® Xeon® Scalable Skylake and Cascade Lake processors with up to 28 cores are supported. For details about the supported models, see the **Compatibility Checker**.
- Each processor integrates memory controllers that can support six DDR4 memory channels. Each memory channel supports two DDR4 DIMMs at 2400 MT/s, 2666 MT/s, or 2933 MT/s.
- Built-in PCIe controllers: supports PCIe 3.0 and 48 lanes per processor.
- Links between processors: three UltraPath Interconnect (UPI) links, each of which provides 10.4 GT/s transmission speed.
- Maximum frequency: 3.8 GHz

Memory

The G560 V5 mainboard provides 24 DIMM slots (12 DIMMs for each processor). At least one DIMM must be configured.

Memory Configuration Rules

Observe the following rules when configuring DIMMs:

1. The G560 V5 supports DIMMs of 8 GB, 16 GB, 32 GB, and 64 GB per module. A server fully configured with DIMMs has up to 1536 GB of memory.
2. The maximum number of DIMMs supported by a compute node varies depending on the CPU type, DIMM type, and number of ranks. For details, see Maximum number of DIMMs in **Table 3-1**.

NOTE

- The DIMM slots of CPU 1 must be configured with DIMMs. If DIMMs are installed only in the DIMM slots of CPU 2, the compute node cannot power on.
- Restriction of the number of ranks supported by each channel on the maximum number of DIMMs 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

3. DIMMs on the same compute node must be of the same type (RDIMM or LRDIMM) and the same specifications (capacity, bit width, rank, and height), and have the same BOM code. To query DIMM BOM numbers, see the **Compatibility Checker**.
4. All DIMMs operate at the same speed, which is the smaller value of:
   – Memory speed supported by a CPU
   – The smallest values among the maximum operating speed of specific DIMMs. See the **Maximum Operating Speed** in **Table 3-1**.

Table 3-1 DIMM configuration rules

Item		Specifications	
Rank		Dual-rank	Quad-rank
Rated speed (MT/s)		2933	2933
Rated voltage (V)		1.2	1.2
Operating voltage (V)		1.2	1.2
Maximum number of DIMMs		24	24
Maximum capacity per DIMM (GB)		32	64
Maximum memory capacity (GB)		768	1536
Maximum memory capacity at maximum operating speed (GB)		768	1536
Maximum operating speed (MT/s)	One DIMM per channel	2933	2933
	Two DIMMs per channel	2933	2933
This table is for reference only. For details about the components that can be purchased, see the **Compatibility Checker**.			

DIMM Slot Configuration Rules

The G560 V5 provides 24 DDR4 DIMM slots. Each CPU integrates six memory channels.

- DIMM channels of CPU1: 1A, 1B, 1C, 1D, 1E, and 1F

- DIMM channels of CPU2: 2A, 2B, 2C, 2D, 2E, and 2F

Table 3-2 describes the composition of each channel.

Slots 1A1, 1B1, 1C1, 1D1, 1E1, 1F1, 2A1, 2B1, 2C1, 2D1, 2E1, and 2F1 are the primary memory channels 1A, 1B, 1C, 1D, 1E, 1F, 2A, 2B, 2C, 2D, 2E, and 2F.

When installing DIMMs, install the primary DIMMs first.

Table 3-2 Channels

CPU	Channel	DIMM
CPU 1	1A	DIMM000(1A1)
		DIMM001(1A2)
	1B	DIMM010(1B1)
		DIMM011(1B2)
	1C	DIMM020(1C1)
		DIMM021(1C2)
	1D	DIMM030(1D1)
		DIMM031(1D2)
	1E	DIMM040(1E1)
		DIMM041(1E2)
	1F	DIMM050(1F1)
		DIMM051(1F2)
CPU 2	2A	DIMM100(2A1)
		DIMM101(2A2)
	2B	DIMM110(2B1)
		DIMM111(2B2)
	2C	DIMM120(2C1)
		DIMM121(2C2)
	2D	DIMM130(2D1)
		DIMM131(2D2)
	2E	DIMM140(2E1)
		DIMM141(2E2)
	2F	DIMM150(2F1)
		DIMM151(2F2)

Table 3-3 shows the DIMM installation rules. See Figure 1-13 for DIMM slot numbers.

Table 3-3 DIMM configuration rules

Quantity	Memory Configuration	DIMM Slots of CPU 1	DIMM Slots of CPU 2
1	Unbalanced	1A1	-
2	Balanced	1A1	2A1
3	Unbalanced	1A1, 1B1	2A1
4	Balanced	1A1, 1B1	2A1, 2B1
5	Unbalanced	1A1, 1B1, 1C1	2A1, 2B1
6	Balanced	1A1, 1B1, 1C1	2A1, 2B1, 2C1
7	Unbalanced	1A1, 1B1, 1D1, 1E1	2A1, 2B1, 2C1
8	Balanced	1A1, 1B1, 1D1, 1E1	2A1, 2B1, 2D1, 2E1
9	Unbalanced	1A1, 1B1, 1C1, 1D1, 1E1	2A1, 2B1, 2D1, 2E1
10	Unbalanced	1A1, 1B1, 1C1, 1D1, 1E1	2A1, 2B1, 2C1 ,2D1, 2E1
11	Unbalanced	1A1, 1B1, 1C1, 1D1, 1E1, 1F1	2A1, 2B1, 2C1 ,2D1, 2E1
12	Balanced	1A1, 1B1, 1C1, 1D1, 1E1, 1F1	2A1, 2B1, 2C1, 2D1, 2E1, 2F1
13	Unbalanced	1A1, 1A2, 1B1, 1C1, 1D1, 1E1, 1F1	2A1, 2B1, 2C1, 2D1, 2E1, 2F1
14	Unbalanced	1A1, 1A2, 1B1, 1C1, 1D1, 1E1, 1F1	2A1, 2A2, 2B1, 2C1, 2D1, 2E1, 2F1
15	Unbalanced	1A1, 1A2, 1B1, 1B2, 1D1, 1D2, 1E1, 1E2	2A1, 2A2, 2B1, 2C1, 2D1, 2E1, 2F1
16	Balanced	1A1, 1A2, 1B1, 1B2, 1D1, 1D2, 1E1, 1E2	2A1, 2A2, 2B1, 2B2, 2D1, 2D2, 2E1, 2E2
17	Unbalanced	1A1, 1A2, 1B1, 1B2, 1C1, 1C2, 1D1, 1E1, 1F1	2A1, 2A2, 2B1, 2B2, 2D1, 2D2, 2E1, 2E2
18	Unbalanced	1A1, 1A2, 1B1, 1B2, 1C1, 1C2, 1D1, 1E1, 1F1	2A1, 2A2, 2B1, 2B2, 2C1, 2C2, 2D1, 2E1, 2F1

Quantity	Memory Configuration	DIMM Slots of CPU 1	DIMM Slots of CPU 2
19	Unbalanced	1A1, 1A2, 1B1, 1B2, 1C1, 1D1, 1D2, 1E1, 1E2, 1F1	2A1, 2A2, 2B1, 2B2, 2C1, 2C2, 2D1, 2E1, 2F1
20	Unbalanced	1A1, 1A2, 1B1, 1B2, 1C1, 1D1, 1D2, 1E1, 1E2, 1F1	2A1, 2A2, 2B1, 2B2, 2C1, 2D1, 2D2, 2E1, 2E2, 2F1
21	Unbalanced	1A1, 1A2, 1B1, 1B2, 1C1, 1C2, 1D1, 1D2, 1E1, 1E2, 1F1	2A1, 2A2, 2B1, 2B2, 2C1, 2D1, 2D2, 2E1, 2E2, 2F1
22	Unbalanced	1A1, 1A2, 1B1, 1B2, 1C1, 1C2, 1D1, 1D2, 1E1, 1E2, 1F1	2A1, 2A2, 2B1, 2B2, 2C1, 2C2, 2D1, 2D2, 2E1, 2E2, 2F1
23	Unbalanced	1A1, 1A2, 1B1, 1B2, 1C1, 1C2, 1D1, 1D2, 1E1, 1E2, 1F1, 1F2	2A1, 2A2, 2B1, 2B2, 2C1, 2C2, 2D1, 2D2, 2E1, 2E2, 2F1
24	Balanced	1A1, 1A2, 1B1, 1B2, 1C1, 1C2, 1D1, 1D2, 1E1, 1E2, 1F1, 1F2	2A1, 2A2, 2B1, 2B2, 2C1, 2C2, 2D1, 2D2, 2E1, 2E2, 2F1, 2F2

NOTE

The unbalanced memory configurations are not recommended.

GPU Cards

- The GP608 supports a maximum of eight dual-slot or single-slot GPU cards. For details about the GPU card models, see the **Compatibility Checker**.

  The GP608 does not support mixed configuration of GPU cards of different models.
- The GS608 supports a maximum of eight NVIDIA Nvlink SXM2 GPUs. For details about the GPU models, see the **Compatibility Checker**.

  The GS608 does not support mixed configuration of GPU cards of different models.

Drives

The G560 V5 supports a maximum of 6 x 2.5" SAS/SATA/NVMe drives and 2 x 2.5" SAS/SATA/M.2 drives. These drives can be independently installed and removed, and support hot swap (scheduled hot swap for NVMe SSDs).

The G560 V5 supports four types of SAS/SATA RAID controller cards: LSI SAS3008, LSI SAS3108, Avago SAS3408, and Avago SAS3508. LSI SAS3008 and Avago SAS3408 support RAID 0 and RAID 1. Avago SAS3508 and LSI SAS3108 support RAID 0, 1, 5, 6, 10, 50 and 60.

The G560 V5 supports 8 x 2.5" SAS or SATA drives. It can support an extra maximum of 8 x 3.5" SAS or SATA drives by expanding the RAID controller card

through the GP608, or an extra maximum of 8 x 2.5" SAS or SATA drives by expanding the RAID controller card through the GS608.

Table 3-4 lists the performance of different RAID levels, the minimum number of disks required, and disk usage.

Table 3-4 RAID level comparison

RAID Level	Reliability	Read Performance	Write Performance	Minimum Number of Hard Disks	Hard Disk Usage
RAID 0	Low	High	High	2	100%
RAID 1	High	Low	Low	2	50%
RAID 5	Relatively high	High	Medium	3	(N – 1)/N
RAID 6	Relatively high	High	Medium	4	(N – 2)/N
RAID 10	High	Medium	Medium	4	50%
RAID 50	High	High	Relatively high	6	(N – M)/N
RAID 60	High	High	Relatively high	8	(N – M x 2)/N
Note: N indicates the number of member drives in a RAID array, and M indicates the number of spans in a RAID array.					

I/O Expansion

The G560 V5 can house two mezzanine cards, which are connected to the GP608 or GS608 through the backplane to provide hardware capability expansion.

- The I/O modules support a maximum of four HHHL single-slot PCIe 3.0 x16 cards. For details, see the **Compatibility Checker**.
- The LAN On Motherboard (LOM) NIC of the G560 V5 provides two 10GE SFP+ ports through the management module. This LOM is an Intel X722 NIC embedded in the PCH.

Power Supply

The power supply of the G560 V5, GP608, and GS608 is provided by the PSUs of the FusionServer G5500 chassis. No independent power supply is required.

OS and Software

For details about the OSs and virtualization software supported by the G560 V5, see the **Compatibility Checker**.

4 Management

The compute node integrates the new-generation iBMC intelligent management system to provide highly reliable hardware monitoring and management functions. It seamlessly communicates with management module in a chassis and manages the compute nodes in the chassis through the management module.

The iBMC supports the following features and protocols:

- KVM and text console redirection
- Remote virtual media
- IPMI V2.0
- Common information model (CIM)
- Login using a web browser

Table 4-1 describes the features of the iBMC.

Table 4-1 iBMC features

Feature	Description
Management interface	Integrates with any standard management system through the following interfaces: ● IPMI V2.0 ● CLI ● HTTPS
Fault detection	Detects faults and accurately locates hardware faults.
System watchdog	Supports BIOS power on self-test (POST), OS watchdog, and automatic system reset for timeout. You can enable or disable these functions on the iBMC.
Boot device configuration	Supports out-of-band configuration for boot devices.
Alarm management	Supports alarm management and reports alarms in various ways such as SMTP and syslog service, ensuring 24/7 reliable device running.

Feature	Description
Integrated KVM	Provides convenient remote maintenance measures, such as KVM and KVM over IP. When the system is faulty, no on-site operation is required. The maximum resolution is 1920 x 1200.
Integrated virtual media	Virtualizes local media devices or images to the media devices for remote compute nodes, 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. The iBMC WebUI supports the following browsers: ● Internet Explorer 9/10/11 ● Mozilla Firefox 26/34 ● Google Chrome 21/43 ● Safari 5.1
Fault reproduction	Reproduces faults to facilitate fault diagnosis.
Screen snapshots and screen videos	Allows you to view screenshots and videos without login, which facilitates routine preventive maintenance inspection (PMI)
DNS/LDAP	Supports the DNS and AD, significantly simplifying network and configuration management.
Dual-image backup	Starts software from a backup image if the software fails.
Asset management	Supports intelligent asset management.
Intelligent power management	Uses the power capping technology to increase deployment density, and uses dynamic energy saving to lower operating expenses.

5 Maintenance and Warranty

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

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

6 Certifications

Region	Country	Certification	Certification Mark
China	China	CCC	
		RoHS	
Europe	European Union	CE-DOC	
		ROHS	NA
		REACH	NA
		WEEE	
	Russia	EAC&GOST	
	UK	UKCA	NA
North America	North America	NRTL-ETL/MET	
Asia Pacific	Japan	VCCI	
Global	IECEE members	CB	NA

7 Waste Product Recycling

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

