NF5688M6
White Paper

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Preface

Abstract

This white paper describes the NF5688M6 server's appearance, features, performance parameters, and software and hardware compatibility, providing in-depth information of NF5688M6.

Intended Audience

This white paper is intended for-pre-sales engineers.

Symbol Conventions

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

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

Revision History

Version	Date	Description of Changes
V1.2	2022/12/5	• Updated the power efficiency at a load of 50% in Section 2.4 • Added Chapter 9 • Deleted the certification logs in Chapter 11
V1.1	2022/11/2	Minor content modifications in 2.4
V1.0	2022/07/29	Initial release

Table of Contents

1 Product Overview

The AI server NF5688M6 features outstanding scalability, leading performance, superior energy efficiency and flexible deployment. With computing capacity up to 5 petaFLOPS, it is ideal for AI applications such as image/video processing, speech recognition, financial analysis, and intelligent customer service.

The NF5688M6 uses the advanced NVIDIA NVSwitch interconnect fabric and provides an optimal GPU-IB-NVMe ratio of 1:1:1 based on excellent hardware topology. The server comes with 8 powerful NVIDIA SXM4 A100 Tensor Core GPUs, allowing direct P2P data communication at 600 GB/s between any two of them. With 2 Intel Ice Lake processors and the leading Ultra Path Interconnect (UPI), the NF5688M6 delivers top AI computing performance for deep learning scenarios. A 6U standard form factor and 3+3 redundant power supplies enable the system to be applicable to extensive data centers, providing increased reliability and stability. Besides, the NF5688M6 delivers a variety of flexible cluster deployment options and allows integrated deployment from hardware to AI applications. Moreover, the 54 V power supply offers higher energy efficiency. The layered and zoned cooling channels and an intelligent PID control strategy ensure optimal cooling performance.

The NF5688M6 enables AI users to efficiently build AI infrastructures and development environments with high computing performance and low deployment and operational costs.

Figure 1-1 NF5688M6 (8-Drive Configuration)

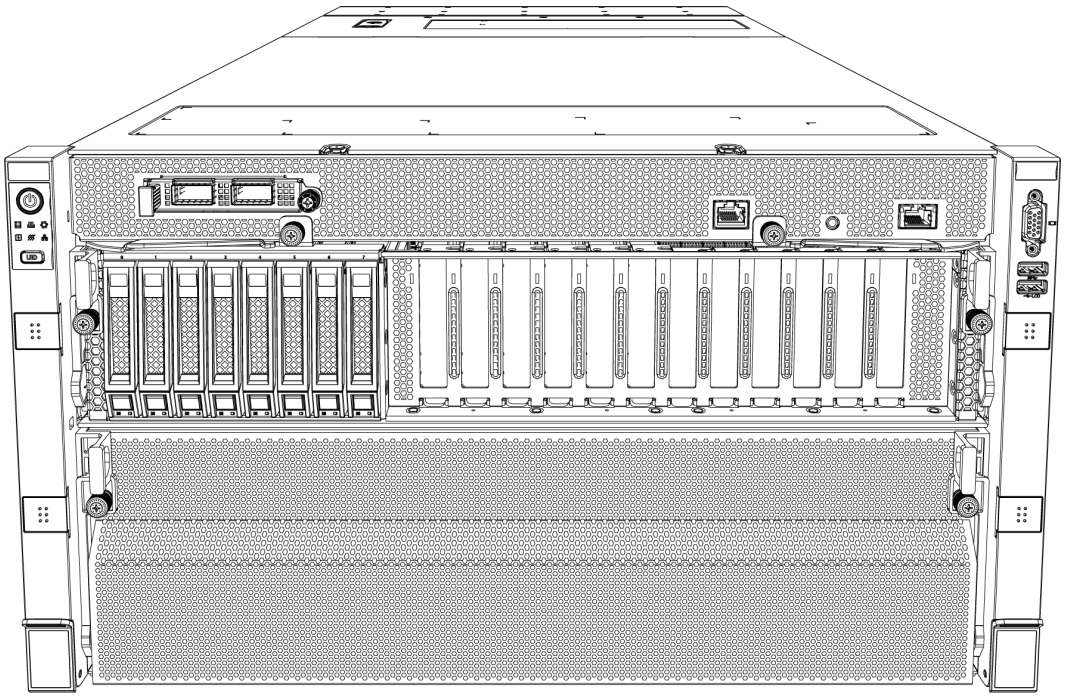
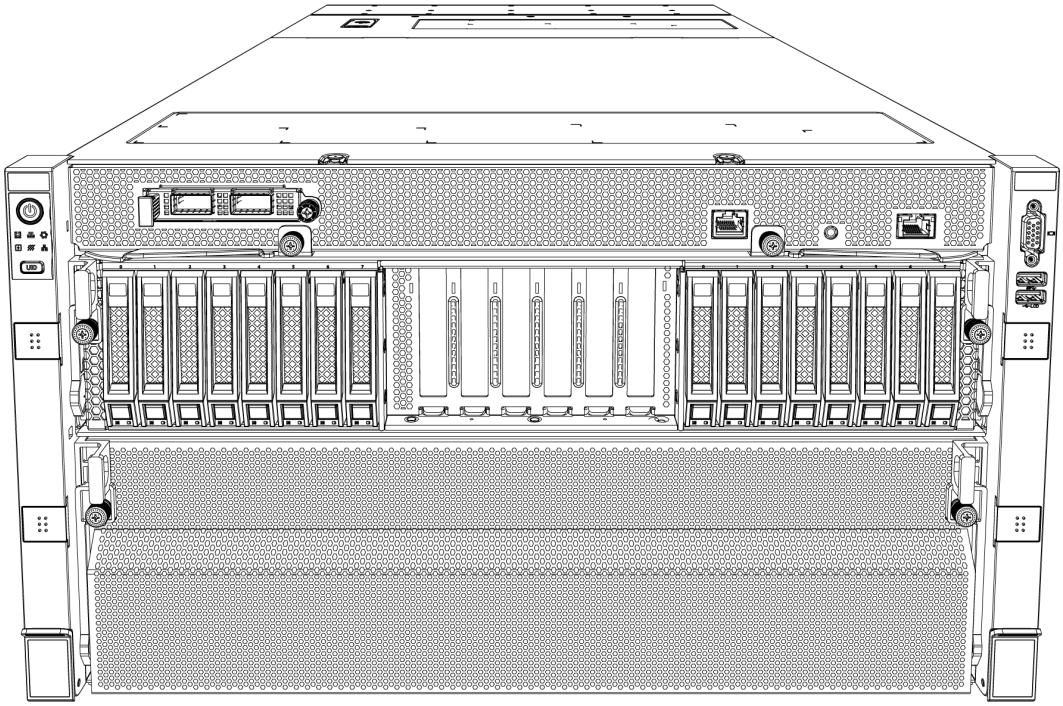


Figure 1-2 NF5688M6 (16-Drive Configuration)



2 Features

2.1 Scalability and Performance

- Features two 3rd Gen Intel Xeon Scalable processors (Ice Lake), with up to 40 cores per processor, a Turbo frequency up to 3.7 GHz, and 3 UPI links at up to 11.2 GT/s.
- Maintains the high quality and reliability of our servers for different scenarios, and offers an optimal GPU-IB-NVMe ratio of 1:1:1.
- Provides the AI computing performance up to 5 petaFLOPS, 300X higher than the traditional 2-socket server.
- Adopts a standard 6U form factor, and comes with an NVIDIA HGX A100 8-GPU baseboard hosting 8 SXM4 A100 GPUs with P2P data communication at up to 600 GB/s.
- Up to 8 hot-swap NVMe SSDs and 2 SATA M.2 SSDs, increasing the read/write speeds and storage capacity to the utmost.
- Up to ten 100/200 Gb high-speed NIC cards that support RDMA, providing high-speed expansion channels for AI clusters.
- Uses the optimal balance topology between CPUs and GPUs for workload balancing, improving data communication efficiency and reducing latency.
- GPUs are interconnected with NVIDIA NVSwitch, the globally advanced interconnect fabric, realizing full interconnection and P2P communication.
- Up to 2 RAID controller cards, and up to 10 HHHL PCIe 4.0 x16 slots and 2 PCIe 4.0 x16 slots (x8 bandwidth only and RAID controller cards dedicated), offering customers with improved I/O expansion capabilities.
- Up to 32 DDR4 ECC DIMMs (3200 MT/s, 4 TB max., LRDIMM/RDIMM) and 16 memory channels, delivering superior speeds and high availability.
- Supports a variety of drive configurations, providing elastic and scalable storage capacities to meet different capacity and upgrade requirements.

2.2 Availability and Serviceability

- Based on humanization design, the server allows tool-less maintenance. The modular structural parts enable quick removal/installation, greatly reducing O&M time.

- Our unique intelligent control technology combined with the cutting-edge air-cooling technology creates an optimum working environment to ensure stable running of the server.
- The server supports up to 16 hot-swap storage drives and 2 RAID controller cards with RAID levels 0/1/10/5/50/6/60, RAID cache and data protection enabled by the super-capacitor in case of power failures.
- The UID LED enables technicians to identify the failed system and the BMC Web GUI and LEDs for fault diagnosis can quickly lead technicians to failed (or failing) components, simplifying maintenance, speeding up troubleshooting, and enhancing system availability.
- The BMC can monitor system parameters and send alerts in advance, enabling technicians to take appropriate measures and ensuring stable running of the server.
- The intelligent management software ISPIM allows centralized management of the server and full lifecycle management covering part-level asset management, intelligent monitoring and alerting, automatic inspection, fault diagnosis and reporting, energy consumption management, and firmware update/configuration.
- The ISIB system enables rapid server initialization and supports batch RAID configuration and OS deployment.

For documentation of the NF5688M6 system, such as product marketing materials, user manuals, product drivers, firmware, and product certifications, visit our website.

2.3 Manageability and Security

- Supports ISBMC, a self-developed remote server management system.
  - ISBMC supports such mainstream management specifications in the industry as IPMI 2.0 and Redfish 1.8.
  - ISBMC improves operational reliability.
  - ISBMC features easy serviceability for different business scenarios.
  - ISBMC provides comprehensive and accurate fault diagnosis capabilities.
  - ISBMC offers industry-leading security reinforcement capabilities.
- Supports Trusted Platform Module (TPM) 2.0 and Trusted Cryptography Module (TCM) that provide advanced encryption.
- Supports Intel Trusted Execution Technology that provides hardware-based resistance to malicious software attacks.

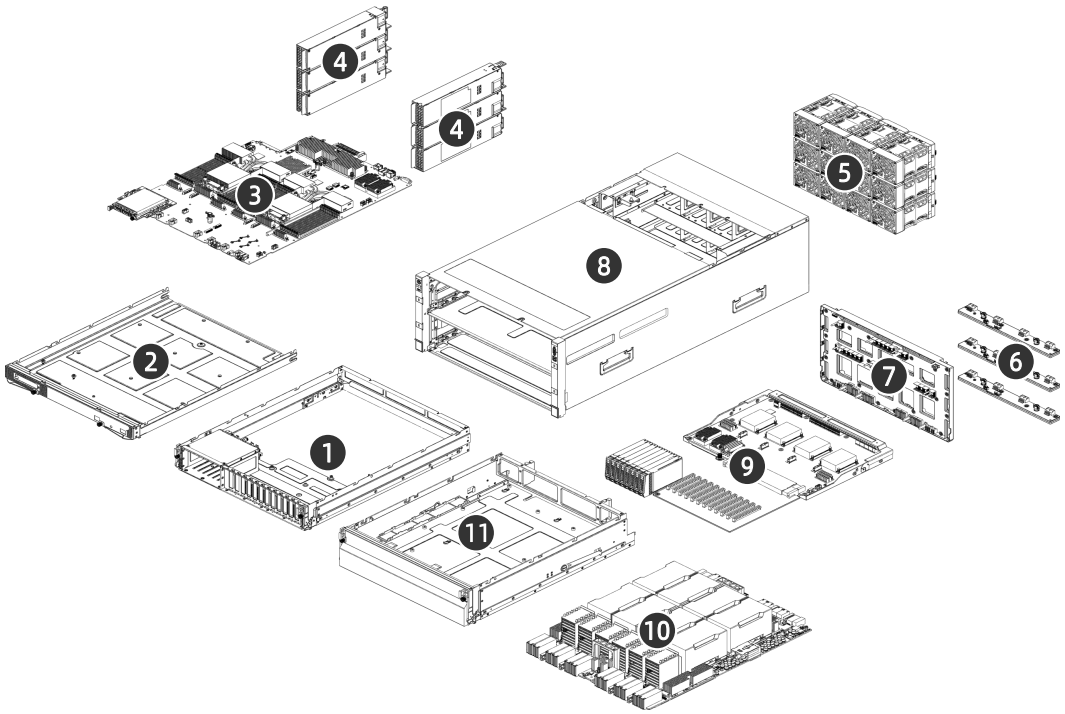
- Supports Intel Software Guard Extensions (SGX) technology that allows applications to run in its own isolated space, helping prevent malicious theft and modification of critical codes and data.
- Supports the firmware update mechanism based on digital signatures to prevent unauthorized firmware updates.
- Supports UEFI Secure Boot to protect the system from malicious boot loaders.
- Supports hierarchical password protection in BIOS, ensuring system boot and management security.
- Supports BIOS Secure Flash and BIOS Lock Enable (BLE), reducing attacks from malicious software on the BIOS flash region.
- Supports dual-image mechanism for BMC and BIOS, recovering firmware upon detection of corrupted firmware.
- Supports BMC Secure Boot to protect BMC from malicious tampering.
- Supports flexible BMC access control policies, improving BMC management security.

2.4 Energy Efficiency

- Equipped with 80 Plus Platinum level PSUs (3,000 W) with power efficiency up to 94% at a load of 50%.
- Offers 3+3 redundant PSUs for improved system reliability.
- Features the high-efficiency single-board voltage regulator down (VRD) solutions, reducing DC-DC conversion loss.
- Supports intelligent fan speed control and intelligent CPU frequency scaling, conserving energy.
- Offers a fully-optimized system cooling design with energy-efficient cooling fans, lowering energy consumption from system cooling.

3 System Parts Breakdown

Figure 3-1 Exploded View (8-Drive Configuration)



Item	Feature	Item	Feature
1	Switch Drawer	2	Motherboard Drawer
3	Motherboard + OCP Module	4	PSU × 6
5	Fan Module × 12	6	Fan Board × 3
7	Mid-plane Board	8	6U Chassis
9	Switch Board + PCIe Expansion Board + Drive Modules (8-bay)	10	NVIDIA HGX GPU Module
11	GPU Module Drawer		

4 System Logical Diagram

Figure 4-1 System Logical Diagram (8-Drive Configuration)

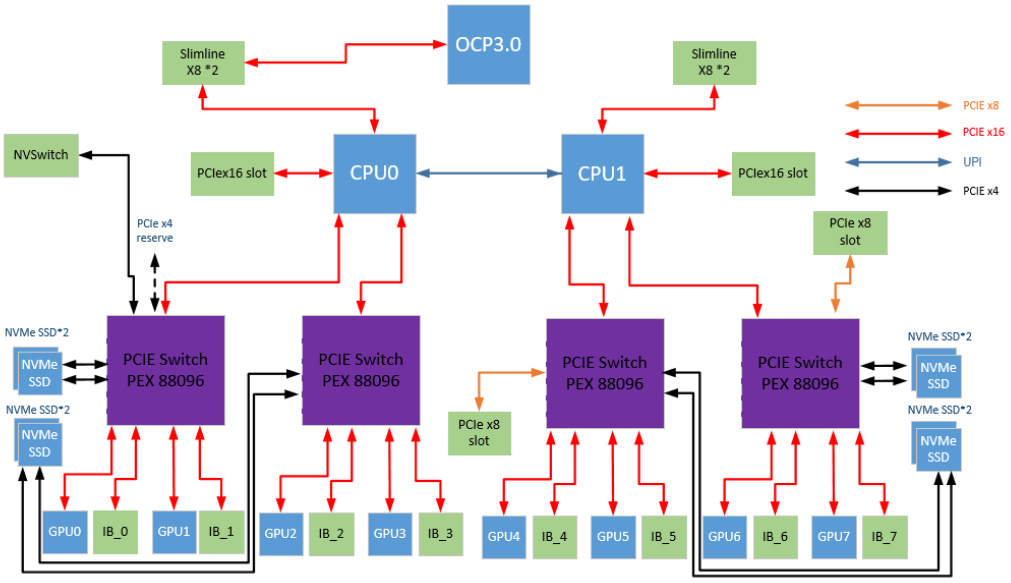


Table 4-1 8-Drive and 16-Drive Configuration Specifications

	NF5688M6 (8-Drive Configuration)	**NF5688M6 (16-Drive Configuration)**
CPU	2 × Intel Ice Lake CPU	2 × Intel Ice Lake CPU
Memory	• 32 × DDR4 DIMM • RDIMM/LRDIMM/BPS supported	• 32 × DDR4 DIMM • RDIMM/LRDIMM/BPS supported
RAID Controller Card	0	1 or 2
SSD	8 × NVMe	16 × SATA/SAS
M.2 SSD	2	2
PCIe Card	10 × PCIe x16 card, 2 × PCIe x8 card	6 × PCIe x16 card
OCP 3.0 Card	1	1
Power Supply	6 × 3,000 W PSU (3+3 redundant)	6 × 3,000 W PSU (3+3 redundant)

	NF5688M6 (8-Drive Configuration)	NF5688M6 (16-Drive Configuration)
Dimensions (W × H × D)	447 × 263.9 × 850 mm (17.60 × 10.39 × 33.46 in.)	447 × 263.9 × 850 mm (17.60 × 10.39 × 33.46 in.)
Operating Temperature	10°C to 35°C (50°F to 95°F)	10°C to 35°C (50°F to 95°F)

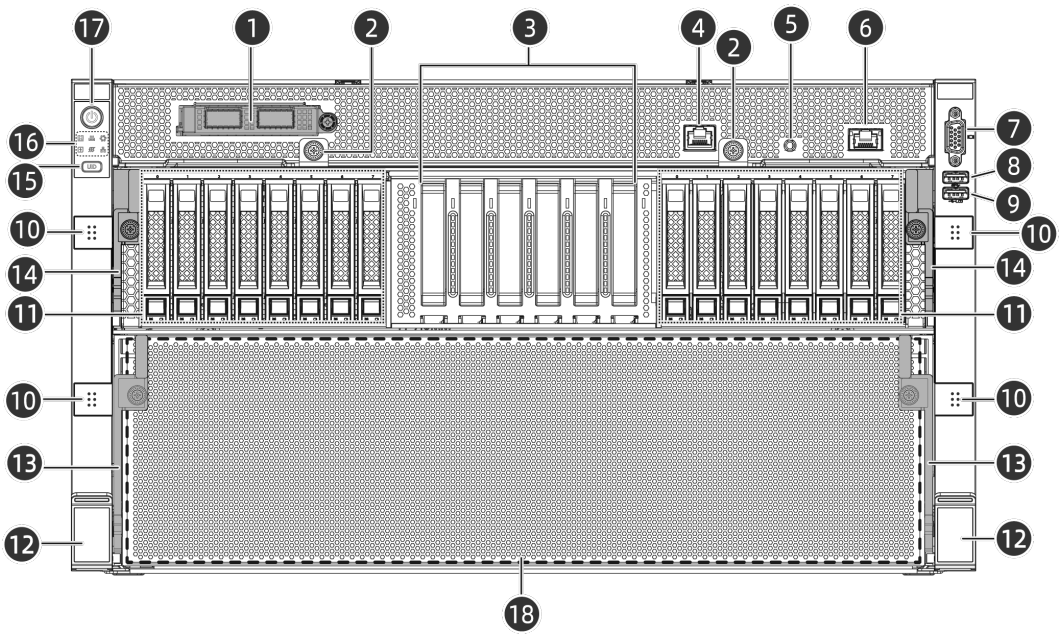
5 Hardware Description

5.1 Front Panel

5.1.1 Front View

- NF5688M6 (16-Drive Configuration)

Figure 5-1 Front View



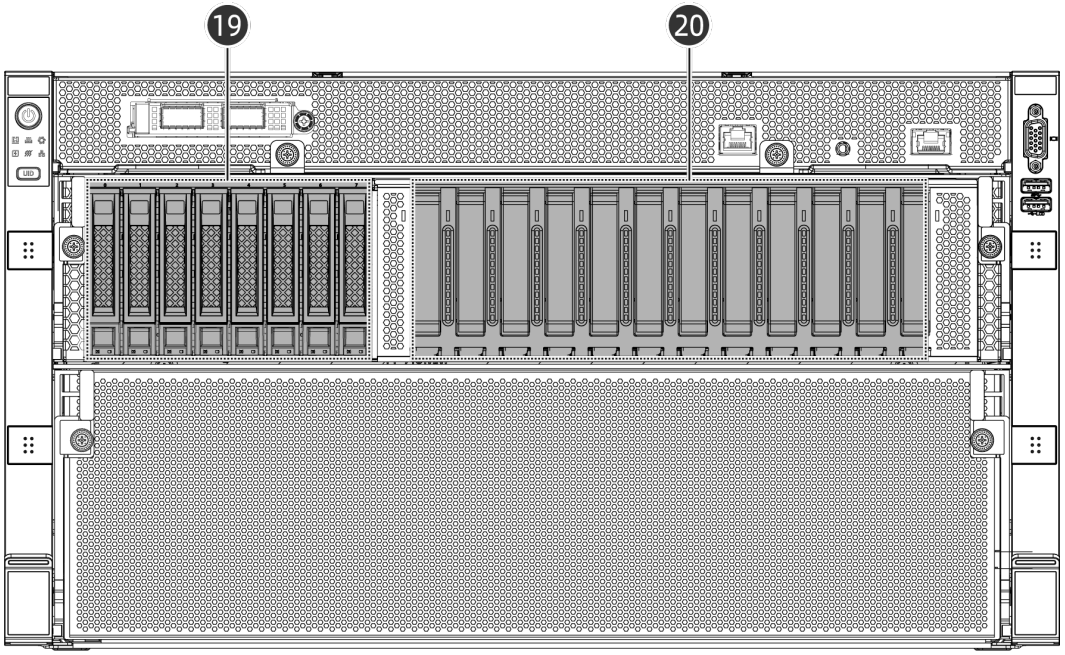
Item	Feature	Item	Feature
1	OCP 3.0 Module	2	Motherboard Drawer Handle × 2
3	PCIe Slots (Up to 6 PCIe Cards)	4	System Serial Port
5	BMC Serial Port	6	BMC Management Network Port
7	VGA Port	8	USB 3.0 Port
9	USB 2.0/LCD Port	10	Screw Cover × 4
11	Drive Bay × 16	12	Ear Latch × 2
13	GPU Drawer Handle × 2	14	Switch Drawer Handle × 2
15	UID/BMC RST Button and LED	16	LEDs
17	Power Button and LED	18	GPU Drawer

Table 5-1 PCIe Slots (Marked with 3 in the figure above, from left to right)

Item	Slot Type	Uplink Port	Hot-Swappable
Slot 0	PCIe x16	CPU0	No
Slot 1	PCIe x16	CPU0_SwitchA	No
Slot 2	PCIe x16	CPU0_SwitchB	No
Slot 3	PCIe x16	CPU1_SwitchC	No
Slot 4	PCIe x16	CPU1_SwitchD	No
Slot 5	PCIe x16	CPU1	No

- NF5688M6 (8-Drive Configuration)

Figure 5-2 Front View



Item	Feature	Item	Feature
19	Drive Bay × 8	20	PCIe Slots (Up to 12 PCIe Cards)

Table 5-2 PCIe Slots (Marked with 20 in the figure above, from left to right)

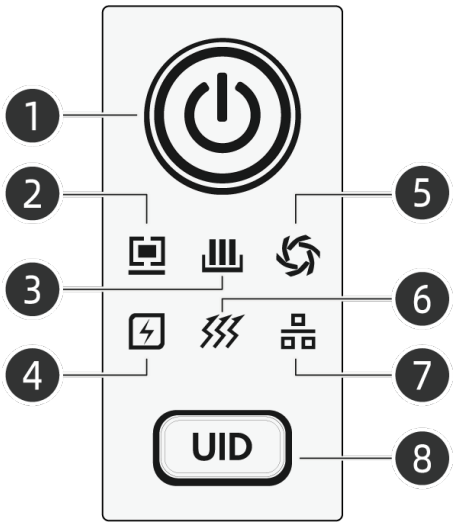
Item	Slot Type	Uplink Port	Hot-Swappable
Slot 0	PCIe x16	CPU0	No
Slot 1	PCIe x16	CPU0_SwitchA	No
Slot 2	PCIe x16	CPU0_SwitchA	No
Slot 3	PCIe x16	CPU0_SwitchB	No
Slot 4	PCIe x16	CPU0_SwitchB	No

Item	Slot Type	Uplink Port	Hot-Swappable
Slot 5	PCIe x16	CPU1_SwitchC	No
Slot 6	PCIe x16	CPU1_SwitchC	No
Slot 7	PCIe x8	CPU1_SwitchC	No
Slot 8	PCIe x8	CPU1_SwitchD	No
Slot 9	PCIe x16	CPU1_SwitchD	No
Slot 10	PCIe x16	CPU1_SwitchD	No
Slot 11	PCIe x16	CPU1	No

5.1.2 LEDs & Buttons

- The 8-drive configuration and 16-drive configuration adopt the same LED and button design.

Figure 5-3 Front Panel LEDs and Buttons



Item	Feature	Item	Feature
1	Power Button and LED	2	System Status LED
3	Memory Status LED	4	Power Status LED
5	Fan Status LED	6	System Overheat LED
7	Network Status LED	8	UID/BMC RST Button and LED

1. LED and Button Description

Table 5-3 Front Panel LED and Button Description

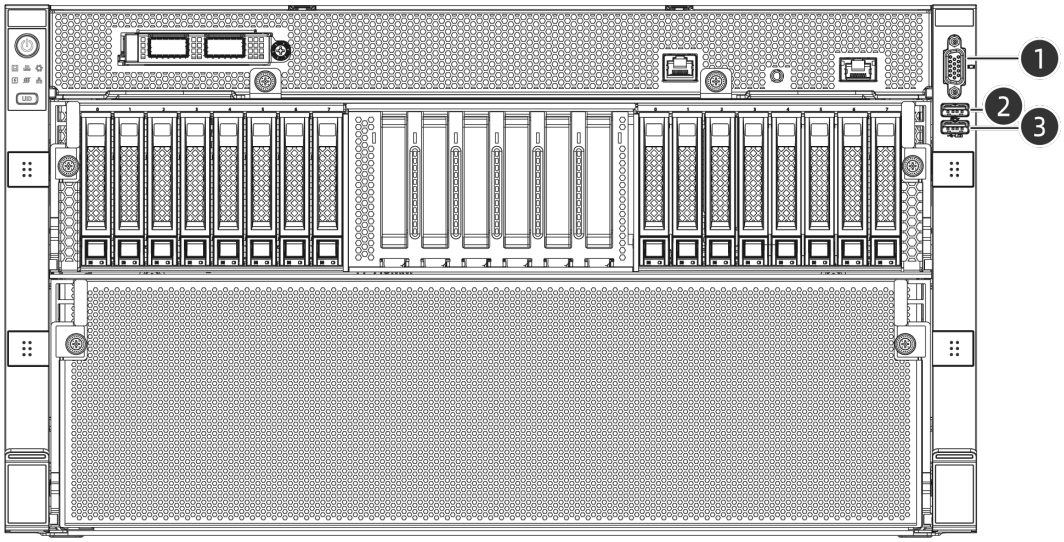
Icon	LED & Button	Description
	Power Button and LED	Power LED: • Off = No power • Solid green = Power-on state • Solid orange = Standby state Power button: Long press 4 seconds to force a shutdown from the power-on state. Notes: Follow the prompt under the OS to shut it down. Short press the power button to power on the system in standby state.
	UID/BMC RST Button and LED	The UID LED is used to identify the device to be operated: • Off = System unit not identified • Solid blue = System unit identified • Flashing blue = System unit being operated remotely Notes: The UID LED turns on when activated by the UID button or via BMC remotely. Long press the UID button for over 6 seconds to reset the BMC.
	Memory Status LED	• Off = Normal • Flashing red (1 Hz) = A non-critical warning occurs • Solid red = A critical warning occurs
	System Status LED	• Off = Normal • Flashing red (1 Hz) = A non-critical warning occurs • Solid red = A critical warning occurs
	Power Status LED	• Off = Normal

Icon	LED & Button	Description
		• Flashing red (1 Hz) = A non-critical warning occurs • Solid red = A critical warning occurs
	System Overheat LED	• Off = Normal • Flashing red (1 Hz) = A non-critical warning occurs • Solid red = A critical warning occurs
	Fan Status LED	• Off = Normal • Flashing red (1 Hz) = A non-critical warning occur • Solid red = A critical warning occurs
	Network Status LED	• NA (No LOM)

5.1.3 Ports

- The 8-drive configuration and 16-drive configuration adopt the same port design on the front panel.

Figure 5-4 Front Panel Ports (16-Drive Configuration)



Item	Feature	Item	Feature
1	VGA Port	2	USB 3.0 Port

Item	Feature	Item	Feature
3	USB 2.0/LCD Port		

1. Port Description

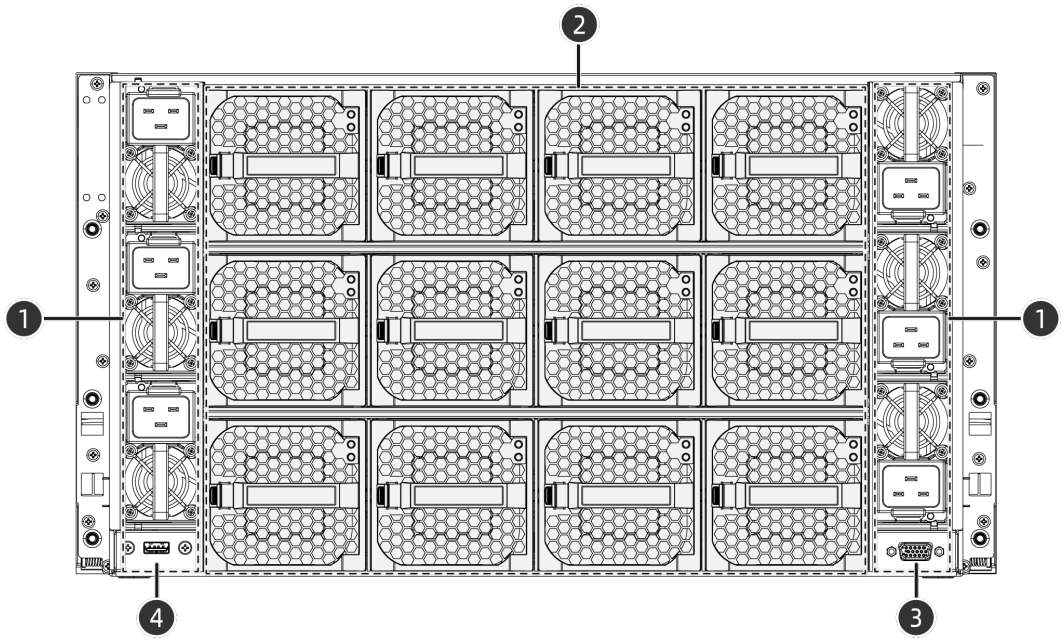
Table 5-4 Front Panel Port Description

Feature	Type	Quantity	Description
VGA Port	DB15	1	Enables you to connect a display terminal, for example, a monitor or KVM, to the system.
USB 3.0 Port	USB 3.0	1	Enables you to connect a USB 3.0 device to the system. Note: Make sure the USB device is in good condition or it may cause the server to work abnormally.
USB 2.0/LCD Port	USB 2.0	1	• Enables you to connect a USB 2.0 device to the system Note: Make sure the USB device is in good condition or it may cause the server to work abnormally. • Enables you to connect an LCD module to the system

5.2 Rear Panel

5.2.1 Rear View

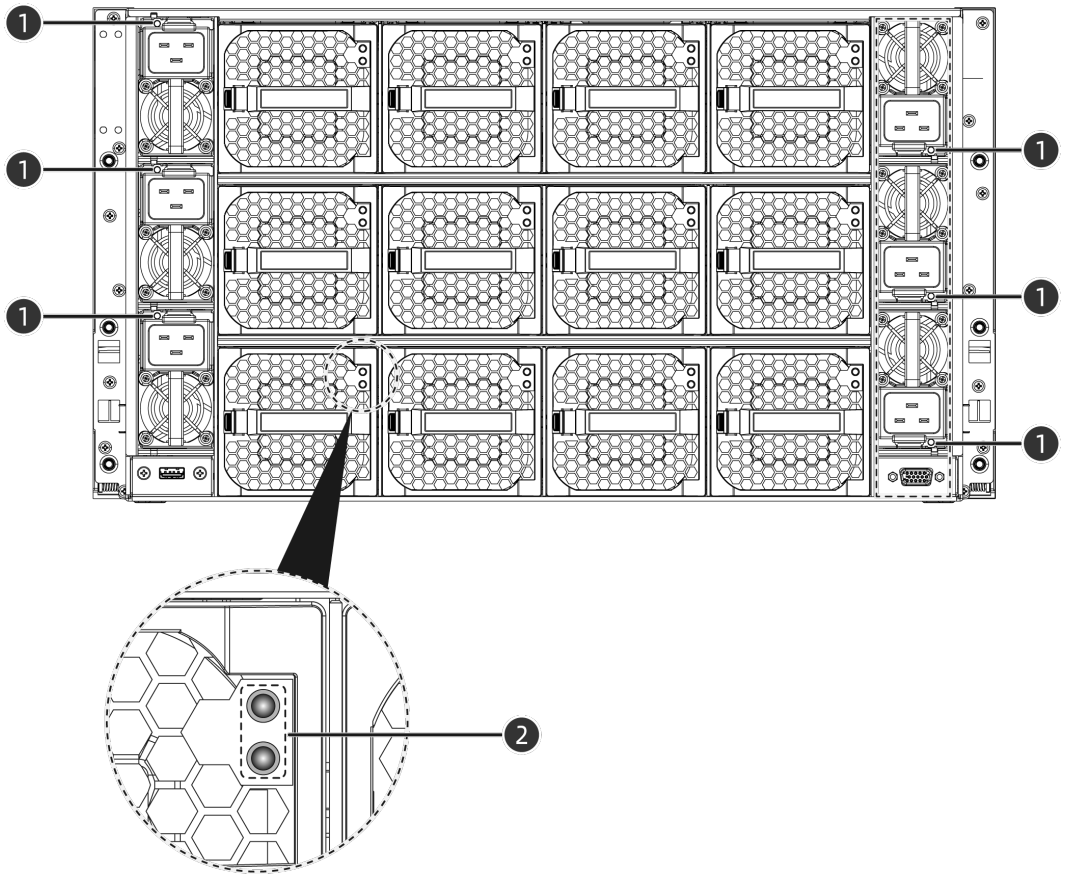
Figure 5-5 Rear View (Same for 8-Drive Configuration and 16-Drive Configuration)



Item	Feature	Item	Feature
1	PSU × 6	2	Fan Module × 12
3	VGA Port	4	USB 3.0 Port

5.2.2 LEDs

Figure 5-6 Rear Panel LEDs (Same for 8-Drive Configuration and 16-Drive Configuration)



Item	Feature	Item	Feature
1	PSU LEDs	2	Fan Module LEDs

1. LED Description

Table 5-5 Rear Panel LED Description

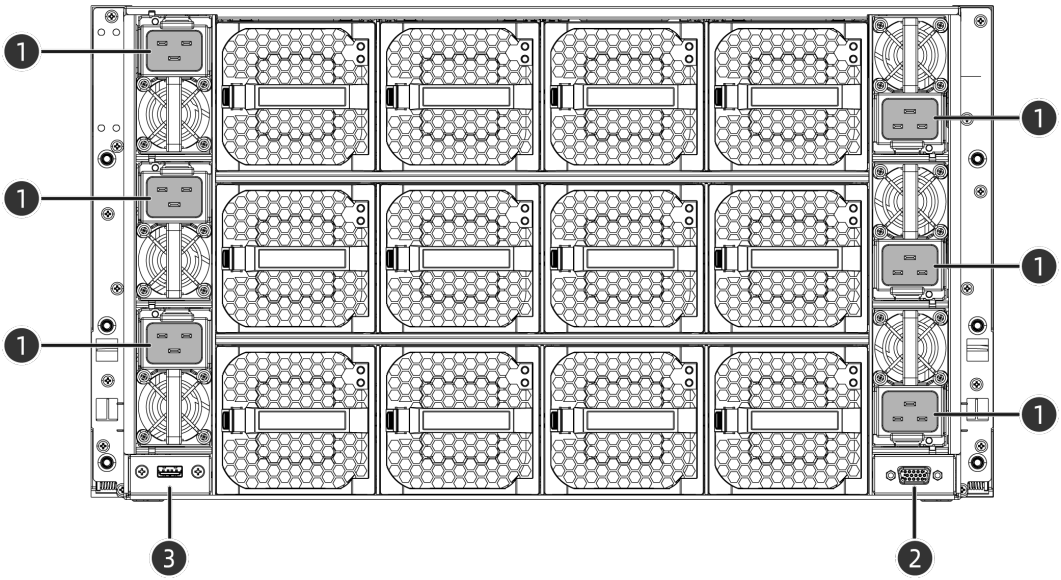
Icon	LED	Description
	Fan Module LEDs	• Solid green = Normal • Solid orange = Fan failure
	PSU LED	• Off = No AC power to PSU • Flashing green (1 Hz) = PSU operating in standby state with normal AC input.

Icon	LED	Description
		• Flashing green (2 Hz) = PSU firmware updating • Flashing green (off for 1 second, on for 2 seconds): PSU in cold redundant state • Solid green = Normal input and output • Flashing amber (1 Hz) = PSU warning event where the PSU continues to operate (possible causes: PSU overtemperature, PSU output overcurrent, excessively high or low fan speed) • Solid amber = PSU critical event causing a shutdown (possible causes: PSU overtemperature protection, PSU output overcurrent or short circuit, output overvoltage, short circuit protection, component (not all components) failure)

5.2.3 Ports

1. Port Location

Figure 5-7 Rear Panel Ports (Same for 8-Drive Configuration and 16-Drive Configuration)



Item	Feature	Item	Feature
1	PSU Socket × 6	2	VGA Port
3	USB 3.0 Port		

2. Port and PSU Description

Table 5-6 Rear Panel Port and PSU Description

Feature	Type	Quantity	Description
USB Port	USB 3.0	2	Enables you to connect a USB 3.0 device to the system. Notes: The maximum current supported by the USB port is 0.9 A. Make sure the USB device is in good condition or it may cause the server to work abnormally.
VGA Port	DB15	1	Enables you to connect a display terminal, for example, a monitor or KVM to the system.
PSU	N/A	6	Connected through a power cord. User can select the PSUs as needed. Note: Make sure that the total rated power of the 3 PSUs is greater than that of the server.

5.3 Processors

- Supports 2 processors.
- The processors used in the same server must be of the same model.

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

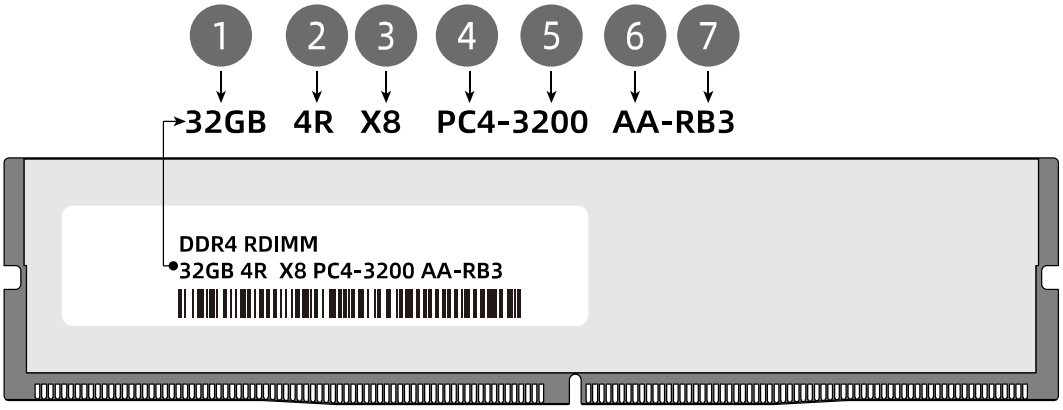
5.4 Memory

5.4.1 DDR4 DIMMs

1. Identification

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

Figure 5-8 DIMM Identification



Item	Description	Example
1	Capacity	• 16 GB • 32 GB • 64 GB • 128 GB • 256 GB
2	Rank(s)	• 1R = Single rank • 2R = Dual rank • 2S2R = Two ranks of two high stacked 3DS DRAM • 4DR = Four ranks of dual die packaged DRAM • 4R = Quad rank
3	Data width on the DRAM	• x4 = 4 bits • x8 = 8 bits
4	DIMM slot type	PC4 = DDR4
5	Maximum memory speed	• 2933 MT/s • 3200 MT/s
6	CAS latency	SDP-chip-based • V = CAS-19-19-19

Item	Description	Example
		• Y = CAS-21-21-21 • AA = CAS-22-22-22 3DS-chip-based • V = CAS-22-19-19 • Y = CAS-24-21-21 • AA = CAS-26-22-22
7	DIMM type	• R = RDIMM • L = LRDIMM

2. Memory Subsystem Architecture

The NF5688M6 supports 32 DIMM slots and 8 channels per CPU with 2 DIMM slots per channel.

Within a channel, populate the DIMM slot with its silk screen ending with D0 first and second the DIMM slot with its silk screen ending with D1. For instance, within CPU0 Channel 0, populate CPU0_C0D0 first and second CPU0_C0D1.

Table 5-7 DIMM Slot List

CPU	Channel ID	Silk Screen
CPU0	Channel 0	CPU0_C0D0
		CPU0_C0D1
	Channel 1	CPU0_C1D0
		CPU0_C1D1
	Channel 2	CPU0_C2D0
		CPU0_C2D1
	Channel 3	CPU0_C3D0
		CPU0_C3D1
	Channel 4	CPU0_C4D0
		CPU0_C4D1
	Channel 5	CPU0_C5D0
		CPU0_C5D1
	Channel 6	CPU0_C6D0
		CPU0_C6D1
	Channel 7	CPU0_C7D0
		CPU0_C7D1
CPU1	Channel 0	CPU1_C0D0

CPU	Channel ID	Silk Screen
		CPU1_C0D1
	Channel 1	CPU1_C1D0
		CPU1_C1D1
	Channel 2	CPU1_C2D0
		CPU1_C2D1
	Channel 3	CPU1_C3D0
		CPU1_C3D1
	Channel 4	CPU1_C4D0
		CPU1_C4D1
	Channel 5	CPU1_C5D0
		CPU1_C5D1
	Channel 6	CPU1_C6D0
		CPU1_C6D1
	Channel 7	CPU1_C7D0
		CPU1_C7D1

3. Compatibility

Refer to the following rules to select the DDR4 DIMMs.

IMPORTANT

- A server must use DDR4 DIMMs with the same part number (P/N code). All DDR4 DIMMs operate at the same speed, which is the lowest of:
  - Memory speed supported by a specific CPU
  - Maximum operating speed of a memory configuration
- Mixing DDR4 DIMM types (RDIMM, LRDIMM) or mixing DDR4 DIMM specifications (capacity, bit width, rank, height, etc.) is not supported.
- For specific system memory options, consult your local sales representative or refer to 7.2 Hardware Compatibility.

- The total memory capacity is the sum of the capacities of all DDR4 DIMMs of two CPUs.
- The total memory capacity cannot exceed the maximum memory capacity supported by two CPUs.
- The maximum number of DIMMs supported varies with the CPU type, DIMM type and the rank quantity.

NOTE

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

Table 5-8 DDR4 DIMM Specifications

Item		Value			
Capacity per DDR4 DIMM (GB)		16	32	64	128
Type		RDIMM	RDIMM	RDIMM	LRDIMM
Rated speed (MT/s)		3,200	3,200	3,200	3,200
Operating voltage (V)		1.2	1.2	1.2	1.2
Maximum number of DDR4 DIMMs supported in a server[a]		32	32	32	32
Maximum capacity of DDR4 DIMMs supported in a server (GB)[b]		512	1,024	2,048	4,096
Actual speed (MT/s)	1DPC[c]	3,200	3,200	3,200	3,200
	2DPC	3,200	3,200	3,200	3,200
a: The maximum number of DDR4 DIMMs supported is based on the 2-processor configuration. b: It indicates the maximum DDR4 memory capacity supported when all DDR4 DIMM slots are populated. The maximum DDR4 capacity varies with the CPU type. c: DIMM Per Channel (DPC) is the number of DIMMs per memory channel. The above information is for reference only, consult your local sales representative for details.					

4. Population Rules

NOTE

This section describes the DIMM population rules when only DDR4 DIMMs are installed in a server. If mixing DDR4 DIMMs and PMems is required, refer to 4 Population Rules in 5.4.2.

General population rules for DDR4 DIMMs:

- Install DIMMs only when the corresponding processor has been installed.

- Mixing LRDIMMs and RDIMMs is not allowed.
- Install dummies in the empty DIMM slots.

Population rules for DDR4 DIMMs in specific modes:

- Memory sparing
  - Follow the general population rules.
  - Each channel must have a valid online spare configuration.
  - Each channel can have a different online spare configuration.
  - Each channel with a DIMM installed must have a spare rank.
- Memory mirroring
  - Follow the general population rules.
  - Each processor supports 4 integrated memory controllers (IMCs). Each IMC has 2 channels to be populated with DIMMs. DIMMs installed must be of the same model.
  - In a multi-processor configuration, each processor must have a valid memory mirroring configuration.

5. DIMM Slot Layout

Up to 32 DDR4 DIMMs can be installed in the server. Balance the total memory capacity between the installed processors for optimal memory performance. DIMM configuration must be compliant with the DIMM population rules.

IMPORTANT

At least one DDR4 DIMM must be installed in the DIMM slot(s) corresponding to each CPU.

Figure 5-9 DIMM Slot Layout

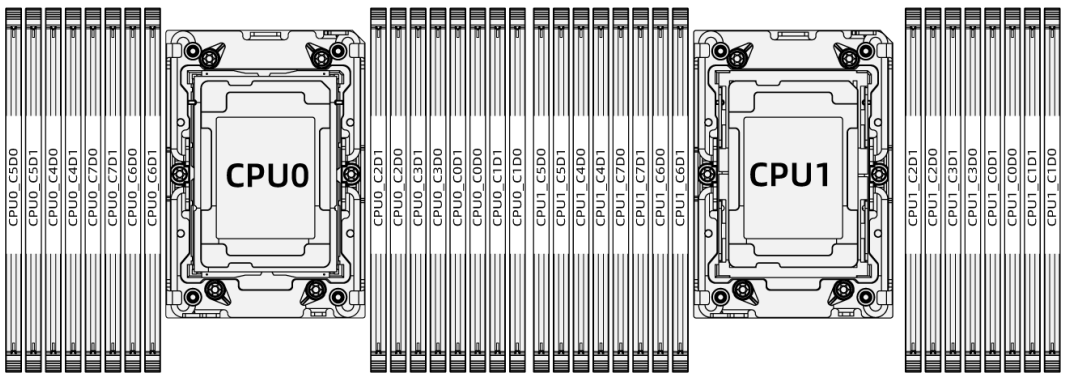


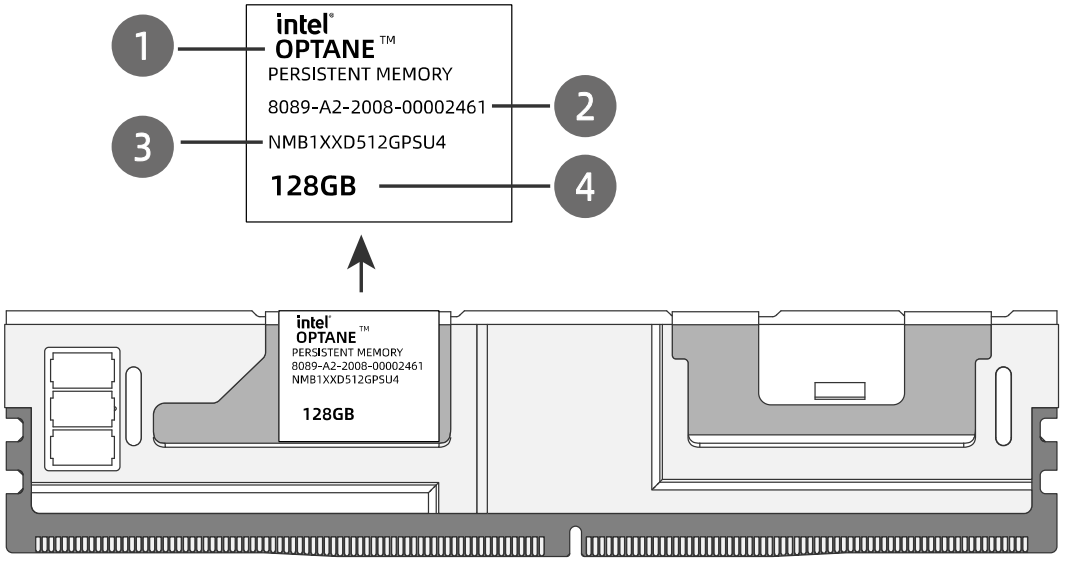
Table 5-9 DDR4 DIMM Population Rules

Memory Slot		2	4	8	12	16	24	32
CPU0	CPU0_C0D0	●	●	●	●	●	●	●
	CPU0_C0D1						●	●
	CPU0_C1D0				●	●	●	●
	CPU0_C1D1							●
	CPU0_C2D0			●	●	●	●	●
	CPU0_C2D1						●	●
	CPU0_C3D0					●	●	●
	CPU0_C3D1							●
	CPU0_C4D0		●	●	●	●	●	●
	CPU0_C4D1						●	●
	CPU0_C5D0				●	●	●	●
	CPU0_C5D1							●
	CPU0_C6D0			●	●	●	●	●
	CPU0_C6D1						●	●
	CPU0_C7D0					●	●	●
	CPU0_C7D1							●
CPU1	CPU1_C0D0	●	●	●	●	●	●	●
	CPU1_C0D1						●	●
	CPU1_C1D0				●	●	●	●
	CPU1_C1D1							●
	CPU1_C2D0			●	●	●	●	●
	CPU1_C2D1						●	●
	CPU1_C3D0					●	●	●
	CPU1_C3D1							●
	CPU1_C4D0		●	●	●	●	●	●
	CPU1_C4D1						●	●
	CPU1_C5D0				●	●	●	●
	CPU1_C5D1							●
	CPU1_C6D0			●	●	●	●	●
	CPU1_C6D1						●	●
	CPU1_C7D0					●	●	●
	CPU1_C7D1							●

5.4.2 PMems

1. Identification

Figure 5-10 PMem Identification



Item	Description	Example
1	Component name	Intel Optane Persistent Memory
2	Serial number	8089-A2-2008-00002461
3	Model	NMB1XXD512GPSU4
4	Capacity	• 128 GB • 256 GB • 512 GB

2. Memory Subsystem Architecture

The NF5688M6 supports 32 DIMM slots and 8 channels per CPU with 2 DIMM slots per channel. Only one PMem can be populated in each channel.

PMems must be used with DDR4 DIMMs.

Table 5-10 DIMM Slot List

CPU	Channel ID	Silk Screen
CPU0	Channel 0	CPU0_C0D0
		CPU0_C0D1
	Channel 1	CPU0_C1D0
		CPU0_C1D1

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

3. Compatibility

Refer to the following rules to configure PMems:

- PMems must be used with DDR4 DIMMs.
- PMems must be used with the 3rd Gen Intel Xeon Scalable processors (Ice Lake).
- PMems can only be configured in two modes: App Direct Mode (AD) and Memory Mode (MM), and the calculation formula for the total memory capacity is as follows:
  - AD: Total memory capacity = Sum of all PMem capacities + Sum of all DDR4

DIMM capacities.

- MM: Total memory capacity = Sum of all PMem capacities (DDR4 DIMMs operate as cache only and do not count toward the total memory capacity).

Table 5-11 PMem Specifications

Item	Value		
Capacity per PMem (GB)	128	256	512
Rated speed (MT/s)	3,200	3,200	3,200
Operating voltage (V)	1.2	1.2	1.2
Maximum number of PMems supported in a server[a]	16	16	16
Maximum capacity of PMems supported in a server (GB)[b]	2,048	4,096	8,192
Actual speed (MT/s)	3,200	3,200	3,200
a: The maximum number of PMems supported is based on the 2-processor configuration. b: The maximum capacity of PMems supported varies with the operating modes of PMems. The above information is for reference only, consult your local sales representative for details.			

4. Population Rules

- General population rules for PMems:
  - DDR4 DIMM types used with PMems include RDIMMs and LRDIMMs.
  - A server must use PMems with the same part number (P/N code).
  - In a server, DDR4 DIMMs used with PMems must have the same part number (P/N code).
- Population rules for PMems in specific modes:
  - AD: In a server, the recommended capacity ratio of DDR4 DIMMs to PMems is between 1:1 and 1:8.
  - MM: In a server, the recommended capacity ratio of DDR4 DIMMs to PMems is between 1:4 and 1:16.

5. DIMM Slot Layout

Up to 16 PMems can be installed in a server, and PMems must be used with DDR4 DIMMs. PMem configuration must be compliant with the PMem population rules.

Figure 5-11 DIMM Slot Layout

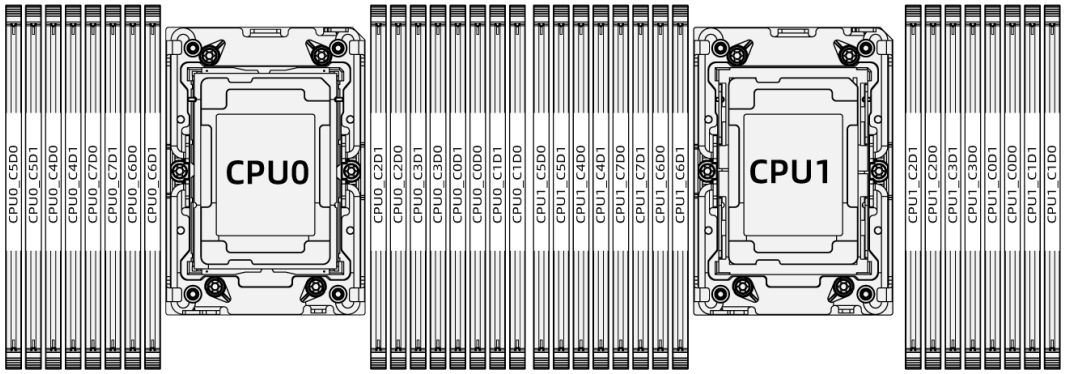


Table 5-12 PMem Population Rules

Processor	Channel ID	Memory Slot	DIMM Quantity ●: DDR4 DIMM ○: PMem											
			AD	MM	AD	AD	AD	MM	AD	MM	AD	
			8+8 Population		12+3 Population	16+2 Population	16+8 Population		16+16 Population		24+4 Population	
CPU0	Channel0	CPU0_C0D0	●		●	●	●		●		●	
		CPU0_C0D1				○	○		○		●	
	Channel1	CPU0_C1D0	○		●	●	●		●		○	
		CPU0_C1D1							○			
	Channel2	CPU0_C2D0	●		●	●	●		●		●	
		CPU0_C2D1							○		●	
	Channel3	CPU0_C3D0	○		○	●	●		●		●	
		CPU0_C3D1							○		●	
	Channel4	CPU0_C4D0	●		●	●	●		●		●	
		CPU0_C4D1							○		●	
	Channel5	CPU0_C5D0	○		●	●	●		●		○	
		CPU0_C5D1							○			
	Channel6	CPU0_C6D0	●		●	●	●		●		●	
		CPU0_C6D1							○		●	
	Channel7	CPU0_C7D0	○			●	●		●		●	
		CPU0_C7D1							○		●	
CPU0	Channel0	CPU0_C0D0	●		●	●	●		●		●	
		CPU0_C0D1				○	○		○		●	
	Channel1	CPU0_C1D0	○		●	●	●		●		○	
		CPU0_C1D1							○			
	Channel2	CPU0_C2D0	●		●	●	●		●		●	
		CPU0_C2D1							○		●	
	Channel3	CPU0_C3D0	○		○	●	●		●		●	
		CPU0_C3D1							○		●	
	Channel4	CPU0_C4D0	●		●	●	●		●		●	
		CPU0_C4D1							○		●	
	Channel5	CPU0_C5D0	○		●	●	●		●		○	
		CPU0_C5D1							○			
	Channel6	CPU0_C6D0	●		●	●	●		●		●	
		CPU0_C6D1							○		●	
	Channel7	CPU0_C7D0	○			●	●		●		●	
		CPU0_C7D1							○		●	

5.5 Storage

5.5.1 Drive Configurations

Table 5-13 Drive Configurations

Configuration	Front Drives	Internal Drives	Drive Management Mode
8-Drive Configuration	8 × 2.5-inch NVMe drive	2 × M.2 SSD	Directly connected to CPUs
16-Drive Configuration	16 × 2.5-inch SAS/SATA drive	2 × M.2 SSD	SAS/SATA drives: 2 × 8i RAID controller card or 1 × 16i RAID controller card

NOTE

- A request for mixing NVMe, SAS and SATA drives shall be submitted to us for a technical review.
- Under the NVIDIA framework, the device VMD function must be disabled. A hardware error will be recorded in the OS or BMC SEL log when NVMe hot plug is performed, which is normal and will not affect the function.

5.5.2 Drive Numbering

- NF5688M6 (16-Drive Configuration)

Figure 5-12 Drive Numbering

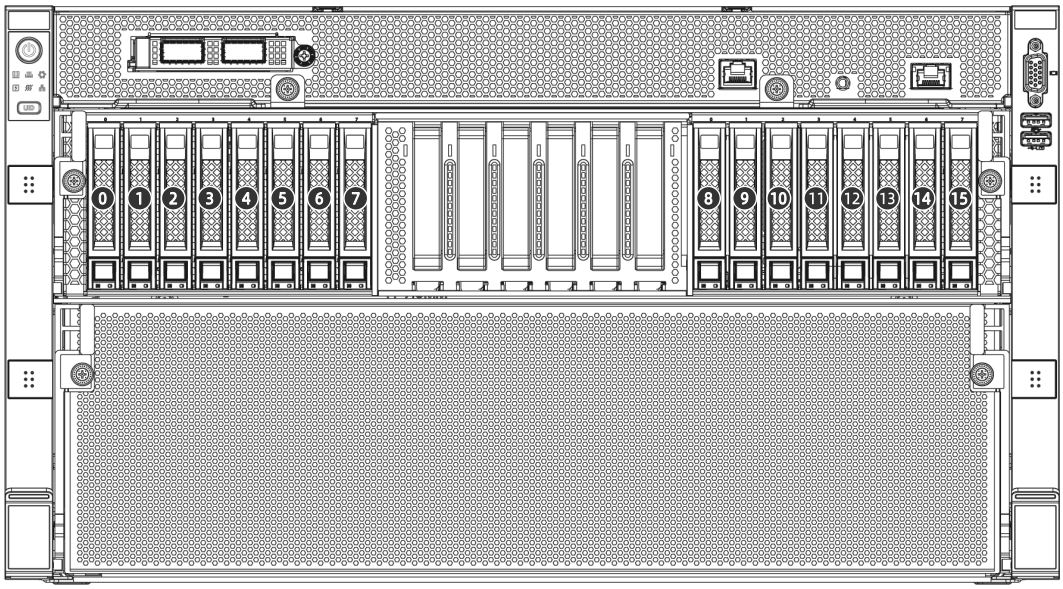


Table 5-14 Drive Number Identified by ISBMC and 16i RAID Controller Card

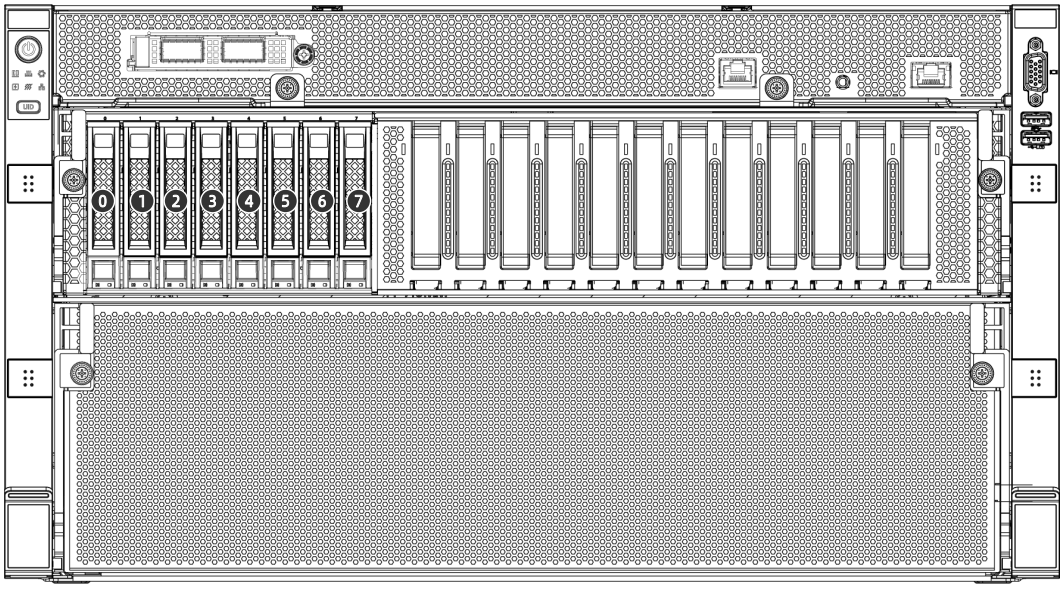
Physical Drive No.	Drive No. Identified by the ISBMC	Drive No. Identified by the 16i RAID Controller Card
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
11	11	11
12	12	12
13	13	13
14	14	14
15	15	15

Table 5-15 Drive Number Identified by ISBMC and 2 × 8i RAID Controller Card

Physical Drive No.	Drive No. Identified by the ISBMC	Drive No. Identified by the 2 × 8i RAID Controller Card
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	0
9	9	1
10	10	2
11	11	3
12	12	4
13	13	5
14	14	6
15	15	7

- NF5688M6 (8-Drive Configuration)

Figure 5-13 Drive Numbering



Physical Drive No.	Drive No. Identified by the ISBMC
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7

5.5.3 Drive LEDs

1. SAS/SATA Drive LEDs

Figure 5-14 SAS/ SATA Drive LEDs

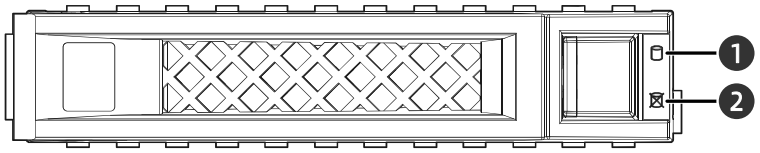


Table 5-16 SAS/SATA Drive LEDs

Activity LED (marked with 1)	Error LED (marked with 2)	Description
Solid green	Off	Drive present but not in use
Flashing green	Off	Drive present and in use
Flashing green	Solid pink	Copyback/Rebuild in progress (RAID created)
Solid green	Solid blue	Drive selected but not in use
Flashing green	Solid blue	Drive selected and in use
Off	Solid blue	Drive absent or failed (RAID not created), and selected
Off	Off	Drive absent or failed (RAID not created), and not selected
Any status	Solid red	Drive absent or failed (RAID created)

2. NVMe Drive LEDs

Figure 5-15 NVMe Drive LEDs

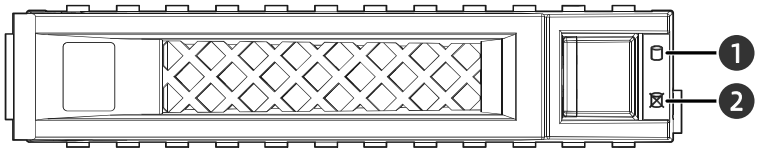


Table 5-17 NVMe Drive LEDs

Activity LED (marked with 1)	Error LED (marked with 2)	Description
Solid green	Off	Drive present but not in use
Flashing green	Off	Drive present and in use
Flashing green	Solid pink	Copyback/Rebuild/Initializing/Verifying in progress
Solid green	Solid blue	Drive selected but not in use
Flashing green	Solid blue	Drive selected and in use
Any status	Solid red	Drive failed
Off	Off	Drive absent

5.5.4 RAID Controller Cards

The RAID controller card provides functions such as RAID configuration, RAID level migration, and drive roaming. For specific RAID controller card options, consult your local sales representative or refer to 7.2 Hardware Compatibility.

5.6 Network

NICs provide network expansion capabilities.

- The OCP I/O slot supports the OCP 3.0 card. Users can select the OCP 3.0 card based on their needs.
- The PCIe expansion slots support PCIe NICs. Users can select the PCIe cards based on their needs.
- For specific network options, consult your local sales representative or refer to 7.2 Hardware Compatibility.

5.7 I/O Expansion

5.7.1 PCIe Cards

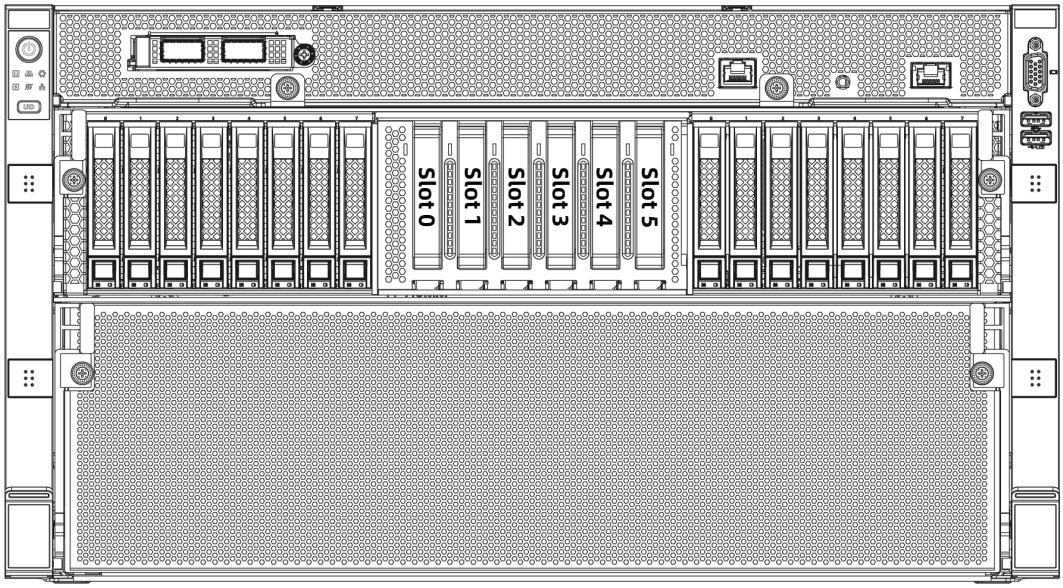
The PCIe cards provide system expansion capabilities.

- The server supports up to 13 PCIe 4.0 expansion slots, including 1 dedicated slot for the OCP 3.0 card.
- For specific PCIe card options, consult your local sales representative or refer to 7.2 Hardware Compatibility.

5.7.2 PCIe Slots

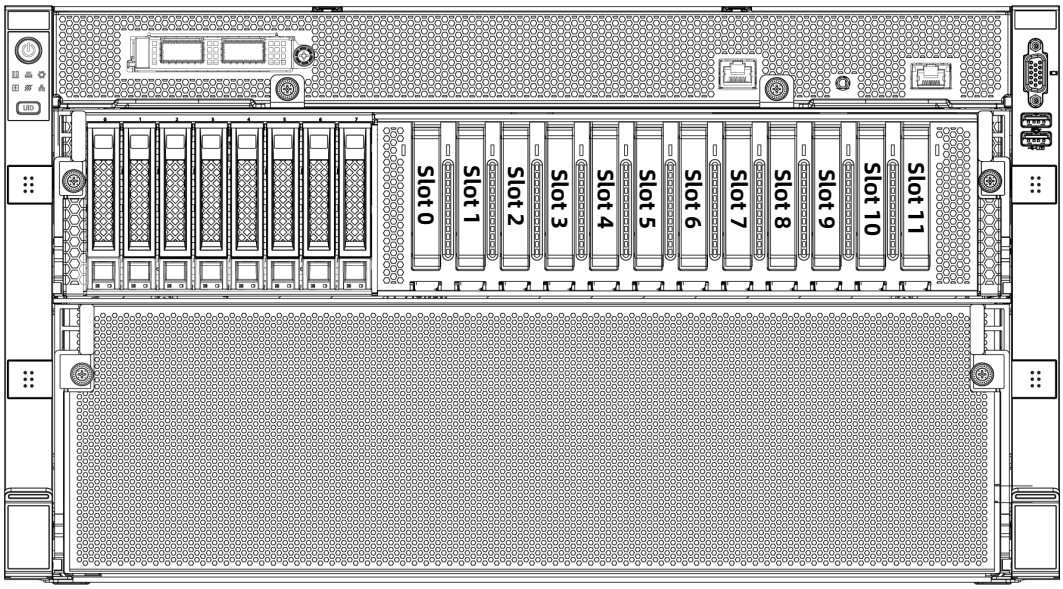
1. PCIe Slot Location

Figure 5-16 PCIe Slots (16-Drive Configuration)



Item	Slot Type	Uplink Port	Hot-Swappable
/	OCP 3.0	CPU0	No
Slot 0	PCIe x16	CPU0	No
Slot 1	PCIe x16	CPU0_SwitchA	No
Slot 2	PCIe x16	CPU0_SwitchB	No
Slot 3	PCIe x16	CPU1_SwitchC	No
Slot 4	PCIe x16	CPU1_SwitchD	No
Slot 5	PCIe x16	CPU1	No

Figure 5-17 PCIe Slots (8-Drive Configuration)

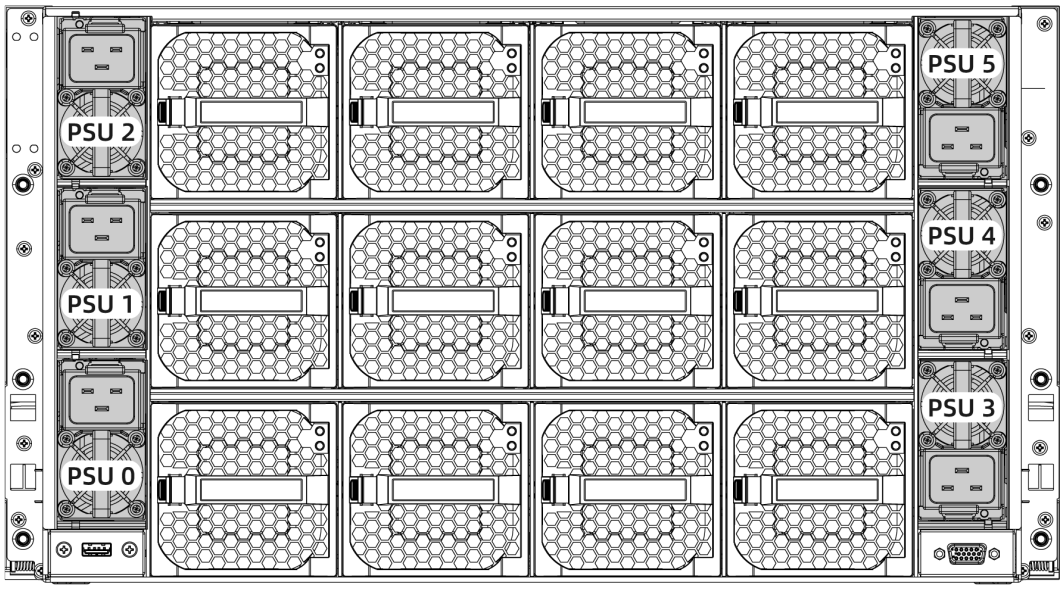


Item	Slot Type	Uplink Port	Hot-Swappable
/	OCP 3.0	CPU0	No
Slot 0	PCIe x16	CPU0	No
Slot 1	PCIe x16	CPU0_SwitchA	No
Slot 2	PCIe x16	CPU0_SwitchA	No
Slot 3	PCIe x16	CPU0_SwitchB	No
Slot 4	PCIe x16	CPU0_SwitchB	No
Slot 5	PCIe x16	CPU1_SwitchC	No
Slot 6	PCIe x16	CPU1_SwitchC	No
Slot 7	PCIe x8	CPU1_SwitchC	No
Slot 8	PCIe x8	CPU1_SwitchD	No
Slot 9	PCIe x16	CPU1_SwitchD	No
Slot 10	PCIe x16	CPU1_SwitchD	No
Slot 11	PCIe x16	CPU1	No

5.8 PSUs

- The server supports up to 6 PSUs.
- The server supports AC or DC power input.
- The PSUs are hot-swappable.
- The server supports 6 PSUs in 3+3 redundancy.
- The server must use PSUs with the same part number (P/N code).

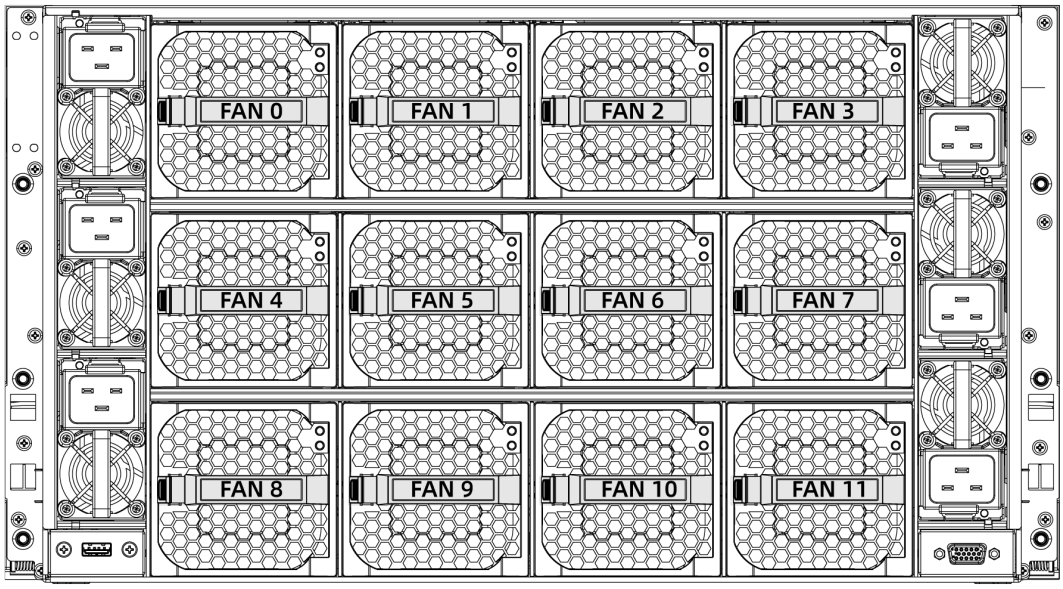
Figure 5-18 PSU Layout



5.9 Fans

- The server supports 12 fan modules (8086).
- The fans are hot-swappable.
- The server supports fans in N+1 redundancy, which means that the server can continue working properly when a single fan fails.
- The server supports intelligent fan speed control.
- The server must use fans with the same part number (P/N code).

Figure 5-19 Fan Module Layout



5.10 LCD Module (Optional)

5.10.1 Function

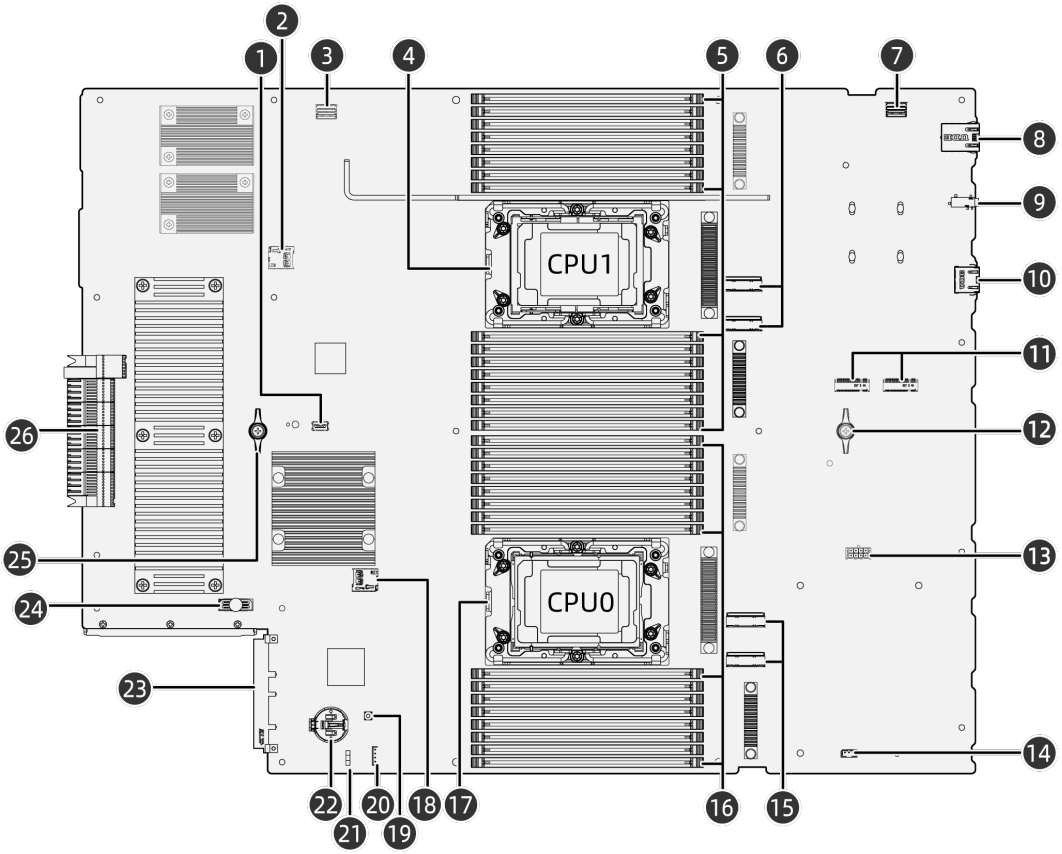
The LCD module reads server-related information from the BMC, such as the operating status of processors and memories, network status, logs, and alerts, and transmits the information to client mobile terminals via Bluetooth.

The LCD module synchronizes information with the ISBMC through I^2C and can display information on an LCD screen or in the app. The server's basic information, system status and alert diagnosis can be displayed in the app via Bluetooth, facilitating the operation and maintenance.

5.11 Boards

5.11.1 Motherboard

Figure 5-20 Motherboard Layout



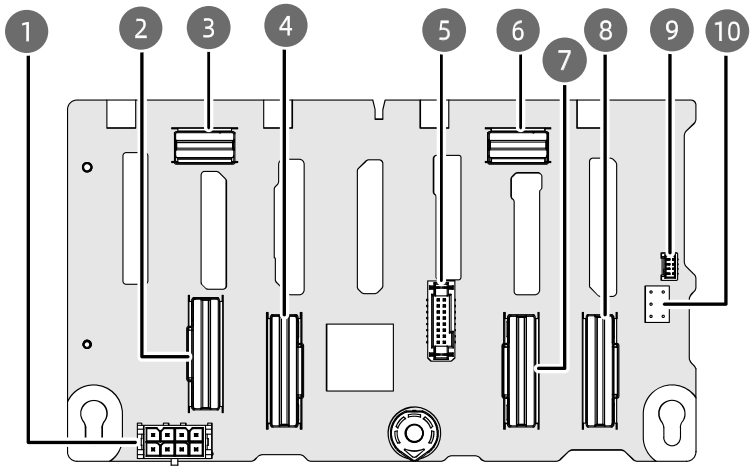
Item	Feature	Item	Feature
1	TPM Connector	2	BMC_TF Card Slot

Item	Feature	Item	Feature
3	BMC Management Network Port Connector	4	CPU1
5	DIMM Slots (CPU1)	6	Slimline x8 Connector × 2
7	BMC Management Network Port Connector	8	BMC Management Network Port
9	BMC Serial Port	10	System Serial Port
11	M.2 SSD Connector × 2	12	Motherboard Handle
13	OCP 3.0 Power Connector	14	Intrusion Switch Connector
15	Slimline x8 Connector × 2	16	DIMM Slots (CPU0)
17	CPU0	18	SYS_TF Card Slot
19	Power Button	20	RAID Key Connector
21	CLR_CMOS	22	Battery Socket
23	OCP Retimer Card Connector	24	XDP Connector
25	Motherboard Handle	26	Bridge Module Connector

5.11.2 Drive Backplane

1. Front Drive Backplane

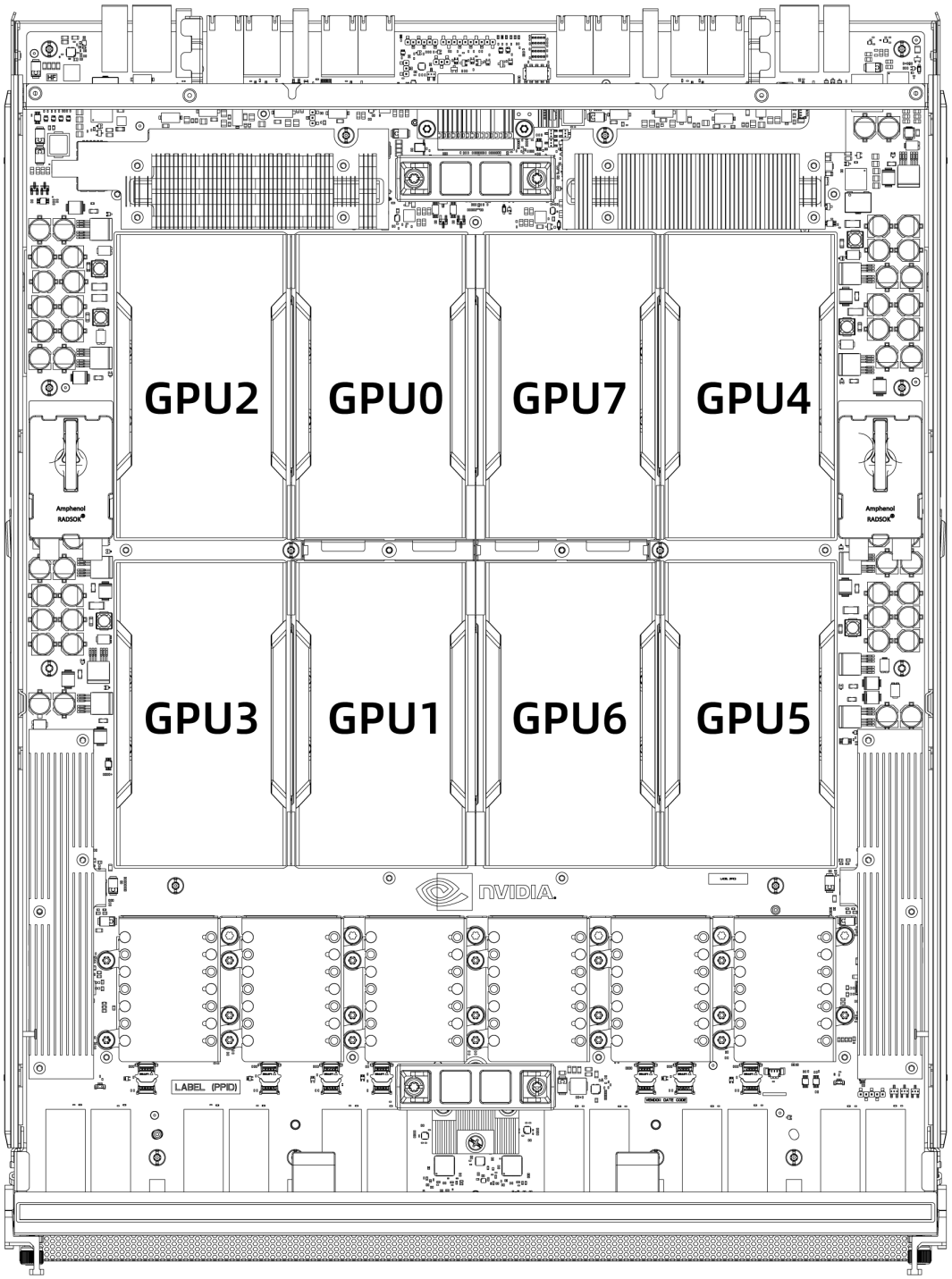
Figure 5-21 8 × 2.5-inch Drive Backplane (8 × SAS/SATA/NVMe Drive)



Item	Feature	Item	Feature
1	Power Connector	2	Slimline x8 Connector 0
3	Slimline x4 Connector 0	4	Slimline x8 Connector 1
5	VPP Connector	6	Slimline x4 Connector 1
7	Slimline x8 Connector 2	8	Slimline x8 Connector 3
9	BMC I^2C Connector	10	CPLD JTAG Connector

5.12 GPUs

Figure 5-22 GPU Layout



6 Product Specifications

6.1 Technical Specifications

Table 6-1 Technical Specifications

Item	Description
Form Factor	6U rack server
Chipset	Intel C621A
Processor	Supports 2 processors • 3rd Gen Intel Xeon Scalable processors (Ice Lake) • Integrated memory controllers and 8 memory channels per processor • Integrated PCIe controllers with PCIe 4.0 supported and 64 lanes per processor • 3 UPI links at up to 11.2 GT/s • Up to 40 cores • Max. Turbo frequency at 3.7 GHz • TDP up to 270 W Note: The information above is for reference only, see 7.2 Hardware Compatibility for details.
Memory	Supports 32 DIMM slots • Up to 32 DDR4 DIMMs - RDIMMs or LRDIMMs - Up to 3,200 MT/s. - Mixing DDR4 DIMMs of different types (RDIMMs and LRDIMMs) and specifications (such as capacity, bit width, rank, and height) is not supported. - A server must use DDR4 DIMMs with the same part number (P/N code). • Up to 16 PMems - PMems must be used with DDR4 DIMMs and up to

Item	Description
	1 PMem can be installed in each memory channel. - Up to 3,200 MT/s. - Mixing PMems of different specifications (such as capacity and rank) is not supported. Note: The information above is for reference only, see 7.2 Hardware Compatibility for details.
Storage	Supports multiple drive configurations, see 5.5.1 Drive Configurations for details. • Supports 2 M.2 SSDs Notes: It is recommended that the M.2 SSD is only used as the boot device for installing the OS. The M.2 SSD has low endurance and cannot be used as a data storage device. For data storage, use enterprise-class SSDs with higher DWPD. Write-intensive business software will cause the M.2 SSD to reach write endurance and wear out; therefore, the M.2 SSD is not recommended for such business scenarios. Do not use the M.2 SSD as caching. • Supports hot-swap SAS/SATA/NVMe drives Note: VMD is disabled by default in BIOS. • Supports multiple models of RAID controller cards. See 7.2 Hardware Compatibility for details
Network	OCP 3.0 card • Supports 1 OCP 3.0 card, which can be selected as required • Non-hot-swappable
PCIe Expansion	Supports PCIe expansion slots • 8-drive configuration: 1 dedicated expansion slot for an OCP 3.0 card and 12 standard PCIe expansion slots • 16-drive configuration: 1 dedicated expansion slot for an OCP 3.0 card and 6 standard PCIe expansion slots For details, see 5.7.2 PCIe Slot.
Port	Supports multiple ports • Front panel ports:

Item	Description
	- 1 USB 2.0 port - 1 USB 3.0 port - 1 VGA port - 1 system serial port - 1 BMC management network port - 1 BMC serial port • Rear panel ports: - 1 USB 3.0 port - 1 VGA port Note: OS installation on the USB storage media is not recommended.
Graphics Card	Integrated graphics chips on the motherboard with a video memory of 64 MB and a maximum 16M color resolution of 1,920 × 1,200 at 60 Hz Notes: The integrated graphics card can support a maximum resolution of 1,920 × 1,200 only when the graphics driver matching the OS version is installed; otherwise only the default resolution of the OS is supported. When the front and rear VGA ports are both connected to monitors, only the monitor connected to the front VGA port works.
System Management	• UEFI • ISBMC • NC-SI • ISPIM
Security Feature	• Intel Platform Firmware Resilience (PFR) • Trusted Platform Module (TPM 2.0) and Trusted Cryptography Module (TCM) • Intel Trusted Execution Technology • Firmware update mechanism based on digital signatures • UEFI Secure Boot • Hierarchical BIOS password protection • BIOS Secure Flash and BIOS Lock Enable (BLE)

Item	Description
	• BMC and BIOS dual-image mechanism • Chassis intrusion detection

6.2 Environmental Specifications

Table 6-2 Environmental Specifications

Parameter	Description
Temperature[1,2,3]	• Operating: 10°C to 35°C (50°F to 95°F) • Storage (packed): -40°C to +60°C (-40°F to +140°F)
Relative Humidity (RH, non-condensing)	• Operating: 20% - 80% RH • Storage (packed): 20% - 93% RH
Operating Altitude	≤ 3,050 m (10,007 ft)
Corrosive Gaseous Contaminants	Maximum growth rate of corrosion film thickness: • Copper coupon: 300 Å/month (compliant with the gaseous corrosivity level of G1 defined in ANSI/ISA-71.04-2013) • Silver coupon: 200 Å/month (compliant with the gaseous corrosivity level of G1 defined in ANSI/ISA-71.04-2013)
Noise Levels[4,5,6]	Noise emissions are measured in accordance with ISO 7779 (ECMA 74) and declared in accordance with ISO 9296 (ECMA 109). Listed are the declared A-weighted sound power levels (LWAd) and the declared average bystander position A-weighted sound pressure levels (LpAm) at a server operating temperature of 23°C (73.4°F): • Idle: - LWAd: 6.7 B for maximum configuration - LpAm: 64.0 dBA for maximum configuration • Operating:

Parameter	Description
	- LWAd: 7.6 B for maximum configuration - LpAm: 73.4 dBA for maximum configuration

CAUTION

1. 10°C to 35°C (50°F to 95°F) is the standard operating temperature.
2. For temperatures between 10°C and 35°C (50°F and 95°F), de-rate the maximum allowable temperature by 1°C per 305 m (1°F per 556 ft) above sea level. The maximum temperature gradient is 20°C/h (36°F/h) and the maximum operating altitude is 3,050 m (10,007 ft), both varying with server configuration.
3. Any fan failure or operations above 30°C (86°F) may lead to system performance degradation.
4. This document lists the LWAd and LpAm of the product at a 23°C (73.4°F) ambient environment. All measurements are conducted in conformance with ISO 7779 (ECMA 74) and declared in conformance with ISO 9296 (ECMA 109). The listed sound levels apply to the maximum configuration. Additional options may result in increased sound levels. Contact your sales representative for more information.
5. The sound levels shown here were measured based on the maximum configuration of a specific server. Sound levels vary with server configuration. These values are for reference only and subject to change without notice.
6. Product conformance to cited normative standards is based on sample testing, evaluation, or assessment. This product or family of products is eligible to bear the appropriate compliance logos and statements.

6.3 Physical Specifications

Table 6-3 Physical Specifications

Item	Description
Dimensions (W × H × D)	• With mounting ears: 447 × 263.9 × 850 mm (17.60 × 10.39 × 33.46 in.)

Item	Description
	• Outer packaging: 800 × 570 × 1,200 mm (31.50 × 22.44 × 47.24 in.)
Installation Dimension Requirements	Installation requirements for the cabinet are as follows: • General cabinet compliant with the International Electrotechnical Commission 297 (IEC 297) standard • Width: 482.6 mm (19 in.) • Depth: Above 1,000 mm (39.37 in.) Installation requirements for the server rails are as follows: • L-bracket rails: only applicable to our cabinets
Weight	Net weight (maximum configuration): • 88 kg (194.01 lbs) Gross weight (maximum configuration, including chassis, packaging, rails, and accessory box): • 126 kg (277.78 lbs)
Power Consumption	Power consumption varies with configurations. Consult us for details.

7 Operating System and Hardware Compatibility

This section describes the OS and hardware compatibility of the NF5688M6. For the latest compatibility configuration and the component models not listed in this manual, contact your local sales representative.

IMPORTANT

Using incompatible components may cause the server to work abnormally, and such failures are not covered by technical support or warranty.
The server performance is strongly influenced by application software, middleware and hardware. The subtle differences in them may lead to performance variation in the application and test software.

- For requirements on the performance of specific application software, contact your sales representatives to confirm the detailed hardware and software configurations during the pre-sales phase.
- For requirements on hardware performance consistency, define specific configuration requirements (for example, specific drive models, RAID controller cards, or firmware versions) during the pre-sales phase.

7.1 Supported Operating Systems

Table 7-1 Supported Operating Systems

OS	Version
Red Hat	Red Hat Enterprise Linux 8.2
CentOS	CentOS 8.2
Ubuntu	Ubuntu 18.04.1
	Ubuntu 20.04.1
Debian	Debian 9.x

IMPORTANT

During the hard disk/RAID test for SUSE OS certification, the "SCSI Controller" dialog box will pop up, indicating that at least one device shall be connected. This is normal and will not affect normal use.

7.2 Hardware Compatibility

7.2.1 CPU Specifications

The NF5688M6 supports 2 Intel Xeon Scalable processors.

Table 7-2 CPU Specifications

Model	Cores	Threads	Base Frequency	Max. Turbo Frequency	Cache	TDP
8380	40	80	2.3 GHz	3.4 GHz	60 MB	270 W
8368	38	76	2.3 GHz	3.4 GHz	57 MB	270 W
8358	32	64	2.6 GHz	3.4 GHz	48 MB	250 W
8360Y	36	72	2.4 GHz	3.5 GHz	54 MB	250 W
8358P	32	64	2.6 GHz	3.4 GHz	48 MB	240 W
8352Y	32	64	2.2 GHz	3.4 GHz	48 MB	205 W
8352S	32	64	2.2 GHz	3.4 GHz	48 MB	205 W
6348	28	56	2.6 GHz	3.5 GHz	42 MB	235 W
6338	32	64	2.0 GHz	3.2 GHz	48 MB	205 W

7.2.2 DIMM Specifications

The NF5688M6 supports up to 32 DDR4 DIMMs. Each processor supports 8 memory channels with 2 memory slots per memory channel. The server supports RDIMMs/LRDIMMs/BPS DIMMs.

Table 7-3 DIMM Specifications

Type	Capacity	Frequency	Data Width	Organization
RDIMM	16 GB	3,200 MHz	x72	1R x4/2R x8
RDIMM	16 GB	2,933 MHz	x72	1R x4/2R x8
RDIMM	32 GB	3,200 MHz	x72	2R x4
RDIMM	32 GB	2,933 MHz	x72	2R x4
RDIMM	64 GB	3,200 MHz	x72	2R x4
RDIMM	64 GB	2,933 MHz	x72	2R x4
RDIMM	128 GB	2,933 MHz	x72	4R x4

7.2.3 Drive Specifications

Table 7-4 SSD Specifications

Model	Capacity	Max. Qty.
SATA SSD	240 GB	16

Model	Capacity	Max. Qty.
SATA SSD	480 GB	16
SATA SSD	960 GB	16
SATA SSD	1.92 TB	16
SATA SSD	3.84 TB	16

Table 7-5 U.2 NVMe SSD Specifications

Model	Capacity	Max. Qty.
U.2 NVMe SSD	960 GB	8
U.2 NVMe SSD	1 TB	8
U.2 NVMe SSD	1.6 TB	8
U.2 NVMe SSD	2 TB	8
U.2 NVMe SSD	3.2 TB	8
U.2 NVMe SSD	4 TB	8
U.2 NVMe SSD	6.4 TB	8
U.2 NVMe SSD	7.68 TB	8
U.2 NVMe SSD	8 TB	8

Table 7-6 M.2 SSD Specifications

Model	Capacity	Max. Qty.
M.2 SATA SSD	240 GB	2
M.2 SATA SSD	480 GB	2
M.2 SATA SSD	960 GB	2
M.2 SATA SSD	1.92 TB	2

7.2.4 SAS/RAID Controller Card Specifications

Table 7-7 SAS/RAID Controller Card Specifications

Type	Model
RAID Controller Card	PM8204-8i_2GB
	9460-8i_2GB
	9460-16i_4GB
	9361-8i_2GB
	9361-16i_2GB
SAS Controller Card	SAS3008

7.2.5 NIC Specifications

Table 7-8 OCP NIC Specifications

Type	Model	Speed (Gb/s)	Network Port Qty.
OCP 3.0 Card	MCX566ACDAB	100	2
	MCX562A-ACAB	25	2
	MCX4121A-ACAT	25	2

Table 7-9 PCIe NIC Specifications

Type	Model	Speed (Gb/s)	Network Port Qty.
PCIe NIC	MCX516A-CCAT	100	2
	MCX515A-CCAT	100	1
	MCX512A-ACAT	25	2
	82599ES	10	2
	X550T2	10	2
	I350-AM2	1	2

7.2.6 HCA Card Specifications

Table 7-10 HCA Card Specifications

Type	Model	Speed (Gb/s)	Port Qty.
HCA Card	MCX653105A-ECAT	100	1
	MCX653106A-ECAT	100	2
	MCX653105A-HDAT	200	1
	MCX653106A-HDAT	200	2

7.2.7 GPU Specifications

Table 7-11 GPU Specifications

Type	Model & Description	Max. Qty.
GPU	GPU_NV_40G_Tesla-A100-SXM4	8
	GPU_NV_80G_Tesla-A100-SXM4	8

7.2.8 PSU Specifications

The NF5688M6 supports up to six 80 Plus Platinum PSUs in 3+3 redundancy that follow the Intel Common Redundant Power Supply (CRPS) specification with

standard electrical and structural design. The PSUs are hot-swappable with the rated input voltage of 110 - 230 VAC and 240 VDC. The PSUs will lock automatically after being inserted into the power bay, enabling tool-less maintenance.

Table 7-12 PSU Specifications

Model	Rated Power	Efficiency Rating	Input Voltage
GW-CRPS3000L5	3,000 W	Platinum	110 - 230 VAC and 240 VDC (When the input voltage is 110 V, the output power is 1,250 W).

Table 7-13 Rated Voltage and Operating Voltage Range

Rated Voltage Range	Operating Voltage Range
110 - 230 VAC	100 - 264 VAC
240 VDC	180 - 310 VDC

8 Regulatory Information

8.1 Safety

8.1.1 General

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

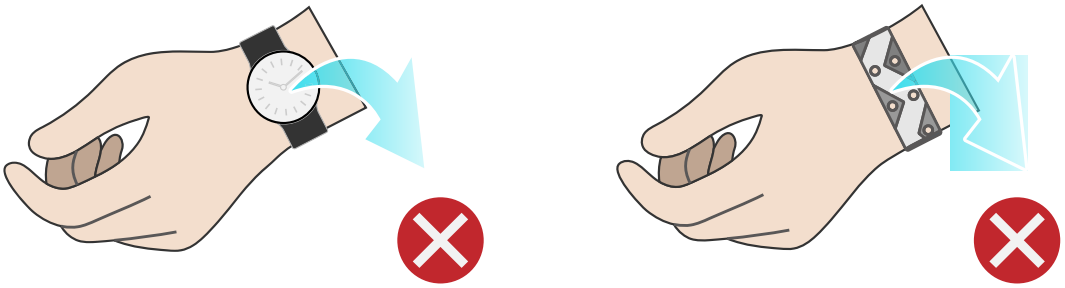
8.1.2 Personal Safety

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

Figure 8-1 Protective Clothing

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

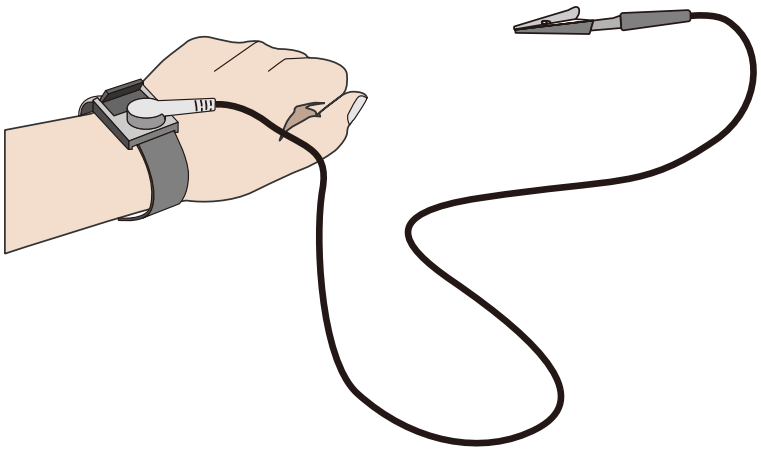
Figure 8-2 Removing Conductive Objects



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

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

Figure 8-3 Wearing an ESD Wrist Strap



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

8.1.3 Equipment Safety

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

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

8.1.4 Transportation Precautions

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

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

8.1.5 Manual Handling Weight Limits

 CAUTION

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

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

Table 8-1 Manual Handling Weight Limit per Person

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

9 Limited Warranty

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

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

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

9.1 Warranty Service

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

9.1.1 Remote Technical Support

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

Information needed when requesting support:

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

Table 9-1 Support Contact Information

Type	Description	Support Window
Email	• Technical Support: serversupport@aivres.com • RMA/ARMA Support: serversupportusa@aivres.com	24 × 7 × 365
Web	Service Portal: www.service.aivres.com	24 × 7 × 365

9.1.2 RMA Service

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

NOTE

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

9.1.3 ARMA Service

Advanced Replacement: If a problem with our hardware products cannot be resolved via hotline or e-mail support and replacement part(s) are required, we will ship out replacement part(s) in advance within one (1) business day. Customer should return defective part(s) within five (5) business days after receiving the replacement(s). We will cover one-way shipment.

NOTE

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

9.1.4 9 × 5 × NBD Onsite Service

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

NOTE

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

9.1.5 24 × 7 × 4 Onsite Service

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

NOTE

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

9.2 Our Service SLA

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

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

9.3 Warranty Exclusions

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

The Limited Warranty does do not apply to

- expendable or consumable parts, such as, but not limited to, batteries or protective coatings that are designed to diminish over time, unless failure has occurred during DOA period due to a defect in material or workmanship;
- any cosmetic damage, such as, but not limited to, scratches, dents, broken plastics, metal corrosion, or mechanical damage, unless failure has occurred during DOA period due to a defect in material or workmanship;
- damage or defects caused by accident, misuse, abuse, contamination, improper or inadequate maintenance or calibration or other external causes;
- damage or defects caused by operation beyond the parameters as stipulated in the user documentation;
- damage or defects by software, interfacing, parts or supplies not provided by us;
- damage or defects by improper storage, usage, or maintenance;
- damage or defects by virus infection;
- loss or damage in transit which is not arranged by us;

- Hardware Products that have been modified or serviced by non-authorized personnel;
- any damage to or loss of any personal data, programs, or removable storage media;
- the restoration or reinstallation of any data or programs except the software installed by us when the product is manufactured;
- any engineering sample, evaluation unit, or non-mass production product that is not covered under warranty service;
- any solid-state drive (SSD) which has reached its write endurance limit.

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

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

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

10 System Management

10.1 Intelligent Management System ISBMC

ISBMC, a self-developed remote server management system, supports mainstream management specifications in the industry such as IPMI 2.0 and Redfish 1.8. ISBMC features high operational reliability, easy serviceability for different business scenarios, accurate and comprehensive fault diagnosis capabilities, and industry-leading security reinforcement capabilities.

ISBMC supports:

- IPMI 2.0
- Redfish 1.8
- SNMP v1/v2c/v3
- HTML5/Java remote consoles (Keyboard Video Mouse)
- remote virtual media
- login via web browsers
- intelligent fault diagnosis

Table 10-1 ISBMC Features

Feature	Description
Management Interface	Supports extensive remote management interfaces for various server O&M scenarios. The supported interfaces include: • IPMI • SSH CLI • SNMP • HTTPS • Web GUI • Redfish • RESTful • DCMI • Syslog

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

Feature	Description
	ensure that the fan operates at safe speeds to avoid system overheating • Supports self-diagnosis of processors, memory modules, and storage devices of ISBMC, and automatically cleans the workload to restore to normal when the device usage rate is too high
Power Control	Supports virtual power buttons for power on/off, power cycle and reset.
UID LED and Remote Control of UID LED	Supports remote lighting of the UID LED for locating the server in the server room, and supports remote control of UID LED. The UID LED flashes when a user remotely logs in via web, KVM, or SSH to inform the on-site personnel that an administrator is accessing the server
Secure Firmware Update	Supports firmware update based on secure digital signatures, mismatch prevention mechanism for firmware from different manufacturers and firmware for different server models, and firmware update of BMC/BIOS/CPLD/PSU
Serial Port Redirection	Supports remote redirection of the system serial port, BMC serial port and other serial ports, and directs the server-side serial port output to the local administrator via the network for server debugging.
Storage Information Display	Displays RAID logical array information and drive information, supports remote RAID creation for improved deployment efficiency.
User Role Management	Supports user detail management based on user roles and flexible creation of user roles with different privileges, and provides more user roles to allow administrators to grant different privileges to O&M personnel.
Security Features	Adopts the industry-leading server security baseline standard V2.0. SSH, HTTPS, SNMP and IPMI use secure and reliable algorithms. ISBMC offers capabilities including secure update and boot and security reinforcement mechanisms such as anti-replay, anti-injection, and anti-brute force.

10.2 ISPIM

The NF5688M6 server is compatible with the latest version of ISPIM.

The independently developed ISPIM for data centers features asset management, monitoring, inspection, energy consumption management and stateless

management. It also provides interfaces such as Restful and SNMP for easy integration and interfacing. ISPIM has the following key features:

- Lightweight deployment in multiple scenarios and full lifecycle management of devices
- High reliability and on-demand node scalability enabled by 1 to N data collectors
- Intelligent asset management and real-time tracking of asset changes
- Comprehensive monitoring and automatic fault diagnosis
- Batch configuration, deployment and update, shortening the deployment time
- Intelligent analysis and control of power consumption, helping save energy and improving operational stability of data centers
- Improved version management efficiency
- Standardized northbound interfaces for easy integration and interfacing
- Centralized management of edge devices

Table 10-2 ISPIM Specifications

Feature	Description
Centralized Device Management	Supports centralized management of network-wide devices, including servers (the full range of our server family, including general-purpose rack servers, AI servers, blade servers, all-in-one servers and other high-end server products, and third-party servers), storage devices (our general-purpose disk arrays, distributed storage devices, and storage devices of other manufacturers), and network devices (our switches, third-party switches, and third-party firewall devices)
Monitoring	Supports centralized display, search, blocking and email notifications of device alerts, creation of alert rules, notification rules and blocking rules, alert severity level setting, alert forwarding and southbound settings, device performance monitoring, and distributed monitoring
Stateless Computing	Supports BMC/BIOS update and configuration of, RAID configuration, firmware configuration templates, automatic firmware baseline management and the repository for update files
OS Deployment	Supports batch deployment of OSs via BMC interfaces, one-click deployment with automatic and detailed logging and with no manual intervention needed, and concurrent deployment of up to 40 devices

Feature	Description
Asset Management	Supports part-level asset management, multi-dimensional asset report, 3D data centers and asset maintenance management
Inspection	Supports active inspection, alert-triggered passive inspection, intelligent fault diagnosis and analysis, and call home
Power Consumption Management	Supports multi-dimensional report of power consumption, intelligent power capping strategies and intelligent power consumption prediction; provides a variety of power consumption optimization analyses, including cooling analysis, server utilization analysis, server power consumption analysis, and load distribution analysis
Security Management	Implements security control of ISPIM via a set of security policies such as user management, role management, authentication management (local authentication and LDAP authentication) and certificate management

10.3 ISIB

The NF5688M6 server is compatible with the latest version of ISIB system, a self-developed automatic O&M management system throughout the server lifecycle. Based on the SSH and PXE technologies, it is compatible with the full range of our servers, and offers more efficient and reliable automatic deployment and software and hardware configuration management. ISIB has the following key features:

- Full lifecycle management from deployment to automatic O&M
- One-stop and one-click deployment for bare metal servers
- Flexible task scheduling with O&M capabilities in multiple scenarios
- Large-scale deployment of technical architecture, shortening the deployment time
- Zero network deployment with plug-and-play support
- Accurate logging and instruction-level tracing of execution results
- Rich built-in O&M scripts and management schemes

Table 10-3 ISIB Specifications

Item	Description
Home	Provides multi-dimensional reports of assets, repositories, operations and jobs, displays jobs 24 hours dynamically and column bars of jobs in the last 30 days

Item	Description
Asset	Supports automatic device discovery, OS information collection, and out-of-band/in-band power management
Repository	Enables you to manage images, software, firmware, configuration files, scripts and sources for easy OS deployment and firmware update
Operation	• Firmware update • Hardware configuration • Automatic OS installation via PXE • Installation template management • Image cloning and restoration • Software distribution • Configuration changes • System inspection
Task	• Supports job scheduling, and scheduled and periodic task execution • Provides visual multi-dimensional task display and detailed logging
GShell	Remote management of a single SSH terminal or multiple SSH terminals
DFX	• Supports high availability (HA) and secure access via HTTPS • Supports system snapshots and self-service management • Supports batch O&M at a scale of 10,000 devices • Provides the northbound RESTful interfaces

11 Certifications

Table 11-1 Certifications

Country/Region	Certification	Mandatory/ Voluntary
China	China Environmental Labelling	Voluntary
International Mutual Recognition	CB	Voluntary
EU	CE	Mandatory
US	FCC	Mandatory
	UL	Voluntary
South Korea	KC	Mandatory
Customs Union	EAC	Mandatory

12 Appendix A

12.1 Operating Temperature Specification Limits

Table 12-1 Operating Temperature Specification Limits

Configuration	Max. Operating Temperature: 35°C (95°F)	Max. Operating Temperature: 40°C (104°F)	Max. Operating Temperature: 45°C (113°F)
8-Drive Configuration 16-Drive Configuration	• 8086 Fan • RDIMM/LRDIMM (≤ 32 pcs) • CPU power consumption ≤ 270 W	Not supported	Not supported

NOTE

- The maximum operating temperature will decrease by 5°C (9°F) if a single fan fails.
- Single fan failure may affect system performance.

12.2 Model

Table 12-2 Model

Certified Model	Description
NF5688M6	Global

12.3 RAS Features

The NF5688M6 supports a variety of RAS (Reliability, Availability, and Serviceability) features. By configuring these features, the NF5688M6 can provide greater reliability,

availability, and serviceability.

12.4 Sensor List

Table 12-3 Sensor List

Sensor	Description	Sensor Location
Inlet_Temp	Air inlet temperature	Right mounting ear
Outlet_Temp	Air outlet temperature	Motherboard
PCH_Temp	PCH temperature	Motherboard
CPUn_Temp	CPUn core temperature	CPUn n indicates the CPU number with a value of 0 - 1
CPUn_DTS	CPUn DTS value	CPUn n indicates the CPU number with a value of 0 - 1
CPUn_DDR DIMM_T	CPUn DIMM temperature	DIMM (CPUn) n indicates the CPU number with a value of 0 - 1
PSUn_Temp	PSUn temperature	The corresponding power supply for PSUn n indicates the PSU number with a value of 0 - 5
HDD_MAX_Temp	The maximum temperature among all drives	Drives attached to drive backplane
NVMe_F_MAX_T	The maximum temperature among all front NVMe drives	NVMe drives attached to drive backplane
OCP_NIC_Temp	OCP NIC temperature	OCP NIC
PCIen_Card_Temp	PCIen card temperature	PCIen card n indicates the PCIe card number with a value of 0 - 11
RAID_Temp	The maximum temperature among all RAID controller cards	PCIe RAID controller card
GPUn_Temp	GPUn temperature	GPUn card n indicates GPU card number with a value of 0 - 7

Sensor	Description	Sensor Location
SYS_12V	12 V voltage supplied by motherboard to CPU	Motherboard
SYS_5V	5 V voltage supplied by motherboard to BMC	Motherboard
SYS_3V3	3.3 V voltage supplied by motherboard to BMC	Motherboard
CPUn_DDR_VDDQ1	1.2 V DIMM voltage	Motherboard n indicates the CPU number with a value of 0 - 1
CPUn_DDR_VDDQ2	1.2 V DIMM voltage	Motherboard n indicates the CPU number with a value of 0 - 1
CPUn_Vcore	CPUn Vcore voltage	Motherboard n indicates the CPU number with a value of 0 - 1
PSUn_VIN	PSUn input voltage	Motherboard n indicates the PSU number with a value of 0 - 5
PSUn_VOUT	PSUn output voltage	Motherboard n indicates the PSU number with a value of 0 - 5
RTC_Battery	RTC battery voltage	RTC battery on motherboard
FANn_F_Speed	FANn speed	FANn n indicates the fan module number with a value of 0 - 11
FANn_R_Speed		
Total_Power	Total power	PSU
PSUn_PIN	PSUn input power	PSUn n indicates the PSU number with a value of 0 - 5
PSUn_POUT	PSUn output power	PSUn n indicates the PSU number with a value of 0 - 5
FAN_Power	Total fan power	Fans
CPU_Power	Total CPU power	Motherboard

Sensor	Description	Sensor Location
Memory_Power	Total memory power	Motherboard
Disk_Power	Total drive power	Motherboard
GPUn Power	GPUn power	GPUn n indicates the GPU number with a value of 0 - 7
CPUn_Status	CPUn status	CPUn n indicates the CPU number with a value of 0 - 1
CPU_Config	CPU configuration status	CPU
CPUn_MEM_Hot	CPUn DIMM overtemperature	CPUn n indicates the CPU number with a value of 0 - 1
CPUn_CxDy	CPUn DIMM status	The corresponding DIMM for CPUn n indicates the CPU number with a value of 0 - 1 x indicates the memory channel number under the CPU with a value of 0 - 7 y indicates the DIMM number with a value of 0 - 1
FANn_Status	FANn failure status	FANn n indicates the fan number with a value of 0 - 11
FAN_Redundant	Fan redundancy lost alert status	Fans
PCIe_Status	PCIe card status error	PCIe card
Power_Button	Power button pressed	Motherboard
Watchdog2	Watchdog	Motherboard
Sys_Health	BMC health status	BMC
UID_Button	UID button status	Motherboard
PWR_Drop	Voltage drop status	Motherboard
PWR_On_TMOUT	Power-on timeout	Motherboard
PWR_CAP_Fail	Power capping status	Motherboard
BP_F_Disk_Stat	Front drive backplane status	Drive backplane

Sensor	Description	Sensor Location
PSU_Redundant	PSU redundancy lost alert status	PSU
PSU_Mismatch	Power supply model mismatch	PSU
PSUn_Status	PSUn failure status	PSUn n indicates the PSU number with a value of 0 - 5
Intrusion	Chassis-opening activity	Motherboard
SysShutdown	Reason for system shutdown	/
ACPI_PWR	ACPI status	
SysRestart	Reason for system restart	
BIOS_Boot_Up	BIOS boot up complete	
System_Error	Emergency system failure	
POST_Status	POST status	
BMC_Boot_Up	Record the BMC boot event	/
SEL_Status	Record the event that system event logs are almost full/cleared	
BMC_Status	BMC status	/
ME_FW_Status	ME status	/

13 Appendix B Acronyms and Abbreviations

A

AC	Alternating Current
ACPI	Advanced Configuration and Power Management Interface
AD	App Direct
AES	Advanced Encryption Standard New Instruction Set
AI	Artificial Intelligence
ANSI	American National Standards Institute
AOC	Active Optical Cables
API	Application Program Interface
ARP	Address Resolution Protocol
AVL	Approved Vendor List

B

BIOS	Basic Input Output System
BLE	BIOS Lock Enable
BMC	Baseboard Management Controller
BPS	Barlow Pass

C

CAS	Column Access Strobe
CE	Conformite Europeenne
CLI	Command-Line Interface

CMOS	Complementary Metal-Oxide-Semiconductor Transistor
CPLD	Complex Programming Logic Device
CPU	Central Processing Unit
CRPS	Common Redundant Power Supplies
CRU	Customer-Replaceable Unit
CSA	Canadian Standards Association
CSM	Compatibility Support Module

D

DC	Direct Current
DCMI	Data Center Manageability Interface
DDR4	Double Data Rate 4
DHCP	Dynamic Host Configuration Protocol
DIMM	Dual-Inline-Memory-Module
DNS	Domain Name System
DPC	DIMM Per Channel
DVD	Digital Video Disc

E

ECC	Error-Correcting Code

F

FMA	Failure Mode Analysis
FRU	Field-Replaceable Unit
FTP	File Transfer Protocol
FW	Firmware

G

GPU	Graphics Processing Unit
GUI	Graphical User Interface

H

HBA	Host Bus Adapter
HCA	Host Channel Adapter
HDD	Hard Disk Drive
HHHL	Half Height Half Length
HTML	Hyper Text Markup Language
HWRAID	Hardware Redundant Arrays of Independent Disks

I

I/O	Input/Output
IB	InfiniBand
IEC	International Electrotechnical Commission
IMC	Integrated Memory Controller
IOPS	Input/Output Operations Per Second
IP	Internet Protocol
IPMB	Intelligent Platform Management Bus
IPMI	Intelligent Platform Management Interface
IRQ	Interrupt ReQuest
iSCSI	Internet Small Computer System Interface

J

JTAG	Joint Test Action Group

K

KVM	Keyboard Video Mouse

L

LAN	Local Area Network
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LOM	LAN on Motherboard
LRDIMM	Load-reduced Dual In-line Memory Module

M

ME	Management Engine
MM	Memory Mode

N

NC-SI	Network Controller Sideband Interface
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NIC	Network Interface Controller
NPU	Network Processing Unit
NTP	Network Time Protocol
NVDIMM	Non-volatile Dual In-line Memory Module
NVMe	Non-volatile Memory Express

O

OCP	Open Compute Project
OS	Operating System

P

PCH	Platform Controller Hub
PCI	Peripheral Component Interconnect
PCIe	Peripheral Component Interconnect Express
PDU	Power Distribution Unit
PFR	Platform Firmware Resilience
PHM	Processor Heatsink Module
PHY	Physical
PMem	Persistent Memory
POST	Power-on Self-test
PSU	Power Supply Unit
PXE	Pre-boot Execution Environment

R

RAM	Random-access Memory
RAS	Reliability, Availability, Serviceability
RAID	Redundant Arrays of Independent Drives
RDIMM	Registered Dual In-line Memory Module
RDMA	Remote Direct Memory Access
RH	Relative Humidity
ROM	Read-only Memory
RTC	Real Time Clock

S

SAS	Serial Attached SCSI
SATA	Serial Advanced Technology Attachment
SCSI	Small Computer System Interface
SEL	System Event Log
SFP	Small Form-factor Pluggable
SGX	Software Guard Extensions
SIC	Smart Interface Card
SKU	Stock Keeping Unit
SMTP	Simple Mail Transfer Protocol
SNMP	Simple Network Management Protocol
SSD	Solid State Disk
SSH	Secure Shell
SWRAID	Software Redundant Arrays of Independent Drives
SAP HANA	SAP High Performance Analytic Application

T

TCG	Trusted Computing Group
TCM	Trusted Cryptography Module
TCO	Total Cost of Ownership
TDP	Thermal Design Power
TPCM	Trusted Platform Control Module
TPM	Trusted Platform Module

U

UEFI	Unified Extensible Firmware Interface
UID	User Identification

UPI	Ultra Path Interconnect
UPS	Uninterruptible Power Supply
USB	Universal Serial Bus

V

VGA	Video Graphics Array
VLAN	Virtual Local Area Network
VPP	Virtual Pin Port
VRD	Voltage Regulator Down

X

XDP	eXtend Debug Port