



Inspur Server NF5448A6 White Paper

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Technical Support

Global Service Hotline:

1-844-860-0011/1-760-769-1847

Address:

No. 1036, Langchao Road, Jinan, China
Inspur Electronic Information Industry Co., Ltd.
250101

Postal Code:

250101

Email:

serversupport@inspur.com

Abstract

This document describes the NF5448A6 server's appearance, features, performance parameters, and software and hardware compatibility of components, providing a profound understanding of NF5448A6.






Target Audience

This manual is intended for:

- Pre-sales engineers of Inspur
- Pre-sales engineers of channel partners
- Enterprise pre-sales engineers of customers

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 manual information.

Revision History

Version	Date	Description of Changes
V1.0	2022/06/15	Initial release

Table of Contents

1	Product Overview	4
2	Features	5
2.1	Ultra-high Computing Performance	5
2.2	Availability and Serviceability	5
2.3	Manageability and Security	6
2.4	Energy Efficiency	6
3	System Layout	7
4	System Architecture	8
4.1	Motherboard System Architecture	8
4.2	System Architecture	9
5	Hardware Description	10
5.1	Front Panel	10
	5.1.1 Appearance	10
	5.1.2 LED & Button	10
	5.1.3 Ports	11
5.2	Rear Panel	12
	5.2.1 Appearance	12
	5.2.2 LED & Button	13
	5.2.3 Ports	15
5.3	Processor	15
5.4	Memory	16
	5.4.1 DDR4 DIMM	16
5.5	Storage	22
	5.5.1 Drive Codes	22
	5.5.2 Drive LED	22
	5.5.3 RAID Controller Card	23
5.6	I/O Expansion	23
	5.6.1 PCIe Card	23
	5.6.2 PCIe Slot	24
	5.6.3 PCIe Slot Description	26
5.7	Power Supply	26
5.8	Fans	27
5.9	Single Board	28
	5.9.1 Motherboard	28
	5.9.2 Drive Backplane	29
6	Product Specifications	31
6.1	Technical Specifications	31
6.2	Environmental Specifications	33
6.3	Physical Specifications	35
7	Software and Hardware Compatibility	36
7.1	Operating System	36
7.2	Compatibility of Commodity of Commodity	36
	7.2.1 CPU Specifications	36
	7.2.2 Memory Specifications	37
	7.2.3 Storage Specifications	37
	7.2.4 SAS Card/RAID Controller Card Specifications	37
	7.2.5 NIC Specifications	38
	7.2.6 HCA Card Specifications	38
	7.2.7 GPU Specifications	39

7.2.8	Power Supply Specifications.....	39
8	Regulatory Information	40
8.1	Security.....	40
8.1.1	General Statement.....	40
8.1.2	Personal Security.....	40
8.1.3	Equipment Safety.....	42
8.1.4	Precautions for Moving the Equipment.....	42
8.1.5	Weight Limit for Handling by a Single Person	43
8.2	Maintenance and Warranty	43
9	System Management.....	44
9.1	Intelligent Management System ISBMC.....	44
9.2	Inspur Physical Infrastructure Manager (ISPIM)	46
9.3	Inspur Server Intelligent Boot (ISIB).....	47
10	Certification	49
11	Appendix A.....	50
11.1	Operating Temperature and Specification Limits	50
11.2	Model.....	51
11.3	RAS Features	51
11.4	Sensor List.....	51
12	Appendix B Terms.....	53
12.1	A - E.....	53
12.2	F - J.....	53
12.3	K - O	53
12.4	P - T.....	54
12.5	U - Z.....	54
13	Appendix C Abbreviations	55
13.1	A - E.....	55
13.2	F - J.....	56
13.3	K - O	57
13.4	P - T.....	58
13.5	U - Z.....	60

1 Product Overview

Inspur NF5448A6 is an AI server featuring light-load AI training and high-performance computing (HPC) for training and inference scenarios. The server uses a more balanced combination of topology and computing power to provide various HPC and AI workloads with ultimate performance and an ultra-high data throughput. It is widely applicable to scientific computing, computer vision, voice recognition, biological research, weather forecasting, and various AI and HPC scenarios. NF5448A6 adopts the cutting-edge NVIDIA NVLink interconnect architecture, which enables P2P data exchange between any two of the 4 NVIDIA SXM4 A100 Tensor Core 80 GB GPUs at a bandwidth of up to 600 GB/s in a 4U space. With 2 AMD EPYC 7003 series PCIe 4.0 CPUs, together with the XGMI-2 bus interconnect design, this server provides top-level general-purpose computing performance. A 4U chassis and fully redundant power supply design enable NF5448A6 to be widely applied to data center environments, and make it especially suitable for mounting to cabinets with limited power consumption. Besides, NF5448A6 adopts a more flexible cluster deployment scheme for integration with both hardware and applications. Moreover, the 54V_VR power supply offers higher power efficiency. The layered and zoned cooling channels and an intelligent PID control strategy ensure optimal cooling performance. NF5448A6 enables AI and HPC users to efficiently build AI infrastructures and development environments with high computing performance and low deployment and operational costs.



For detailed model information of NF5448A6, refer to 11.2 Model.

Figure 1-1 NF5448A6



2 Features

2.1 Ultra-high Computing Performance

- NF5448A6 provides the AI computing performance of 2.5 petaFLOPS per unit, which is 75 - 150 times higher than that of a traditional 2-socket CPU server.
- Based on 1 NVIDIA HGX A100 4-GPU Baseboard that is equipped with 4 SXM4 A100 80 GB GPUs, it supports P2P interconnection between GPUs at a total bandwidth of up to 600 GB/s in a standard 4U space.
- Supports 2 AMD® EPYC™ Milan CPUs, with each processor supporting up to 64 cores, a max Turbo frequency of 3.7 GHz, an L3 cache of 256 MB, and 4 XGMI-2 interconnected links, offering unrivaled processing performance.
- Supports up to 32 DDR4 ECC DIMMs (3,200 MT/s, RDIMM,) in 16 memory channels to deliver superior speed, high availability, and a memory capacity up to 2 TB.
- Supports up to 4 hot-swap NVMe SSDs, 6 enterprise-grade internal M.2 SSDs, and 4 SATA/SAS SSDs to maximize the data transfer speed of internal storage.
- Supports up to 5 high-speed networks (100/200 Gbps) that support remote direct memory access (RDMA), providing high-speed expansion channels for AI clusters.

2.2 Availability and Serviceability

- Supports hot-swap SAS/SATA/NVMe drives. SAS/SATA drives can be configured to RAID level 0/1/1E/10/5/50/6/60 supported by different RAID controller cards, with RAID cache as well as power failure protection enabled by the super-capacitor module.
- An SSD is much more reliable than a traditional HDD, enabling the system to run for a longer time.
- The UID/Health LEDs on the panel, the plug-in Bluetooth app management module, and the ISBMC Web management interface indicate the statuses of key components and guide technicians to quickly find the components that have failed or are at risk of failure, thus simplifying maintenance, speeding up troubleshooting, and improving system availability.
- The rear panel provides the management interface for direct connection to ISBMC to support near-end O&M and improve O&M efficiency of ISBMC.
- Provides 4 hot-swap PSUs with 2+2 redundancy; and provides 6 hot-swap fan modules with N+1 redundancy to improve overall system availability.
- The onboard BMC module (ISBMC) monitors system parameters constantly and triggers alarms, so O&M personnel can restore the system and minimize system downtime.
- Memory online diagnosis helps to mark the specific location of each faulty DIMM on the motherboard, so that maintenance personnel can quickly determine the DIMM needing maintenance, improving maintenance efficiency.
- For international warranty information, refer to [Warranty Policy](#).

2.3 Manageability and Security

- The ISBMC management module integrated on the server can be used to monitor the operating status of the system and enable the remote management of the system.
- Supports the network controller sideband interface (NC-SI) feature that supports the reuse of the management network port and service network port. The NC-SI feature is disabled by default and can be enabled/disabled through the BIOS or the ISBMC intelligent management system.
- Integrates industry-standard Unified Extensible Firmware Interface (UEFI) to improve the efficiency of setup, configuration, and update and simplifies error handling.
- Trusted Platform Module (TPM 2.0) provides advanced encryption functions.
- The firmware update mechanism based on digital signatures prevents unauthorized firmware updates.
- UEFI Secure Boot protects the system from malicious bootloaders.
- Hierarchical BIOS password protection ensures the security of system boot and management.
- BIOS Secure Flash and BIOS Lock Enable (BLE) reduce attacks from malicious software on BIOS Flash regions.
- BMC Secure Boot protects BMC from malicious tampering.
- Flexible BMC access control policies improve BMC management security.



NOTE

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

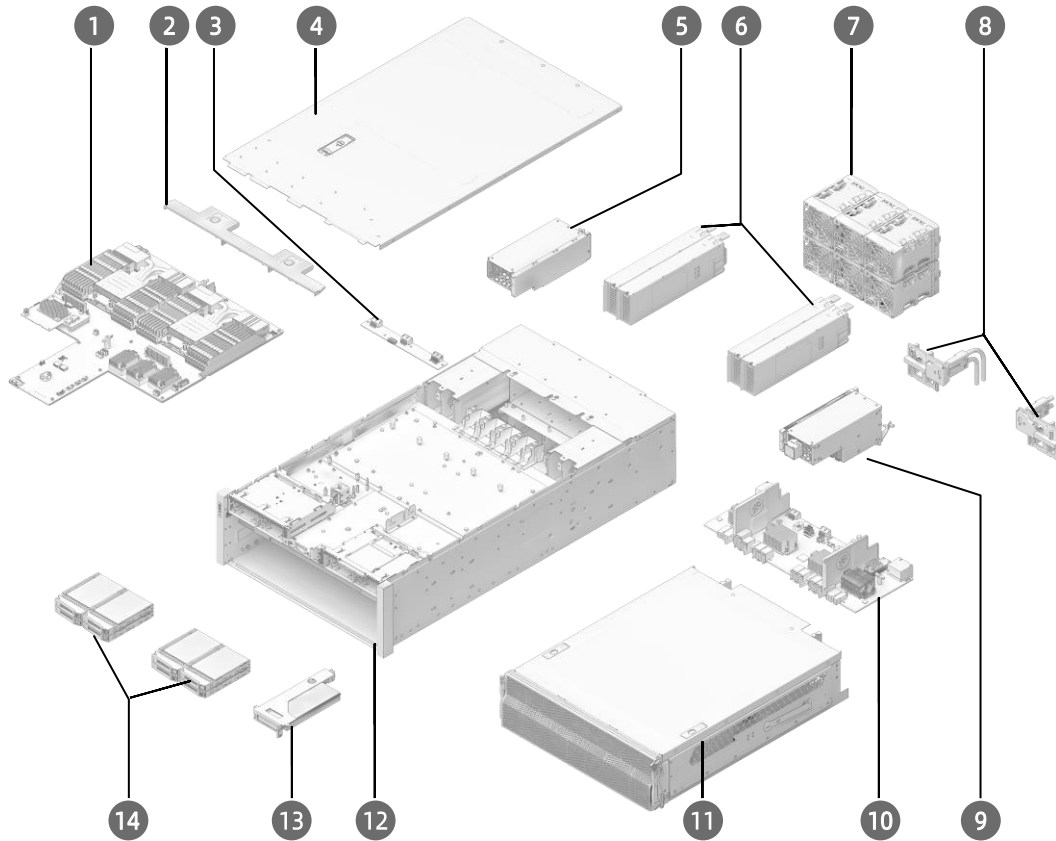
- Any network port for the FLEX I/O card that can be bound to the server and the standard PCIe NIC that supports the NC-SI feature.
 - Supports the enable/disable function and configuration of Virtual Local Area Network ID (VLAN ID). VLAN ID is disabled by default and its default value is 0.
 - Supports both IPv4 and IPv6 addresses. The information that can be configured includes IP address, subnet mask, default gateway, and prefix length of IPv6 address.
-

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 2+2 redundant and integrated AC/DC power supplies for optimized power conversion efficiency.
- Efficient single-board voltage regulator down (VRD) PSU reduces power loss due to DC-DC conversion.
- Supports intelligent fan speed control and intelligent CPU frequency scaling to conserve energy.
- A fully-optimized cooling design and energy-efficient cooling fans reduce power consumption of the fans.

3 System Layout

Figure 3-1 System Layout

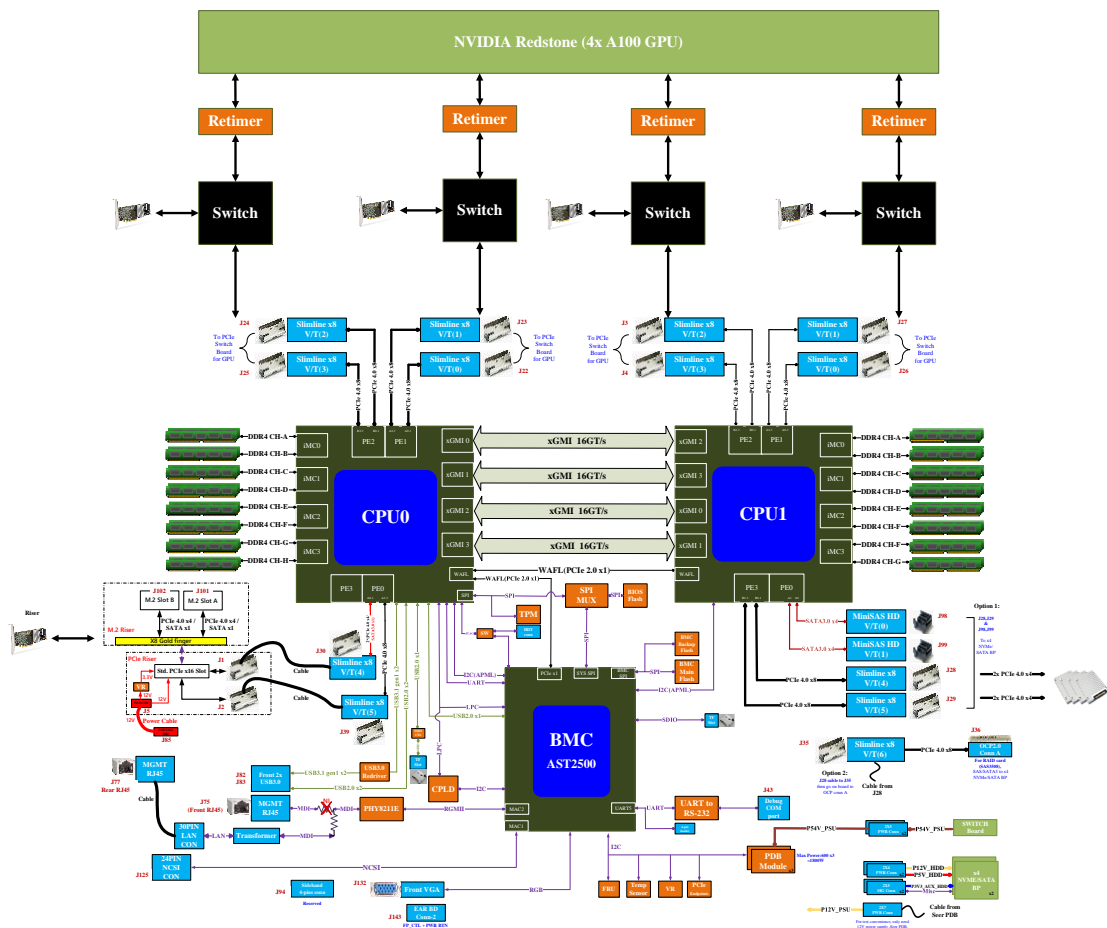


1	Motherboard	8	Power Backplanes
2	Air Duct	9	I/O Box A
3	Fan Backplane	10	Switch Board
4	Top Cover	11	GPU Box
5	I/O Box B	12	Chassis
6	PSUs	13	PCIe Module
7	Fans	14	Drives

4 System Architecture

4.1 Motherboard System Architecture

Figure 4-1 NF5448A6 System Architecture

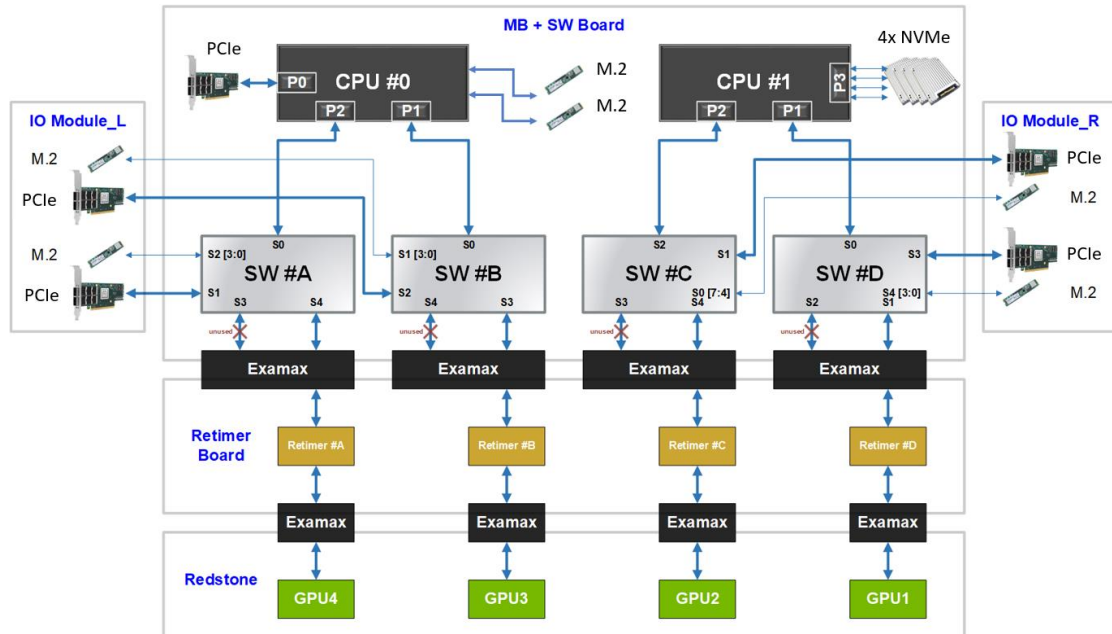


- Supports 2 AMD® Milan® processors with a TDP of up to 280 W.
- Supports 32 DIMMs.
- Processors are interconnected through 4 xGMI-2 buses at a transmit rate of up to 16 GT/s.
- Supports up to 5 PCIe 4.0 expansion slots, with the front panel supporting 1 and the rear I/O box supporting 4.
- The Mezz RAID controller card is connected to CPU1 through the PCIe bus, and is connected to the drive backplane through the SAS signal cable. Multiple local storage specifications are supported through different drive backplanes.
- Motherboard supports 2 USB 3.0 ports and 1 TF card through CPU0.
- The motherboard integrates an AST2500 management chip and supports an external Video Graphics Array (VGA) port, management network port, serial port, and TF card.

4.2 System Architecture

NF5448A6 uses a balanced CPU-GPU connection topology.

Figure 4-2 NF5448A6 System Architecture



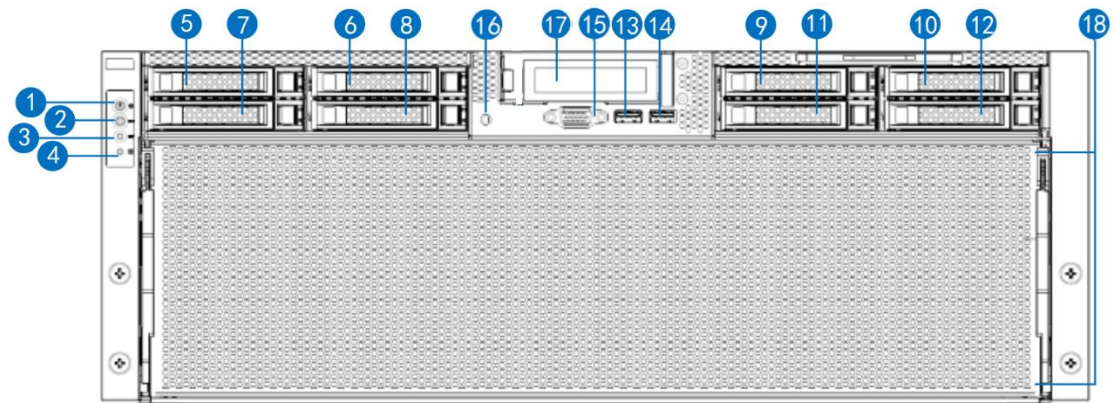
The uplink bandwidth of CPU-to-GPU connections is provided via 4 PCIe 4.0 x16 cards. This greatly increases the bandwidth for data communication between CPUs and GPUs to prevent bottlenecks in AI training involving a large amount of data. NVIDIA® NVLink 3.0 is supported between GPUs, with up to 600 GB/s of P2P interconnection bandwidth. The NVLink™ full-interconnection topology reduces latency in case of data sharing among multiple GPUs, thereby providing more efficient computing performance.

5 Hardware Description

5.1 Front Panel

5.1.1 Appearance

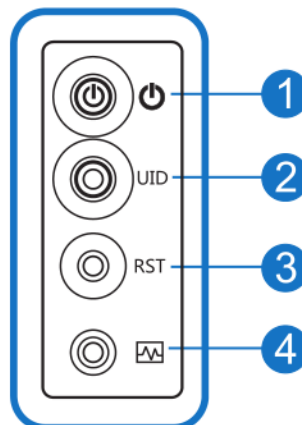
Figure 5-1 Front Panel



1	Power Button and LED	2	UID LED and Button
3	System Reset Button	4	System Status LED
5 - 12	Drives (0 - 7)	13 - 14	USB 3.0 Slots
15	VGA Port	16	MB BMC Debug Serial Port
17	PCIe 4.0 x16 Slot	18	GPU Box

5.1.2 LED & Button

Figure 5-2 LEDs and Buttons on the Front Panel



1	Power Button and LED	2	UID LED and Button
3	System Reset Button	4	System Status LED

1. LED and Button Description

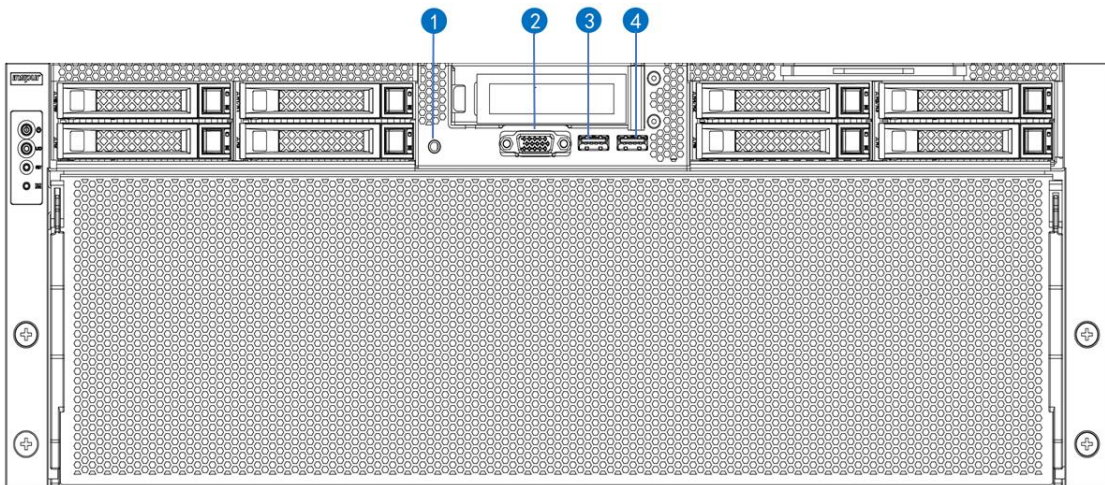
Table 5-1 Description of LEDs and Buttons on the Front Panel

Item	LED & Button	Description
1	Power Button and LED	<ul style="list-style-type: none"> Green = Power-on state Orange = Standby state Long press to force a system shutdown
2	UID/BMC RST Button/LED	<ul style="list-style-type: none"> Turn on/off UID (Blue = UID is turned on) Long press the button for 6 s to reset the BMC system
3	System Reset Button	<ul style="list-style-type: none"> Short press to force a system reset
4	System Status LED	<ul style="list-style-type: none"> Off = Normal Solid Red = A power failure occurs Flashing red = Power state is abnormal

5.1.3 Ports

1. Port Location



Figure 5-2 Ports on the Front Panel



1	MB BMC Debug Serial Port	2	VGA Port
3	USB 3.0 Port	4	USB 3.0 Port

2. Port Description

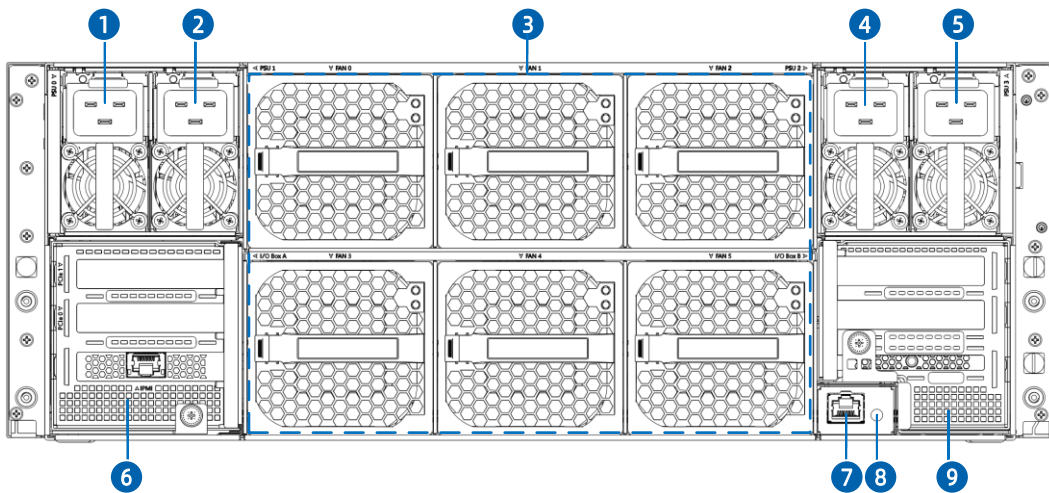
Table 5-2 Description of Ports on the Front Panel

Port	Type	Quantity	Description
BMC Debug Serial Port	Headphone jack	1	Captures BMC logs and uses the BMC debugging function.  NOTE The serial port uses a standard 3.5 mm jack with a default baud rate of 115,200 bit/s.
VGA Port	DB15	1	Connects a display terminal, for example, a monitor or keyboard, video and mouse (KVM), to the system.
USB Port	USB 3.0	2	Connects a USB 3.0 device to the system.  IMPORTANT When using an external USB device, the maximum current supported by the USB device connected is 0.9 A. Make sure the USB device is in good condition or it may cause the server to work abnormally.

5.2 Rear Panel

5.2.1 Appearance

Figure 5-3 Rear Panel

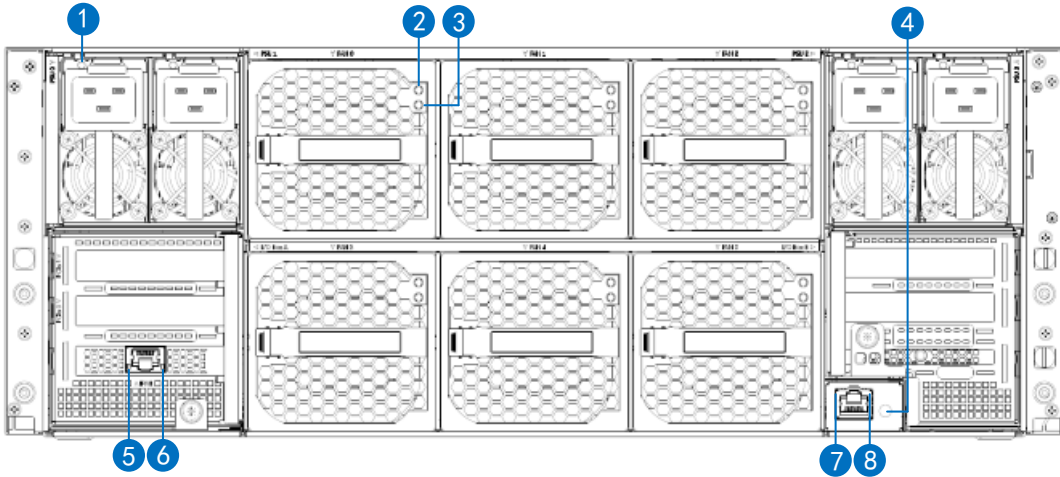


1	PSU0	2	PSU1
3	Fans (0 - 5)	4	PSU2
5	PSU3	6	I/O Box A

7	BMC Management Network Port	8	UID Button and LED
9	I/O Box B		

5.2.2 LED & Button

Figure 5-4 LEDs on the Rear Panel




1	PSU LED	2	Fan Power LED
3	Fan Status LED	4	UID LED/BMC Reset Button
5	Data Transmit Rate LED of Switch Board BMC Management Network Port	6	Connection Status LED of Switch Board BMC Management Network Port
7	Data Transmit Rate LED of Motherboard BMC Management Network Port	8	Connection Status LED of Motherboard BMC Management Network Port

1. LED and Button Description

Table 5-3 Description of LEDs on the Rear Panel

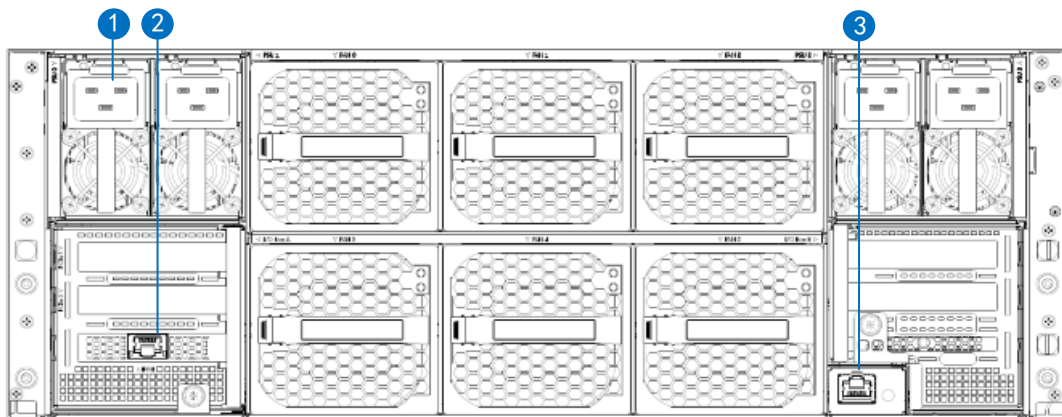
Icon	LED	Description
N/A	PSU LED	<ul style="list-style-type: none"> Solid green = Normal Off = No AC power to PSU Solid amber = A shutdown has occurred due to a PSU critical event Flashing amber at 1 Hz = PSU continues operating after a warning event has occurred Flashing green at a rate of 1 Hz = PSU is unplugged, but has AC input

Icon	LED	Description
		<ul style="list-style-type: none"> Flashing green at 0.33 Hz (on for 2 seconds and off for 1 second) = PSU operating in cold redundant and sleep mode <p>Flashing green at 2 Hz = PSU operating in firmware update mode</p>
N/A	Fan Power LED	<ul style="list-style-type: none"> Green = Normal Off = Fan failure
	Fan Status LED	<ul style="list-style-type: none"> Off = Normal Solid Red = Fan failure
	UID LED/BMC Reset Button	<p>The UID LED is used to locate the device to be operated.</p> <ul style="list-style-type: none"> Off = Device not located. Solid blue = Device located. Flashing blue = Device being remotely operated. <p> NOTE</p> <p>Turn the LED on or off either by manually pressing the UID button or through ISBMC remote control.</p> <ul style="list-style-type: none"> Long press the UID button for over 6 s to reset the BMC.
N/A	Data Transmit Rate LED of Management Network Port	<ul style="list-style-type: none"> Off = Network is not connected. Solid green = Network is connected at the speed of 1,000 Mbps. Solid orange = Network is connected at the speed of 100 Mbps or 10 Mbps.
N/A	Connection Status LED of Management Network Port	<ul style="list-style-type: none"> Off = Network is not connected. Solid green = Network connection status is normal. Flashing green = There is network data transmission

5.2.3 Ports

1. Port Location



Figure 5-5 Ports on the Rear Panel



1	PSU Connector	2	Switch Board BMC Management Network Port
3	Motherboard BMC Management Network Port		

2. Port Description

Table 5-4 Description of Ports on the Rear Panel

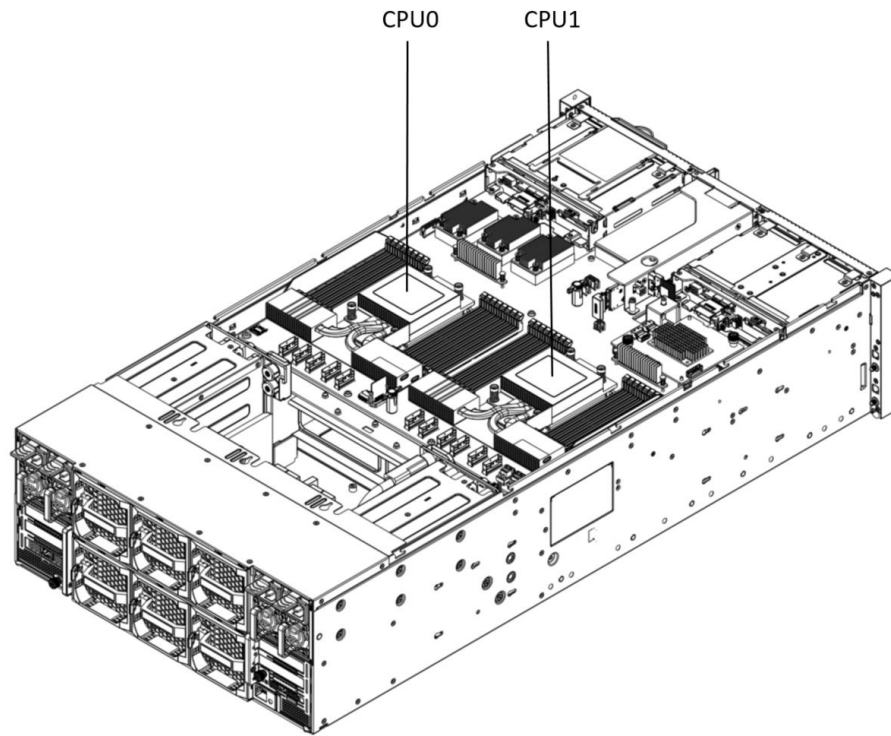
Port	Type	Quantity	Description
PSU Connector	N/A	4	Connected through a power cable. User can optionally configure the PSUs as required. Description Make sure that the rated power of the PSU is greater than the rated power of the server when selecting a PSU.
Switch Board BMC Management Network Port	RJ45	1	ISBMC management network port to manage the switch board.  NOTE It is a Gigabit Ethernet port of 100/1,000 Mbps (self-adaptive).
Motherboard BMC Management Network Port	RJ45	1	ISBMC management network port to manage the server.  NOTE It is a Gigabit Ethernet port of 100/1,000 Mbps (self-adaptive).

5.3 Processor

- Supports 2 processors to install in CPU0 and CPU1 respectively.
- The processors configured in the same server must be of the same model.

- For specific system options, consult your local Inspur sales representative or refer to [Compatibility of Commodity](#).

Figure 5-6 Processor Location



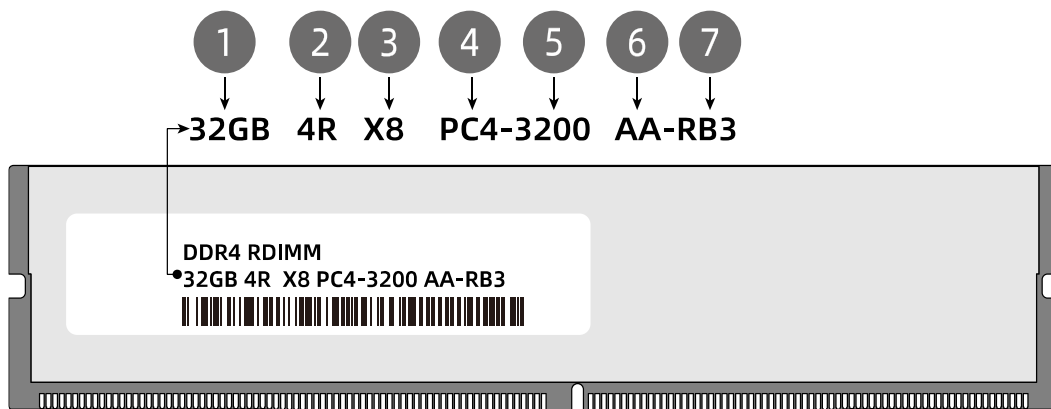
5.4 Memory

5.4.1 DDR4 DIMM

1. DIMM Identification

To determine the characteristics of a DIMM, refer to the label attached on the DIMM and the illustrations and tables below.

Figure 5-7 DIMM Identification



Item	Description	Example
1	Capacity	<ul style="list-style-type: none"> • 16 GB • 32 GB • 64 GB • 128 GB • 256 GB
2	Rank(s)	<ul style="list-style-type: none"> • 1R = Single rank • 2R = Dual rank • 2S2R = 3DS 2Hi 2 rank • 4DR = DDP 4 rank • 4R = Quad rank
3	Data width of DRAM	<ul style="list-style-type: none"> • x4 = 4 bits • x8 = 8 bits
4	DIMM slot type	PC4 = DDR4
5	Maximum memory speed	<ul style="list-style-type: none"> • 2,933 MT/s • 3,200 MT/s
6	CAS latency time	SDP chip based <ul style="list-style-type: none"> • V = CAS 19-19-19 • Y = CAS 21-21-21 • AA = CAS 22-22-22 3DS chip based <ul style="list-style-type: none"> • V = CAS 22-19-19 • Y = CAS 24-21-21 • AA = CAS 26-22-22
7	DIMM type	<ul style="list-style-type: none"> • R = RDIMM • L = LRDIMM

2. Memory Subsystem Architecture

NF5448A6 provides 32 DIMM slots with 8 internal memory channels per processor.

Install DIMMs in the slots of active DIMM channels first. DIMMs in the standby channels cannot be used normally if no DIMMs are installed in the active channels.

Table 5-5 Channel Composition

Channel Allocation	Channel ID	Composition
CPU0	Channel A (active)	CPU0_CAD0
	Channel A	CPU0_CAD1
	Channel B (active)	CPU0_CBD0
	Channel B	CPU0_CBD1
	Channel C (active)	CPU0_CCD0
	Channel C	CPU0_CCD1
	Channel D (active)	CPU0_CDD0
	Channel D	CPU0_CDD1
	Channel E (active)	CPU0_CED0
	Channel E	CPU0_CED1
	Channel F (active)	CPU0_CFD0
	Channel F	CPU0_CFD1
	Channel G (active)	CPU0_CGD0
	Channel G	CPU0_CGD1
	Channel H (active)	CPU0_CHD0
	Channel H	CPU0_CHD1
CPU1	Channel A (active)	CPU1_CAD0
	Channel A	CPU1_CAD1
	Channel B (active)	CPU1_CBD0
	Channel B	CPU1_CBD1
	Channel C (active)	CPU1_CCD0
	Channel C	CPU1_CCD1
	Channel D (active)	CPU1_CDD0
	Channel D	CPU1_CDD1
	Channel E (active)	CPU1_CED0
	Channel E	CPU1_CED1
	Channel F (active)	CPU1_CFD0
	Channel F	CPU1_CFD1
	Channel G (active)	CPU1_CGD0
	Channel G	CPU1_CGD1
	Channel H (active)	CPU1_CHD0
	Channel H	CPU1_CHD1

3. DIMM Compatibility

Configure the DDR4 DIMMs by referring to the rules as follows:

i IMPORTANT

- The server must use DDR4 DIMMs of the same Part No. (P/N code) with the operating speed at the lowest value of each item below:
 - The memory speed supported by a specific CPU.
 - The maximum working speed of a specific memory configuration.
 - Mixed use of DDR4 DIMMs is not supported for different types (RDIMM, LRDIMM) and different specifications (capacity, bit width, rank, height, and so on).
 - For specific system options, consult your local Inspur sales representative or refer to [Compatibility of Commodity](#).
-

Table 5-5 DDR4 DIMM Specifications

Parameter		Value		
Capacity per DDR4 DIMM (GB)		16	32	64
Type		RDIMM	RDIMM	RDIMM
Rated speed (MT/s)		3,200	3,200	3,200
Operating voltage (V)		1.2	1.2	1.2
Maximum quantity of DDR4 DIMMs supported in the server ^a		32	32	32
Maximum capacity of DDR4 DIMMs supported in the server (GB) ^b		512	1,024	2,048
Actual speed (MT/s)	1DPC ^c	3,200	3,200	3,200
	2DPC	3,200	3,200	3,200
<p>1. a: The maximum number of DDR4 DIMMs supported is based on the 2-processor configuration.</p> <p>2. b: The maximum capacity of DDR4 DIMMs supported needs to consider CPU type, and its maximum value at full load is selected here.</p> <p>3. c: DIMM Per Channel (DPC), the number of DIMMs configured per memory channel.</p> <p>The above information is for reference only, please consult your local Inspur sales representative for details.</p>				

4. DIMM Population Guidelines



NOTE

This section describes the DIMM population guidelines when DDR4 DIMMs are fully configured.

General population guidelines for DDR4 DIMMs:

- Install DIMMs only when the corresponding processor is installed.
- Mixed use of LRDIMMs and RDIMMs is not allowed.
- Install dummies in the DIMM slots where no DIMMs are installed.

Population guidelines for DDR4 DIMMs in specific modes:

- Memory sparing

- Follow the general population guidelines.
- The online standby configuration for each channel must be valid.
- Each channel can have a different active online standby configuration.
- Each channel with a DIMM installed must have a spare column.

5. DIMM Slot Location

Up to 32 DDR4 DIMMs can be installed in a server, and a balanced DIMM configuration is recommended for optimal memory performance. DIMM configuration must adhere to the DIMM population principles. Please refer to Computing Product Memory Configuration Assistant for details.



At least 1 DDR4 DIMM is installed in the corresponding active memory channel of CPU0.

Figure 5-8 DIMM Slot Location

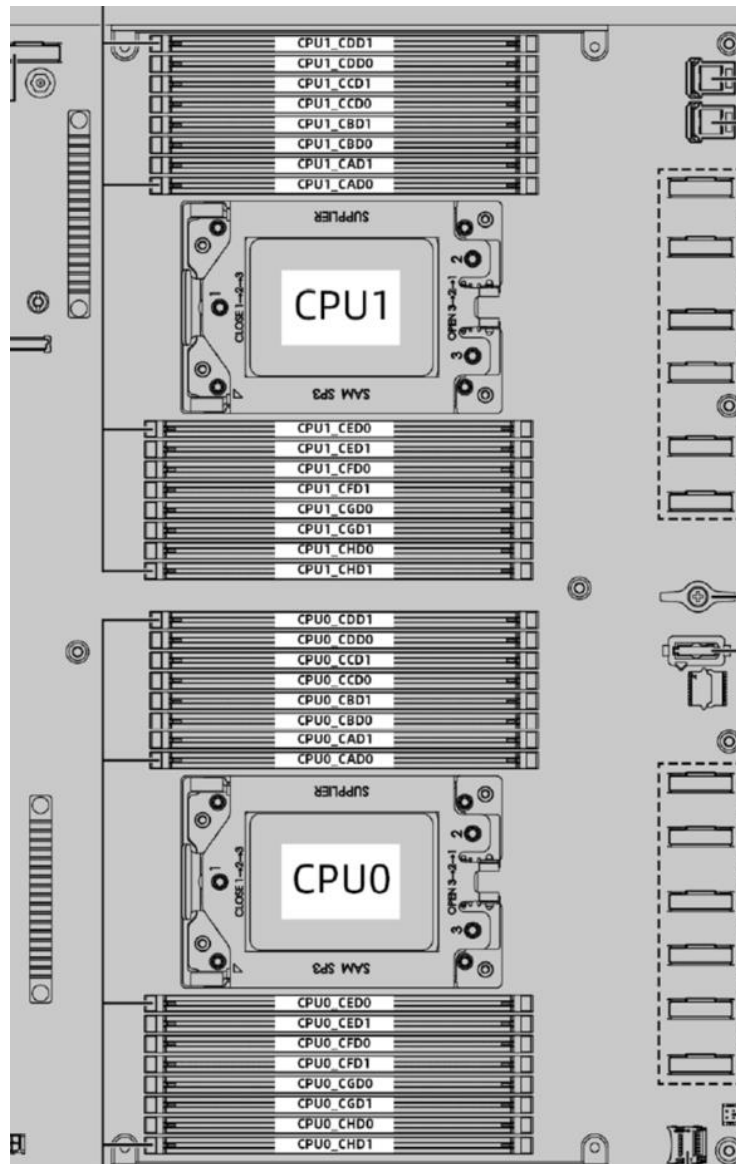


Figure 5-9 DDR4 DIMM Population Principles (2-processor Configuration)

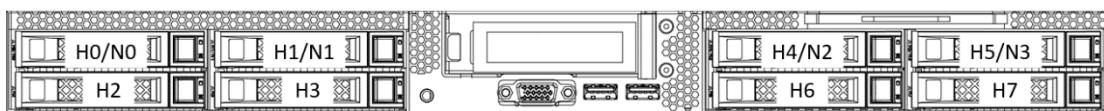
DIMM Qty	CPU1																CPU0															
	CD		CC		CB		CA		CE		CF		CG		CH		CD		CC		CB		CA		CE		CF		CG		CH	
	D1	D0	D1	D0	D1	D0	D1	D0	D1	D0	D1	D0	D1	D0	D1	D0	D1	D0	D1	D0	D1	D0	D1	D0	D1	D0	D1	D0	D1	D0	D1	D0
2			●																●													
4	●		●												●		●															
6	●		●										●		●		●															
8	●		●										●		●		●												●		●	
10	●		●		●								●		●		●				●								●		●	
12	●		●		●		●						●		●		●				●		●						●		●	
14	●		●		●		●						●		●		●				●		●						●		●	
16	●		●		●		●				●		●		●		●				●		●				●		●		●	
24	●	●	●	●	●	●	●	●					●	●	●	●	●	●			●	●	●	●			●	●	●	●	●	●
32	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

5.5 Storage

5.5.1 Drive Codes

- HDD0, HDD1, HDD4, and HDD5: Supports 2.5-inch NVMe/SAS/SATA drive pass-through configuration.
- HDD2, HDD3, HDD6, and HDD7: Supports 2.5-inch SAS/SATA drive pass-through configuration.

Figure 5-10 Drive Codes



5.5.2 Drive LED

1. SAS/SATA Drive LEDs

Figure 5-11 SAS/SATA Drive LEDs

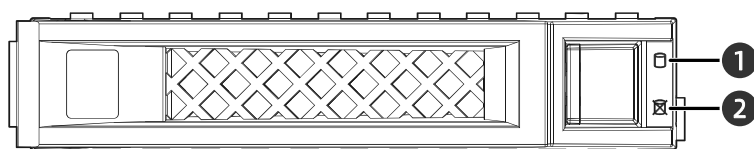
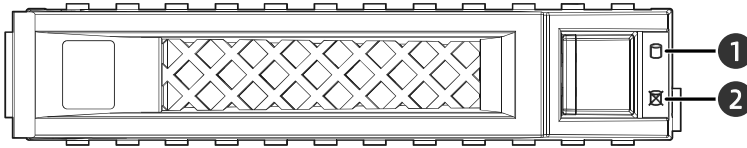


Table 5-6 SAS/SATA Drive LEDs

Item 1 Activity LED (Green)	Item 2 Error LED (Blue/Red)		Description
	Blue	Red	
Off	Off	With RAID Without RAID	Absent
		Solid on Off	
Solid on	Off	Off	Present, normal, and not in use
Flashing	Off	Off	Present, normal, and in use
Flashing	Solid pink		Copyback/Rebuilding
Solid on	Solid on	Off	Selected and normal
Flashing	Solid on	Off	Selected, normal, and in use
Off	Solid on	Off	Selected and faulty
N/A	Off	Solid on	Faulty

2. NVMe Drive LEDs

Figure 5-12 NVMe Drive LEDs



- When the VMD function is enabled and the latest VMD driver is installed, the NVMe drive supports surprise hot swap.

Table 5-7 Description of NVMe Drive LEDs (VMD Function Enabled)

Item 1 Activity LED (Green)	Item 2 Error LED (Blue/Red)		Description
	Blue	Red	
Off	Off	Off	Absent
Solid on	Off	Off	Present, normal, and not in use
Flashing	Off	Off	Present, normal, and in use
Flashing	Solid pink		Copyback/Rebuilding/Init/Verify
Solid on	Solid on	Off	Selected and normal
Flashing	Solid on	Off	Selected, normal, and in use
Off	Solid on	Off	Selected and faulty
N/A	Off	Solid on	Faulty

5.5.3 RAID Controller Card

A RAID controller card provides functions such as RAID configuration, RAID level migration, and disk roaming.

- For specific system options, consult your local Inspur sales representative or refer to [Compatibility of Commodity](#).

For detailed information on the RAID controller card, refer to [Inspur V6 Server RAID Controller Card User Guide](#).

5.6 I/O Expansion

5.6.1 PCIe Card

The PCIe card offers system scalability.

- Supports up to 5 PCIe 4.0 expansion slots.
- For specific system options, consult your local Inspur sales representative or refer to [Compatibility of Commodity](#).

5.6.2 PCIe Slot

1. PCIe Slot Location

Figure 5-13 PCIe Slots - Rear View

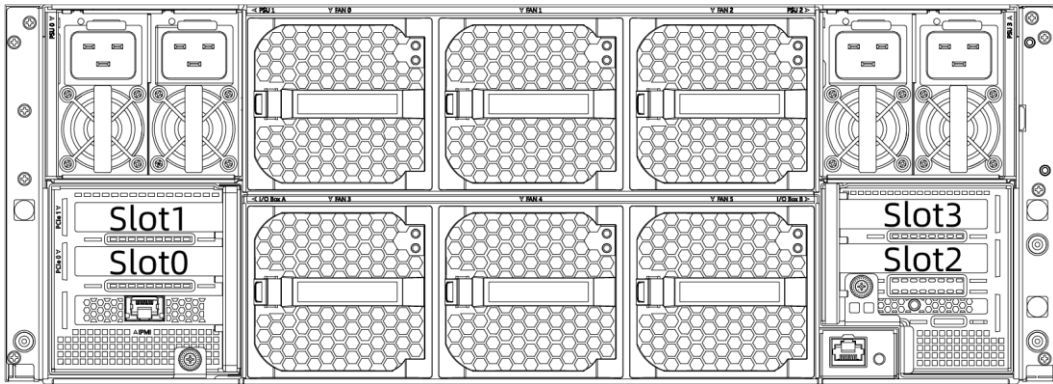
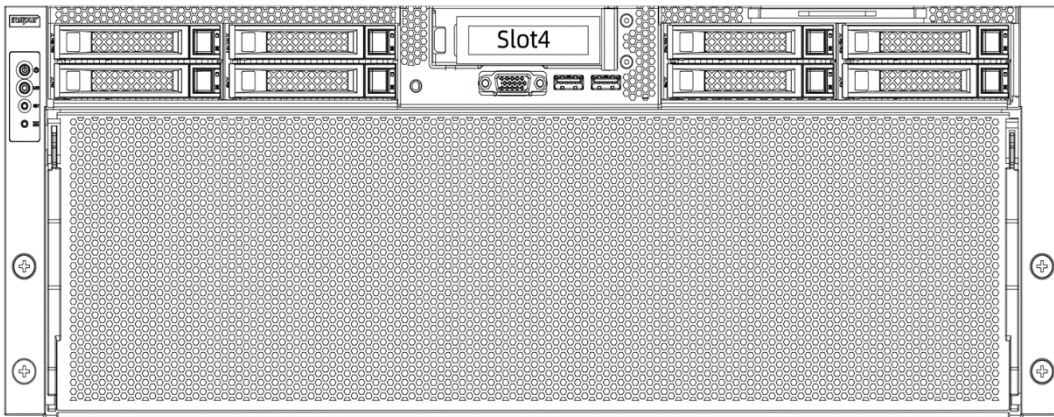
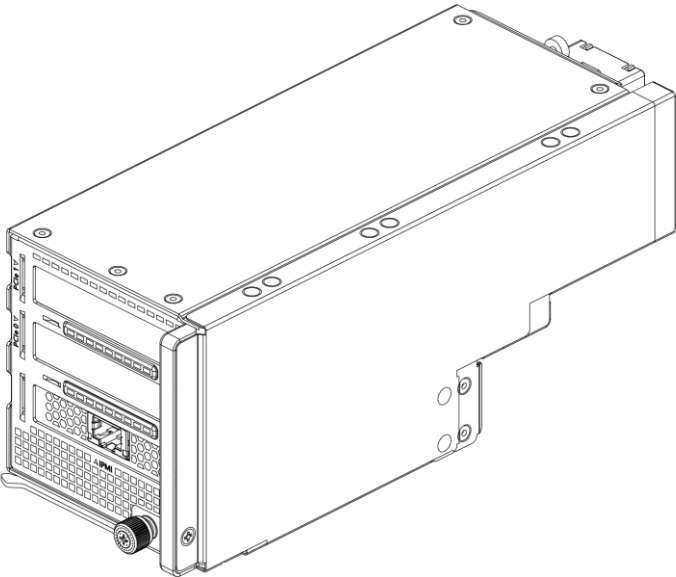


Figure 5-14 PCIe Slots - Front View



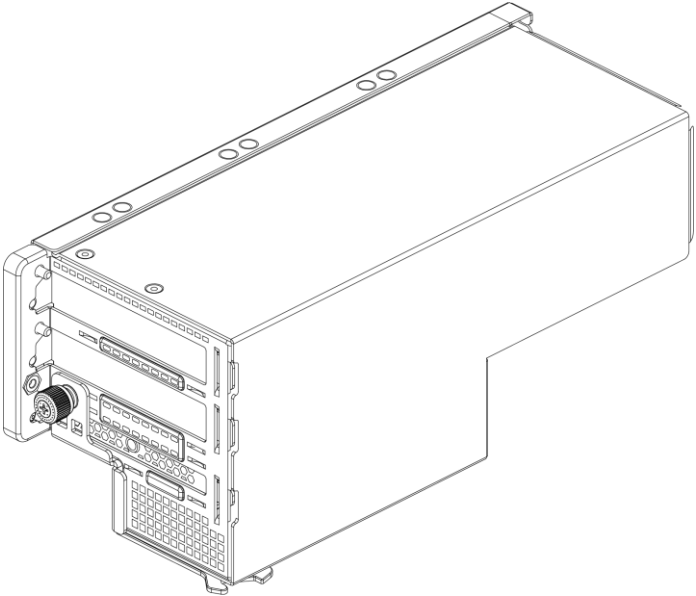
- IOBOXA Module0 provides slots including Slot0 and Slot1.
- IOBOXB Module1 provides slots including Slot2 and Slot3.
- The motherboard provides Slot4.

Figure 5-27 Left IOBOXA Module



- IOBOXA Module0 (YZIO-02054-101, Gen4) can provide 2 PCIe slots.

Figure 5-28 Right IOBOXA Module



- IOBOXA Module1 (YZIO-02700-101, Gen4) can provide 2 PCIe slots.

5.6.3 PCIe Slot Description

1. Rear PCIe Riser Module Configuration

Table 5-8 Description of PCIe Slots

PCIe Slot	Corresponding CPU	PCIe Standard	Connector Bandwidth	Bus Bandwidth	Port No.	Root Port (B/D/F)	Device (B/D/F)	Slot Size
Slot0	CPU0	PCIe 4.0	x16	x16	PCIe 0	CPU0 P1	05:00.0	HHH L
Slot1	CPU0	PCIe 4.0	x16	x16	PCIe 1	CPU0 P2	4b:00.0	HHH L
Slot2	CPU1	PCIe 4.0	x16	x16	PCIe 2	CPU1 P2	89:00.0	HHH L
Slot3	CPU1	PCIe 4.0	x16	x16	PCIe 3	CPU1 P1	C9:00.0	HHH L
Slot4	CPU0	PCIe 4.0	x16	x16	PCIe 4	CPU0 P0	61:00.0	HHH L

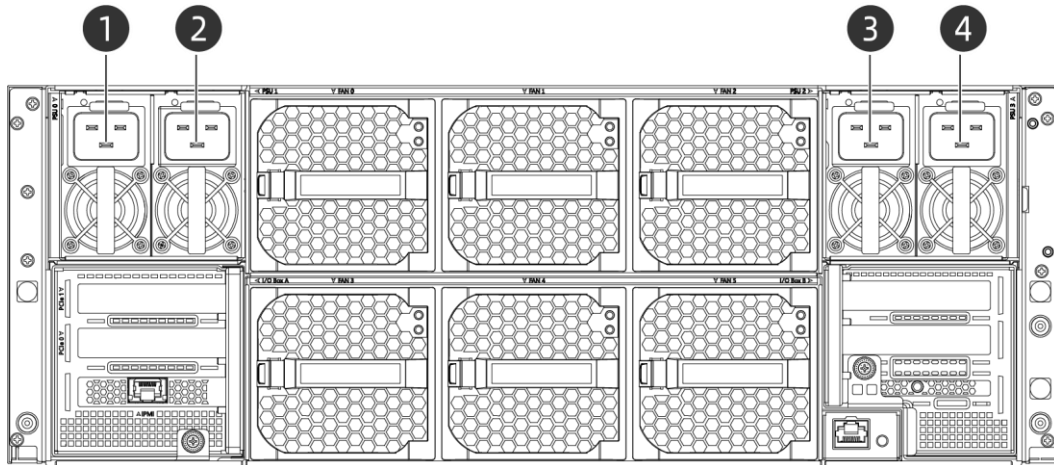
- The bus, device, and function number (B/D/F) in the table is the default value when the PCIe cards are fully configured, which may vary if the PCIe cards are not fully configured or PCIe cards with PCI bridge are installed.
- Root Port (B/D/F): the B/D/F of the PCIe root node of the processor.
- Device (B/D/F): the B/D/F of the onboard or expanded PCIe device viewed in the OS, that is, the bus address.
- A PCIe x16 slot is compatible with a PCIe card with the bus bandwidth of x16, x8, x4, or x1.
- It is not upward compatible, that is, the bandwidth of the PCIe slot should be larger than that of the inserted PCIe card.
- A FHFL PCIe slot is compatible with FHFL PCIe card, FHHL PCIe card, and HHHL PCIe card.
- A FHHL PCIe slot is compatible with FHHL PCIe card and HHHL PCIe card.
- The power supply capacity of each PCIe slot is up to 75 W.

5.7 Power Supply

- Supports up to 4 PSUs.
- Supports AC or DC PSUs.

- Hot-swappable.
- Supports 2+2 redundant backup when 4 PSUs are configured.
- The server must use PSUs of the same Part No. (P/N code).
- Provides short-circuit protection, and provides bipolar fuses for PSUs supporting dual-live-wire input.
- For specific system options, consult your local Inspur sales representative or refer to [Compatibility of Commodity](#).

Figure 5-15 PSU Location



1	PSU0	2	PSU1
3	PSU2	4	PSU3



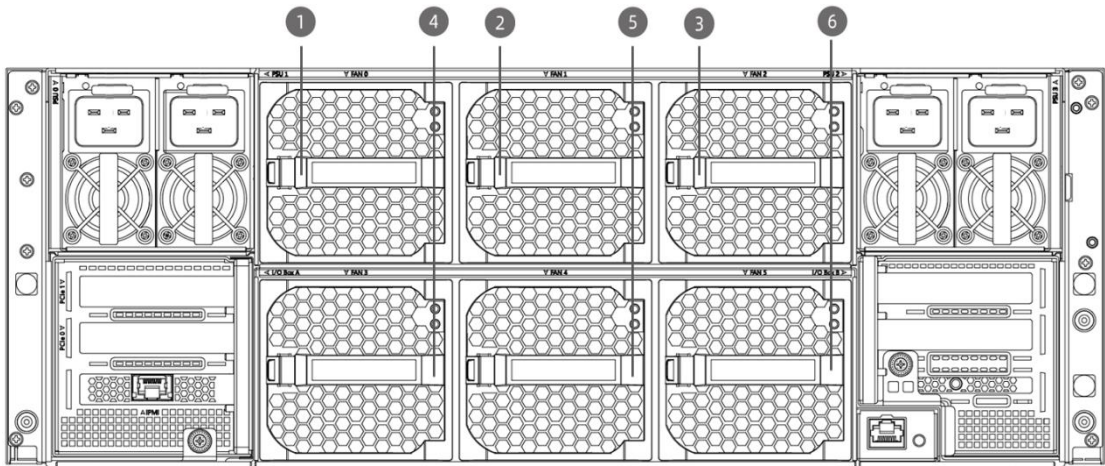
CAUTION

An interval of over 2 minutes is needed to power the server on and off.

5.8 Fans

- Supports 6 fan modules (8086 only).
- Hot-swappable.
- Supports N+1 redundancy, which means that the server can continue working properly when a single fan fails.
- Supports intelligent fan speed control.
- Fan modules configured in the same server must have the same Part No. (P/N code).

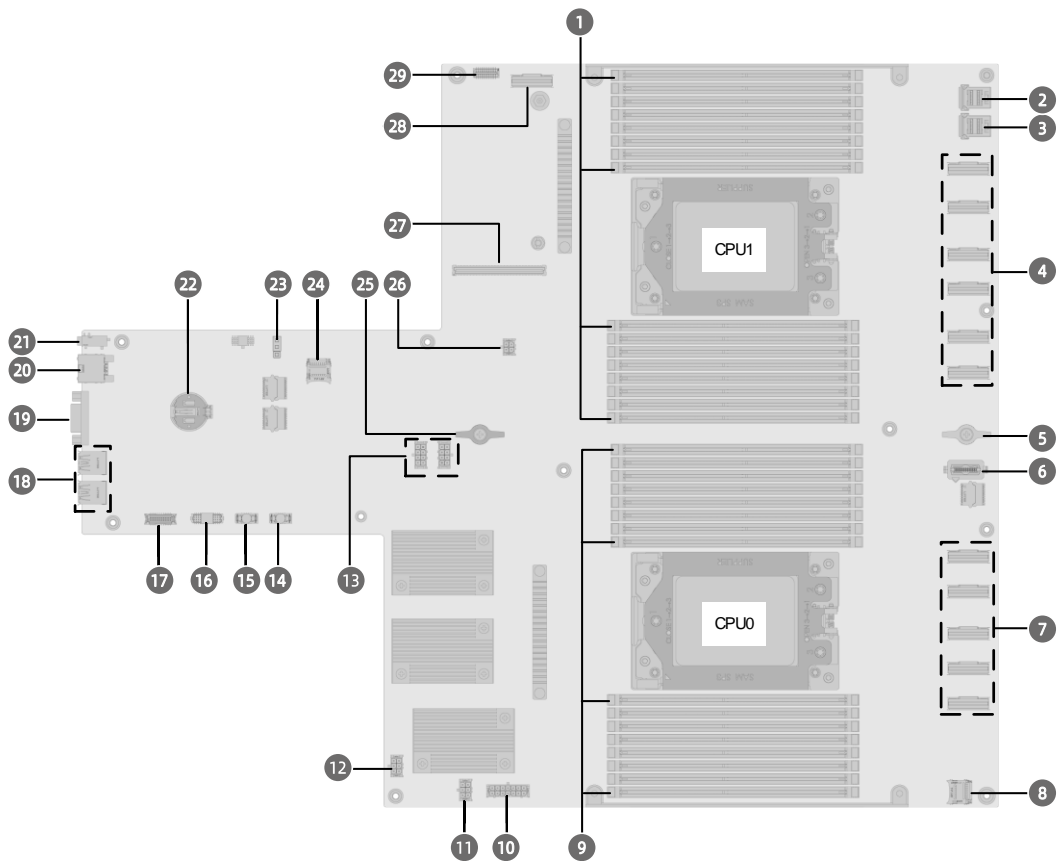
Figure 5-16 Fan Module Location



5.9 Single Board

5.9.1 Motherboard

Figure 5-17 NF5448A6 Motherboard



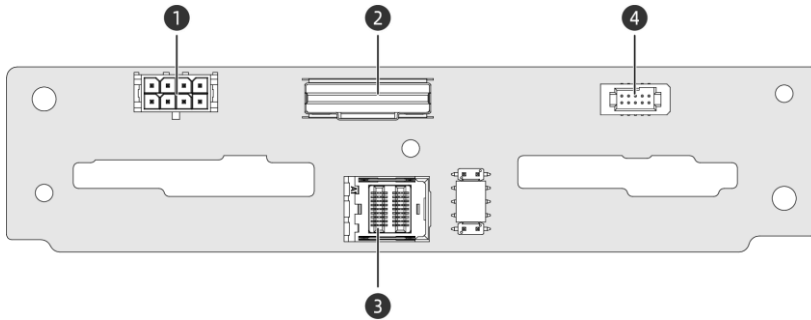
Item	Feature	Item	Feature
1	DIMM Slots (CPU1)	16	Real I/O Board Connector
2	SASHD1 Connector	17	NC-SI Connector

Item	Feature	Item	Feature
3	SASHD0 Connector	18	USB 3.0 Port × 2
4	Slimline x8 Connector × 6	19	VGA Port
5	Motherboard Handle	20	BMC Management Network Port
6	TPM Connector	21	BMC Debug Connector
7	Slimline x8 Connector × 5	22	Battery Socket
8	TF Card Slot	23	CLR_CMOS Jumper
9	DIMM Slots (CPU0)	24	BMC_TF Card Slot
10	P12V_INPUT Connector	25	Motherboard Handle
11	PWR_PDB1 Connector	26	PCIe Riser Board Power Connector
12	PWR_PDB0 Connector	27	RAID Controller Card Slot
13	Drive Backplane Power Connector × 2	28	Slimline_PCIE_RAID Connector
14	Drive Backplane Signal Connector0	29	Left Mounting Ear Front Panel Connector
15	Drive Backplane Signal Connector1		

5.9.2 Drive Backplane

1. Front Drive Backplane

Figure 5-18 Backplane for 2.5-inch Drive Pass-through Configuration



Item	Feature	Item	Feature
1	Power Connector	2	Slimline Connector
3	SAS Connector	4	VPP Connector

2. Internal Drive Backplane

- Backplane for Rear M.2 (2 × NVMe) Drive Configuration

Figure 5-34 Backplane for M.2 Drive (2 × NVMe) Configuration

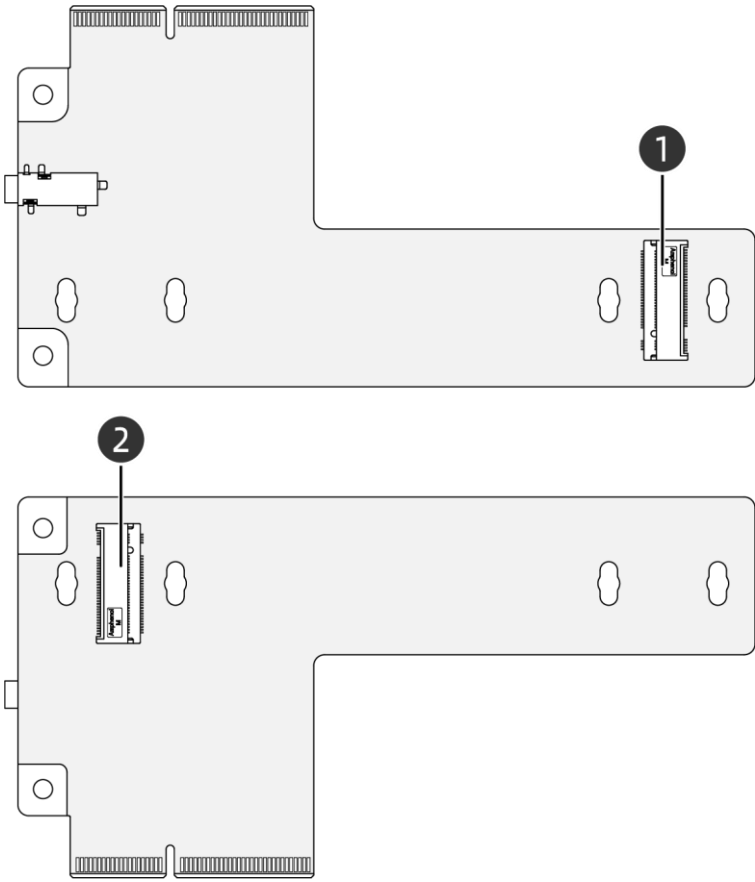
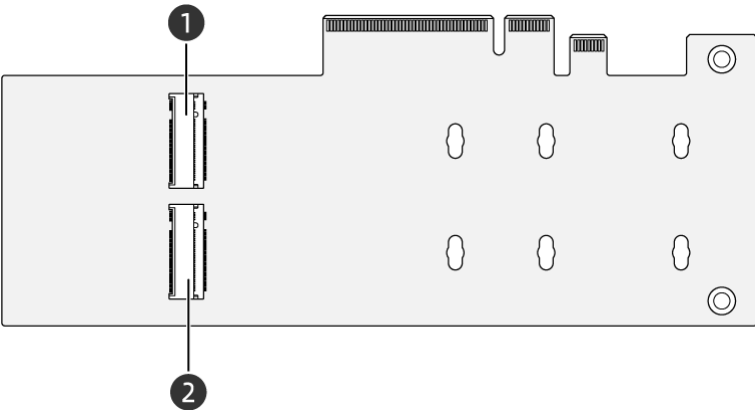


Figure 5-35 Backplane for Front M.2 Drive (2 × SATA/NVMe) Configuration









Item	Feature	Item	Feature
1	M.2 Connector1	2	M.2 Connector2



6 Product Specifications

6.1 Technical Specifications

Table 6-1 Technical Specifications

Item	Specification
Form Factor	4U rack server
Processors	<p>Supports 2 processors.</p> <ul style="list-style-type: none"> • 2 × AMD® Milan® processor. • Integrated memory controllers and 8 × memory channel per processor. • Integrated PCIe controllers and PCIe 4.0 with 48 × lane per processor. • 4 × xGMT-2 bus are used to interconnect the CPUs at a transmit rate of up to 16 GT/s per channel. • Up to 64 cores. • Max Turbo frequency at 3.7 GHz. • L3 cache of 256 MB per core. • TDP up to 280 W. <p> NOTE The above information is for reference only, see Compatibility of Commodity for details.</p>
Memory	<p>Supports 32 × DIMM slot.</p> <ul style="list-style-type: none"> • Up to 32 × DDR4 DIMM. <ul style="list-style-type: none"> - Supports RDIMM. - The maximum transmit rate is 3,200 MT/s. - Mixed use of DDR4 DIMMs of different types (RDIMM and LRDIMM) and specifications (capacity, bit width, rank, and height) is not supported. - The server must use DDR4 DIMMs of the same Part No. (P/N code). <p> NOTE The above information is for reference only, see Compatibility of Commodity for details.</p>
Storage	<p>Supports multiple drive configurations, see 5.5.1 Drive Codes for details.</p> <ul style="list-style-type: none"> • The front PCIe slot supports 2 × M.2 SSD. <ul style="list-style-type: none"> - Supports the configuration of RAID in M.2 SSD when SND 9230 RAID controller card is configured.


Item	Specification
	<ul style="list-style-type: none"> - Supports M.2 SSD configuration (SATA/PCIe RAID) when M.2 SSD riser card is configured. <p> NOTE</p> <ul style="list-style-type: none"> • The M.2 SSD is only used as a boot device for installing the operating system. • The M.2 SSD has low endurance and cannot be used as a data storage device, especially in scenarios with frequent data erase and write, because it may have write risk within a short period of time, resulting in damage and unavailability. • If it is used as a data storage device, please replace it with an enterprise-grade SSD or HDD with higher DWPD. • Write-intensive service software will cause the M.2 SSD to run out of write endurance and then become permanently damaged; therefore, the M.2 SSD is not recommended for such service scenarios. • Do not use the M.2 SSD for caching. <ul style="list-style-type: none"> • Supports hot-swap SAS/SATA/NVMe drives. <p> NOTE</p> <ul style="list-style-type: none"> • Supports multiple models of RAID controller cards, see Compatibility of Commodity for details. <ul style="list-style-type: none"> - Supports functions such as RAID configuration, RAID level migration, and disk roaming. - Supports power failure protection in super-capacitor mode to protect user data. <p>Detailed information on the RAID controller card, please refer to Inspur V6 Server RAID Controller Card User Guide.</p>
Network	<p>Supports multiple types of network expansion.</p> <ul style="list-style-type: none"> • PCIe card <p> NOTE</p> <ul style="list-style-type: none"> - Supports multiple models of NICs, see Compatibility of Commodity for details.
I/O Expansion	<p>Supports PCIe expansion slots.</p> <ul style="list-style-type: none"> • 4 × rear PCIe 4.0 x16 25 W low-profile PCIe card • 1 × front PCIe 4.0 x16 75 W low-profile PCIe card <p>For detailed information, see 5.6.2 PCIe Slot and 5.6.3 PCIe Slot Description.</p> <p> NOTE</p> <p>The above information is for reference only, see Compatibility of Commodity for details.</p>
Ports	<p>Supports multiple ports</p> <ul style="list-style-type: none"> • Ports on the front panel: <ul style="list-style-type: none"> - 2 × USB 3.0 port - 1 × DB15 VGA port - 1 × headphone serial port

Item	Specification
	<ul style="list-style-type: none"> Ports on the rear panel: <ul style="list-style-type: none"> 1 × RJ45 MB management network port 1 × RJ45 Switch Board BMC management network port  <p>NOTE Installation of operating system on USB mobile storage media is not recommended.</p>
Display Controller	<ul style="list-style-type: none"> Internally integrated ASPEED 2500 Up to a resolution of 1,900 × 1,200  <p>NOTE The integrated display controller can support a maximum resolution of 1,920 × 1,200 only when the graphics card driver matching the OS version is installed; otherwise only the default resolution of the OS is supported.</p>
System Management	<ul style="list-style-type: none"> UEFI ISBMC NC-SI Inspur Physical Infrastructure Manager
Security Features	<ul style="list-style-type: none"> Trusted Platform Module (TPM 2.0) and Trusted Cryptography Module (TCM) Firmware update mechanism based on digital signature UEFI Secure Boot Hierarchical BIOS password protection BIOS Secure Flash and BIOS Lock Enable (BLE) BMC and BIOS dual mirroring mechanism

6.2 Environmental Specifications

Table 6-2 Environmental Specifications

Parameter	Requirement
Temperature ^{1,2,3}	<ul style="list-style-type: none"> Operating temperature: 10°C - 35°C (50°F - 95°F) Storage temperature (packed): -40°C to +70°C (-40°F to +158°F) Storage temperature (unpacked): -40°C to +55°C (-40°F to +131°F)
Relative humidity (RH, non-condensing)	<ul style="list-style-type: none"> Operating humidity: 10% - 80% RH Storage humidity (packed): 10% - 93% RH Storage humidity (unpacked): 10% - 93% RH
Operating altitude	≤ 3,050 m (10,000 ft)

Parameter	Requirement
	<ul style="list-style-type: none"> Operating temperature at 0 - 1,000 m (0 - 3,281 ft): 0°C - 40°C (32°F - 104°F) Operating temperature at 1,000 - 3,050 m (3,281 - 10,000 ft): 5°C - 32°C (41°F - 89.6°F)
Corrosive airborne contaminants	<p>Maximum growth rate of corrosion product thickness:</p> <ul style="list-style-type: none"> Copper test piece: 300 Å/month (compliant with the gaseous corrosivity level of G1 defined in ANSI/ISA-71.04 - 2013) Silver test piece: 200 Å/month
Particulate contaminants	<ul style="list-style-type: none"> Comply with the data center cleanliness classification of Class 8 provided in ISO14664-1 The server room must be free of explosive, conductive, magnetic, and corrosive dust <p> NOTE It is recommended to hire a professional organization to monitor the particulate contaminants in the server room.</p>
Noise ^{4,5,6,7}	<p>At an operating temperature of 23°C (73.4°F), the declared A-weighted sound power levels (LWAd) and the declared average bystander position A-weighted sound pressure levels (LpAm) are as follows in accordance with ISO7779 (ECMA 74) and ISO9296 (ECMA 109):</p> <ul style="list-style-type: none"> Idle: <ul style="list-style-type: none"> LWAd: 5.8 B for normal configuration LpAm: 49.0 dBA for normal configuration Operating: <ul style="list-style-type: none"> LWAd: 6.4 B for normal configuration LpAm: 53 dBA for normal configuration

Note:

- Maintains an operating temperature range of 10°C - 35°C (50°F - 95°F) when one robot is faulty.
- Standard operating temperature
 - 10°C - 35°C (50°F - 95°F) at sea level. Every 305 m increase in the altitude above sea level reduces the operating temperature range by 1.0°C (a 1.8°F drop per 1,000 ft). The maximum operating altitude is 3,050 m (10,000 ft). Please keep the product away from direct sunlight. The maximum rate of change is 20°C/h (36°F/h). The operating altitude and maximum rate of temperature change vary with different system configurations.
 - Any fan failure or operations above 30°C (86°F) may lead to system performance degradation.
- Expanded operating temperature
 - As for certain approved configurations, the supported entry range of the system can be expanded to 5°C - 10°C (41°F - 50°F) and 35°C - 45°C (95°F - 113°F) at sea level. At an altitude of 900 - 3,050 m (2,953 - 10,000 ft) above sea level, every 175 m increase in the altitude reduces the operating temperature range by 1.0°C (a 1.8°F drop per 574 ft).
 - As for certain approved configurations, the supported entry range of the system can be expanded to 35°C - 45°C (95°F - 113°F) at sea level. At an altitude of 900 - 3,050 m (2,953 - 10,000 ft) above sea level, every 125 m increase in the altitude reduces the operating temperature range by 1°C (a 1.8°F drop per 410 ft).
 - Any fan failure or operations under expanded environments may lead to system performance degradation.
- This document lists the weighted sound power level (LWAd) and the weighted sound pressure level (LpAm) of the product at an operating temperature of 23°C (73.4°F). The values were reported according to the ISO 7779 (ECMA 74) noise measurement standards and ISO 9296 (ECMA 109). The listed sound levels are

applicable to general shipping configurations and other options may increase the volume. Please contact your sales representative for more information.

5. The sound levels shown here were measured based on specific test configurations. The sound level will vary with different system configurations. Values are subject to change without notice and are for reference only.
6. The sample (model) test assessments meet the referenced product specifications. This product or product series is eligible to have appropriate compliance labels and declarations.
7. All sound levels listed are for standard shipping configurations and other system configurations may increase the volume.

6.3 Physical Specifications

Table 6-3 Physical Specifications

Indicator	Description
Dimensions	<ul style="list-style-type: none"> • With mounting ears: 483 × 175.35 × 861.59 mm (19.02 × 6.90 × 33.92 in.) (W × H × D) • Without mounting ears: 448 × 175.35 × 834.39 mm (17.64 × 6.90 × 32.85 in.) (W × H × D) • Packing dimensions: 1,200 × 800 × 473 mm (47.24 × 31.50 × 18.62 in.) (L × W × H)
Installation dimension requirements	<ul style="list-style-type: none"> • Installation requirements for the cabinet are as follows: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - L-shaped slide rails: only applicable to Inspur cabinets
Weight	<ul style="list-style-type: none"> • Net weight: <ul style="list-style-type: none"> - Maximum weight: 54 kg (119.05 lbs) • Packaging: 28 kg (61.73 lbs)
Power consumption	Differ with different configurations, refer to the Power Consumption Calculator for details.

7 Software and Hardware Compatibility

For detailed information on the OSs and hardware, refer to the [Compatibility of Commodity](#).

IMPORTANT

- Use of non-compatible components may cause equipment abnormality, and such kind of failures is not covered by technical support or warranty.
- The performance of a server is strongly related to application software, middleware basic software, and hardware. Some subtle differences in application software, middleware foundation software and hardware may cause inconsistent performance at the application level and test software level.
 - If the customer has performance-related requirements on specific application software, contact Inspur sales personnel to request for the proof of concept (POC) to confirm the detailed hardware and software configurations before procurement.
 - If the customer has requirements on consistency of hardware performance, specific configuration requirements (such as specific drive models, specific RAID controller cards, and specific firmware versions) need to be identified before procurement.

7.1 Operating System

Table 7-1 Operating Systems

Manufacturer	Version
Red Hat	Red Hat Enterprise Linux 8.3
CentOS	CentOS Linux 8.3
Ubuntu	Ubuntu 20.04
VMware	VMware 7.0u2

7.2 Compatibility of Commodity of Commodity

7.2.1 CPU Specifications

NF5448A6 supports 2 AMD® EPYC™ processors.

- Supports up to 64 cores.
- Max Turbo frequency at 3.7 GHz.
- 4 xGMI-2 interconnected links at a transmit rate of up to 16 GT/s per channel.
- Up to 256 MB of L3 cache.
- TDP up to 280 W.

Table 7-2 CPU Specifications

Model	Cores	Thread Count	Base Frequency	Max Turbo Frequency	Cache	TDP
-------	-------	--------------	----------------	---------------------	-------	-----

75F3	32	64	2.95 GHz	4.0 GHz	256 MB	280 W
7543	32	64	2.8 GHz	3.7 GHz	256 MB	225 W
7643	48	96	2.3 GHz	3.6 GHz	256 MB	225 W
7713	64	128	2.0 GHz	3.675 GHz	256 MB	225 W
7763	64	128	2.45 GHz	3.5 GHz	256 MB	280 W
7513	32	64	2.6 GHz	3.65 GHz	128 MB	200 W

7.2.2 Memory Specifications

NF5448A6 supports up to 32 DDR4 3200/2933 MT/s RDIMMs. Each processor supports 8 memory channels and each channel supports 2 DIMM slots.

Table 7-3 Memory Specifications

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

7.2.3 Storage Specifications

Table 7-4 SSD Specifications

Model	Capacity	Max. Qty.
M.2 SSD	240 GB	6
M.2 SSD	480 GB	6
SATA SSD	240 GB	8
SATA SSD	480 GB	8
SATA SSD	960 GB	8
SATA SSD	1.92 TB	8
SATA SSD	3.84 TB	8

Table 7-5 U.2 NVMe SSD Specifications

Model	Capacity	Max. Qty.
U.2 NVMe SSD	1 TB	4
U.2 NVMe SSD	2 TB	4
U.2 NVMe SSD	4 TB	4
U.2 NVMe SSD	8 TB	4

7.2.4 SAS Card/RAID Controller Card Specifications

Table 7-6 SAS Card/RAID Controller Card Specifications

Type	Manufacturer	Model and Description
RAID Controller Card	Inspur	RAID Controller Card_BRCM_8R0_3508MR_4GB_SMSAS3_PClE3_Mezz

RAID Controller Card	Broadcom	RAID Controller Card_L_8R0_9361-8i_2G_HDM12G_PClE3
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7.2.5 NIC Specifications

Table 7-7 Front NIC Specifications

Type	Model and Description	Speed (Gbps)	Quantity
PCIe	NIC_Inspur_M5_82599ES_10G_LC_PClE8_2_XR	10	2
	NIC_I_10G_X710DA2_LC_PClE8_2_XR	10	2
	NIC_M_100G_MCX515A-CCAT_LC_PClE16_XR	100	1

Table 7-8 Rear NIC Specifications

Type	Model and Description	Speed (Gbps)	Quantity
PCIe NIC	NIC_M_25G_MCX4111A-ACAT_LC_PClE8_XR	25	1
	NIC_M_100G_MCX516A-CCAT_LC_PClE16_2_XR	100	2
	NIC_M_100G_MCX515A-CCAT_LC_PClE16_XR	100	1
	NIC_M_100G_MCX516ACDAT_LC_PClE16_2P_XR	100	2
	NIC_M_100G_MCX516A-CDAT_LC_PClE16_2P_XR	100	2
	NIC_M_25G_MCX512A-ACAT_LC_PClE8_2_XR_TX	25	2
	NIC_M_25G_MCX512A-ACAT_LC_PClE8_2_XR	25	2
	NIC_M_100G_MCX516C06_LC_PClE16_2_XR_al i	100	2
	NIC_M_100G_MCX516A_LC_PClE16_2_XR_27_TX	100	2
	NIC_M_25G_MCX512A_LC_PClE8_2_XR_27_TX	25	2
	NIC_M_50G_MCX516_LC_PClE16_2_XR_TX	50	2
	NIC_M_50G_MCX516A_LC_PClE16_2_XR_TX	50	2
	NIC_M_25G_MCX4121A-ACAT_LC_PClE8_2_XR	25	2

7.2.6 HCA Card Specifications

Table 7-9 HCA Card Specifications

Type	Model and Description
HCA Card	HCA Card_M_1-QSFP_MCX555A-ECAT_PClE
	HCA Card_M_2-HDR100_MCX653106A-ECAT_PClE
	HCA Card_M_1-HDR100_MCX653105A-ECAT_PClE
	HCA Card_M_1-HDR200_MCX653105A-HDAT_PClE-
	HCA Card_M_2-QSFP_MCX556A-ECAT_PClE
	HCA Card_M_2-QSFP_MCX653106A-HDAT_PClE-

7.2.7 GPU Specifications

Table 7-10 GPU Specifications

Type	Model and Description	Max. Qty.
NVLink	GPU_NV_320G_HGX-A100-4GPU-AC_5120b	1

7.2.8 Power Supply Specifications

- Supports hot-swap Intel CRPS PSUs, meeting general electrical and structural design requirements.
- Supports 2+2 redundancy and up to 4 PSUs.
- The PSUs can be inserted into the power bay and locked automatically, enabling tool-free maintenance.
- CRPS power supply meets 80 PLUS Platinum/Titanium efficiency.

The following rated 110 V AC - 230 V AC and 240 V DC power supplies of 2+2 redundancy are supported:

3,000 W Platinum/Titanium power supply: 1,200 W (110 V AC), 3,000 W (230 V AC), 3,000 W (240 V DC for China).



CAUTION

- At a rated voltage of 110 V AC, a 3,000 W power supply will be derated.
 - Input voltage range:
 - 110 V AC - 230 V AC: 90 V - 264 V.
 - 240 V DC: 180 V - 320 V.
-

8 Regulatory Information

8.1 Security

8.1.1 General Statement

- When using the equipment, you must strictly comply with local laws and regulations. The safety precautions in the manual are only a supplement to local safety regulations.
- The "Danger," "Warning," and "Important" icons in the manual are only a supplement to all safety precautions.
- To protect personal safety and the equipment, please strictly comply with the icons on the equipment and all safety precautions in the manual.
- Operators of special equipment, such as electricians and electric forklift operators, must possess qualifications recognized by the local government or authority.
- This is a Class A product, which may cause radio interference in a domestic environment. In such case, you may need to take necessary measures to mitigate the interference.

8.1.2 Personal Security

- The entire installation of the equipment must be carried out by a person certified by Inspur or a person authorized by such certified person.
- During the installation, in case of possible personal injury or damage to the equipment, the installation personnel shall stop the operation immediately, report to the project leader and take effective protective measures.
- Do not operate in thunderstorms, including but not limited to handling equipment, installing cabinets and installing power cables.
- Do not exceed the maximum limit for handling by a single person allowed by local laws or regulations. Fully consider the current physical conditions of installation personnel, and do not exceed the weight that installation personnel can bear.
- Installation personnel must wear clean work gloves, work clothes, safety helmet and work shoes, as shown in Figure 8-1.

Figure 8-1 Safety Protection Measures



- Before touching the equipment, put on ESD clothing and ESD gloves or wrist strap, and remove conductive objects (such as metal jewelry and wristwatch) carried on the body to avoid electric shock or burns, as shown in Figure 8- 2.

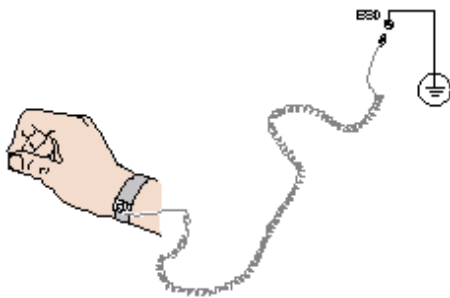
Figure 8-2 Removing Conductive Objects



The method of wearing an ESD wrist strap is shown in Figure 8-3.

1. Put your hand into the ESD wrist strap.
2. Tighten the latch and make sure the ESD wrist strap is in good contact with the skin.
3. Plug the grounding strap of the ESD wrist strap into the jack for the ESD wrist strap in the cabinet (grounded) or chassis (grounded).

Figure 8-3 Wearing an ESD Wrist Strap



- Installation personnel must follow the correct procedures to avoid personal injuries.
- When the installation position of the equipment is above the shoulder of the installation personnel, please use a lifting vehicle and other tools to assist the installation, thus avoiding personnel injury or equipment damage caused by equipment slipping.
- Equipment is powered by high-voltage PSU which may cause fatal danger in case of direct contact or indirect contact through moist objects.
- To ensure personal safety, you must ground the power cable before you connect the power supply to the equipment.
- When installation personnel use ladders, they must be attended by specially-assigned personnel. It is forbidden to work alone in case of a fall.
- When connecting, testing or replacing an optical fiber cable, do not directly look at the optical fiber outlet to prevent the laser beam from burning your eyes.

8.1.3 Equipment Safety

- To protect the equipment and personal safety, use the power cable included.
- The power cable can only be used with the server it was packaged with. Do not use the power cable with other equipment.
- Before touching the equipment, put on ESD clothing and ESD gloves to prevent static electricity from damaging the equipment.
- When moving the equipment, support the bottom edge of the equipment. Do not hold the equipment by the handles of a module mounted to the equipment, such as the PSU, fan module, drive module, or motherboard. Pay attention to handle the equipment gently. Do not throw it heavily.
- Installation personnel must follow the correct procedures to avoid damage to the equipment.
- To ensure equipment availability, you must connect the power cable to different power distribution units (PDUs) in the active-passive mode.
- To ensure equipment safety, you must ground the power cable before you connect the power supply to the equipment.

8.1.4 Precautions for Moving the Equipment

To prevent accidental damage to the equipment while moving it, contact the original manufacturer for specific precautions before moving the equipment. Note the following precautions before moving the equipment:

- Engage a bona fide logistics company to move the equipment. The transportation process must comply with international transportation standards for electronic equipment, to prevent the equipment from being placed in an inverted position, and subject to impact, moisture, and corrosion, as well as to avoid damage to its packaging or contamination.
- The equipment should be moved in its original manufacturer's packaging.
- If there is no original manufacturer's packaging, heavy and bulky components, such as the chassis and blade-shaped devices, should be packed separately from fragile components such as optical modules and PCIe cards.
- Before installing the server into the rack, disassemble the transportation screws at both sides of the chassis.



For the components supported by the server, refer to [Compatibility of Commodity](#) for details.

- During moving, the equipment must be powered off.

8.1.5 Weight Limit for Handling by a Single Person



The weight limit for handling by a single person is subject to local laws and regulations. The icons on the equipment and descriptions in this document are recommendations.

Table 8-1 lists the weight limits for handling by an adult provided by some organizations, as a reference.

Table 8-1 Weight Limits for Handling by an Adult Provided by Some Organizations

Organization	Weight Limit (kg/lbs)
European Committee for Standardization (CEN)	25/55.12
International Organization for Standardization (ISO)	25/55.12
National Institute for Occupational Safety and Health (NIOSH)	23/50.71
Health and Safety Executive (HSE)	25/55.12
General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China (GAQSIQ)	<ul style="list-style-type: none">• Male: 15/33.07• Female: 10/22.05

For more information on security, refer to [Inspur Product Security](#).

8.2 Maintenance and Warranty

For detailed information on maintenance, see [Maintenance Service](#).

For detailed information on warranty, see [Warranty Service](#).

9 System Management

9.1 Intelligent Management System ISBMC

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

ISBMC supports the following key features:

- IPMI 2.0
- Redfish 1.8
- Simple network management protocols (SNMP v1/v2c/v3)
- HTML5/Java remote consoles (keyboards, mice, and videos)
- Remote virtual media
- Login on web browsers
- Supports intelligent fault diagnosis

Table 9-1 ISBMC Specifications

Item	Description
Management Interfaces	Supports extensive remote management interfaces and is applicable to various server O&M scenarios. The supported interfaces include: <ul style="list-style-type: none">• IPMI• SSH CLI• SNMP• HTTPS• Web GUI• Redfish• RESTful• DCMI• Syslog
Intelligent Fault Location	With IDL, a fault diagnosis system independently developed by Inspur, it provides comprehensive and accurate hardware fault location capabilities, and outputs detailed fault causes and correction suggestions.
Alarm Management	Supports rich automatic remote alarm capabilities, including SNMP (v1/v2c/v3), email alarms, syslog remote alarms, and other proactive alarming mechanisms to ensure 24 x 7 reliability.
Remote Console KVM	Supports HTML5- and Java-based remote consoles, supports remotely taking over the display/mouse/keyboard of the server, and provides highly available remote management capabilities without on-site operations.

Item	Description
Virtual Network Console (VNC)	Supports mainstream third-party VNC clients without relying on Java and improves management flexibility.
Remote Virtual Media	Supports virtualizing local media devices or mirrors, USB devices, and folders as media devices of remote servers, simplifying system installation, file sharing, and other O&M tasks.
Web GUI	Supports the visual management interface developed by Inspur, provides comprehensive display of server information and status, and offers an easy-to-use O&M panel.
Downtime Screenshotting and Common Screenshotting	Supports automatic screenshotting during downtime to capture the last screen before the downtime, and provides the screenshotting function, which can quickly capture the screen to facilitate regular inspections.
Dual Flash and Dual Image	Supports dual flash and dual image with automatic flash failover upon software faults or flash damage, 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.
Adaptation of Management Network Ports	Supports adaptation of dedicated management network ports and network controller sideband interfaces (NC-SI), and provides 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 abnormal programs to normal under extreme BMC situations. Provides a thermal protection mechanism, which is automatically triggered when a BMC program is abnormal to ensure that the fan operates at a safe speed to avoid overheating of the entire system. Supports self-diagnosis of processors, memory modules, and storage devices of ISBMC, and automatically cleans up the workload and restores to normal when the device usage rate is too high.
Power Supply Control	Supports virtual power buttons for startup, shutdown, restart, and restart after shutdown.
UID LED and Remote Control LED	Supports remote lighting of the unit identification (UID) LED for locating the server in the server room, and supports remote control LED. The UID LED flashes when a user remotely logs in through the web, KVM, or SSH to inform the on-site personnel that an administrator is accessing the server.
Secure Firmware Upgrade	Supports firmware upgrades based on secure digital signatures, unexpected upgrade prevention mechanism for different manufacturers and models, and firmware upgrades of BMC/BIOS/CPLD/PSU and other devices.
Serial Port Redirection	Supports remote redirection of system serial ports, BMC serial ports, and other serial ports, and directs the server-side serial port output to the local administrator through the network for server debugging
Storage Information Display	Supports display of RAID logical array information and drive information, and remote RAID formation for improved deployment efficiency.
User Role Management	Supports refined user management based on user roles and flexible creation of user roles with different permissions, and provides refined user roles to allow administrators to grant different permissions to O&M personnel.
Security Features	Adopts the industry-leading Inspur server security baseline standard V2.0, and uses secure and reliable algorithms for SSH,

Item	Description
	HTTPS, SNMP, and IPMI, and has the capabilities including secure upgrade and boot as well as security reinforcement mechanisms such as anti-replay, anti-injection, and anti-brute force.

9.2 Inspur Physical Infrastructure Manager (ISPIM)

The NF5448A6 server is compatible with the latest version of Inspur Physical Infrastructure Manager (ISPIM).

The independently developed ISPIM features asset management, monitoring management, inspection management, energy consumption management, and stateless management. It also provides Restful and SNMP interfaces to facilitate user integration and interfacing. ISPIM has the following key features:

- Lightweight deployment for multiple scenarios and full lifecycle management of devices
- High reliability and on-demand node expansion for data collection at 1 - N nodes
- Intelligent asset management and real-time tracking of asset changes
- Comprehensive monitoring and automatic fault diagnosis
- Batch configuration, deployment, and upgrade for reduced launch time
- Intelligent analysis and control of power consumption to improve energy efficiency and operational stability of data centers
- Version management for improved version management efficiency
- Standardized northbound interfaces for easy integration and interfacing
- Centralized management of edge devices

Table 9-2 ISPIM Specifications

Item	Description
Centralized Device Management	Supports centralized management of network-wide devices, including servers (covering the complete Inspur server family, including general rack servers, AI servers, blade servers, all-in-ones and other high-end server products, and third-party servers), storage devices (Inspur general disk arrays, distributed storage devices, and storage devices of other manufacturers), and network devices (Inspur switches, third-party switches, and third-party firewall devices).
Monitoring Management	Supports centralized display, search, and blocking of device alarms, and email notifications, and supports the creation of alarm rules, notification rules, and blocking rules, alarm redefinition, alarm forwarding and southbound settings, device performance monitoring, and distributed monitoring.
Stateless Computing	Supports BMC/BIOS upgrade and configuration of Inspur servers, RAID configuration of Inspur servers, hardware configuration templates, automatic hardware baseline management, and file repository upgrade.
Operating System Deployment	Supports batch deployment of operating systems through the BMC interface, one-click deployment with automatic status write-back without manual intervention, and concurrent deployment of up to 40 devices.

Item	Description
Asset Management	Supports part-level asset management, multi-dimensional asset statistics, 3D data centers, and asset maintenance management.
Inspection Management	Supports active inspection tasks, alarm-triggered passive inspection, intelligent fault diagnosis and analysis, and automatic fault reporting and correction.
Power consumption management	Supports multi-dimensional statistics of power consumption, intelligent power consumption capping strategy, 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 by using a set of security policies such as user management, role management, authentication management (local authentication and LDAP authentication), and certificate management policies.

9.3 Inspur Server Intelligent Boot (ISIB)

NF5448A6 is compatible with the latest version of Inspur Server Intelligent Boot (ISIB) system, an automatic O&M management system throughout the server lifecycle developed in house by Inspur. Based on the SSH and PXE technologies, it is compatible with the entire family of Inspur servers, and has more efficient and reliable automatic deployment and software and hardware configuration management functions. ISIB has the following key features:




- Full lifecycle device management from racking to automatic O&M
- Bare-metal one-stop deployment with one-click racking
- Flexible task scheduling with multi-scenario O&M capabilities
- Large-scale deployment of technical architecture for reduced launch 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 9-3 ISIB Specifications

Item	Description
Home	Provides multi-dimensional statistical results of assets, repositories, operations, and jobs, dynamic display of jobs in the last 24 hours, and histogram display of jobs in the last 30 days.
Assets	Supports automatic device discovery, operating system information collection, and out-of-band/in-band power supply management.
Repository	Provides the management of mirrors, software, firmware, configuration files, scripts, and sources to facilitate operations such as operating system deployment and firmware upgrades.
Operations	Firmware upgrade Hardware configuration PXE automatic installation Installation template management Image cloning and restoration Software distribution Configuration changes

Item	Description
	System inspection
Tasks	Supports job scheduling, and scheduled and periodic task execution. Provides visual multi-dimensional task display and refined log viewing.
GShell	Supports remote management of a single SSH terminal or multiple SSH terminals.
DFX	Supports high availability (HA) and secure access to HTTPS; Supports system snapshots and self-service management; Supports batch O&M at a scale of 10,000 devices; Provides a northbound RESTful interface.

10 Certification

Country/ Region	Item	Certification Logo	Compulsory/ Voluntary	Description
China	China Environmental Label		Voluntary	
International Mutual Recognition	CB	CB	Voluntary	
EU	CE	CE	Compulsory	
US	FCC	FC	Compulsory	
	UL		Voluntary	
Russia	EAC	EAC	Compulsory	
	FSS	N/A	Compulsory	
South Korea	KC		Compulsory	

11 Appendix A

11.1 Operating Temperature and Specification Limits

Table 11-1 Operating Temperature and Specification Limits

Configuration	Maximum Operating Temperature: 30°C (86°F)	Maximum Operating Temperature: 35°C (95°F)	Maximum Operating Temperature: 40°C (104°F)	Maximum Operating Temperature: 45°C (113°F)
Typical configuration	<ul style="list-style-type: none"> 8086 Fan RDIMM (\leq 16 pcs) CPU power consumption \leq 280 W 5 x MCX515A-CCAT single-port NIC (100 Gbps) 4 x Tesla A100 NVLink 80 GB GPU 1 x 2.5-inch SATA SSD (480 GB) + 1 x 2.5-inch SATA SSD (1,920 GB) 	<ul style="list-style-type: none"> 8086 Fan RDIMM (\leq 16 pcs) CPU power consumption \leq 280 W 5 x MCX515A-CCAT single-port NIC (100 Gbps) 4 x Tesla A100 NVLink 80 GB GPU 1 x 2.5-inch SATA SSD (480 GB) + 1 x 2.5-inch SATA SSD (1,920 GB) 	Not supported	Not supported
High-end configuration	<ul style="list-style-type: none"> 8086 Fan RDIMM (\leq 32 pcs) CPU power consumption \leq 280 W 4 x 200 Gbps HCA card; 1 x 100 Gbps NIC 4 x Tesla A100 NVLink 80 GB GPU 4 x SATA SSD + 4 x NVMe SSD 	<ul style="list-style-type: none"> 8086 Fan RDIMM (\leq 32 pcs) CPU power consumption \leq 280 W 4 x 200 Gbps HCA card; 1 x 100 Gbps NIC 4 x Tesla A100 NVLink 80 GB GPU 4 x SATA SSD + 4 x NVMe SSD 	Not supported	Not supported

Configuration	Maximum Operating Temperature: 30°C (86°F)	Maximum Operating Temperature: 35°C (95°F)	Maximum Operating Temperature: 40°C (104°F)	Maximum Operating Temperature: 45°C (113°F)
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NOTE

- The maximum operating temperature supported when a single fan fails is 5°C (9°F) below the normal operating temperature.
- Single fan failure may affect system performance.
- It is recommended to deploy your servers at an interval of a 1U space to reduce server noise and improve server energy efficiency.

11.2 Model

Certified Model	Description
NF5448A6	Global

11.3 RAS Features

NF5448A6 supports a variety of RAS (Reliability, Availability, and Serviceability) features. By configuring these features, NF5448A6 can provide greater reliability, availability, and serviceability.

11.4 Sensor List

Item	Feature	Description
01	Sys_Inlet_Temp1	System inlet air temperature (located at the mounting ear)
02	CPU0_Temp	CPU0 temperature
03	CPU1_Temp	CPU1 temperature
04	CPU0_DIMM_Temp	The maximum temperature of the corresponding DIMMs of CPU0
05	CPU1_DIMM_Temp	The maximum temperature of the corresponding DIMMs of CPU1
06	CPU0_VR_Temp	CPU0 VR temperature
07	CPU1_VR_Temp	CPU1 VR temperature
08	DIMM0_VR_Temp	The maximum temperature of the corresponding DIMM VR of CPU0

09	DIMM1_VR_Temp	The maximum temperature of the corresponding DIMM VR of CPU1
10	NVME0_SSD_Temp	The maximum temperature of all drives (NVMe SSDs) in the upper front panel
11	HDD_BP0_Temp	The maximum temperature of all drive backplanes in the upper front panel
12	HDD_BP1_Temp	The maximum temperature of all drive backplanes in the upper front panel
13	M.2_Temp	The maximum temperature of M.2 SSDs
14	GPU0_Temp	GPU0 internal temperature
15	GPU1_Temp	GPU1 internal temperature
16	GPU2_Temp	GPU2 internal temperature
17	GPU3_Temp	GPU3 internal temperature
18	PSU0_Temp	PSU0 air inlet temperature
19	PSU1_Temp	PSU1 air inlet temperature
20	PSU2_Temp	PSU2 air inlet temperature
21	PSU3_Temp	PSU3 air inlet temperature
22	Switch Board Inlet_Temp	Switch board air inlet temperature
23	Outlet_Temp	System air outlet temperature
24	PEX88080	Internal temperature
25	54V VR	Internal temperature

12 Appendix B Terms

12.1A - E

B

Baseboard management controller (BMC)	As the core of the IPMI, BMC collects, processes, and stores sensor signals, and monitors the running status of components. BMC enables the chassis management module (MM) to manage various objects by providing such information as hardware status and alarms of the managed objects for the MM.
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C

Ejector lever	A component on the panel used to plug in or out a device from a slot.
Ethernet	Ethernet is a baseband LAN specification created by Xerox and jointly developed by Xerox, Intel and DEC. It uses CSMA/CD to transmit data on various cables at 10 Mbps. It is similar to IEEE 802.3 series standards.

12.2F - J

G

Gigabit Ethernet Ethernet (GE)	It is an extension and enhancement of traditional shared media Ethernet standards. It is compatible with 10 Mbps and 100 Mbps Ethernet and complies with IEEE 802.3z standards.
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H

Hot swap	A technology that can improve the reliability and maintainability of the system, which can ensure that the plugging or unplugging of functional modules in or from a running system as specified will not affect the normal operation of the system.
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12.3K - O

K

KVM	Keyboard, video and mouse.
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12.4P - T

P

Panel	An external component (including but not limited to ejector levers, indicators and ports) that can be seen on the front view and rear view of the server. It seals the front and rear of the chassis to ensure optimal ventilation and electromagnetic compatibility (EMC).
Peripheral Component Interconnect express (PCIe)	A type of PCI computer bus that uses existing PCI programming concepts and communication standards, but is based on a faster serial communication system. PCIe is primarily developed by Intel. It is used only for internal interconnection. A PCI system can be transformed to a PCIe system only by modifying the physical layer instead of software since it is built based on the existing PCI system. The high-speed PCIe can replace almost all existing internal buses, including AGP and PCI.

R

Redundancy	The mechanism of a system to keep functioning normally in the event of a device failure, by automatically having a backup device replace the faulty one.
Redundant array of independent disks (RAID)	A technology that combines multiple independent physical drives into one logical drive group in different ways to provide data redundancy and higher storage performance than a single drive.

S

Server	A special computer that provides various services for clients in the network environment.
System event log (SEL)	Event information stored in the system for fault diagnosis and system recovery.

12.5U - Z

U

U	A unit of measure to describe the height of cabinet, chassis and sub-rack in IEC 60297-1. 1U = 44.45 mm (1.75 in.).
Ultra Path Interconnect (UPI)	Intel's next generation point-to-point interconnect architecture.

13 Appendix C Abbreviations

13.1A - E

A

AC	Alternating Current
AES	Advanced Encryption Standard New Instruction Set
ARP	Address Resolution Protocol
AVX	Advanced Vector Extensions

B

BBU	Backup Battery Unit
BIOS	Basic Input Output System
BMC	Baseboard Management Controller

C

CD	Calendar Day
CE	Conformite Europeenne
CIM	Common Information Model
CLI	Command-line Interface

D

DC	Direct Current
DDR4	Double Data Rate 4
DDDC	Double Device Data Correction
DEMT	Dynamic Energy Management Technology
DIMM	Dual In-line Memory Module
DRAM	Dynamic Random-Access Memory

DVD	Digital Video Disc
-----	--------------------

E

ECC	Error Checking and Correcting
ECMA	European Computer Manufacturer Association
EDB	Execute Disable Bit
EN	European Efficiency
ERP	Enterprise Resource Planning
ETS	European Telecommunication Standards

13.2F - J

F

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

G

GE	Gigabit Ethernet
GPIO	General Purpose Input/Output
GPU	Graphics Processing Unit

H

HA	High Availability
HDD	Hard Disk Drive
HPC	High Performance Computing
HTTP	Hypertext Transfer Protocol

HTTPS	Hypertext Transfer Protocol Secure
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I

iBMC	Intelligent Baseboard Management Controller
IC	Industry Canada
ICMP	Internet Control Message Protocol
IDC	Internet Data Center
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IGMP	Internet Group Management Protocol (IGMP)
IOPS	Input/Output Operations per Second
IP	Internet Protocol
IPC	Intelligent Power Capability
IPMB	Intelligent Platform Management Bus
IPMI	Intelligent Platform Management Interface

13.3K - O

K

KVM	Keyboard, Video and Mouse
-----	---------------------------

L

LC	Lucent Connector
LRDIMM	Load-Reduced Dual In-line Memory Module
LED	Light Emitting Diode
LOM	LAN on Motherboard

M

MAC	Media Access Control
MMC	Module Management Controller

N

NBD	Next Business Day
NC-SI	Network Controller Sideband Interface

O

OCP	Open Compute Project
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13.4P - T**P**

PCIe	Peripheral Component Interconnect Express (PCIe)
PDU	Power Distribution Unit
PHY	Physical Layer
PMBUS	Power Management Bus
POK	Power OK
PWM	Pulse-width Modulation
PXE	Preboot Execution Environment

R

RAID	Redundant Array of Independent Disks (RAID)
RAS	Reliability, Availability and Serviceability
RDIMM	Registered Dual In-line Memory Module
REACH	Registration Evaluation and Authorization of Chemicals
RJ45	Registered Jack 45

RoHS	Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment
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S

SAS	Serial Attached Small Computer System Interface
SATA	Serial Advanced Technology Attachment
SCM	Supply Chain Management
SDDC	Single Device Data Correction
SERDES	Serializer/Deserializer
SGMII	Serial Gigabit Media Independent Interface
SMI	Serial Management Interface
SMTP	Simple Mail Transfer Protocol
SNMP	Simple Network Management Protocol
SOL	Serial Over LAN
SONCAP	Standards Organization of Nigeria-Conformity Assessment Program
SSD	Solid-State Drive
SSE	Streaming SIMD Extension

T

TACH	Tachometer Signal
TBT	Turbo Boost Technology
TCG	Trusted Computing Group
TCM	Trusted Cryptography Module
TCO	Total Cost of Ownership
TDP	Thermal Design Power
TELNET	Telecommunication Network Protocol
TET	Trusted Execution Technology
TFM	Trans Flash Module

TFTP	Trivial File Transfer Protocol
TOE	TCP Offload Engine
TPM	Trusted Platform Module

13.5U - Z

U

UDIMM	Unbuffered Dual In-line Memory Module
UEFI	Unified Extensible Firmware Interface
UID	Unit Identification Light
UL	Underwriter Laboratories Inc.
UPI	Ultra Path Interconnect (UPI)
USB	Universal Serial Bus

V

VCCI	Voluntary Control Council for Interference by Information Technology Equipment
VGA Port	Video Graphics Array
VLAN	Virtual Local Area Network
VRD	Voltage Regulator-Down

W

WEEE	Waste Electrical and Electronic Equipment
WSMAN	Web Service Management