MAIPU

NSS5830, NSS5930, NSS5950(V1) Series

Switch Installation Manual

Copyright

Security Statement

Important! Before powering on and starting the product, please read the security and compatibility information of the product.

Environmental protection

This product has been designed to comply with the environmental protection requirements. The storage, use, and disposal of this product must meet the applicable national laws and regulations.

Preface

Manual Introduction

This manual first describes the appearance and hardware of NSS5830-56XQFP, NSS5930-56SQFP, NSS5950-32QFP, and NSS5830-54XTQFP series switch; secondly, describes the installation preparations and installation methods of the device; at last, describes the basic using methods and daily maintenance of the device from the aspects of powering on and running the device, troubleshooting and device maintenance.

Product Version

The corresponding product versions of the manual are as follows:

Product Name	Product Model
NSS5830-56XQFP switch	NSS5830-56XQFP (V1)
NSS5930-56SQFP switch	NSS5930-56SQFP (V1)
NSS5950-32QFP switch	NSS5950-32QFP (V1)
NSS5830-54XTQFP switch	NSS5830-54XTQFP (V1)

Audience

This documentation is intended for:

● Hardware installation engineers

● Commissioning engineers

● Field maintenance engineers

● System maintenance engineers

Conventions

Conventions of screen output format:

Format	Description
Screen print	Represents the output information of the screen
Keywords of Screen print	The red part represents the key information in the screen output

Symbol conventions:

Format	Description
Note	An alert that contains additional or supplementary information.
Caution	An alert that calls attention to important information that if not understood or followed can result in data loss, data corruption, or damage to hardware or software.
Warning	An alert that calls attention to important information that if not understood or followed can result in personal injury or device damage.

Command conventions:

Convention	Description
Boldface	Bold text represents commands and keywords that you enter literally as shown.
Italic	Italic text represents arguments that you replace with actual values.
[ ]	Square brackets enclose syntax choices (keywords or arguments) that are optional.
{ x | y | ... }	Braces enclose a set of required syntax choices separated by vertical bars, from which you select one.
[x | y | ...]	Square brackets enclose a set of optional syntax choices separated by vertical bars, from which you select one or none.
{ x | y | ... } *	Asterisk marked braces enclose a set of required syntax

	choices separated by vertical bars, from which you select at least one.
&<1-n>	The argument or keyword and argument combination before the ampersand (&) sign can be entered 1 to n times.
#	A line that starts with a pound (#) sign is comments.

The icons used in the manual and the meanings:

Icon	Description
	Represents a generic switch
	Represents a generic router

Supporting Manuals of Product

The supporting manuals of the product:

Manual Name	Overview
NSS5830, NSS5930, NSS5950(V1) Series Switch Installation Manual	Introduces the hardware specifications and installation methods of the device in details, and guide you to install the device.

Technical Support

- Technical supporting hotline: 400-886-8669

- Fax: (+8628)85148948

Revision Records

Revision Date	Revised Content
2022-03-21	The first formal releas

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Appendix Tables

1 Device Introduction

This chapter mainly describes the product specificatios of NSS5830-56XQFP, NSS5930-56SQFP, NSS5950-32QFP, and NSS5830-54XTQFP, containing the following contents:

1.1 Product Shapes

1.2 Product Appearance and Hardware

1.3 Power Modules

1.4 Fan Modules

1.5 Device Air Passage

1.6 Physical Parameters

1.1 Product Shapes

The product shapes of the NSS5830-56XQFP, NSS5930-56SQFP, NSS5950-32QFP, and NSS5830-54XTQFP are shown in Table 1-1.

Table 1-1 Product shapes

Product Model	Supported Interfaces and Description
NSS5830-56XQFP	48 10G (SFP+module) optical interfaces, eight 100G (QSFP28 module) optical interfaces, one RJ45 Console port, one management Ethernet interface, one USB interface, dual power supply slots, and five fan slots.
NSS5930-56SQFP	48 25G (SFP28 module) optical interfaces, eight 100G (QSFP28 module) optical interfaces, one RJ45 Console port, one management Ethernet interface, one USB interface, dual power supply slots, and five fan slots.
NSS5950-32QFP	32 100G (QSFP28 module) optical interfaces, one RJ45 Console port, one management Ethernet interface, one USB interface, dual power supply slots,

Product Model	Supported Interfaces and Description
	and six fan slots.
NSS5830-54XTQFP	48 10G base-T interfaces, six 100G (QSFP28 module) optical interfaces, one RJ45 Console configuration interface, one management Ethernet interface, one USB interface, dual power supply slots, and five fan slots.

1.2 Product Appearance and Hardware

NSS5830-56XQFP adopts centralized hardware platform and 1U standard desktop architecture.

Note

● The overall dimension of the NSS5830-56XQFP chassis is 442mm x 420mm x 44.2mm (W x D x H).
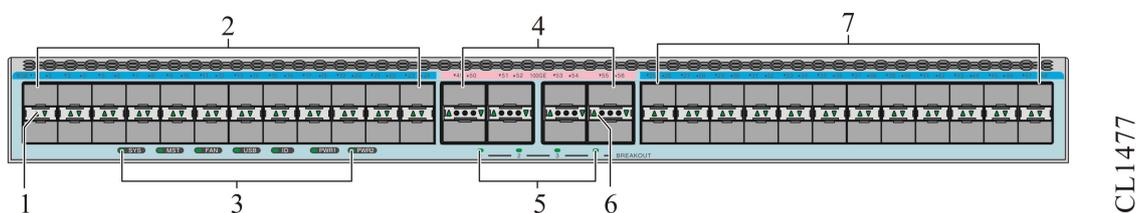
Figure 1-1 NSS5830-56XQFP front panel

1. Port status indicator (10G optical port)	2. 10G optical port (port No.1~24)
3.The device status indicators from left to right are: 　SYS: System indicator 　MST: Stacking indicator 　FAN: Fan indicator 　USB: USB indicator 　ID: ID indicator 　PWR1: Power 1 indicator	4. 100G optical port (port No.49~56)

PWR2: Power 2 indicator	
5. BREAK OUT indicator (100G port)	6. Port status indicator (100G optical port)
7. 10G optical port (port No.25~48)	
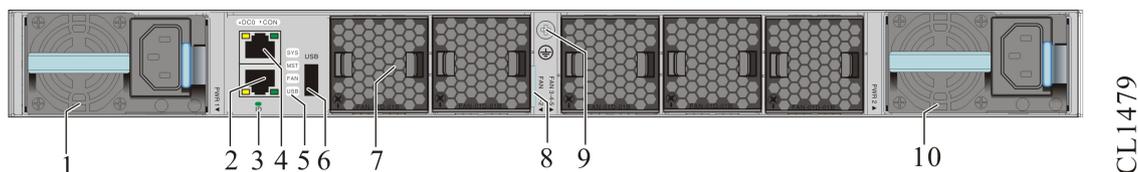
Figure 1-2 NSS5830-56XQFP rear panel

1. PWR1 modular power slot	2.CONSOLE port
3. ID indicator	4. DC0 management interface
5. The device status indicators from top to bottom are: SYS: System indicator MST: Stacking indicator FAN: Fan indicator USB: USB indicator	6. USB2.0 interface
7. Fan module slots (FAN1~FAN5)	8. Draw-type barcode label
9. Ground terminal	10. PWR2 modular power slot

NSS5930-56SQFP adopts centralized hardware platform and 1U standard desktop architecture.

⊘Note

● The overall dimension of the NSS5930-56SQFP chassis is 442mm x 420mm x 44.2mm (W x D x H).
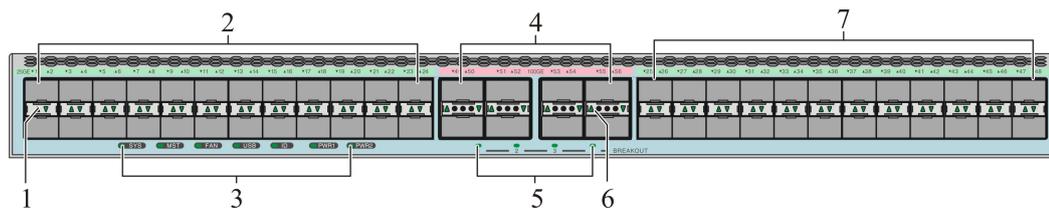
Figure 1-3 NSS5930-56SQFP front panel

1. Port status indicator (25G optical port)	2. 25G optical port (port No.1~24)
3.The device status indicators from left to right are: SYS: System indicator MST: Stacking indicator FAN: Fan indicator USB: USB indicator ID: ID indicator PWR1: Power 1 indicator PWR2: Power 2 indicator	4. 100G optical port (port No.49~56)
5. BREAK OUT indicator (100G port)	6. Port status indicator (100G optical port)
7. 25G optical port (port No.25~48)	
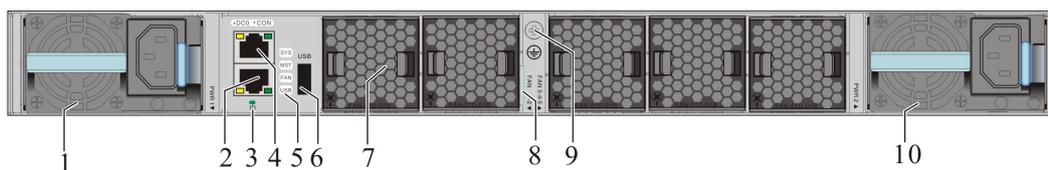
Figure 1-4 NSS5930-56SQFP rear panel

1. PWR1 modular power slot	2.CONSOLE port
3. ID indicator	4. DC0 management interface
5. The device status indicators from top to bottom are: SYS: System indicator MST: Stacking indicator FAN: Fan indicator USB: USB indicator	6. USB2.0 interface

7. Fan module slots (FAN1~FAN5)	8. Draw-type barcode label
9. Ground terminal	10. PWR2 modular power slot

NSS5830-54XTQFP adopts centralized hardware platform and 1U standard desktop architecture.

> 📝 **Note**
>
> - The overall dimension of the NSS5830-54XTQFP chassis is 442mm x 480mm x 44.2mm (W x D x H).
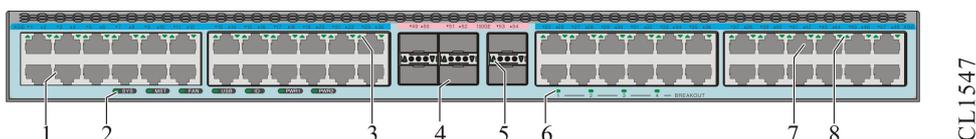
Figure 1-5 NSS5830-54XTQFP front panel

1. 10G electrical port (port No.1~24)	2.The device status indicators from left to right are:
	SYS: System indicator
	MST: Stacking indicator
	FAN: Fan indicator
	USB: USB indicator
	ID: ID indicator
	PWR1: Power 1 indicator
	PWR2: Power 2 indicator
3. Port status indicator (10G electrical port)	4. 100G optical port (port No.49~54)
5. Port status indicator (100G optical port)	6. BREAK OUT indicator (100G port)
7. 10G electrical port (port No.25~48)	8. Port status indicator (10G electrical port)
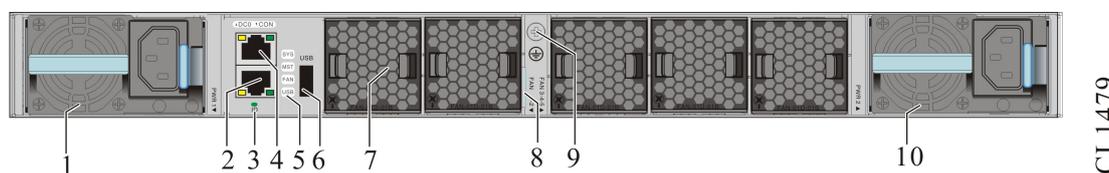
Figure 1-6 NSS5830-54XTQFP rear panel

1. PWR1 modular power slot	2.CONSOLE port
3. ID indicator	4. DC0 management interface
5. The device status indicators from top to bottom are: SYS: System indicator MST: Stacking indicator FAN: Fan indicator USB: USB indicator	6. USB2.0 interface
7. Fan module slots (FAN1~FAN5)	8. Draw-type barcode label
9. Ground terminal	10. PWR2 modular power slot

NSS5950-32QFP adopts centralized hardware platform and 1U standard desktop architecture.

⌀Note

● The overall dimension of the NSS5950-32QFP chassis is 442mm x 480mm x 44.2mm (W x D x H).
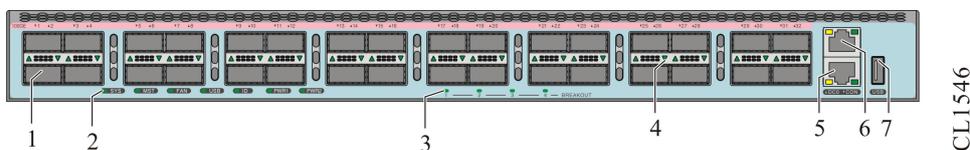
Figure 1-7 NSS5950-32QFP front panel

1. 100G optical port (port No.1~32)	2.The device status indicators from left to right are: SYS: System indicator MST: Stacking indicator FAN: Fan indicator USB: USB indicator

	ID: ID indicator PWR1: Power 1 indicator PWR2: Power 2 indicator
3. BREAK OUT indicator (100G port)	4. Port status indicator (100G optical port)
5. CONSOLE port	6. DC0 management interface
7. USB2.0 interface	
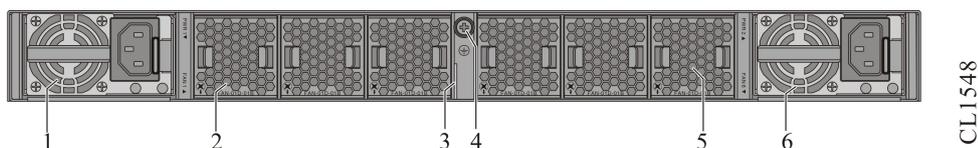
Figure 1-8 NSS5950-32QFP rear panel

1. PWR1 modular power slot	2. Fan module slots (FAN1~ FAN3)
3. Draw-type barcode label	4. Ground terminal
5. Fan module slots (FAN4~ FAN6)	6. PWR2 modular power slot

1.3 Power Modules

The rear panel of the NSS5830-56XQFP, NSS5930-56SQFP, NSS5950-32QFP, and NSS5830-54XTQFP switches provides two power sockets, which can be powered by a single power supply and can also support parallel operation of two power supplies for backup system power. The device supports three power supply models. The specific models and function descriptions are shown in Table 1-2.

Table 1-2 Supported power modules

Model	Name	Remarks
AD550M-HV0B	AC power module, 550W	Two power supplies of the same model can be used for system power hot backup.
AD800M-HV0B	AC power module, 800W	Two power supplies of the

Model	Name	Remarks
		same model can be used for system power hot backup.
DD800M-5V0B	DC Power module, 800W	Two power supplies of the same model can be used for system power hot backup.
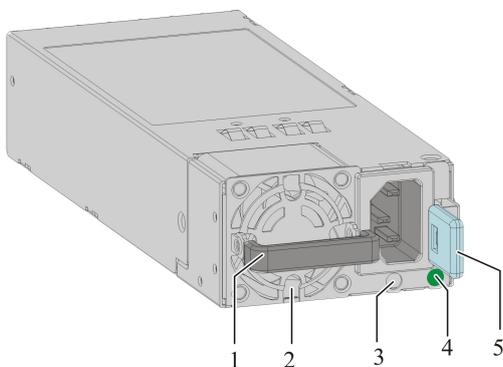
CL1482

Figure 1-9 Power module appearance

1. Folding handle	2. Power fan
3. Mounting hole of power cord fixing strap	4. Power LED indicator
5. Power latch	

⊘Note

● When the power module enters the over-temperature protection state due to high temperature, please take cooling measures immediately. When the temperature drops, the power module will automatically resume normal operation.

1.4 Fan Modules

The rear panel of the NSS5830-56XQFP and NSS5930-56SQFP switches provides five fan slots and can be configured with up to five fan modules to meet 3+2 fan redundancy backup. The rear panel of the NSS5830-54XTQFP switch provides five fan slots and five fan modules as standard. The rear panel of the NSS5950-32QFP provides six fan slots and can be configured with up to six fan modules to meet the redundant backup of 4+2 fans.

The specific model and function description of the fan module provided by the switch are shown in Table 1-3.

Table 1-3 Supported fan module

Model	Remarks
FAN-01E-01B	Exhaust fan module (extract air from the device to the outside)
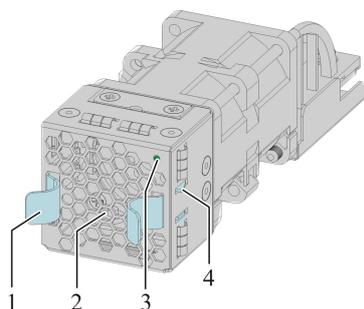
Figure 1-10 FAN-01E-01B fan module

1. Installation handle	2. Dustproof net
3. Fan LED indicator	4. Installation buckle

1.5 Device Air Passage

The front and rear sides of the switch is the device air inlet and outlet (the left side is the air inlet and outlet of the power module, and it is an independent air passage), as shown in the figure below. Sufficient space shall be reserved at the front and back of the device (the space at the front and back shall not be less than 60mm respectively) to ensure good ventilation.
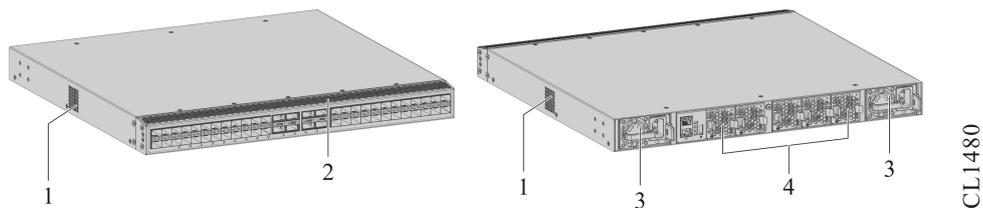
Figure 1-11 Device air vent

1. Power slot air inlet	2. Front panel air inlet
3. Power module air outlet	4. Fan module air outlet

1.6 Physical Parameters

Table 1-4 NSS5830-56XQFP physical parameters

Item	Description
Package size (W x D x H)	Host: 671mm x 606mm x153mm Power supply: 307mm x 236mm x68mm
Dimension (W x D x H)	442mm x 420mm x44.2mm
Overall power consumption	289W
Weight of the whole device and module	NSS5830-56XQFP(V1) whole device (containing five fans, two AD550 power supplies): 9.2Kg Fan module FAN-01E-01B: 0.14Kg Power module AD550M-HV0B: 0.80Kg Power module AD800M-HV0B: 0.82Kg Power module DD800M-5V0B: 0.78Kg Package: 2.84Kg (only package)
Rated input voltage of power supply	AC: 100~240V 50/60Hz (use AD550M-HV0B/AD800M-HV0B power supply) DC: -40~-72V (use DD800M-5V0B power supply)
Work humidity	10%–90%/RH, no-condensing

Item	Description
Work temperature	0℃~45℃
Altitude	≤5000m

Table 1-5 NSS5930-56SQFP physical parameters

Item	Description
Package size (W x D x H)	Host: 671mm x 606mm x153mm Power supply: 307mm x 236mm x68mm
Dimension (W x D x H)	442mm x 420mm x44.2mm
Overall power consumption	294W
Weight of the whole device and module	NSS5930-56SQFP(V1) whole device (containing five fans, two AD550 power supplies): 9.2Kg Fan module FAN-01E-01B: 0.14Kg Power module AD550M-HV0B: 0.80Kg Power module AD800M-HV0B: 0.82Kg Power module DD800M-5V0B: 0.78Kg Package: 2.84Kg (only package)
Rated input voltage of power supply	AC: 100~240V 50/60Hz (use AD550M-HV0B/AD800M-HV0B power supply) DC: -40~-72V (use DD800M-5V0B power supply)
Work humidity	10%～90%/RH, no-condensing
Work temperature	0℃~45℃
Altitude	≤5000m

Table 1-6 NSS5950-32QFP physical parameters

Item	Description

Item	Description
Package size (W x D x H)	Host: 671mm x 606mm x153mm Power supply: 307mm x 236mm x68mm
Dimension (W x D x H)	442mm x 480mm x44.2mm
Overall power consumption	423W
Weight of the whole device and module	NSS5950-32QFP (V1) whole device (containing two AD550 power supplies, the weight of six fan modules): 10.2Kg Fan module FAN-01E-01B: 0.14Kg Power module AD550M-HV0B: 0.80Kg Power module AD800M-HV0B: 0.82Kg Power module DD800M-5V0B: 0.78Kg Package: 2.84Kg (only package)
Rated input voltage of power supply	AC: 100~240V 50/60Hz (use AD550M-HV0B/AD800M-HV0B power supply) DC: -40~-72V (use DD800M-5V0B power supply)
Work humidity	10%–90%/RH, no-condensing
Work temperature	0℃~45℃
Altitude	≤5000m

Table 1-7 NSS5830-54XTQFP physical parameters

Item	Description
Package size (W x D x H)	Host: 671mm x 606mm x153mm Power supply: 307mm x 236mm x68mm
Dimension (W x D x H)	442mm x 480mm x44.2mm
Overall power consumption	371W
Weight of the whole device and module	NSS5830-54XTQFP(V1) whole device (containing five fans, two AD550 power supplies): 9.86Kg

Item	Description
	Fan mkdule FAN-01E-01B: 0.14Kg
	Power module AD550M-HV0B: 0.80Kg
	Power module AD800M-HV0B: 0.82Kg
	Power module DD800M-5V0B: 0.78Kg
	Package: 2.84Kg (only package)
Rated input voltage of power supply	AC: 100~240V 50/60Hz (use AD550M-HV0B/AD800M-HV0B power supply)
	DC: -40~-72V (use DD800M-5V0B power supply)
Work humidity	10%～90%/RH, no-condensing
Work temperature	0℃~45℃
Altitude	≤5000m

2 Installation Preparations

This chapter describes the precautions and related work before installing the device, containing the following contents:

2.1 Safety Precautions

2.2 Check Device Running Environment

2.3 Carton Un-packing and Inspection

Note

- When the device is delivered, there is the packing list. Please confirm whether the accessories are complete and good according to the items in the packing list. If there is damaged or loss, please contact Maipu technical staff to replace.

2.1 Safety Precautions

2.1.1 General Safety

Caution

- Ensure that the ground of the installation place is dry and smooth and you have made the anti-skidding measures.

- Keep the device clean and dust-free; do not place the device in the damp place.

- When handling the switch device, please pay attention to avoid being scratched by the sharp parts of the device.

- This is a Class-A product. In a living environment, this product may cause radio interference. In this case, users may be required to take practical measures against the interference. When disconnecting power, remove all power cords.

2.1.2 Electrical Safety

⚠ Caution

- Please check whether there are potential dangers. For example, the power is not grounded, power supply grounding is not reliable, and the ground is wet.

- Before installation, get to know the location of the emergency power switch in the room; when there is an accident, cut off the emergency power switch at first.

- Before moving the chassis, be sure to unplug all external cables (including power cable).

- When maintaining with power, it is recommended that there are two or more persons in the field.

- When closing the power, do not assume that the power has been turned off, but carefully check and confirm.

2.1.3 Static Safety

To avoid the static from damaging the electronic parts of the switch, we need to take the anti-static measures.

⚠ Caution

- When installing the components of the switch, especially installing the components with the circuit board (such as board), we should wear anti-static wrists.

- When holding the circuit board, please hold the edge of the circuit board and do not touch the components or printed circuit.

- For the security, please check the resistance of the anti-static wrists. The resistance between the body and the ground should be 1-10 megohms.

The using steps of the anti-static wrists are as follows:

Step 1: Put his hand into the anti-static wrist.

Step 2: Tighten the fastener and ensure that the piece metal on the anti-static wrist is well contacted with the skin.

Step 3: Clamp the alligator clip of the anti-static wrist on the grounding column of the device.

Step 4: Ensure that the anti-static wrist is well-grounded.

The using method of the anti-static wrist is shown in Figure 2-1.
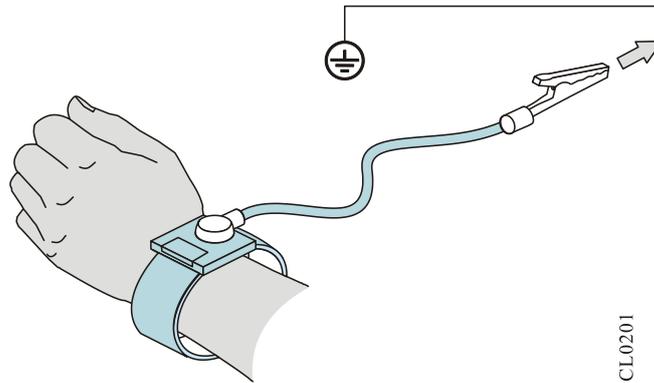
Figure 2-1 Using method diagram of anti-static wrist

2.1.4 Handing Safety

● Before handling or moving the device, unplug all external cables (including power cable).

● If the distance is far when moving the device, it is recommended to use professional mechanical handling tools.

2.1.5 Laser Safety

For the switch with optical interface, please avoid looking directly at the laser beam emitted inside the optical module.

⊗Warning

● Looking directly at the laser beam emitted inside the optical interface may cause damage to your eyes.

2.2 Check Device Running Environment

2.2.1 Check Equipment Room Conditions

To ensure the normal running of the device, take the corresponding measures to meet
the environment requirement of the device running:

● Air conditioning and ventilation system can ensure the normal running temperature
and humidity conditions of the switch. For details, refer to Appendix E1
Environmental Requirements for Computer Room.

● The good grounding is the basis of the switch running and the important guarantee
conditions of preventing lightning and resisting interference. Ensure that grounding
meets the grounding specifications. For details, refer to Appendix F1 Equipment
Grounding Specifications.

● Ensure that there is enough installation space and moving path space.

● Ensure that the cleanness of the equipment room meets the requirement. Do not
place the switch in the environment with lots of dust, such as in the being
renovated passage.

2.2.2 Check Power Supply System

A good power supply system is the basis for the power on and stable operation of the
switch. Because this series of switches are desktop devices and have been configured
with power supply when leaving the factory, you only need to check the power supply
system of the installation site.

Ensure that the power supply system at the installation site is stable and can meet the
requirements of the input mode, rated input voltage and other parameters of the switch
device. Refer to "Appendix E2 Power Condition Requirements" for details.

Note

● For the power consumption data of the switch, see Chapter 1.6 Physical
Parameters.

2.3 Carton Un-packing and Inspection

2.3.1 Unpacking of Device Carton

The desktop switch is packed in cartons. The packing box is composed of cartons, plastic bags, protective pearl cotton and other packaging materials. Unpacking steps are as follows:

Step 1:   Check the carton label and confirm the equipment model.

Step 2:   Use a paper knife to gash the tape along the lid commissure; be careful when using the knife; do not insert too deep, avoiding damaging equipment inside.

Step 3:   Open the carton, take out of the protection EPE, and you can take out the device.

2.3.2 Unpacking Inspection of Equipment

Step 1:   Take out the equipment list.

Step 2:   Check whether the equipment is correct according to the equipment list and equipment label.

Step 3:   Check whether other accessories are complete according to the equipment list.

⚠ Caution

● Please keep the accessories in the accessory box properly to prevent loss.

3 Device Installation

This chapter describes the device installation, containing the following contents:

3.1 Install Device to Cabinet

3.2 Install Device to Desktop

3.3 Ground the Device

3.4 Connect Power Cable

3.5 Check after Installation

3.1 Install Device to Cabinet

This section describes how to install the device to the 19-inch standard cabinet.

3.1.1 Installation Preparations

- NSS5830-56XQFP, NSS5930-56SQFP, NSS5950-32QFP, and NSS5830-54XTQFP series switch is 1U high, and the user can fix the switch through one pair of hanging ears.

- Check the grounding and stability of the cabinet and ensure that there is no obstacle inside and around the cabinet affecting the switch installation.

> **Note**
>
> - The 1U is 44.45mm. Here, U is the abbreviation of RU (Rack Unit).

3.1.2 Install Hanging Ears to Switch

Step 1: When installing the hanging ears to the chassis, the screw holes fixed between the

hanging ears and the switch are aligned with the screw holes on the side panel of the chassis, as shown in Figure 3-1.
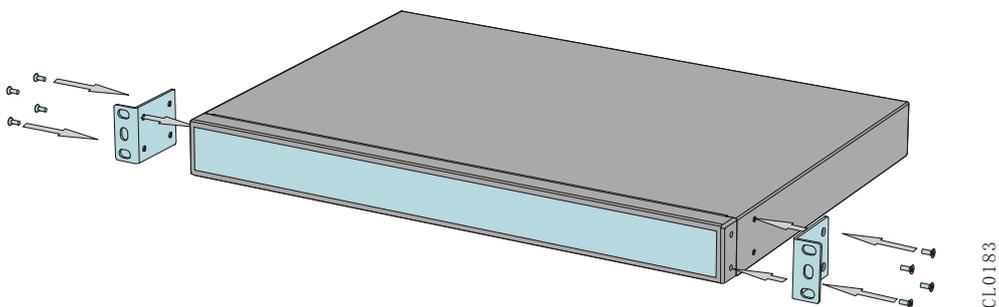
Figure 3-1 Install hanging ears to the switch

Step 2:　　Tighten the screws clockwise to fix the hanging ears to the chassis. After installation is complete, it is shown in Figure 3-2.
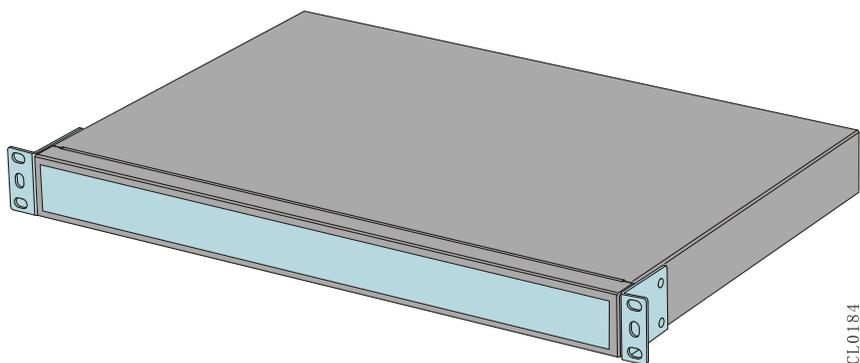
Figure 3-2 The hanging ears are installed

3.1.3　Install Tail Bracket Kits for Cabinet

The rear stock kits for switches can select the rear stock kits for cabinets, which include: two sets of guide rails and two sets of slide grooves, 10 black small countersunk screws of M4*8, and 4 sets of nickel-plated M6*12 cabinet nut kit, available in two lengths.
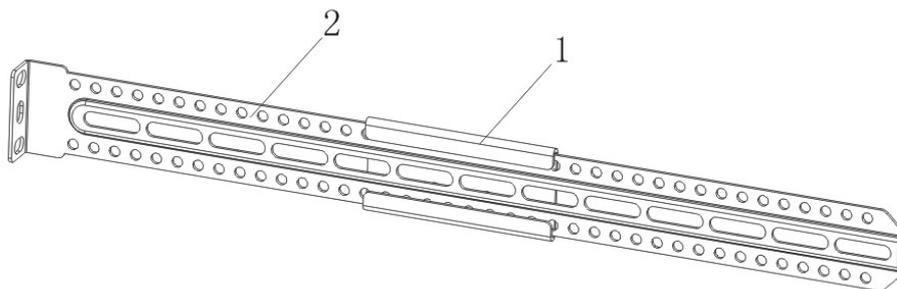
Figure 3-3 The rear stock kits for cabinet

1. Slide groove	2. Guide rail

The only difference between the two stock kits is the length and size of the guide rails. The corresponding relationship with the depth of the cabinet is as follows:

Length of rear stock kits for cabinet	Applicable Device	Applicable Cabinet	Installation Location
420mm	Applicable to new type 1U device with a depth of 420mm and above	19-inch standard cabinet with a depth of 800mm, 1000mm	Post installation on the rear of the cabinet
620mm	Applicable to new type 1U device with a depth of 420mm and above	19-inch standard cabinet with a depth of 1200mm	Post installation on the rear of the cabinet

Before installation, make sure that the rear stock kit includes: two guide rails and two slide slots; 4 square nuts, 4 cabinet screws; 10 countersunk screws.

Step 1: First install the slide groove on the device chassis: on the side of the rear of the chassis, attach the slide groove flat and align the installation holes of the slide groove with the corresponding screw holes on the side of the chassis; then tighten them one by one with countersunk screws, and the screw heads will not highlight slide groove surface. A slide groove is installed on the left and right sides of the device. (There are 8 countersunk screws), as shown in the following figure:
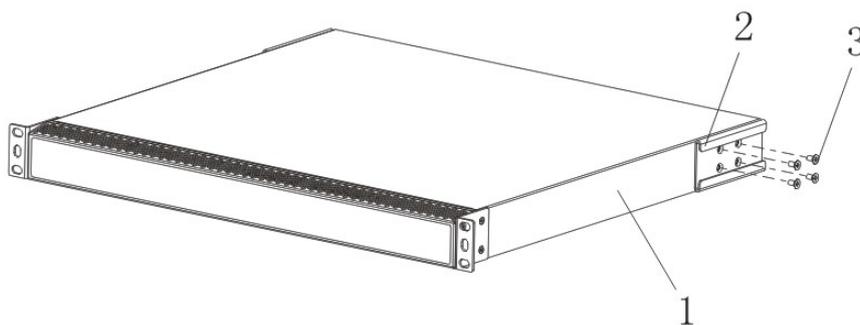
Figure 3-4 Install the slide groove

| 1. Device | 2. Slide groove | 3. Countersunk screws |

Step 2: Install square nuts in the holes of the rear column of the cabinet (two on the left and two on each side): First, determine the location where the device needs to be installed, as shown in the figure below:
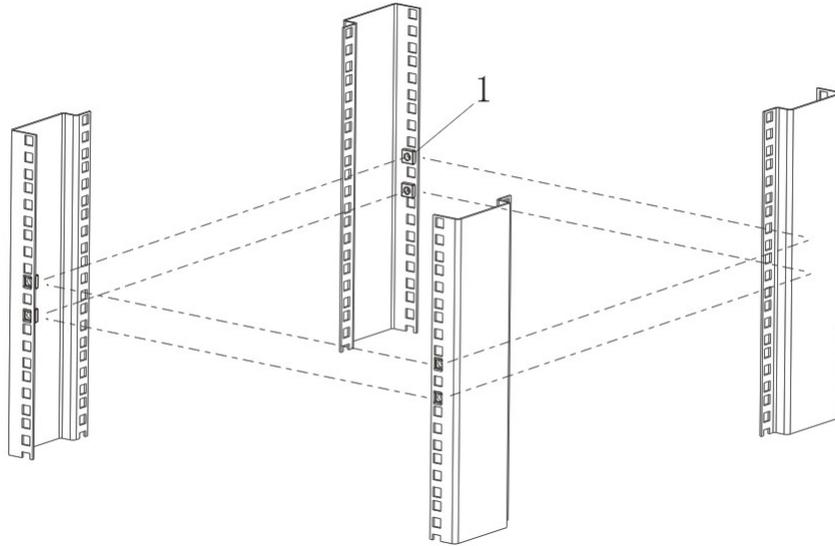
Figure 3-5 Install square nuts

1. Square nuts

Step 3: Install the guide rail at the corresponding position of the square nut: Align the installation hole of the guide rail with the square nut of the rear column of the cabinet, and tighten them with the cabinet screws. Note that the height of the guide rails on both sides is the same.
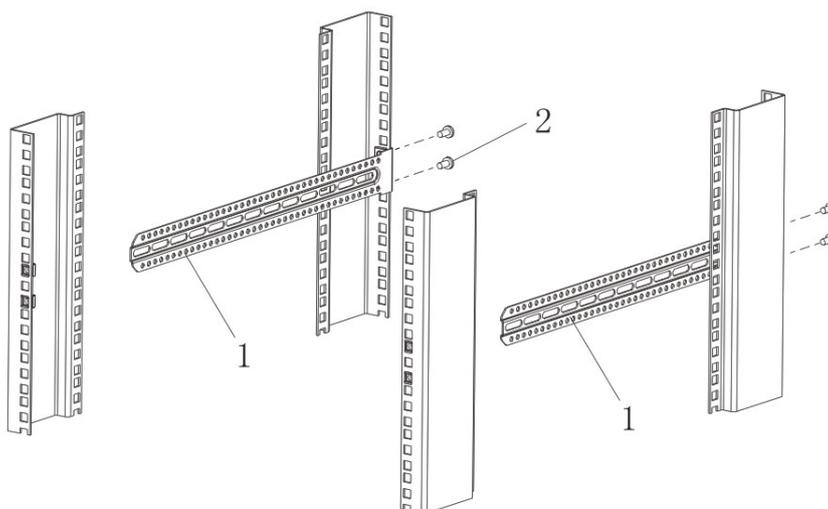
Figure 3-6 Install the guide rail

1. Guide rail	2. Cabinet screw

Step 4: Install the device: Hold the bottom of the device with your hands, and adjust the chassis so that the slide grooves on both sides are aligned with the guide rails on the cabinet column. Then move the device so that the guide rail passes through the slide groove until the mounting ear of the device is close to the front column of the cabinet, as shown in the following figure:
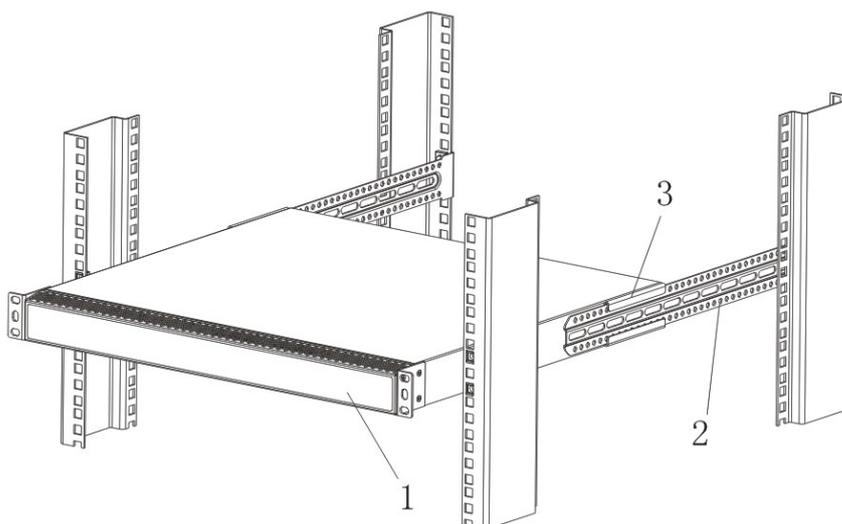
Figure 3-7 Install the device

1. Device	2. Guide rail	3. Slide groove

Step 5: Use the cabinet screws at the device hanging ears and tighten them with the

square nuts on the cabinet columns. The installation of the device on the cabinet is completed, as shown in the following figure:
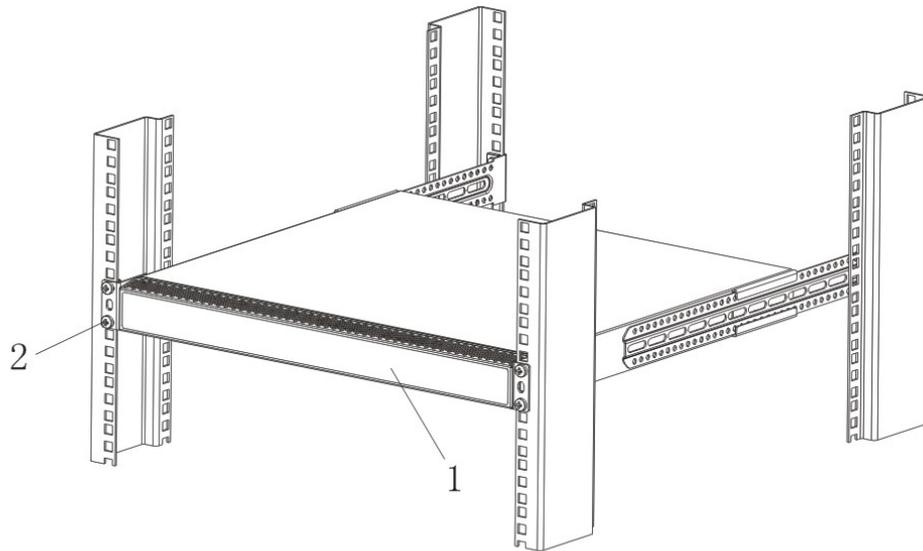
Figure 3-8 The installation is completed

1. Device	2. Cabinet screws

3.1.4 Install the Device to the Cabinet

> ⚠ **Caution**
>
> ● Before installing the device to the cabinet, ensure that the corresponding positions on the cabinet are installed with slide rails (tray), which can support the weight of device and its accessories.

The following is a brief description of the steps to install the device to the cabinet.

Step 1:   Wear anti-static wrist strap and check the grounding and stability of the cabinet.

Step 2:   Compare the position of the floating nut on the square hole strip of the cabinet column with the hanging ears, and mark it with a marking pen.

Step 3:   Install the floating nuts on the marked positions, as shown in Figure 3-9.
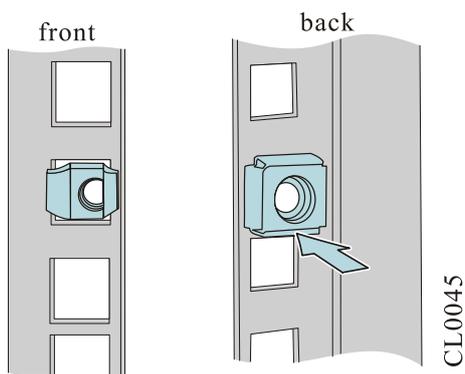
Figure 3-9 Install the floating nut

Step 4:   Fix the hanging ears on both sides of the switch with screws. For the installation method, see "3.1.2 Install Hanging Ears to Switch".

Step 5:   According to the actual situation and the installation position of the hanging ears, move the switch along the cabinet to the appropriate position.

Step 6:   Fix the switch to the square hole strip of the cabinet column through the hanging ears with the screws meeting the installation dimension requirements of the cabinet (the switch is not attached with the cabinet screws, the screws are provided by the cabinet manufacturer, the surface is rust proof and matched with the floating nut). The installation method is shown in Figure 3-10. Pay attention to ensure that the position is horizontal and firm.
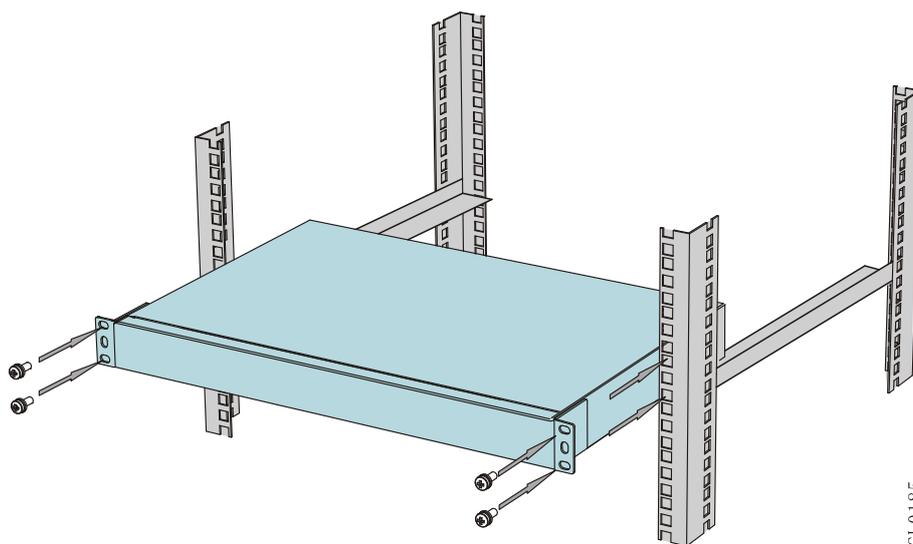
Figure 3-10 Install the host to the cabinet

3.1.5   Check Installation

After the switch is installed to the cabinet, check the installation according to the

following items and ensure all the items are normal.

- Confirm that the switch is installed in the correct position.

- Confirm that the switch hanging ears are well fastened to the cabinet.

- Confirm that enough space is reserved around the switch for heat dissipation.

3.2 Install Device to Desktop

Place the switch on a clean workbench. This operation is relatively simple. The installation process is as follows:

Step 1:   Carefully invert the switch. Check whether the footpads in the circular stamping area on the chassis base plate are all in good condition. If they are in good condition, skip to step 3; otherwise, proceed to step 2.

Step 2:   Clean the circular stamping area on the chassis bottom plate with a dry soft cloth to ensure that there is no oil or dust absorption. Remove the foot pad from the adhesive paper and paste it into a circular stamping area on the chassis bottom plate without foot pad, as shown in Figure 3-5.

CL0273
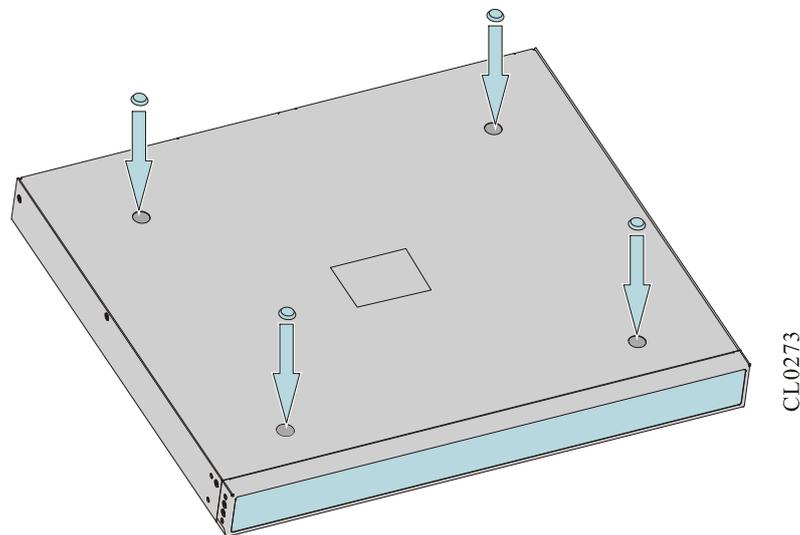
Figure 3-11 Install the rubber foot pad of 1U device

Step 3:   Place the switch in the front position on the workbench.

⚠ Caution

- Ensure the stability and good grounding of the workbench.

- 10 cm heat dissipation space shall be reserved around the switch.

- Do not place heavy objects on the switch.

3.3 Ground the Device

Generally, there is the grounding bar on the cabinet and we can connect the ground cable of the switch to the grounding bar.

Note

- Please use the ground cable carried by the switch.

The steps of installing the ground cable are as follows:

Step 1: Remove the ground screw on the chassis of the switch.

Step 2: Bind the wiring terminal of the ground cable carried by the switch to the ground screw of the chassis.

Step 3: Install the ground screw with the ground cable to the grounding hole and tighten it.

Step 4: Use the same method to install the other side of the ground cable to the grounding terminal of the cabinet.
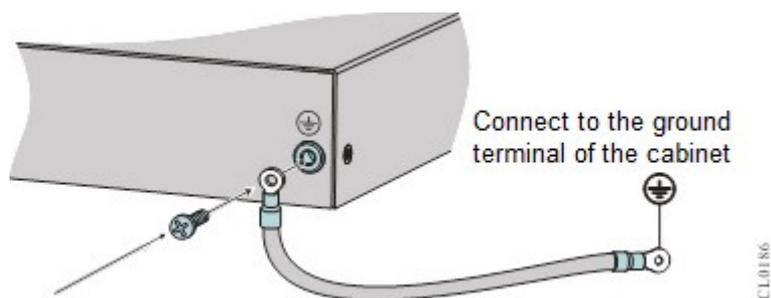
Figure 3-12 Connect the ground cable

Caution

- If there is no appropriate grounding point on the cabinet, we also can connect the grounding cable of the switch to other grounding bar of the installation place.

- Fire hose and lightning rod grounding of the building are not the proper grounding

location; the grounding cable of the switch should be connected to the engineering grounding of the equipment room.

⊗Warning

● For the switch and human security, the switch must be grounded well. The resistance between the device chassis and the ground should be less than1 ohm.

3.4 Connect Power Cable

3.4.1 Installation Preparations

Considering the lightning protection requirements of the device, it is suggested that the AC power introduced into the device should pass through the external lightning protection device.

3.4.2 Connect AC Power Cable

When using the AD550M-HV0B and AD800M-HV0B power supplies, use the AC power cord, and the connection steps are as follows:

Step 1: Connect the one side of the AC power cable to the AC power interface on the rear panel of the switch chassis, as shown in Figure 3-10.

Connected to device power input port   Connected to socket
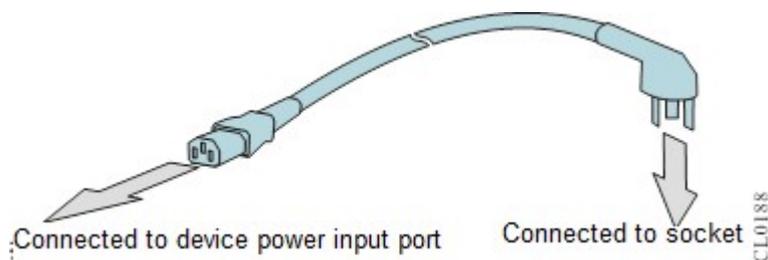
Figure 3-13 Connect the AC power cable

Step 2: Insert the other end of the AC power cable into the socket of the external AC power supply system.

3.4.3 Connect DC Power Cable

When using the DD800M-5V0B power supply, use the DC power cable, and the

connection steps are as follows:

Step 1: Install the other end of the DC power cable to the DC power connector on the rear panel of the switch chassis, as shown in Figure 3-14.

Step 2: Install the three-wire independent installation end of the DC power cable to the socket of the external DC power supply system with screws. The yellow-green wire corresponds to GND, the black wire corresponds to the negative pole of the power supply, and the red wire corresponds to the positive pole of the power supply.

接设备电源输入口   接直流电源输出口
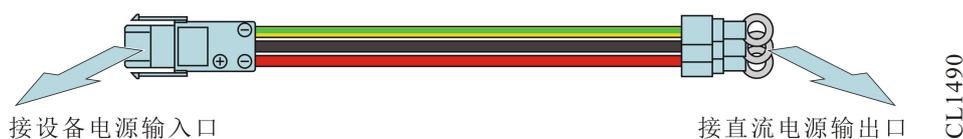
Figure 3-14 Connect the DC power cable

3.5 Check after Installation

- Confirm that the power modules are installed fixedly.

- Confirm that the power cables are connected correctly.

- Confirm that the ground wire connection is correct.

- Confirm that the fan module is properly installed.

- Confirm whether the device is placed stably after installation.

⊗Warning

- Before checking whether the installation is correct, please make sure to turn off the power to avoid personal injury and component damage caused by wrong connection.

4 Power on and Run Device

The chapter describes the related operations of powering on and running the device, containing the following contents:

4.1 Log into Device

4.2 Access Network

4.3 Hardware Management

4.1 Log into Device

When logging into the device for the first time, you can only log in via Console port. This is the most basic mode of logging into the device and also the basis of configuring other login modes.

4.1.1 Connect Configuration Cables

The rear panel of NSS5830-56XQFP, NSS5930-56SQFP, NSS5950-32QFP, and NSS5830-54XTQFP switches provides an RJ45 serial port (EIA/TIA-232). Through this interface, the user can use a PC (or laptop) with an RS-232 serial port to configure the switch.

To configure the switch through a PC (or laptop), please follow the steps below to connect:

Step 1: Prepare one PC (or laptop). Confirm that the PC (or laptop) has the RS-232 serial port.

Step 2: After confirming that the switch or PC (or laptop) is powered off, connect the RS-232 serial port (or USB interface) of the PC (or laptop) with the RJ45 serial port of the switch via the configuration cable. For details about the Console cables, refer to Appendix D1 Console Port Cable.
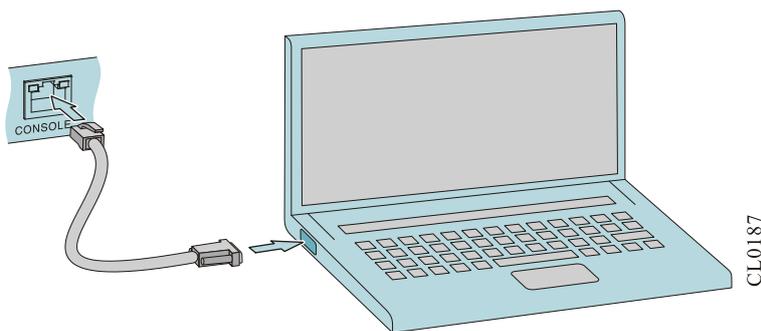
Figure 4-1 Connect the switch and PC via RS-232 serial port

Note

- The configuration cable used by RS-232 serial port (delivered with the device) is one eight-core unshielded cable. One side is the crimped RJ-45 plug, inserted to the Console port of the switch; the other side is one DB-9 (female), inserted to the nine-core (male) serial port socket of the PC (or laptop), as shown in Figure 4-1.

Caution

- When the PC (or laptop) is connected with the switch via the configuration cable, first connect the DB-9 side of the configuration cable to the PC and then connect the RJ-45 side of the configuration cable to the Console port of the switch.

- When removing the configuration cable that connect the PC (or laptop) with the switch, first remove the RJ-45 side of the configuration cable, and then remove the DB-9 side of the configuration cable.

4.1.2 Set PC HyperTerminal Parameters

The following takes running Windows XP HyperTerminal on the PC (or laptop) as an example to describe the setting of the serial interface parameters of the PC (or laptop).

Step 1: Enable the PC (or laptop), select **Start** > **All Programs** > **Accessories** > **Communication** > **HyperTerminal**, and click to set up the new connection. If it is the first time to set the Hyperterminal, the system displays the interface of **Location Information**, as shown in Figure 4-2. Fill in according to the red indication in the fiugre and click **OK**.
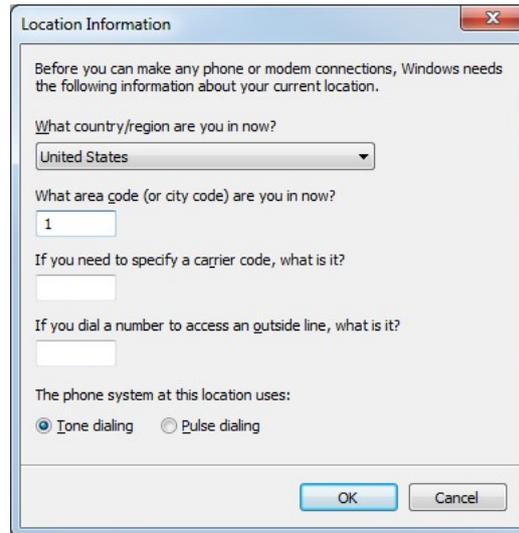
Figure 4-2 "Location information" interface

Step 2:   Display the following **Telephone and Modem** interface and click **OK**.
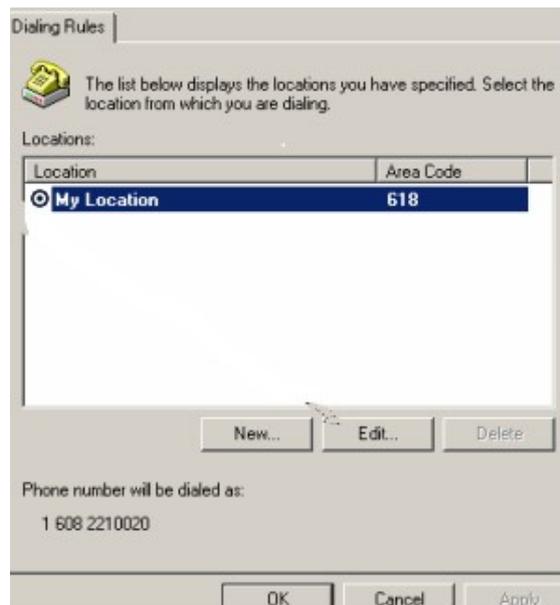
Figure 4-3 The **Telephone and Modem** interface

Step 3:   Display the following **Connection Description** interface, and fill in the name in **Name (N)**, such as test, and click **OK**.
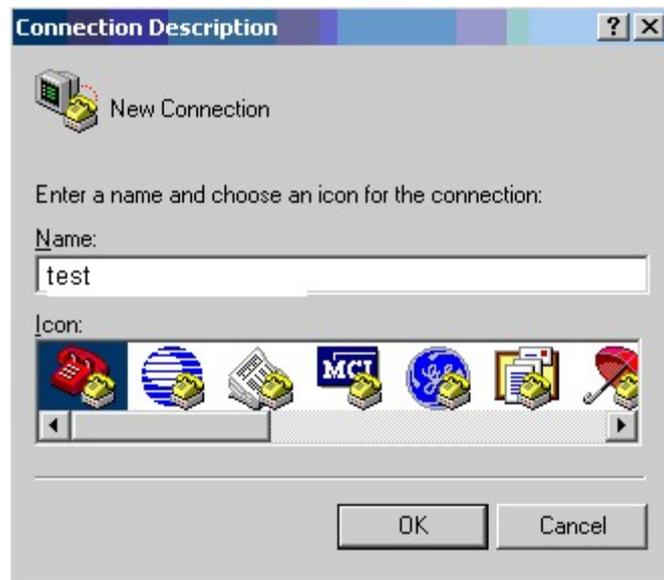
Figure 4-4 Connection description interface of Hyperterminal

Step 4: Display the following **Connect to** interface, select the serial interface used by the connection in the **Connect using**, and click **OK**.

Figure 4-5 Hyperterminal connection uses the serial port setting

Step 5: Display the following **COM1 Attributes** interface, set the baud rate as 9600, data bit as 8, parity check as none, stop bit as 1, and data flow control as none, and then click **OK**.
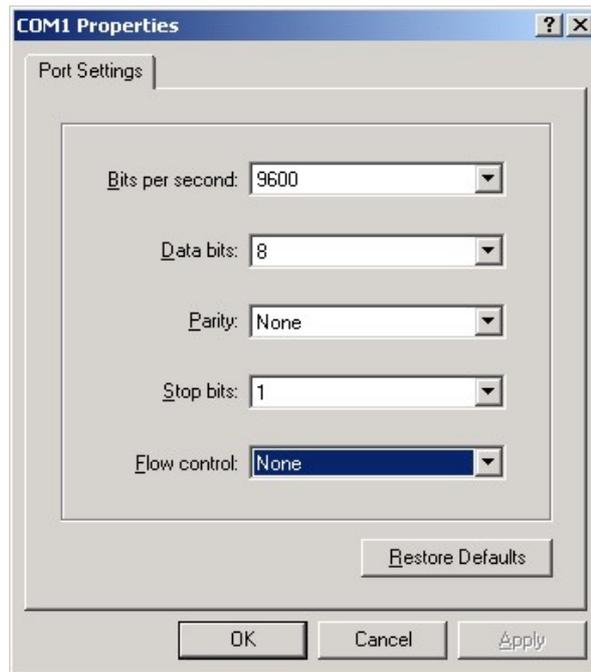
Figure 4-6 Serial port parameter setting

Step 6:   Display the following **test-HyperTerminal** interface, and click **Attributes**.

Figure 4-7 "HyperTerminal" window

Step 7:   Display the following "**test properties**" interface, click **Setting**, select VT100 in **Terminal emulation**, and click **OK**.
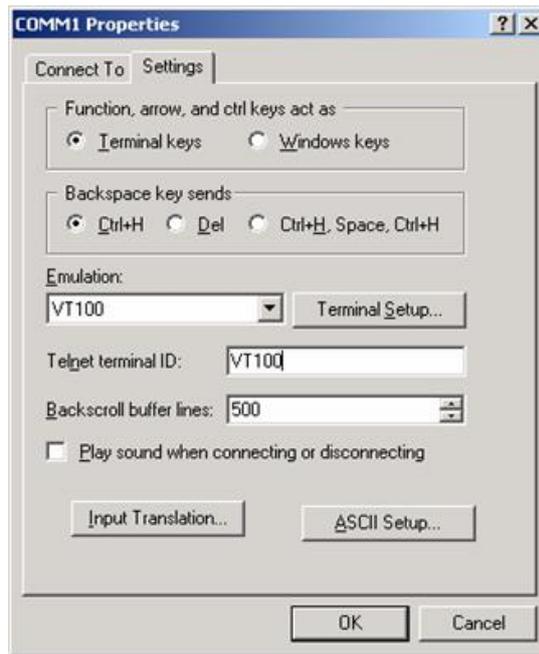
Figure 4-8 Terminal emulation settings in the property settings window

Step 8:   Display the following **test-HyperTerminal** interface, press **Enter** at the blank place, and the serial port displays the print information. The setting of the HyperTerminal is complete.
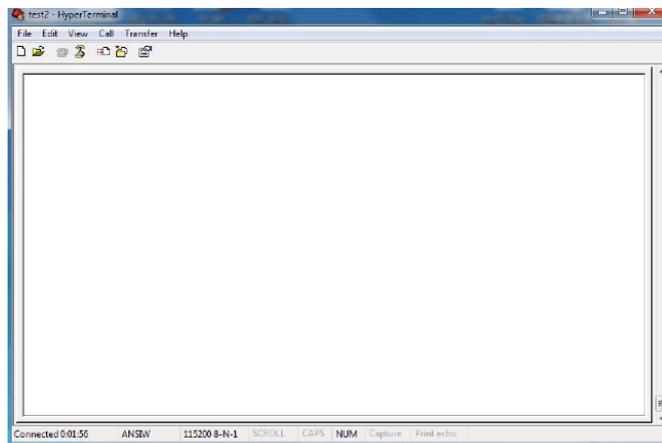
Figure 4-9 **test-Hyperterminal** interface after setting

4.1.3 **Power on and Start**

Check before Power on

Check the switch before powering on:

● The interface cables, power cables, and PEs are connected correctly.

● Power supply voltage meets the power requirement of the device. For details, refer

to Appendix E2 Power Condition Requirements.

- The configuration cable is connected correctly; the PC for configuration is enabled; the setting of the terminal parameters is complete.

⚠ Caution

- Before the switch is powered on, confirm the position of the power switch of the equipment room where the switch is located, so as to cut off the power in time when there is an accident.

Power on Switch

Please power on in the following order:

- Turn on the power supply switch of the switch.

After the switch is powered on and starts, the configuration terminal will display some basic manufacturing information of the switch, such as:

```
MyPower (R) Operating System Software
NSS5830 system image file (dc0: sp43-g-9.8.0(98)(T)(v3.11.0.1)-dbg.pck), version 9.8.0(98)(integrity), Compiled on Nov 24 2021, 12:14:08
Copyright (C) 2021 Maipu Communication Technology Co.,Ltd.All Rights Reserved.

System ID              : ccd80123ffc3
Hardware Model         : NSS5830-56XQFP(V1)
Hardware Version       : 001(Hotswap Unsupported)
MPU CPLD Version       : 105
Bootloader Version   : 1.0.0.15
Software Version     : 9.8.0(98)(integrity)
Software Image File  : dc0: sp43-g-9.8.0(98)(T)(v3.11.0.1)-dbg.pck

Compiled               : Nov 24 2021, 12:14:08
```

✎ Note

- The above displayed information on the start interface is just for reference. Please refer to the actual display.

4.1.4 Check after Power on

After the switch is powered on, it is better to conduct the following checks to ensure the normal operation of the following configuration:

- After the switch is powered on, the ventilation system works and check whether there is the sound of the fan rotation and whether there is air discharged from the ventilation holes of the switch.

- View whether the indicators on the switch are normal. For the details, refer to Appendix C Description of Device Indicators.

4.2 Access Network

4.2.1 Access Network via Fiber

For the SFP+/SFP28 and LC-type QSFP28 optical interfaces of the switch, you can use optical fiber to connect to the network. Before connecting the optical fiber, you need to install the optical module on the switch, and then insert the optical fiber connector into the optical module. The appearance of common LC fiber optic connectors is shown in Figure 4-10.
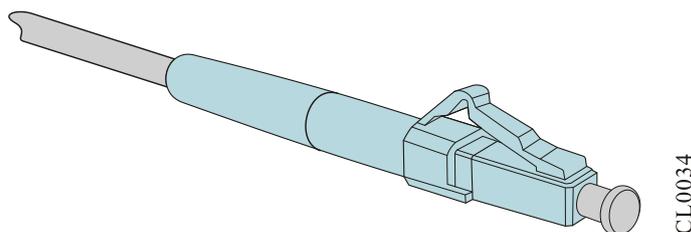
Figure 4-10 Appearance of the LC fiber connector

Install Optical Module

The installation process of SFP+/SFP28 and LC-type QSFP28 modules is the same. The following description takes the SFP+ module as an example. Proceed as follows:

⚠ **Caution**

- When installing the SFP module, do not use the hands to touch the gold-finger of the SFP module directly.

- The TX wire should be connected to the RX wire of the peer device; the RX wire should be connected to the TX wire of the peer device.

Step 1: Wear the anti-static wrist and confirm that the anti-static wrist is well contacted with the skin and well-grounded.

Step 2: Pull out the dust plug on the optical port of the switch, as shown in Figure 4-11.

Step 3: Get the SFP+ module out from the packing box. The diagram of the SFP+ module is as shown in Figure 4-12 Use the hands to hold the two sides of the SFP+ module and push it into the interface slot of the switch horizontally until the SFP+ module is close-contact with the slot (you can feel that the shrapnel at the top and bottom of the SFP+ module stuck the interface slot), as shown in Figure 4-13.
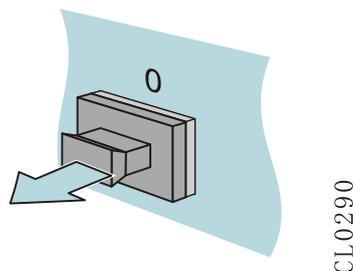
Figure 4-11 Pull out the dust plug
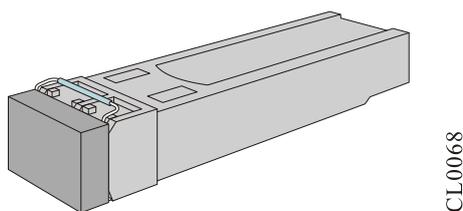
Figure 4-12 SFP+ module
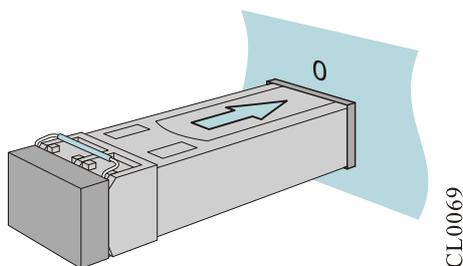
Figure 4-13 SFP+ module

⚠ **Caution**

- Before installing the fiber, do not pull out the protective rubber stopper on the SFP+ module.

- For the unused optical port, do not unplug the dust plug on the optical port of the switch.

- It is recommended not to insert the SFP module with the fiber into the interface slot

directly. Please install after unplugging the fiber.

● The TX wire should connect to the RX wire of the peer device; the RX wire should connected to the TX wire of the peer device.

Connect Fiber on Optical Module

Step 1:   Wear the anti-static wrist and confirm that the anti-static wrist is well contacted with the skin and well-grounded.

Step 2:   Remove the dust cap of the fiber connector, as shown in Figure 4-14.
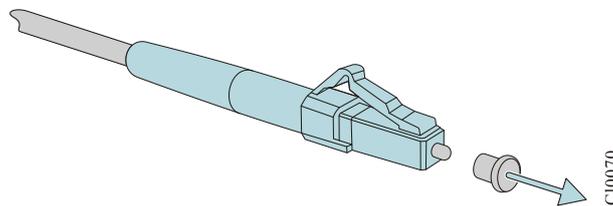
Figure 4-14 Remove the dust cap of the fiber

Step 3:   Remove the dust plug of the SFP+ module, as shown in Figure 4-15.
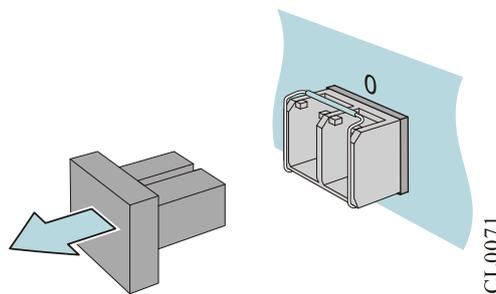
Figure 4-15 Remove the dust plug of the SFP+ module

Step 4:   Insert the prepared fibers to the ports of the optical module in order, as shown in Figure 4-16.
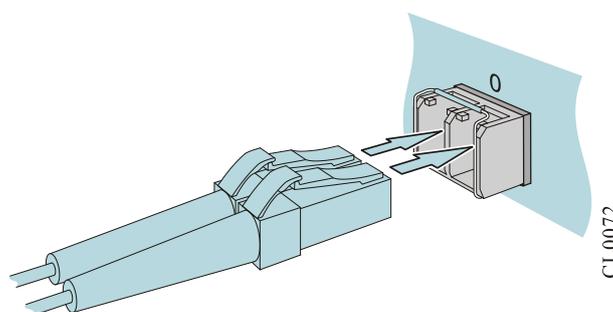
Figure 4-16 Connect the fiber

Step 5: Connect the other side of the fiber to the peer device.

⚠ Caution

- When using the uni-directional dual fiber to connect the optical module, pay attention to make the receiving and sending signals of the modules at the two sides cross-connected.

- If the fiber connector ferrule has dust, please use the air-laid paper to stick the absolute alcohol and clean the face of the fiber connector ferrule.

4.2.2 Access Network through MPO-type Optical Fiber

For the MPO-type QSFP28 optical interface of the switch, you can use the MPO type optical fiber to connect to the network. Before connecting the optical fiber, you need to install the optical module on the switch, and then insert the optical fiber connector into the optical module. The appearance of commonly used MPO fiber optic connectors is shown in the figure below.
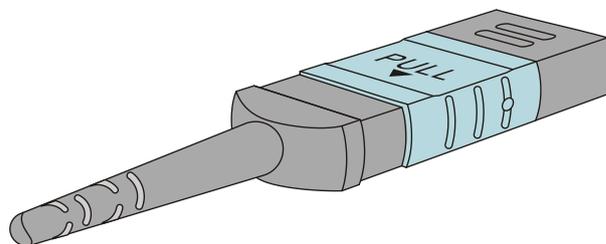
Figure 4-17 Appearance of MPO fiber optic connector

Install Optical Module

The steps of installing the MPO QSFP28 module are as follows:

⚠ Caution

- During the process of installing the QSFP28 module, please do not directly touch the gold finger part of the QSFP28 module with your hands.

Step 1: Wear an anti-static wrist, and confirm that the anti-static wrist is in good contact with the

---

skin and grounded reliably.

Step 2:   Take out the QSFP28 module from the packing box, and the diagram of the QSFP28 module is shown in Figure 4-18. Hold both sides of the QSFP28 module with your hands, and push it horizontally into the interface slot of the switch until the QSFP28 module is in close contact with the slot (you can feel that the shrapnels on the top and bottom of the QSFP28 module are stuck in the interface slot during the insertion process), as shown in Figure 4- 19.
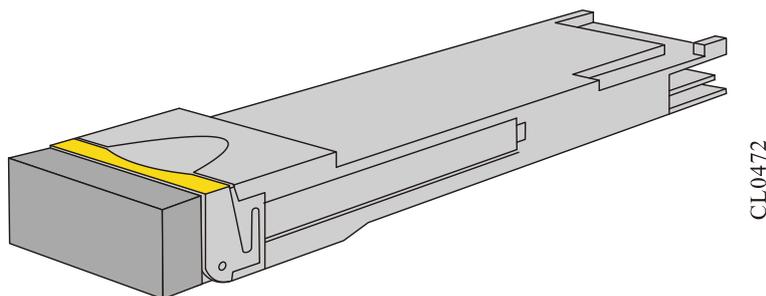
Figure 4-18 QSFP28 module
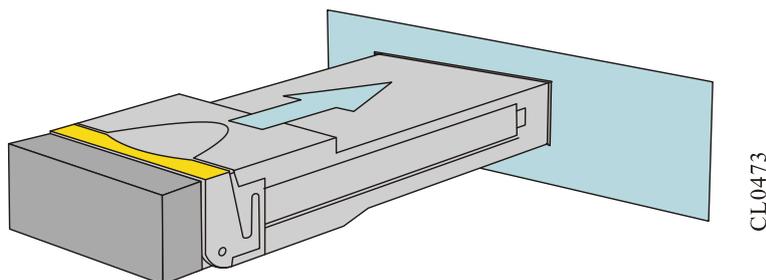
Figure 4-19 Install the QSFP28 module

⚠ Caution

● Before installing the optical fiber, please do not pull out the protective rubber plug on the QSFP28 module.

● It is recommended that you do not directly insert the QSFP28 module with optical fiber inserted into the interface slot, please pull out the optical fiber before installing.

Connect Fiber on the Optical Module

Step 1:   Wear an anti-static wrist, and confirm that the anti-static wrist is in good contact with the skin and grounded reliably.

Step 2: Remove the dust cap from the fiber connector.
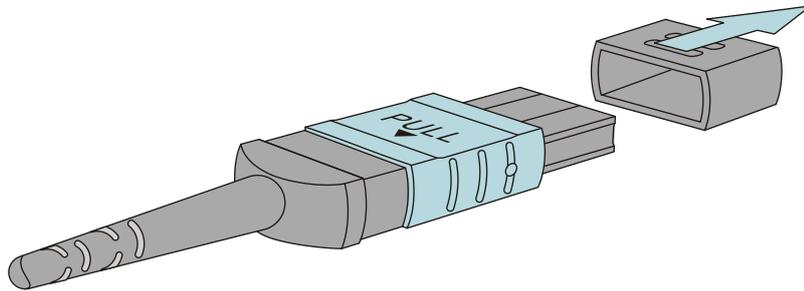
Figure 4-20 Remove the dust cap of the fiber

Step 3: Remove the dust cap of the QSFP28 module.
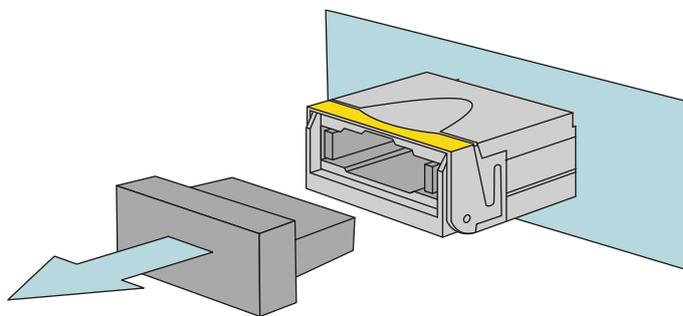
Figure 4-21 Remove the dust cap of the QSFP28 module

Step 4: Insert the prepared optical fibers into the ports of the optical module in sequence.
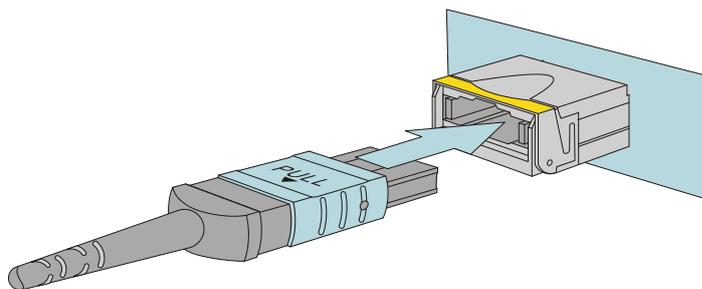
Figure 4-22 Connect the fiber

Step 5: Connect the other end of the fiber to the peer device.

⚠ Caution

- If there is dust on the ferrule of the fiber connector, please wipe the end face of the ferrule of the fiber connector with a dust-free paper dipped in absolute alcohol.

4.3 Hardware Management

This section describes various hardware management functions of the device. With the function interfaces, the user can conveniently view the software and hardware version information of the device, as well as the work status information of the hardware modules.

4.3.1 View Software and Hardware Version Information of Switch

You can use the **show version** command to view the software and hardware version information, including system serial number, hardware general information, hardware version, hardware CPLD version, bootloader version, software version and other information. For example:

sw_bnss05#show version

MyPower (R) Operating System Software

NSS5830 system image file (dc0: sp43-g-9.8.0(98)(T)(v3.11.0.1)-dbg.pck), version 9.8.0(98)(integrity), Compiled on Nov 24 2021, 12:14:08

Copyright (C) 2021 Maipu Communication Technology Co.,Ltd.All Rights Reserved.

NSS5830 Version Information

System ID	: ccd80123ffc3
Hardware Model	: NSS5830-56XQFP(V1)
Hardware Version	: 001(Hotswap Unsupported)
MPU CPLD Version	: 105
Bootloader Version	: 1.0.0.15
Software Version	: 9.8.0(98)(integrity)
Software Image File	: dc0: sp43-g-9.8.0(98)(T)(v3.11.0.1)-dbg.pck
Compiled	: Nov 24 2021, 12:14:08
Package File	: sp43-g-9.7.6.0(12)(T)(v3.9.0.255)-dbg-001.pkg

Table 4-1 Key field description of the information displayed via **show version**

Field	Description
System ID	Switch device number, provided by the equipment supplier, such as: ccd80123ffc3
Hardware Model	The hardware information, such as NSS5830-56XQFP(V1)
Hardware Version	PCB version, such as 001

Field	Description
MPU CPLD Version	Hardware CPLD version, such as 105
Bootloader Version	Bootloader version, such as 1.0.0.15
Software Version	Software version, such as 9.8.0(98)(integrity)
Software Image File	The software mirror file, such as dc0: sp43-g-9.8.0(98)(T)(v3.11.0.1)-dbg.pck
Compiled	Compiling time of the version, such as Nov 24 2021, 12:14:08

4.3.2 View Power Module Status Information

You can use the **show system power** command to view information about the power supply used on the device, including: power supply presence information, status information, alarm information, serial number, statistics on the times of plugging and unplugging the power module, and statistics on the number of errors during plugging and unplugging, etc. For example:

```
sw_bnss05#show system power
 System Power Information(Power 1 - ONLINE)
 -------------------------------------------------------------
                Power Name     :    AD550M-HV0B(V1)
                    Status     :    Normal
         Last-Alarm :    Normal
         Serial No.  :    N/A
         Description  :
 -------------------------------------------------------------
STATISTICS:            1 IN, 0 OUT, 0 IERR, 0 OERR


 System Power Information(Power 2 - OFFLINE)
 -------------------------------------------------------------
STATISTICS:            0 IN, 0 OUT, 0 IERR, 0 OERR
```

Table 4-2 Key field description of the information displayed via **show system power**

Field	Description
System Power Information	The power online information, such as Power 1 - ONLINE
Power name	The name of the power module, such as AD550M-HV0B(V1)

Field	Description
Status	The work status of the power module, such as Normal ● Normal: The power module works normally ● Abnormal: The power module works abnormally
Last-Alarm	The alarm information of the power module, such as Normal ● Normal: The power module has no alarm information ● Abnormal: The power module has alarm information
Serial No.	Power module serial number, provided by the device supplier
Description	The description information field, configured by the user
STATISTICS	The swapping times of the power module and the error swapping times; for example 1 IN, 0 IERR, 0 OUT, 0 OERR indicates that the power module is correctly inserted for once. Here: IN: The physical inserting times of the power module, such as 1 IERR: The physical error inserting times, such as 0 OUT: The physical pull-out times, such as 0 OERR: The physical error pull-out times, such as 0

4.3.3 View System Environment Temperature Information

You can use the **show environment** command to view the temperature information of the cards on the device card and the main chips on the cards.

```
switch#show environment
        System CPU temperature is 49 C
        System switch temperature is 59 C
```

4.3.4 View Fan Status Information

You can view the relevant information of the fans used on the device through the **show system fan** command, including: the online information of the fans, fan speed, fan working status, statistics of the swapping times of the fan modules, and the statistics of the errors in the swapping process, for example:

```
sw_bnss05#show system fan
 System FAN Information(Fan 1 - ONLINE)
 ---------------------------------------------------------
                 Fan Name:    FAN-01E-01B
                   Status:    normal
              Description:    N/A
               Speed Rate:    43%
 ---------------------------------------------------------
 STATISTICS:              1 IN, 0 OUT, 0 IERR, 0 OERR


 System FAN Information(Fan 2 - ONLINE)
 ---------------------------------------------------------
                 Fan Name:    FAN-01E-01B
                   Status:    normal
              Description:    N/A
               Speed Rate:    43%
 ---------------------------------------------------------
 STATISTICS:              1 IN, 0 OUT, 0 IERR, 0 OERR


 System FAN Information(Fan 3 - OFFLINE)
 ---------------------------------------------------------
                 Fan Name:    FAN-01E-01B
                   Status:    normal
              Description:    N/A
               Speed Rate:    43%
 ---------------------------------------------------------
 STATISTICS:              0 IN, 0 OUT, 0 IERR, 0 OERR


 System FAN Information(Fan 4 - ONLINE)
 ---------------------------------------------------------
                 Fan Name:    FAN-01E-01B
                   Status:    normal
              Description:    N/A
               Speed Rate:    43%
 ---------------------------------------------------------
 STATISTICS:              1 IN, 0 OUT, 0 IERR, 0 OERR


 System FAN Information(Fan 5 - OFFLINE)
 ---------------------------------------------------------
                 Fan Name:    FAN-01E-01B
                   Status:    normal
              Description:    N/A
               Speed Rate:    43%
 ---------------------------------------------------------
 STATISTICS:              0 IN, 0 OUT, 0 IERR, 0 OERR
```

Table 4-3 Key field description of the information displayed via **show system fan**

Field	Description

Field	Description
System FAN Information	Fan online information, such as Fan 1 - ONLINE
CardName	The fan name (not concerned)
Status	Fan work status, such as Normal
Description	The description information field, configured by the user
Speed Rate	Fan speed percentage, such as 30%
STATISTICS	The swapping times of the fan module and the error swapping times; for example 1 IN, 0 IERR, 0 OUT, 0 OERR indicates that the power module is correctly inserted for once. Here: IN: The physical inserting times of the fan, such as 1 IERR: The physical error inserting times, such as 0 OUT: The physical pull-out times, such as 0 OERR: The physical error pull-out times, such as 0

4.3.5   View Swappable Optical Module Information

You can use the **show optical all** command to view the work parameters of all optical modules used on the switch.

```
switch#show optical all
Name              VendorName      LaserWaveLen(nm) Temperature(C)   Voltage(V)    TxPower(dBm)
RxPower(dBm)
--------------------------------------------------------------------------------
 te0/45           Eoptolink       850              11.773438        3.300200      -2.771194
-1.999706
 te0/46           Eoptolink       850              11.335938        3.286100      -2.261405
-2.263598
 te0/47           Eoptolink       850              10.398438        3.290900      -1.907771
-1.685782
 te0/48           Eoptolink       850              11.128906        3.269900      -2.407856
-1.133965
```

Table 4-4 Key field description of the information displayed via **show optical all**

Field	Description
Name	The name of the port where the optical module is located, such as ten0/45
VendorName	The name of the manufacturer of the optical module, such as Eoptolink
LaserWaveLen(nm)	The center wavelength of the sent laser, such as 850nm
Temperature(C)	The temperature of the optical module (only for the optical module supporting the DDMI function), such as 11.773438
Voltage(V)	The work voltage of the optical module (only for the optical module supporting the DDMI function), such as 3.300200
TxPower(dBm)	The sending power of the optical module (only for the optical module supporting the DDMI function), such as -2.771194
RxPower(dBm)	The receiving power of the optical module (only for the optical module supporting the DDMI function), such as -1.999706

Besides, you can use the following commands to view the details of the inserted optical module on one specified port of the device, including the optical module name, interface type, supplier name, optical module model, optical module serial number, the production date of the optical module, the sending power of the optical module and so on. If the used optical module supports the DDMI function, you can use the command to get the internal monitor parameters of the optical module and the corresponding alarm threshold information. The command format: **show optical interface interface-name detail**. For example, view the details of the optical module on port 45 of the front panel.

```
switch# show optical interface tengigabitethernet 0/45 detail
        Device Name          : SFP
        Connector Name       : LC
        Encoding Code        : 64B/66B
        Bit Rate          : 10.300GBd
        Transmit Distance   : 80m(OM2),30m(OM1),300m(OM3)
        Vendor OUI           : 00-00-00
        Vendor Name          : Eoptolink
        Part Number       : EOLP-8596-02
        Revision Number      : 1.0
        Serial Number       : SE2N080081
        Production Date     : 14/02/27(y/m/d)
        Laser WaveLength      : 850(nm)
        Vendor Specific      : 000000000000000000000000000000000000000000000000000000000000000000
        Monitor Parameters   :
```

```
                                                          T - ThresHold, S - Status
        Type             Value        Alarm-High(T/S)    Alarm-Low(T/S)    Warning-High(T/S)
Warning-Low(T/S)
--------------------------------------------------------------------------------
    Temperature(C)     10.347656      90.000000(N)       -10.000000(N)      85.000000(N)
-5.000000(N)
    Voltage(V)          3.310500       3.600000(N)         3.000000(N)       3.500000(N)
3.050000(N)
    Tx  Bias(mA)        5.742000      50.000000(N)         1.000000(N)      40.000000(N)
2.000000(N)
    Rx  Power(dBm)     -4.352156       0.999912(N)       -13.098040(N)       0.000000(N)
-12.097148(N)
    Tx  Power(dBm)     -2.426040       0.999912(N)        -9.299622(N)       0.000000(N)
-8.300319(N)
```

Table 4-5 Key field description of the information displayed via **show optical interface interface-name detail**

Field	Description
Device Name	The optical module name, such as SFP
Connector Name	Optical module connector type, such as LC
Encoding Code	Coding mode of the optical module, such as 64B/66B
Bit Rate	The optical module rate, such as 10.300GBd
Transmit Distance	The transmission distance of the optical module, such as 80m(OM2),30m(OM1),300m(OM3)
Vendor OUI	The supplier ID, such as 00-00-00
Vendor Name	The supplier name, such as Eoptolink
Part Number	The optical module model, such as EOLP-8596-02
Revision Number	The version number of the optical module, such as 1.0
Serial Number	The serial number of the optical module, such as:SE2N080081
Production Date	The production date of the optical module, such as 14/02/27(y/m/d)
Laser WaveLength	The center wavelength of the sent laser, such as 850(nm)
Vendor Specific	The detailed information of the supplier, such as 000000000000000000000000000000000000 000000000000000000000000000000
Monitor Parameters	Monitor parameters (only for the optical module supporting the

Field	Description
	DDMI function)
	● Temperature/Alarm-High/Alarm-low/Warning-High/Warning-Low
	Temperature/alarm upper threshold/alarm lower threshold/warning upper threshold/warning lower threshold
	● Voltage/Alarm-High/Alarm-low/Warning-High/Warning-Low
	Voltage/alarm upper threshold/alarm lower threshold/warning upper threshold/warning lower threshold
	● Tx Bias/Alarm-High/Alarm-low/Warning-High/Warning-Low
	Tx bias current/alarm upper threshold/alarm lower threshold/warning upper threshold/warning lower threshold
	● RxPower /Alarm-High/Alarm-low/Warning-High/Warning-Low
	Rx optical power/alarm upper threshold/alarm lower threshold/warning upper threshold/warning lower threshold
	● TxPower /Alarm-High/Alarm-low/Warning-High/Warning-Low
	Tx optical power/alarm upper threshold/alarm lower threshold/warning upper threshold/warning lower threshold

5 Troubleshooting

This chapter describes how to exclude the installation failure of NSS5830-56XQFP, NSS5930-56SQFP, NSS5950-32QFP, and NSS5830-54XTQFP series switch, and the maintenance of the device modules, including:

5.1 Troubleshooting of Configuration System

5.2 Troubleshooting of Power Module

5.3 Troubleshooting of Fan Module

5.4 Device Maintenance

5.5 De-dust the Device

5.6 Get Technical Support

5.1 Troubleshooting of Configuration System

After the switch is powered on and if the system is normal, the start information is displayed on the configuration terminal. If the configuration system fails, there may be no display or messy code on the configuration terminal.

5.1.1 Troubleshooting about no Display on Terminal

If there is no display information on the configuration terminal after being powered on, check according to the following steps:

Step 1:   Check whether the power system of the switch works normally (observe whether the power indicator on the panel is always on. If not, indicate that the power supply is abnormal.). Refer to "Appemdix C1 System Status Indicator" for specific indicator status.

Step 2:   Check whether the configuration cable is connected to the Console port of the switch.

Step 3:   Check whether the indicator of the switch is working properly. For specific indicator status, refer to "Appendix C2 Interface Status Indicator".

If no problem is found in the above checks, there may be the following reasons:

1. The serial port connected to the configuration cable is wrong (the actual selected serial port is not consistent with the set serial port of the terminal).

2. The setting of the configuration terminal parameters is wrong (the parameter requirement: set the baud rate as 9600, data bit as 8, parity check as none, stop bit as 1, traffic control as none, and select the terminal emulation as VT100). For details, refer to 4.1.2 Set PC HyperTerminal Parameters.

3. There is something wrong with the configuration cable and you can try to change the configuration cable.

5.1.2 Troubleshooting about Messy Code on Terminal

If messy code is displayed on the configuration terminal, maybe the setting of the configuration terminal parameters is wrong (set the baud rate as 9600, data bit as 8, parity check as none, stop bit as 1, traffic control as none, and select the terminal emulation as VT100), and please check correspondingly. For details, refer to 4.1.2 Set PC HyperTerminal Parameters.

5.2 Troubleshooting of Power Module

On the front panel of NSS5830-56XQFP, NSS5930-56SQFP, NSS5950-32QFP, and NSS5830-54XTQFP, there are two power status indicators "PWR1, PWR2" to indicate the working status of the power module. See "Appendix C-1 System Status Indicators" for specific indicator status.

The device uses a modular power supply, and there is a power status indicator "PWR" on the panel of the modular power supply to indicate the status of the modular power supply. For the status of the indicator light, see "Appendix Table C-4 Power module status indicator description".

Step 1:   Observe whether the "PWR" indicator of the faulty power supply is green (indicating that the power supply system is normal), if not, check the power supply system connected to the switch to confirm whether the power supply system is normally powered and whether the voltage is normal.

Step 2:   Check the connection of the power cord on the faulty power supply socket, unplug the power cord again, and confirm whether the power cord is loose.

Step 3:   Pull out the power cord connected to the failed power supply slot, connect it to another power supply slot, and check whether the other power indicator light is on normally. If it can, it means that the original power supply may be damaged; if not, it means that the power cord may be damaged, and then proceed to the next step.

Step 4: Replace the power cord of the failed power supply, and see if the power module light returns to normal. If yes, it can be confirmed that the original power cord connected to the power supply is damaged; if no, please contact the agent or local technical service engineer to deal with it.

5.3 Troubleshooting of Fan Module

The fan module is a mandatory module for NSS5830-56XQFP, NSS5930-56SQFP, NSS5950-32QFP, and NSS5830-54XTQFP switches, and supports hot-swap. NSS5830-56XQFP and NSS5930-56SQFP have 5 fan slots, and a maximum of 5 fan modules can be configured to meet 3+1 or 3+2 fan redundancy backup. The rear panel of the NSS5830-54XTQFP switch provides 5 fan slots and 5 fan modules as standard. NSS5950-32QFP has 6 fan slots, and can be configured with up to 6 fan modules to meet 4+1 or 4+2 fan redundancy backup.

Use the **show system fan** command to view the status of each fan through the Status field. If Abnormal is displayed, it means that the fan module is abnormal. Please refer to the following steps for troubleshooting:

Step 1: If the status of all fan modules is displayed as Abnormal, please confirm whether the power module is working normally. For details, see "5.2 Power Module Troubleshooting".

Step 2: Check whether the air outlet and air inlet of the chassis are blocked by foreign objects. If there are foreign objects, please clean them to ensure the smooth flow of the air duct.

Step 3: Check whether the fan module is properly installed. You can unplug the fan module, plug it back in, and see if the fan status returns to normal.

Step 4: You can try to install the faulty fan module into another fan slot to see if it can work normally. If so, the original fan slot may be damaged. If not, proceed to the next step.

Step 5: If possible, try to replace the fan module and check whether the replaced fan module can work normally. If yes, it means the original fan module is damaged.

If the fault still cannot be located through the above steps, please contact the agent or local technical service engineer for processing.

5.4 Device Maintenance

Device maintenance is mainly reflected in module replacement, including: Power module, fan module and pluggable optical module.

Caution

- Please place the replaced hardware module properly. It is recommended to put it on an anti-static bag or in a packing box.

5.4.1 Replace Power module

Preparations before Replacement

Step 1: Wear an anti-static wrist, and confirm that the anti-static wrist is reliably grounded.

Step 2: Disconnect the power cable from the power module.

Caution

- The power module supports hot swap, and the power supply can be replaced during operation, please pay attention to ensure safety.

- Do not touch any terminals that are marked with live signs or may be live to avoid the risk of electric shock.

Replace Power Module

Six fan slots, a maximum of 6 fan modules can be configured to meet 4+2 fan redundancy backup. The steps to replace the switch module power supply are as follows:

Step 1: Push the small clip on the side of the AC cable hole toward the power fan, and at the same time, pull the handle to pull out the power module.

Step 2: Put the removed power module on an antistatic mat or in a packing box.
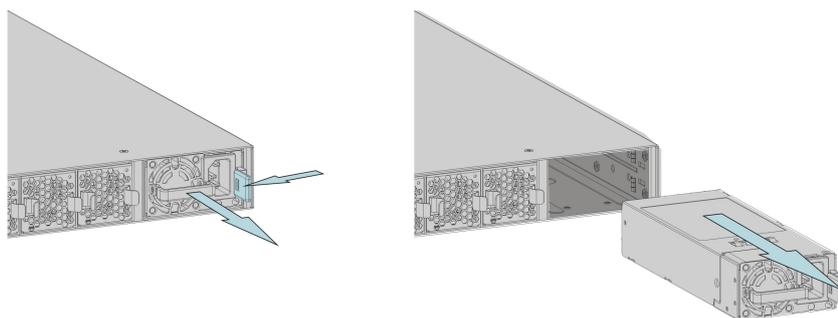
Figure 5-1 Pull out the power module

Step 3: Push the other power module slowly and horizontally along the guide slot until the rear end of the power module is in good contact with the motherboard slot.
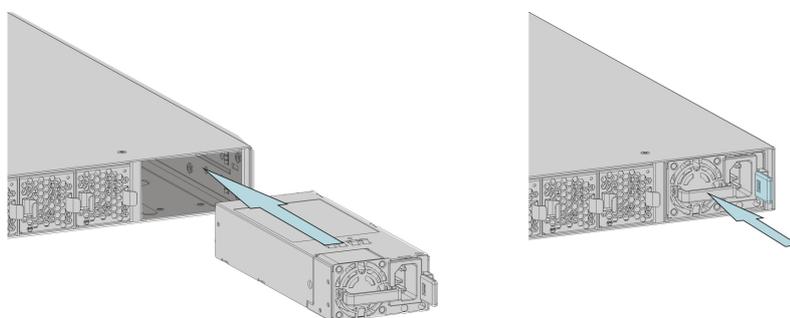
Figure 5-2 Insert the power module

5.4.2 Replace Fan Module

⚠ **Caution**

● Do not touch any exposed wires, terminals and parts marked with dangerous voltage signs in the product, so as not to cause injury to the human body.

● The fan module supports hot-swapping. If the fan module is replaced while the switch is working, do not pull out the replaced fan module from the chassis, and wait for the fan to stop before pulling it out. At the same time, considering the possibility that the fan may still be running, it is strictly forbidden to put your hands into the fan module to avoid injury.

● Before replacing, please prepare a new fan module in advance, and after uninstalling the fan module in the working state of the switch, you need to install a new fan module in time to ensure the normal use of the switch.

The fan modules of NSS5830-56XQFP, NSS5930-56SQFP, NSS5950-32QFP, and NSS5830-54XTQFP switches are composed of fan sub-frames according to the number of slots. Each fan sub-frame can be replaced individually. The replacement steps are as follows:

Step 1:   Wear an antistatic wrist.

Step 2:   Squeeze the two metal pieces on the fan sub-frame inward and pull out the fan module at the same time.

Step 3:   Put the removed fan module on an antistatic mat or in a packing box.
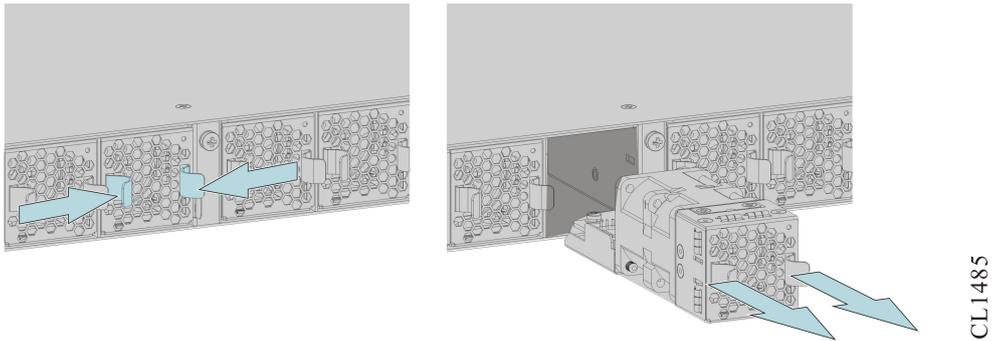
Figure 5-3 Pull out the fan module

Step 4:   Insert the fan module to be installed smoothly into the fan module slot along the slot guide rails, so that the fan module is in close contact with the chassis backplane.
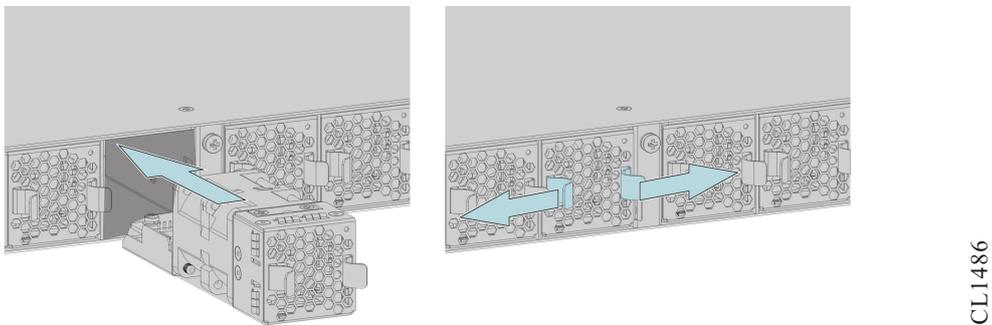
Figure 5-4 Insert the fan module

5.4.3   **Replace Swappable Optical Module**

The replacement process of SFP+/SFP28 and QSFP28 modules is the same. The following description takes the SFP+ module as an example.

⊗Warning

- When installing or uninstalling the SFP+ module, do not use the hands to touch the gold-finger part of the SFP+ module directly.

- Do not directly stare at the fiber connection holes of the optical module when the fiber is pulled down, but the optical module is not pulled out.

Step 1: Wear the anti-static wrist and pull out the fiber connected to the SFP+ module.

Step 2: Pull the handle of the SFP+ module down to the horizontal position, and then pull out the SFP+ module, as shown in the following figure.
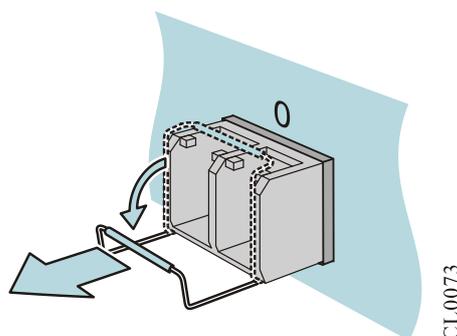
Figure 5-5 Uninstall the SFP+ module

Step 3: Fit the removed SFP+ module with the dust cap and put it in the anti-static bag or packaging box, as shown in the following figure.
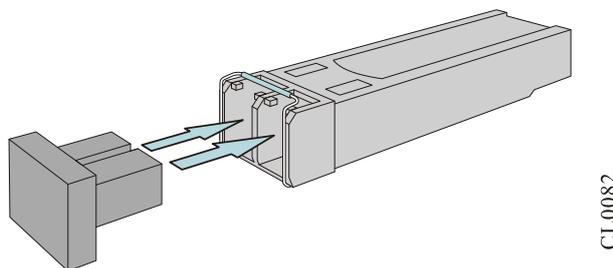
Figure 5-6 Install the dust cap of the SFP+ module

Step 4: Up-turn the handle of the installed SFP+ module to the vertical position to lock the buckle at the top of the module. Use the hands to hold the two sides of the SFP+ module and push it into the SFP+ slot horizontally until the SFP+ module closely-contacts the slot (you can feel that the shrapnel at the bottom and top of the SFP+ module locks the SFP+ slot), as shown in the following figure.
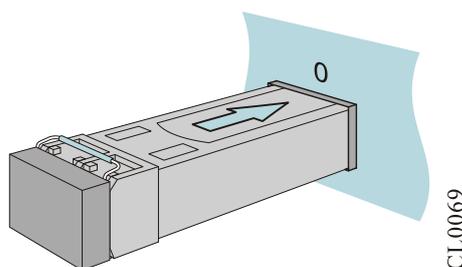
Figure 5-7 Install SFP+ module

Step 5: Remove the dust cap of the SFP+ module, as shown in the following figure.
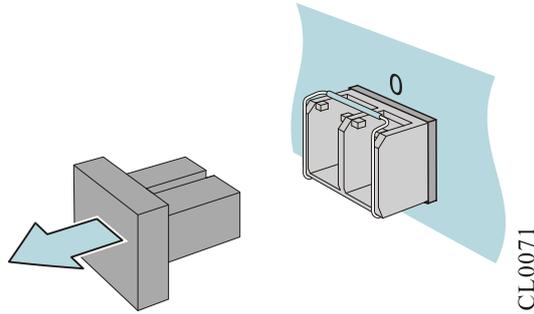
Figure 5-8 Uninstall the dust cap of the SFP+ module

Step 6: Insert the fibers into the SFP+ ports in order, as shown in the following figure.
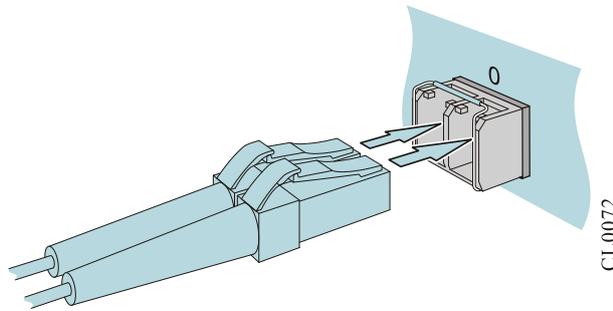
Figure 5-9 Connect the fibers to SFP+

⊘Note

- It is suggested not to insert the SFP+ module with the fiber into the slot directly. Please first pull out the fiber and then install.

5.5 De-dust the Device

This section describes how to de-dust the switch.

5.5.1 De-dust Fan Module

5.5.2 De-dust Optical Interface and Pigtail Connector

⊗Warning

- All de-dusting must be operated based on the anti-static requirements. For example, the staff must wear the anti-static overalls, anti-static wrist, and anti-wrist gloves if they'll work on the workbench.

● The de-dusting tool and cleaning agent are selected based on a certain standard. Otherwise, the board of the device will be severely damaged.

5.5.1 De-dust Fan Module

The fan module is an important part of the device, which mainly provides power for heat dissipation and ventilation of the device. During the operation of the device, the fan blades and the control circuit board in the fan module will absorb dust in the surrounding air. When the adsorbed dust accumulates to a certain extent, on the one hand, the dust will affect the stable operation of the fan module, and on the other hand, the dust will also become a source of pollution for other service boards in the equipment, thereby burying hidden dangers to the stable operation of the equipment.

To ensure long-term stable operation of the device, maintenance personnel should regularly (recommended once a year) perform dust removal maintenance on the fan module of the device. The relevant steps are as follows:

Note

● Before operation, please prepare a spare fan module in advance, and after removing the fan module in the working state of the device, you need to install the spare fan module in time to ensure the normal operation of the device.

Step 1: Dedust the spare fan module: After the maintenance personnel wear anti-static wrist or gloves correctly, use clean cotton gauze, anti-static brush, vacuum cleaner and other cleaning tools to dedust the fan blades, control circuit board and other parts of the spare fan module , The fan module should be free of dust after dust removal.

Step 2: Replace the fan module to be dust-removed. For details, see "5.4.2 Replace the Fan Module". The replacement process of the entire fan module must be timely. Otherwise, it will cause the chassis temperature to be too high, which seriously threatens the safety and stable operation of the device.

Step 3: The replaced and dust-cleaned fan module will be used as a spare fan module.

5.5.2 De-dust Optical Interface and Pigtail Connector

To ensure the stable running of the device, de-dusting the optical interface and pigtail connector on the device regularly is necessary.

The de-dusting process is as follows:

Step 1:   Unplug the interface sub card where the optical interface is located: when cleaning the optical interface, first unplug the optical fiber connected to the optical interface, and then unplug the corresponding interface sub card for cleaning operation.

Step 2:   Use the dedicated cleaning tools and materials when cleaning the optical interface and pigtail connector. These materials can be purchased from the optical fiber or optical cable manufacturer.

📝Note

● Use the dust cap to cover the unused optical interfaces on the board and pigtail.

● For the optical interface in using, use a dust cap to cover the optical interface and the pigtail connector connected by the optical interface when the pigtail requires to be removed. In this way, on the one hand, the invisible laser sent by the laser maser can be prevented radiating human eyes. On the other hand, the dustproof function is available to avoid the loss of the optical interface contaminated with dust or pigtail connector being increased.

⚠Caution

● Before de-dusting the optical interface, remove the corresponding interface daughter card at first and ensure that the normal deployment of the system service will not be affected.

● For the high-power laser interface, use the cleaning tool and material for cleaning.

● For the small-power optical interface, use the clean and dry anti-static soft rush to remove the dust on the surface of the optical interface if the dedicated cleaning tool and material cannot be obtained.

⊗Warning

● The laser sent by the laser maser on the optical interface is invisible infrared light. When the laser directly radiates the human eyes, it may cause permanent injury for the human eyes.

● It is forbidden to use any unapproved cleaning tools or materials to clean the optical interface or the pigtail connector.

5.6 Get Technical Support

If the fault remains via the above contents of the chapter, please contact the agent or local technical engineers in time. Before you contact the customer service, please prepare the following information, which is convenient for the customer service staff to help you solve the problem.

1. The arrival time of the switch

2. The serial number of the chassis (labeled on the chassis)

3. Software version number (it can be viewed via **show version** in the command line view)

4. Maintenance agreement or warranty card

5. Simple description of the fault problem

6. Simple introduction of the taken troubleshooting steps

You can contact the customer service via the customer service hotline and you can also search for help via the website or email.

Customer service: 400-886-8669

Website: http://www.maipu.com

E-mail: techsupport@maipu.com

Appendix

A Common Module Specifications

A1 Modular Fan Specifications

The fan module is an important part to ensure the normal operation of the device system, and provides airflow for the system to dissipate heat. It consists of fan frame, fan and so on. NSS5830-56XQFP, NSS5930-56SQFP, NSS5950-32QFP, and NSS5830-54XTQFP switches have only one fan module option, which is a modular fan for ventilation. The fan module has the following specifications:

Specification	Brief Description
FAN-01E-01B	Exhaust fan module (exhaust air from the inside of the device to the outside)

A1.1 FAN-01E-01B
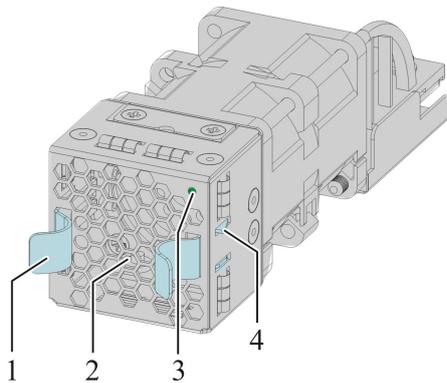
Appendix Figure A1-1 FAN-01E-01B fan module

A2 Modular Power Specifications

The power modules of NSS5830-56XQFP, NSS5930-56SQFP, NSS5950-32QFP, NSS5830-54XTQFP switch support AC and DC power supply mode (see E2 power supply requirements for supported AC and DC power supply specifications).

The power modules have the following specifications:

Model	Name	remarks
AD550M-HV0B	AC power module, 550W	Two power supplies of the same model can be used for system power hot backup.
AD800M-HV0B	AC power module, 800W	Two power supplies of the same model can be used for system power hot backup.
DD800M-5V0B	DCDCPower module , 800W	Two power supplies of the same model can be used for system power hot backup.

A2.1 AD550M-HV0B
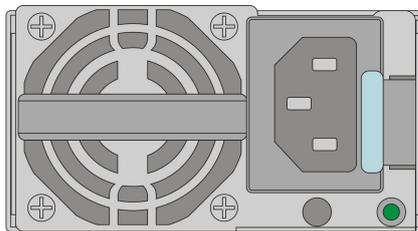
Appendix Figure A2-1 AD550M-HV0B power module panel

A2.2 AD800M-HV0B
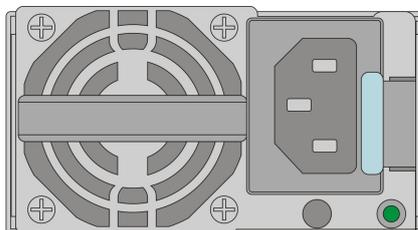
Appendix Figure A2-2 AD800M-HV0BPower module panel

A2.3   DD800M-5V0B
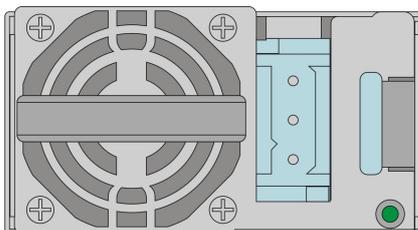
Appendix Figure A2-3 DD800M-5V0BPower module panel

B Common Interface Specifications

Describes device interface properties.

B1 Console Port Attributes

NSS5830-56XQFP, NSS5930-56SQFP, NSS5950-32QFP, NSS5830-54XTQFP provide a console port that conforms to the EIA/TIA-232 asynchronous serial specification . Through this port, the user can complete the local configuration of the switch. For the properties of the console port, see Appendix Table B-1.

Appendix Table B-1 Console port attributes

Attributes	Description
Interface standard	Asynchronous EIA/TIA-232
Connector type	RJ45
Rate	9600bit/s–115200bit/s (the default value is 9600bit/s)
Supported service	Connect to the serial port of a local terminal (such as a PC), and run a terminal emulation program on the terminal

B2 USB Port Attributes

NSS5830-56XQFP, NSS5930-56SQFP, NSS5950-32QFP, NSS5830-54XTQFP devices provide a USB port that conforms to the USB2.0 specification. Through this interface, users can complete the local configuration of the switch or expand the storage space. For the properties of the USB port, see Appendix Table B-2.

Appendix Table B-2 USB port attributes

Attributes	Description
Interface standard	USB2.0
Connector type	USB Type A
Work mode	1.5Mbps, 12Mbps, 480Mbps Host, support direct hot-swap and controlled (command mode) hot-swap. (You cannot perform the hot-swap operation during data transmission)
Cable	None

B3 10Base-T/100Base-TX/1000Base-T/10000Base-TX -RJ45 Electrical Interface Attributes

Appendix Table B-3 B3 10Base-T/100Base-TX/1000Base-T/10000Base-TX -RJ45 Electrical Interface Attributes

Attributes	Description
Interface standard	IEEE 802.3, IEEE802.3u, IEEE802.3ab
Connector type	RJ45
Work mode	10Mbps/100Mbps/1000Mbps/10000Mbps half-duplex/full-duplex/auto-negotiation
Maximum transmission distance	100m
Connection cable	10Mbps/100Mbps/1000Mbps: CAT-5 and CAT-5E above twisted pair 10000Mbps: CAT-6A SSTP and above CAT-6A SSTP twisted pair

B4 10GBase-SR/LR/ER SFP+ Optical Interface Attributes

Appendix Table B-5 10GBase-SR/LR/ER SFP+ Optical Interface Attributes

Attributes	Description
Interface standard	IEEE 802.3ae
Supported optical module model	SFP+

Attributes	Description
Work mode	10Gbps full duplex
Supported SFP+ interfaces	10GBase-SR 10GBase-LR 10GBase-ER
Connection cable	Single mode fiber or multimode fiber

B5 25GBase-SR SFP28 Optical Interface Attributes

Appendix Table B-4 25GBase-SR SFP28 Optical Interface Attributes

Attributes	Description
Interface standard	IEEE 802.3by
Supported optical module model	SFP 28, SFP+
Work mode	25Gbps/10Gbps full duplex
Support SFP28 interface/SFP+ interface	25GBase-SR 10GBase-SR 10GBase-LR 10GBase-ER
Connection cable	Single mode fiber or multimode fiber

B6 100GBase-SR4/LR4 QSFP28 Optical Interface Attributes

Appendix Table B-5 100GBase-SR4/LR4 QSFP28 Optical Interface Attributes

Attributes	Description
Interface standard	IEEE 802.3ba
Connector type	ZQSFP+, QSFP+
Work mode	100Gbps/40Gbps full duplex

Attributes	Description
Support QSFP28 interface/QSFP+ interface	100GBase-SR4/LR4 40GBase-SR4/LR4
Connection cable	Single mode fiber or multimode fiber

C Description of Device Indicators

C1 System Status Indicator

Through the system status indicator, you can preliminarily judge the working status of the switch. For details, please refer to Appendix Tables C-1 and C-2.

Appendix Table C-1 Description of the system status indicators on the front panel of the switch

Indicator Type	Indicator Name	Indicator Color	Status
System status	SYS	Red-green dual-color light	Green and on: Indicates that the board is powered on, but the software is not running. Green and flashing slowly: Indicates that the board is running normally. 0.5Hz Green and flashing quickly : Indicates that the board is in the loading state. 5Hz Red and on: The system failed to load or malfunction. Such as: fan failure, system overheating, etc. Off: The system is not powered on or abnormal
Stack indication	MST	Green light	on: Indicates that the device is the master device in the stack off: Indicates that the device is a slave device in the stack group, or an independent device
Fan	FAN	Red-green dual-color light	Green and on: All fans are working normally Red and on: 4 fans are in

Indicator Type	Indicator Name	Indicator Color	Status
			place, 1 or more FANs are working abnormally; 5 fans are in place, 2 or more FANs are working abnormally off: Some fans are not in place or not working properly
USB interface	USB	Green light	Flashing: data is being sent and received between the motherboard and the external U-disk on: U-disk is controlled by the motherboard, but no data is sent or received off: There is no external U-disk, or the motherboard does not control the external U-disk
ID indicator	ID	Blue light	on: Indicates that the device is remotely selected by the administrator off: The indicator is not in use
Power 1	PWR1	Red-green dual-color light	Green and on: Indicates that the power supply 1 is working normally red and on: Indicates that the power supply 1 is working abnormally
Power 2	PWR2	Red-green dual-color light	Green and on: Indicates that the power supply 2 is working normally red and on: Indicates that the power supply 2 is working abnormally

Appendix Table C-2 Description of the system status indicators on the rear panel of the switch

Indicator Type	Indicator Name	Indicator Color	Status

Indicator Type	Indicator Name	Indicator Color	Status
System status indicator	SYS	Red-green dual-color light	Green and on: Indicates that the board is powered on, but the software is not running. Green and flashing slowly: Indicates that the board is running normally. 0.5Hz Green and flashing quickly : Indicates that the board is in the loading state. 5Hz Red and on: The system failed to load or malfunction. Such as: fan failure, system overheating, etc. Off: The system is not powered on or abnormal
Stack indication	MST	Green light	on: Indicates that the device is the master device in the stack off: Indicates that the device is a slave device in the stack group, or an independent device
Fan indicator	FAN	Red-green dual-color light	Green and on: All fans are working normally Red and on: 4 fans are in place, 1 or more FANs are working abnormally; 5 fans are in place, 2 or more FANs are working abnormally off: Some fans are not in place or not working properly
USB indicator	USB	Green	on: Indicates that the U disk is in place Flashing: Indicates that data is being read and written off: Indicates that the U disk is not in place
ID indicator	ID	Blue	Fast flashing (5Hz flashing frequency): used for on-site locating, and the operation and maintenance personnel can

Indicator Type	Indicator Name	Indicator Color	Status
			remotely control the ID light to turn on and off off: ID light is not enabled by default.

C2 Interface Status Inidcator

Through the interface status indicator, you can judge the working status of the interface of the switch. For details, please refer to Appendix Table C-3.

Appendix Table C-3 Description of Switch Interface Status Indicators

Indicator Type	Indicator Name	Indicator Color	Status
DC0 port indicator	1000M	RJ45 with yellow light	on: The interface rate is 100M or 1000M off: The interface has no Link
	ACT	RJ45 with green light	off: No data is being sent or received on the interface Flashing: The interface has data sending and receiving
Serial indicator	TXD	RJ45 with yellow light	Flashing: Indicates that the serial port has data sent Off: Indicates that there is no data sent by the serial port
	RXD	RJ45 with green light	Flashing: Indicates that the serial port has data receiving Off: Indicates that the serial port has no data receiving
10G optical\25G optical\100G optical interface	LINK/ACT	Green light	off: The interface is not linked on: The interface has link Flashing: The interface has data sending and receiving
1 breakout 4 indicators (100G optical interface)	BREAKOUT 1-2-3-4	Green light	Off: No ports are in the split state On: The channel corresponding to the split port

Indicator Type	Indicator Name	Indicator Color	Status
			is in the Link state

C3 Power Module Status Indicator

Through the power module status indicator, you can judge the working status of the power module of the switch, see Appendix Table C-4 for details

Appendix Table C-4 Description of the power module status indicators

Indicator Type	Indicator Name	Indicator Color	Status
Power Status Indicator	none	Bi-color (green, yellow)	green and on: Indicates that the power supply is working normally Flashing and green (1Hz): The input is in place or only 12Vsv power output is available or the power supply is working in cold redundant mode yellow and on: 1. Under the working condition of standby power supply, it indicates no voltage output or poor contact of input power cable 2. Under the working condition of no standby power supply, it indicates abnormal power supply output (power supply fan is abnormal, output overvoltage, output current limit, output short circuit, power supply overtemperature protection) Yellow and flashing (1Hz): power supply alarm, indicating that the power supply is in an abnormal state (high temperature, high current, the fan is abnormal and runs in low speed, etc.) off: no voltage input, poor power cable contact, power supply damage

D Interface Cable Specifications

- It is recommended to use Maipu's related modules on the device.

- The following information is for reference only, please consult the marketing or technical support personnel of Maipu for details.

D1 Console Port Cable

The console port cable of the switch is connected to the 9-core serial socket of the computer. It is an 8-core unshielded cable with a crimped RJ45 crystal plug on one side and a DB9 (hole) on the other side. The console port cable diagram is as follows:
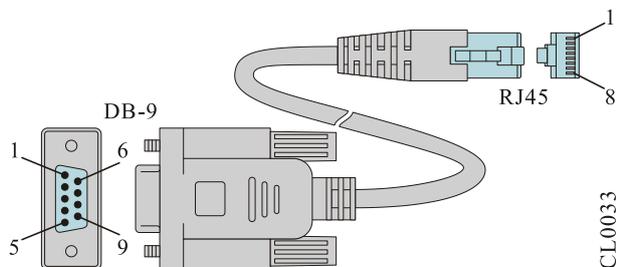
Appendix Figure D-1 Console port cable

The internal signal connection relationship table of the console port cable is as follows:

Appendix Table D-1 Console port cable connection table

RJ-45	Signal	Direction	DB-9
1	RTS	→	8
2	DTR	→	6
3	TXD	→	2
4	GND	——	5
5	NC	——	——
6	RXD	←	3
7	DSR	←	4
8	CTS	←	7
——	——	——	1

RJ-45	Signal	Direction	DB-9
——	——	——	9

D2 10Base-T/100Base-TX/1000Base-T Ethernet Electrical Interface Cable

10Base-T/100Base-TX/1000Base-T Ethernet port cables are recommended to be 8-core unshielded Category-5 or above straight-through twisted pair cables, and 10000Base-T Ethernet port cables are recommended to be 8-core CAT-6A and CAT-6A or above SSTP network cable.

Appendix Table D-2 RJ45 straight-through cable (category 5 twisted pair) connection relationship table

RJ45	Signal	Direction	RJ45	Description	Length
1	TRD0+	←→	1	twisted pair 1	
2	TRD0-	←→	2		
3	TRD1+	←→	3	twisted pair 2	
6	TRD1-	←→	6		
4	TRD2+	←→	4	twisted pair 3	Support 100m
5	TRD2-	←→	5		
7	TRD3+	←→	7	twisted pair 4	
8	TRD3-	←→	8		

The wiring sequence of the Ethernet RJ45 port is shown in Appendix Figure D-2.
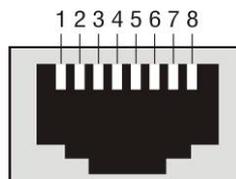
Appendix Figure D-2 RJ45 socket

D3 1000BASE-X SFP Gigabit Optical Module Model and Corresponding Interface Cable Relationship Table

Appendix Table D-3 1000BASE-X SFP gigabit optical module model and corresponding interface cable relationship table

Optical Module Model	Center Wavelength	User Interface Type	Interface Cable Specifications	Max. Transmission Distance	Remark
SFP-M1-L24P8	850nm	LC	50/125µm multimode fiber	500M	—
			62.5/125µm multimode fiber	275M	—
SFP-S2-L24P3	1310nm	LC	9/125µm singlemode fiber	20KM	—
SFP-S4-L24P3	1310nm	LC	9/125µm singlemode fiber	40KM	—
SFP-S4-L24P5	1550nm	LC	9/125µm singlemode fiber	40KM	Support DDMI
SFP-S8-L24P5	1550nm	LC	9/125µm singlemode fiber	80KM	—
SFP-S10-L24P5	1550nm	LC	9/125µm singlemode fiber	100KM	—

D4 10GBase-SR/LR/ER SFP+ 10G Optical Module Model and Corresponding Interface Cable Relationship Table

Appendix Table D-4 10GBASE-SR/LE/ER SFP+ 10G optical module model and corresponding interface cable relationship table

Optical Module Model	Center Wavelength	User Interface Type	Interface Cable Specifications	Max. Transmission Distance
SFP-M1-L192P8	850nm	LC	50/125μm multimode fiber	300M
SFP-S1-L192P3	1310nm	LC	9/125μm singlemode fiber	10KM
SFP-S4-L192P5	1550nm	LC	9/125μm singlemode fiber	40KM

D5 25GBase-SR SFP28 Optical Module Model and Corresponding Interface Cable Relationship Table

Appendix Table D-5 25GBASE-SR SFP28 optical module model and corresponding interface cable relationship table

Optical Module Model	Center Wavelength	User Interface Type	Interface Cable Specifications	Max. Transmission Distance
SFP28-M1-L480C8	850nm	LC	50/125μm multimode fiber	100M(OM4)
SFP28-S1-L480C3	1310nm	LC	9/125μm singlemode fiber	10KM

D6 40GBase-SR4/LR4 QSFP+ Optical Module Model and Corresponding Interface Cable Relationship Table

Appendix Table D-6 40GBASE-SR4/LR4 QSFP+ optical module model and corresponding interface cable relationship table

Optical Module Model	Center Wavelength	User Interface Type	Interface Cable Specifications	Max. Transmission Distance
QSFP-M1-M768C8	850nm	MPO	50/125μm multimode fiber	100m(OM3)
QSFP-M1-L768C8	850nm	LC	50/125μm multimode fiber	100m
QSFP-S1-L768C3	1310nm	LC	9/125μm singlemode fiber	10km
QSFP-S4-L768C5	1550 nm	LC	9/125μm singlemode fiber	30km

D7 100GBase-SR4/LR4 QSFP28 Optical Module Model and Corresponding Interface Cable Relationship Table

Appendix Table D-7 100GBase-SR4/LR4 QSFP28 optical module model and corresponding interface cable relationship table

Optical Module Model	Center Wavelength	User Interface Type	Interface Cable Specifications	Max. Transmission Distance
QSFP28-M1-M1920C8	850nm	MPO	50/125μm multimode fiber	100M(OM4)
QSFP28-S1-L1920C3	1310nm	LC	9/125μm singlemode fiber	10KM

D8 10G Optical Interface Passive Cable Relationship Table

Appendix Table D-8 10G Optical Interface Passive Cable Relationship Table

Cable Model	User Interface Type	Cable Specifications	Electrical Characteristics
SFP-STACK-15	SFP+←to→SFP+	1.5m	Passive

Cable Model	User Interface Type	Cable Specifications	Electrical Characteristics
SFP-STACK-30	SFP+←to→SFP+	3m	Passive
SFP-STACK-50	SFP+←to→SFP+	5m	Passive

D9 25G Optical Interface Passive Cable Relationship Table

Appendix Table D-9 25G Optical Interface Passive Cable Relationship Table

Cable Model	User Interface Type	Cable Specifications	Electrical Characteristics
SFP28-STACK-15	SFP28←to→SFP28	1.5m	Passive
SFP28-STACK-30	SFP28←to→SFP28	3m	Passive
SFP28-STACK-50	SFP28←to→SFP28	5m	Passive

D10   40G Interface Passive Cable Module

Appendix Table D-10 40GBASE QSFP28 Interface Passive Cable Relationship Table

Cable Model	User Interface Type	Cable Specifications	Electrical Characteristics
QSFP-STACK-10	QSFP+←to→QSFP+	1m	Passive
QSFP-STACK-30	QSFP+←to→QSFP+	3m	Passive
QSFP-STACK-50	QSFP+←to→QSFP+	5m	Passive

D11   100G Interface Passive Cable Module

Appendix Table D-11 100GBASE QSFP28 Interface Passive Cable Relationship Table

Cable Model	User Interface Type	Cable Specifications	Electrical Characteristics

Cable Model	User Interface Type	Cable Specifications	Electrical Characteristics
QSFP-STACK-30	QSFP28←to→QSFP28	3m	Passive

D12   10A AC Power Cable

Appendix Table D-12 10A AC power cable description

Power Cable Length	Max. Load Current	Main Country or Region of Use
1.5m	10A	Chinese mainland
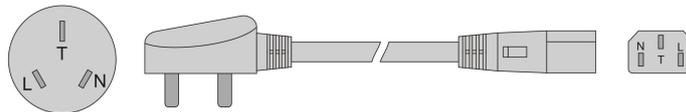
Appendix Figure D-3 10A AC power cable

D13   2.5mm² DC Power Cable

When NSS5830-56XQFP, NSS5930-56SQFP, NSS5950-32QFP, NSS5830-54XTQFP devices use DD800M-5V0B power supply, a 2.5mm² DC power cable is standard, as shown in Figure:

Appendix Figure D-4 2.5mm² DC power cable

D14   2.5mm² Ground Wire

NSS5830-56XQFP, NSS5930-56SQFP, NSS5950-32QFP, NSS5830-54XTQFP devices are equipped with a standard 2.5mm² ground wire, as shown in the Figure below:
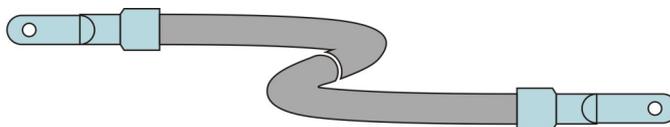
Appendix Figure D-5 2.5mm² ground wire

E Equipment Operating Environment Requirements

E1 Environmental Requirements for Computer Room

E1.1   Computer Room Building Requirements

It is recommended that the equipment room adopts the anti-static floor, which is dust-free. It is required to lay the static floor. The laying of the floor plate should be tight and sturdy and the horizontal error per square meter should be less than 2mm. When there is no raised floor, lay the static conductive ground material (the volume resistivity should be 1.0×107 Ω*m -1.0×1010 Ω*m). The static conductive ground material or raised floor should be static grounding. We can use the current limiting resistor and connection line to connect with the grounding device. The resistance of the current limiting resistor is 1MΩ.

E1.2   Temperature/Humidity Requirements

Appendix Table E-1 Environmental Adaptability Requirements

Description	Temperature
Storage temperature	-40°C–70°C
Storage humidity	5%–95%/RH, non-condensing
Operating temperature	0°C–45°C
Working humidity	10%–90%/RH, non-condensing

⚠ Caution

● If the temperature is too high, the reliability of the switch will be greatly reduced. Long-term high temperature will also affect its life. Too high temperature will accelerate the aging process of insulating materials.

● If the long-term humidity in the computer room is too high, it is easy to cause poor insulation of insulating materials or even leakage of electricity, and sometimes it is easy to cause changes in the mechanical properties of materials and corrosion of metal parts. If the humidity in the equipment room is too low for a long time, the insulating gasket will shrink and cause the fastening screws to loosen. At the same time, in a dry climate, static electricity is likely to be generated, which will damage

the circuit on the switch.

- The measured value of temperature and humidity in the working environment refers to the value measured at 1.5m above the floor and 0.4m from the front of the switch when there is no protective plate on the front and back of the cabinet.

- When the device enters a high temperature environment from a low temperature environment, if there is condensed water on the device, please take certain measures (such as drying, drying, etc.) .

- Altitude: ≤5000m.

E1.3　Load Requirements

Please evaluate the ground load-bearing requirements according to the actual weight of the installed switch and its accessories, and ensure that the ground load-bearing capacity of the installation site meets this requirement. And ensure that the ground load-bearing capacity of the installation site meets this requirement. For the weight of each component of the switch, please refer to "1.6 Physical Parameters".

⚠ Caution

- When evaluating the ground load, please consider the need for future switch expansion (such as adding a single board).

E1.4　Space Requirements

In order to ensure sufficient operating space for chassis handling, module plugging and maintenance, it is recommended that the aisle width of the equipment room should not be less than 0.8 meters. If the switch is installed in a cabinet, the clear height of the equipment room should not be less than 3 meters.

In order to facilitate heat dissipation and switch maintenance, please do not install the switch against the wall, and the space between the front and back of the switch should be no less than 0.7 meters.

E1.5　Cleanliness Requirements

Dust is a hazard to the safe operation of switches. Indoor dust falls on the machine body, which can cause electrostatic adsorption and make poor contact of metal connectors or metal contacts. Especially in the case of low indoor relative humidity, it is more likely to cause electrostatic adsorption, which will not only affect the life of the device, but also easily cause communication failures. See the table below for the dust

content and particle size requirements in the equipment room.

Appendix Table E-2 Requirements for dust content in the computer room

Max. Diameter (μm)	0.5	1	3	5
Ma. Concentration (grains/m^3)	1.4×10^7	7×10^5	2.4×10^5	1.3×10^5

⚠ Caution

- The cleanliness requirement is met when there is no visible dust on the desktop within 3 days.

In addition to dust, the switch room also has strict requirements on the salt, acid, and sulfide contained in the air, because these harmful gases will accelerate the corrosion of metals and the aging process of certain components.

The equipment room should prevent the intrusion of harmful gases such as SO_2, H_2S, NO_2, NH_3, Cl_2, etc. The specific limit values are shown in the table below.

Appendix Table E-3 Index of Harmful Gas Content in Computer Room

Gas	Max. (mg/m^3)
SO_2	0.2
H_2S	0.006
NO_2	0.2
NH_3	0.05
Cl_2	0.01

E1.6   Anti-interference Requirements

There may be sources of interference in the use of the switch. Whether it comes from the outside of the application system or from the inside of the switch, it affects the switch by the conduction modes, such as capacitive coupling, inductive coupling, electromagnetic wave radiation, public impedance (including grounding system)

coupling, wires (including power lines, signal lines, and output lines, etc.). Therefore, pay attention to the following:

⚠ **Caution**

- Take effective anti-grid interference measures for the power supply system.

- It is best not to use the working place of the switch with the grounding device of the power equipment or the lightning protection grounding device, and keep it as far away as possible.

- Stay away from high-power radio transmitters, radar transmitters, and high-frequency and high-current equipment. If necessary, users can adopt electromagnetic shielding method for anti-interference.

E1.7　Grounding Requirements

A good grounding system is the basis for the stable and reliable operation of the switch, and it is an important guarantee for the switch to prevent lightning strikes, anti-interference, and anti-static. The user must provide a good grounding system for the switch, and the resistance between the switch chassis and the ground should be less than 1 ohm.

E2　Power Condition Requirements

E2.1　Basic Power Requirements

⚠ **Caution**

- The low-voltage AC power supply system should adopt a three-phase five-wire system or a single-phase three-phase system. The nominal voltage of low-voltage AC power is 110V/220V, and the frequency is 50Hz/60Hz.

- An uninterruptible power supply is required. For example, UPS (Uninterrupted Power Supply) serves as an AC backup power supply. The AC backup power supply and the mains should be in the same phase, and the switching time with the mains should be less than 10ms. Otherwise the device may restart or reset.

- The AC power distribution capacity of the equipment room should fully consider the working current and fault current of the equipment. Ensure that independent equipment has AC power distribution protection devices. The configuration protection switch should be larger than the protection switch of the subsequent electrical equipment.

The allowable fluctuation range of power input is shown in the table below.

Appendix Table E-4 Basic Power Requirements Table

Project	Description
Rated input voltage of power supply	AC: 100~240V 50/60Hz (using AD550M-HV0B/AD800M-HV0B power supply) DC: -40~-72V (using DD800M-5V0B power supply)

⚠ Caution

- Conductors should be flame-retardant conductors, and conductor layout should be in accordance with the provisions of GB50045-95 "*Class I Fire Protection Design Standards for High-Rise Civil Buildings*". Low-voltage power distribution is carried out in accordance with GB50045-95 "*Code for Design of Low-Voltage Power Distribution Devices and Circuits*".

E2.2   Basic Power Recommendations

Suggestions on the basic power supply are:

- If the equipment is directly powered by the mains, its supply voltage exceeds -10% to 5% of the rated voltage, or exceeds the allowable voltage range of the equipment. Regulating or stabilizing equipment should be used to meet the requirements.

- For communication loads that require uninterrupted AC or no transient, UPS power supply system or inverter power supply system should be used for power supply.

- When the mains power is abnormal, in order to ensure the important communication load and important power load, the communication station should be equipped with a self-contained generator set as a self-provided power supply. Its capacity should be checked according to not less than 1.5 times to 2 times of the total capacity of AC uninterrupted power equipment.

F Equipment Grounding Specification and Protection

F1 Equipment Grounding Specifications

Grounding specifications include: general grounding specifications, computer room building grounding specifications, equipment grounding specifications, communication power supply grounding specifications, and grounding wire laying specifications.

F1.1   General Grounding Specifications

Common grounding specifications are shown in the table below.

Appendix Table F-1 General Grounding Specifications

Serial No.	Description
1	The grounding design should be designed according to the principles of voltage equalization and equipotentiality, that is, the working grounding and protective grounding (including shielding grounding and lightning protection grounding of distribution frames) jointly use a joint grounding method of a group of grounding bodies.
2	Cable racks, hanging iron frames, racks or cabinets, metal ventilation ducts, metal doors and windows in the machine room should be grounded for protection.
3	The metal parts of the equipment that are normally not charged shall be protectively grounded.
4	Ensure that the ground wire is in good contact with the protective ground bar in the equipment room.
5	No other device shall be used as part of the electrical connection to the ground wire.

F1.2   Grounding Specifications for Computer Room Buildings

The specific requirements of the building grounding code for the computer room.

The grounding resistance of the comprehensive communication building should not be greater than 1 ohm, and should be less than 5 ohms in ordinary communication bureaus (stations) (it can be relaxed to 10 ohms in areas with high soil resistivity).

F1.3   Equipment Grounding Specifications

The equipment grounding specifications are shown in the table below.

Appendix Table F-2 Equipment Grounding Specifications

Serial No.	Description
1	All communication equipment and supporting equipment (mobile base station, transmission, switching, power supply, etc.) They should be connected on the protective grounding bar in the same machine room.
2	The protection ground (PGND) of the equipment is short-circuited to the protective grounding copper bar provided by the user, and the short-circuit wire should be a plastic insulated copper core wire of not less than 2.5mm^2 in yellow and green colors.
3	There are ground terminals and grounding signs under the front, rear and side doors of the cabinet, which must be connected to the ground terminal of the cabinet structure through connecting cables with a cross - sectional area of not less than 2.5mm^2.
4	The metal components of the cabinet of the equipment must ensure good electrical conductivity, and it is strictly forbidden to spray insulating paint on the joints of the metal components of the cabinet.
5	The rack bodies of the cabinets in the same row are tightly connected to each other through fastening bolts and gaskets at the top. The surface of the 30mm*50mm rectangle around the fastening bolt connection hole should not be painted, and must be treated with anti-rust and anti-corrosion treatment. The surface of the gasket and nut should also be galvanized to ensure good electrical contact.
6	When combining the cabinets of the same type, the ground bus bars of the neighboring cabinets (if any) need to be interconnected via the bus bar short-circuit cable. The cross-sectional area of the short-circuit cable is 6mm^2 and the length is no more than 300mm. Connect the two ends to the ground bus bar terminals of the neighboring cabinets respectively and tighten.

F1.4   Grounding Specifications for Communication Power

The grounding specifications of the communication power supply are shown in the table below.

Appendix Table F-3 Grounding Specifications for Communication Power

Serial No.	Description
1	The AC power supply system of the communication equipment room should adopt the TN-S power supply mode.
2	At the entrance of the AC power wire entering the equipment room, we should configure the AC power mine (C-class mine) with the discharge current no less than 20KA.

Serial No.	Description
3	The protection ground of the communications power should share one group of ground body with the protection ground of the communication device. When the communication power and the communication device are at the same equipment room, they should share the protection ground bar of the same equipment room.
4	AC power port should be added with lightning protection circuit.

F1.5　Laying Specifications of Ground Wires

The laying specifications of the ground wire are as shown in the following table:

Appendix Table F-4 Specifications for Layout of Grounding Wires

No.	Description
1	Ground lead should not be intertwined or parallel with the signal line.
2	Grounding cable cannot be led aerially, but should be buried in the earth or routed indoor.
3	On the protection ground wire, prohibit the connectors; prohibit installing the switch or fuse.
4	The protection ground wire should adopt the yellow and green plastic insulated copper wire.
5	The neutral line of the AC power cable in the equipment room cannot be connected with the protection ground of the transmission and communication devices in the equipment room.
6	The length of the protection ground wire should not exceed 45m, but should be as short as possible. When exceeding 45m, it is required that the consumer re-sets the ground row at the nearest.

F2　Device Protection

This section mainly describes the precautions for the lightning protection of the device during installation.

F2.1　General Requirement of Lightning Protection Wires

The device cables can be divided to indoor cables and outdoor cables according to the location of connecting the terminal. They have different requirements for the wiring in

the lightning protection design.

⚠ Caution

- Communication connection cable should be routed indoors, which can effectively reduce the damage rate of the induction lightning of the device. The Ethernet cable is the interconnection line of the indoor signals and should not be overhead outdoors.

The general requirements for the wiring of the indoor cables:

- The cable installation is required to be done by category, avoiding that the cables of different categories are bundled with each other.

- It is recommended that the cable is bundled with one line deduction every 100 mm, strengthening the combing and fixing.

- The ground wire should be as short and thick as possible. The connection of the ground wire and grounding bar needs to use the screw to tighten or welding and preservative treatment.

The general requirements for the wiring of the outdoor cables:

- If the actual conditions cannot meet the indoor wiring, the outdoor cables should be laid and buried (introduced to the indoor from the underground).

- If you cannot lay and bury all outdoor cables, the aerial cables should be dressed with the metal pipes 15m before entering the indoor. The two sides of the metal pipe are grounded and we should install the signal mine at the corresponding interface of the device after the cable enters the indoor.

- If using the shielded cable, ensure that the shielded layer well contacts with the metal shell of the device at the device interface. We should install the signal mine at the corresponding interface of the device after the cable enters the indoor.

- When the outdoor cable without any protection is connected to the device, we should install the signal mine at the corresponding port.

- When laying the fibers, it is required that the wiring is smooth and the bundling the neat. It is required that the internal core wire is grounded before the outdoor fiber enters the indoor. The fiber cannot be stretched or bundled too tightly.

F2.2 Installation Method of Cable Wiring

Installation Method of Power Cable

One end of the power cable is connected to the device and the other end is connected to the power strip or lightning protection bar. The excessive part is folded to the shape of S and fixed in the chassis. Keep a distance of more than 20cm with other cables.

Installation Method of Cables

The signal cables should be installed and bundled by indoor and outdoor, drawn from the outlet holes of different chassis to the user terminal or cascading device.

Precautions for Using Fiber

● When using the fiber to connect the network device, first confirm whether the type of the optical connector and the fiber type conform to the used optical port type.

● Before connecting the fiber, first confirm that the optical power of the receiving end does not exceed the upper threshold of the receiving optical power of the optical module. Otherwise, it may burn the optical module.

● If the optical port is not connected to the optical connector, please be sure to wear a protective cap.

● If the optical port is not connected to the optical connector and the protective cap is opened, maybe some invisible rays emitted from the optical port, so you do not directly look at the optical port.

● The fiber connector should have the safe and reliable packaging and the connector should have the dust cap. When not using, the fiber connector should wear the dust cap, avoiding scratching the end face of the insert core of the fiber connector, and affecting the performance index. If the dust cap is too loose or polluted, change it in time.

● Before connection, we should use the dust-free paper to soak the absolute alcohol and wipe the end face of the insert core of the fiber connector. You can wipe in one direction only and you also need to wipe the end face of the peer fiber connector.

● When connecting, you cannot twist or bend the fiber. After installation, the bent radius of the fiber cannot be smaller than 40 mm (In dynamic bending case, the minimum bend radius is 20D; in the static bending case, the minimum bend radius is 10D; D is the fiber sheath diameter).

● If the fiber needs to pass through the metal board hole when connecting, the metal board hole should have the smooth and fully-filleted surface (the filleting radius

should be no less than 2 mm). When passing through the metal board hole and turning along the sharp edge of the structural part, we should add the protective sleeve or pad.

● Be careful when plugging the connector and avoid damaging the connector or fracturing the fiber because of too much force. Avoid pulling, pressing, and extruding the fiber. The permitted maximum tensile force and crush force of the fiber are as shown in the following table.

Appendix Table F-5 Permitted force of the fiber

Force Time	Tensile Force (N)	Crush Force (N/100mm)
Short-term force	150	500
Long-term force	80	100

Installation Method of Fiber

After the fiber is drawn out from the optical port, the fiber directly connected to the photoelectric converter can be coiled to hang in the inner side of the chassis. The fiber cascaded with other devices should slip over the PVC pipe to draw out, avoiding traction and stretching.

⚠ Caution

● Fiber itself does not belong to the conductor, and it does not sense or transduce the over-voltage, but the strengthen core of the fiber optic cable (the armored component installed to prevent the fiber from being affected by the environment event) can easily sense and transduce the lightning overvoltage, so we should treat properly. It is recommended that the user performs the ground protection at the user end of the fiber optic cable.

F2.3   Equipotential Connection Requirement and Method

⚠ Caution

● The interconnected devices in the same work range need the equipotential connection. For example, the interconnected devices, the metal sheath of the cable, power supply PE line, and the installed metal structure should ensure the equipotential connection.

For the equipotential connection of the interconnected devices, refer to the following figure. After connection, use the multimeter to measure whether each equipotential connection point well contacts and the impedance is low enough.
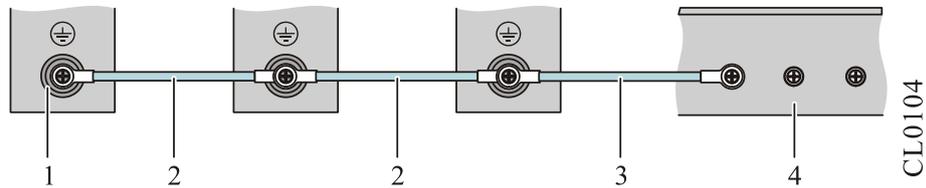
Appendix Figure F-1 Device equipotential connection

1. Device grounding terminal	2. Device equipotential connection line
3. Ground protection cable	4. Ground bar

G Environmental Substance Statement

Appendix Table G-1 Toxic and hazardous substance name and content

Part Name 1	Toxic and Hazardous Substance or Element					
	Pb	Hg	Cd	Cr(VI)	PBB	PBDE
Printed circuit board component 2	×	O	O	O	O	O
Switch power	×	O	O	O	×	×
Shell/frame (metal)	O	O	O	O	O	O
Chassis mat	O	O	O	O	×	×
Screw	×	O	×	O	O	O
Dust cap (Plastic)	×	×	×	×	×	×
Heat dissipation	O	O	O	O	O	O
Fan	O	O	O	O	O	O
Cable	×	×	×	×	×	×
Lithium	O	O	O	O	O	O

battery						
Memory	O	O	O	O	O	O

O: It indicates that the content of the toxic and hazardous substance in all homogeneous materials of the component is below the limit requirement in SJ/T11363-2006 standard.

×: It indicates that the content of the toxic and hazardous substance in at least one homogeneous material of the component exceeds the limit requirement in SJ/T11363-2006 standard.

In the environmental protection use period, only strictly complying with the using conditions in the environmental protection use period, the environmental substances or elements contained in the product do not leak or mutate.

The environmental protection use period of the Li battery of the product is 5 years; the environmental protection use period of the other components is 50 years.

For the use conditions of the product in the environmental protection use period, refer to the requirements for the use environment in the product manuals.

Note

- In the statement, list all components that may be configured in Maipu products. For the actual components contained in each product, please prevail in kind.

- PCB components include the printed circuit boards and the formed IC devices and the discrete devices, such as resistors, capacitors, integrated circuits, and connectors.