

1 Hardware Overview

1.1 AntiDDoS8160

The AntiDDoS8160 is a 32 U device. It employs an integrated chassis and has 16 LPU/SPU slots. Its MPUs, SFUs, power modules, and fans work in redundancy mode.

1.1.1 Device Overview

This section describes the appearance and hardware system features of the AntiDDoS8160.

Appearance

The AntiDDoS8160 has an integrated chassis and adopts a centralized routing engine and a distributed forwarding architecture.

Figure 1-1 shows the chassis of the AntiDDoS8160.

Figure 1-1 Chassis



System Features

The AntiDDoS8160 provides the following system features:

- Upgradable and congestion-free switching fabric, with switching capacity in the Tbit/s range.
- Distributed hardware-based forwarding and rapid service deployment
- Compact structure for increasing interface density
- Normalized system component design
- Separation of control, service, and monitoring channels for ensuring non-blocking of control and monitoring channels

- Carrier-class reliability and manageability
- Modular-level shielding for meeting Electro Magnetic Compatibility (EMC) requirements
- Hot-swappable boards, power modules, and fans
- U-shaped air channels for improving system heat dissipation
- Distributed power supply for enhancing power supply capabilities of a single chassis
- 200-mm fans
- MPUs in 1:1 backup mode
- SFUs in load balancing mode
- Backup for key components such as power modules, fan modules, clocks, and management buses
- Protection against misinsertion of boards
- Queries about alarm prompts, alarm indications, running status, and alarm status of the voltage and ambient temperature

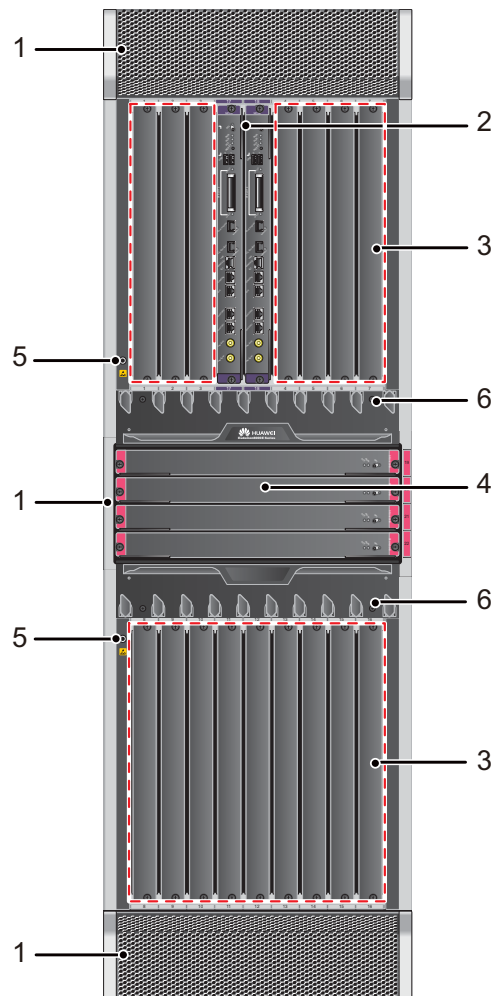
1.1.2 AntiDDoS8160 Components

The section describes the main components on the front and rear panels of the AntiDDoS8160.

The AntiDDoS8160 has an integrated chassis. [Figure 1-2](#) and [Figure 1-3](#) show the architecture and main components of the AntiDDoS8160.

Front Panel

Figure 1-2 AntiDDoS8160 front panel

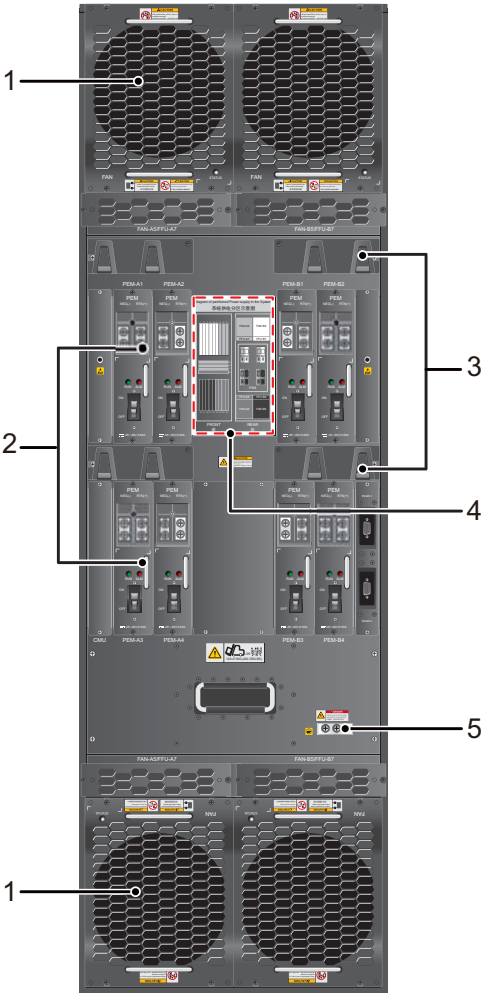


No.	Name	Description
1	Air filter	The AntiDDoS8160 has three air filters on the air intake vents of the upper and lower air channels and an air intake vent at the left side of the SFU area to protect the device against dust.
2	MPU	The Main Processing Unit (MPU) on the AntiDDoS8160 is in charge of system control and route information learning. It is the central control unit of the device. The AntiDDoS8160 MPUs work in 1:1 backup mode. When the active MPU is faulty, the standby MPU immediately takes over for it, ensuring service continuity.
3	LPU/SPU slot	Holds an LPU or SPU.

No.	Name	Description
4	SFU	The SFUs of the AntiDDoS8160 are responsible for the data switching of the entire system. The AntiDDoS8160 has four SFUs that work in 3+1 backup mode to help with load balancing.
5	ESD jack	The equipment end of the wrist strap is inserted into the ESD jack. For the wrist strap to be effective, ensure that the device is grounded.
6	Front cable rack	Used for laying optical fibers and cables. It is divided into the upper and lower racks. "HUAWEI" is written on the upper cable rack, while "AntiDDoS8000 Series" appears on the lower cable rack.

Rear Panel

Figure 1-3 AntiDDoS8160 rear panel



No.	Name	Description
1	Fan module	The AntiDDoS8160 has four fan modules that are arranged in pairs. One pair is deployed on the air exhaust vents at the upper air channels and one pair is deployed on the air exhaust vents at the lower air channels. The modules work in 2+2 backup mode.
2	PEM	The AntiDDoS8160 uses eight power entry modules (PEMs) for DC power supply. The backplane is divided into four areas, each of which has two PEM power inputs. These eight power inputs work in 4+4 backup mode. If the AntiDDoS8160 uses the AC power supply, two additional external AC power chassis are required.
3	Rear cable rack	Used for laying optical fibers and cables. There are four rear cable racks on the upper parts of the power modules.
4	Power supply areas	Power supply areas of the eight PEMs on the AntiDDoS8160.
5	Protection ground terminal	The OT terminal of the ground cable is connected to the protection ground terminal of the device, and the other terminal of the ground cable is connected to the ground point of the cabinet or workbench or the ground bar of the equipment room.

1.1.3 Slot Layout and Boards

This section describes the layout of slots and supported boards on the AntiDDoS8160.

Slots Layout

Figure 1-4 shows the slot layout on the AntiDDoS8160.

Figure 1-4 AntiDDoS8160 slot layout

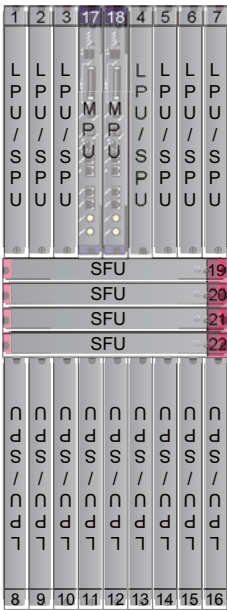


Table 1-1 describes the slot layout on the AntiDDoS8160.

Table 1-1 Table 1 Board distribution on the AntiDDoS8160 board cage

Slot Name	Slot Number	Quantity	Slot Height	Remarks
LPU/SPU	1 to 16	16	41 mm (1.6 inches)	These slots hold LPUs or SPUs.
MPU	17 to 18	2	41 mm (1.6 inches)	These slots hold MPUs that work in 1:1 backup mode.
SFU	19 to 22	4	41 mm (1.6 inches)	These slots hold SFUs.

Supported Boards

Table 1-2 lists the specifications of boards supported by the AntiDDoS8160.

Table 1-2 Boards supported by the AntiDDoS8160

Type	BOM	Description	Hot-Swappable or Not
MPU	0305G06U	1.4.2.1 EKEX16-FWCD00MPUB00	Yes
SFU	0305G08Q	1.4.3.1 E8KE-X16-SFUC-200SP	Yes
SPUs and SPCs	03056690	1.4.4.3 AntiDDoS8080&AntiDDoS8160 Service Processing Unit (ADS-SPUD-B)	Yes
	03056705	1.4.4.4 Service Card (ADS-SPC-40-01)	No
	03056680	1.4.4.6 Service Card (ADS-SPC-80-01)	No
	03057777	1.4.4.5 Service Card (ADS-SPC-60-01)	No
	03057790	1.4.4.7 Service Card (ADS-SPC-120-01)	No
	03057872	1.4.4.8 SPCA-APPSEC-FW	No
	03057873	1.4.4.9 SPCB-APPSEC-FW	No
LPUF-240 and FPIC	03056683	1.4.5.1 LPUF-240	Yes
	03056684	1.4.5.2 6*10GE SFP+ Daughter Card (FW-6X10G-SFP+)	No
	03056686	1.4.5.3 12*10GE SFP+ Daughter Card (FW-12X10G-SFP+)	No

Type	BOM	Description	Hot-Swappable or Not
	03056848	1.4.5.4 3-Port 40GBase QSFP+ FPIC ()	No
	03056685	1.4.5.5 1*100GE CFP Daughter Card (FW-1X100G-CFP)	No
	03056632	1.4.5.6 5-Port 10GBase LAN/WAN-SFP + FPIC A (E8KE-X-101-5X10GE-SFP+)	No
	03056633	1.4.5.7 24-Port 100/1000 Base-X-SFP FPIC (E8KE-X-101-24XGE-SFP)	No
	03056631	1.4.5.8 1-Port 40GBase LAN-CFP FPIC A (E8KE-X-101-1X40GE-CFP)	No
LPUF-120 and FPIC	03056682	1.4.6.1 LPUF-120	Yes
	03056684	1.4.5.2 6*10GE SFP+ Daughter Card (FW-6X10G-SFP+)	No
	03056686	1.4.5.3 12*10GE SFP+ Daughter Card (FW-12X10G-SFP+)	No
	03056848	1.4.5.4 3-Port 40GBase QSFP+ FPIC ()	No
	03056685	1.4.5.5 1*100GE CFP Daughter Card (FW-1X100G-CFP)	No
	03056632	1.4.5.6 5-Port 10GBase LAN/WAN-SFP + FPIC A (E8KE-X-101-5X10GE-SFP+)	No
	03056633	1.4.5.7 24-Port 100/1000 Base-X-SFP FPIC (E8KE-X-101-24XGE-SFP)	No
	03056631	1.4.5.8 1-Port 40GBase LAN-CFP FPIC A (E8KE-X-101-1X40GE-CFP)	No
	03056632	1.4.5.6 5-Port 10GBase LAN/WAN-SFP + FPIC A (E8KE-X-101-5X10GE-SFP+)	No
	03056633	1.4.5.7 24-Port 100/1000 Base-X-SFP FPIC (E8KE-X-101-24XGE-SFP)	No
	0305G09L	4-Port 10G Base LAN -SFP+ FPIC (E8KE-X-101-4X10GE-SFP+)	No
	03056631	1.4.5.8 1-Port 40GBase LAN-CFP FPIC A (E8KE-X-101-1X40GE-CFP)	No
LPUF-40-A and FPIC	03056627	1.4.7.1 LPUF-40-A	Yes
	03056629	1.4.7.2 20-Port 100/1000Base-X-SFP Flexible Card (P40-20xGE/FE-SFP)	No

Type	BOM	Description	Hot-Swappable or Not
	03056628	1.4.7.3 2-Port 10GBase LAN/WAN-XFP Flexible Card (P40-2x10GBase LAN/WAN-XFP)	No
	0305G07X	1.4.7.4 4-port 10GBase LAN/WAN-XFP FPIC (P40-4x10GBase LAN/WAN-XFP)	No
LPUF-21 and FPIC	03056624	1.4.8.1 LPUF-21	Yes
	03056625	1.4.8.2 1-port 10GBase LAN/WAN-XFP FPIC (1 x 10GBase LAN/WAN)	No
	03056626	1.4.8.3 12-port 100Base-FX/1000Base-X-SFP FPIC (12x100/1000Base-SFP)	No
	0305G054	1.4.8.4 12-port 10Base-T/100Base-TX/1000Base-T-RJ45 FPIC (12x10/100/1000Base-TX-RJ45)	No
	0305G055	1.4.8.5 1-port OC-192c/STM-64c POS-XFP FPIC (1 x OC-192c/STM-64c POS-XFP)	No
	0305G07W	1.4.8.6 4-Port 10GBase WAN/LAN-XFP FPIC (4x10GBase LAN/WAN)	No

1.1.4 Power Supply System

This section describes the power supply system architecture, power supply area partitioning, and AC/DC power systems of the AntiDDoS8160.

1.1.4.1 Features and Distributed Architecture of the Power Supply System

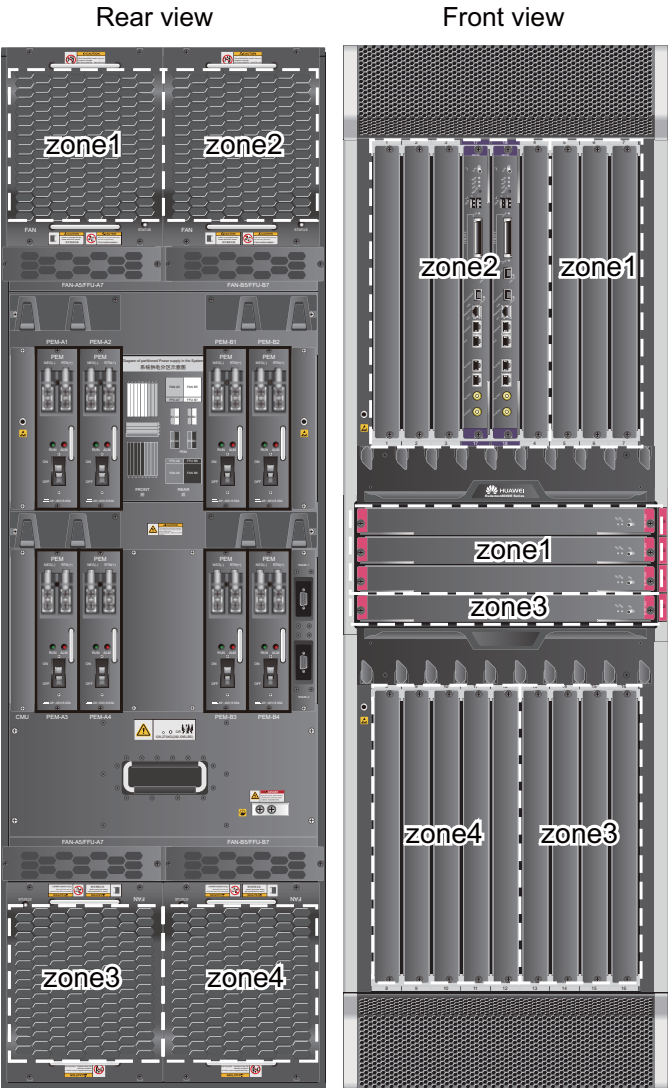
This section describes the power supply mode and power supply area partitioning of the AntiDDoS8160.

The AntiDDoS8160 supports either DC and AC power supplies (but not at the same time).

- If DC power supply is used, connect the DC power cables to the PEM input terminals.
- If AC power supply is used, use two suitable external AC-DC convertors. The number of rectifier modules on the AC-DC convertors depends on the system power consumption. The AC-DC convertor converts AC power to DC power and supplies DC power to the PEMs.

As shown in **Figure 1-5**, the AntiDDoS8160 backplane is divided into four areas, each with two power inputs. These eight power inputs work in backup mode.

Figure 1-5 Distributed architecture of the AntiDDoS8160 power supply



1.1.4.2 DC Power Supply System

This section describes the power supply architecture of the DC power system and the appearance and technical specifications of the DC power modules of the AntiDDoS8160.

The AntiDDoS8160 uses eight 70 A PEMs that work in 4+4 backup mode for DC power supply. Table 1-3 describes the power supply solution.

Table 1-3 Power supply solution of the AntiDDoS8160 DC power system

DC power module	Powered Area	Powered Part
PEM-A1 PEM-B1	Zone1	● Front panel: slots 5-7, 19-21 ● Rear panel: fan modules (upper left side)

DC power module	Powered Area	Powered Part
PEM-A2 PEM-B2	Zone2	● Front panel: slots 1-4, 17, 18 ● Rear panel: fan modules (upper right side)
PEM-A3 PEM-B3	Zone3	● Front panel: slots 13-16, 22 ● Rear panel: fan modules (lower left side)
PEM-A4 PEM-B4	Zone4	● Front panel: slots 8-12 ● Rear panel: fan modules (lower right side)
NOTE PEMs A and B back up each other.		

Figure 1-6 shows the relationships between the power modules and chassis parts. Each DC power input contains one -48 V power input and one RTN input. Two separate RTN inputs join together on the board.

Figure 1-6 Power supply architecture of the AntiDDoS8160 DC power system

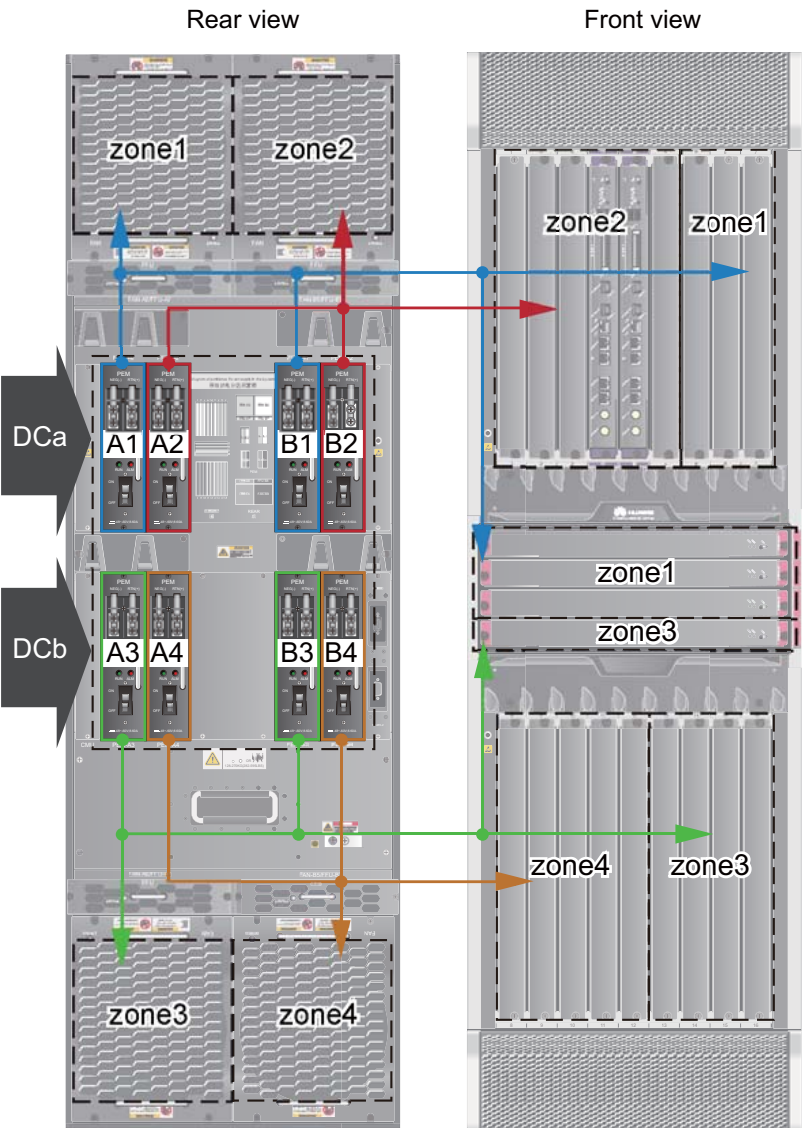


Figure 1-7 shows the PEM.

Figure 1-7 Appearance of the PEM

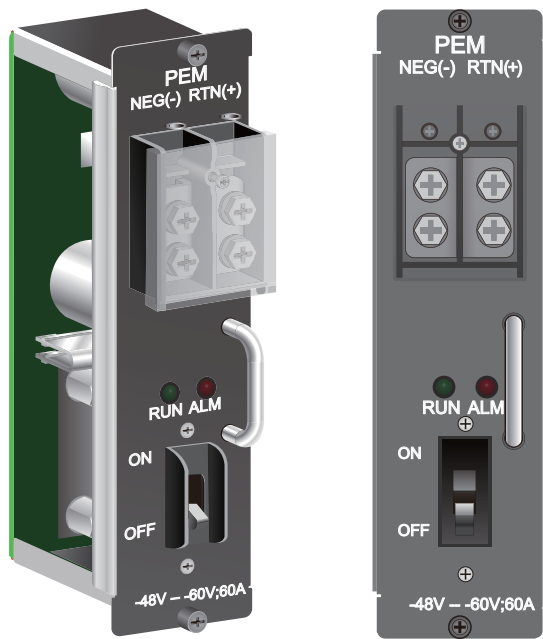


Table 1-4 describes the LED indicators on the PEM.

Table 1-4 Description of the PEM indicators

Indicator	Color	Description
RUN	Green	Indicates normal power output. If the indicator is steady on, the output is normal.
ALM	Red	Power failure indicator. If the indicator is steady on: ● The lightning protection link of the power module has failed. ● The input power cable is not connected to the power module.

Table 1-5 lists the technical specifications of the PEM.

Table 1-5 Technical specifications of the DC PEM

Item	Technical Specification
Type	PEMB
Dimensions (Width x Depth x Height)	58 mm x 115 mm x 220 mm
Weight	1.1 kg

Item	Technical Specification
Number of power inputs	1
Maximum input voltage range	-72 V DC to -38 V DC
Rated input voltage range	-48 V DC to -60 V DC
Input current	60 A (Each power supply input with at least 60 A current is recommended.)
Output voltage	-72 V DC to -38 V DC
Output current	60 A
Rated current of the air-break	70 A (Each PEM is controlled by an air switch).

1.1.4.3 AC Power Supply System

This section describes the power supply architecture of the AC power system and the appearance and technical specifications of the AC power chassis of the AntiDDoS8160.

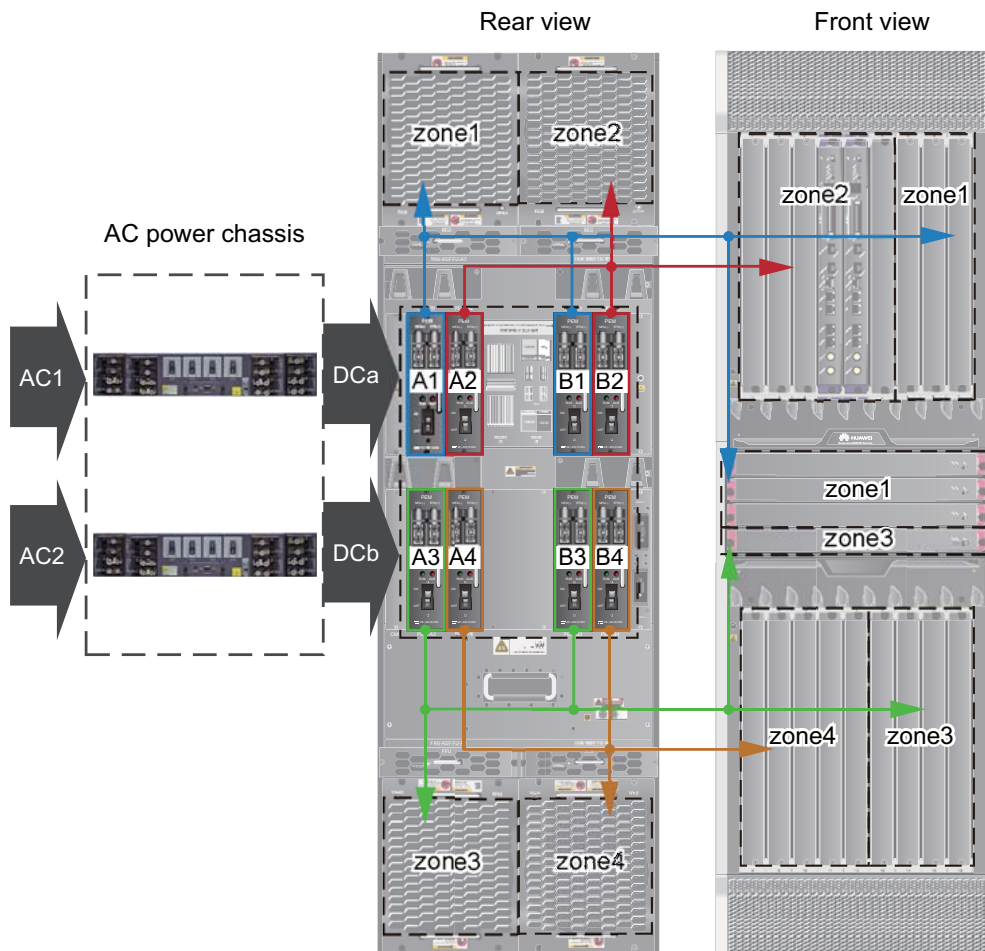
Table 1-6 shows the power supply architecture of the AntiDDoS8160 AC power supply system. The input AC power is output as steady DC power after being converted by the AC/DC module and being transmitted along external cables to the PEM to power all boards and fans.

Table 1-6 Power supply solution of the AntiDDoS8160 AC power system

AC Power Module	DC Power Module	Powered Area	Powered Part
AC power chassis A	PEM-A1 PEM-B1	Zone1	● Front panel: slots 5-7, 19-21 ● Rear panel: fan modules (upper left side)
	PEM-A2 PEM-B2	Zone2	● Front panel: slots 1-4, 17, 18 ● Rear panel: fan modules (upper right side)
AC power chassis B	PEM-A3 PEM-B3	Zone3	● Front panel: slots 13-16, 22 ● Rear panel: fan modules (lower left side)
	PEM-A4 PEM-B4	Zone4	● Front panel: slots 8-12 ● Rear panel: fan modules (lower right side)
NOTE PEMs A and B back up each other.			

Figure 1-8 shows the relationships between the AC power chassis, power modules, and chassis parts. Each DC power input contains one -48 V power input and one RTN input. Two separate RTN inputs join together on the board.

Figure 1-8 Power supply architecture of the AntiDDoS8160 AC power system



An AC power chassis is 2 U high. Install the AC power chassis in the same cabinet as the device. If they cannot be installed in the same cabinet, install them in as close proximity as possible. The two AC power chassis work in 1+1 backup mode. Each AC power chassis has four circuit breakers and eight AC power inputs. The current of each air circuit breaker is 20 A.

Figure 1-9 and **Figure 1-10** show the appearance of the EPS200-4850A AC power chassis.

Figure 1-9 Schematic diagram of the appearance of the EPS200-4850A AC power chassis (front)



Figure 1-10 Schematic diagram of the appearance of the EPS200-4850A AC power chassis (rear)

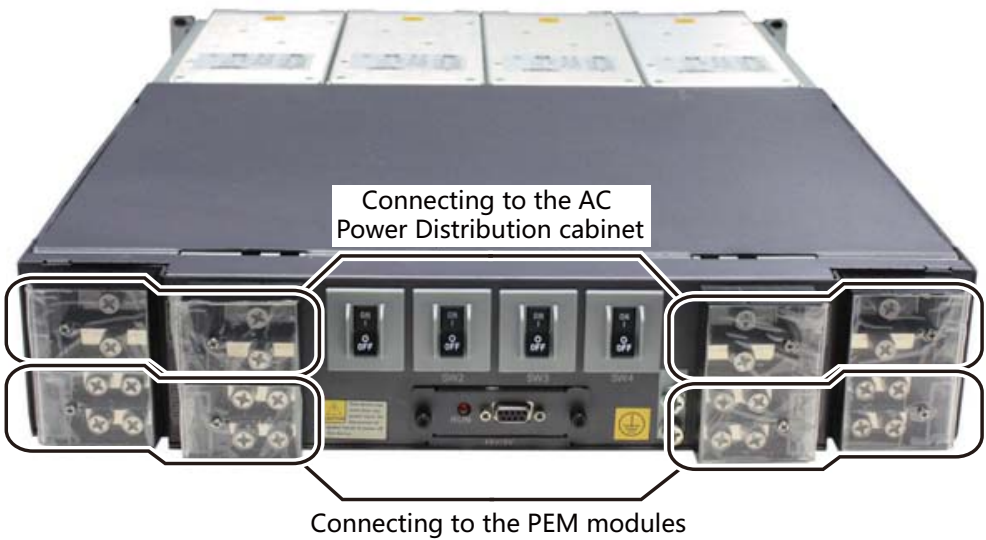
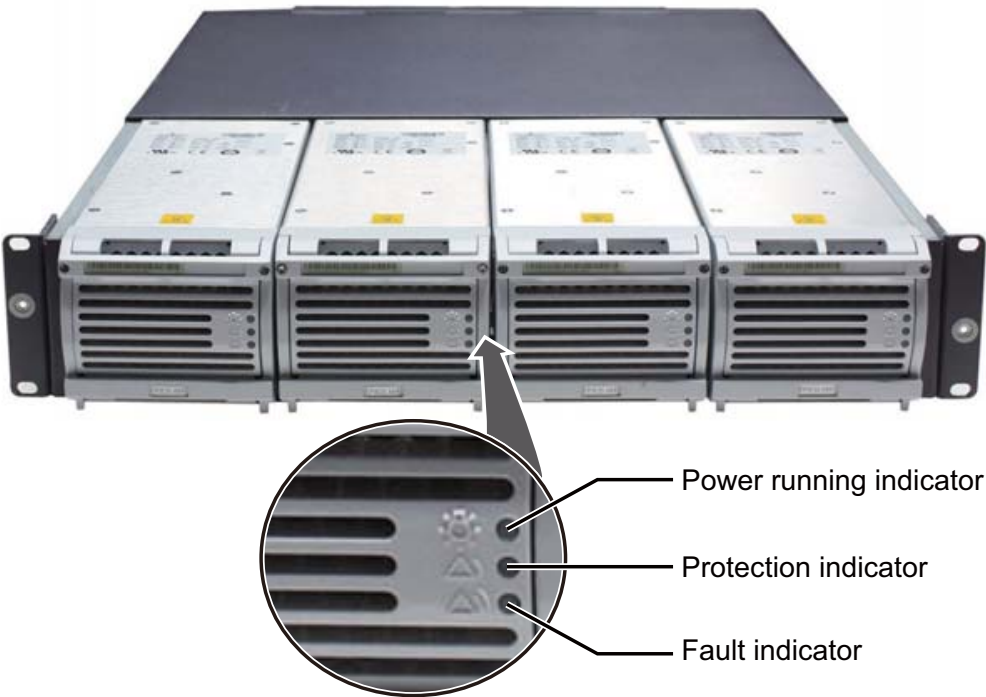


Figure 1-11 and Figure 1-12 show the appearance of the EPS200-4850B AC power chassis.

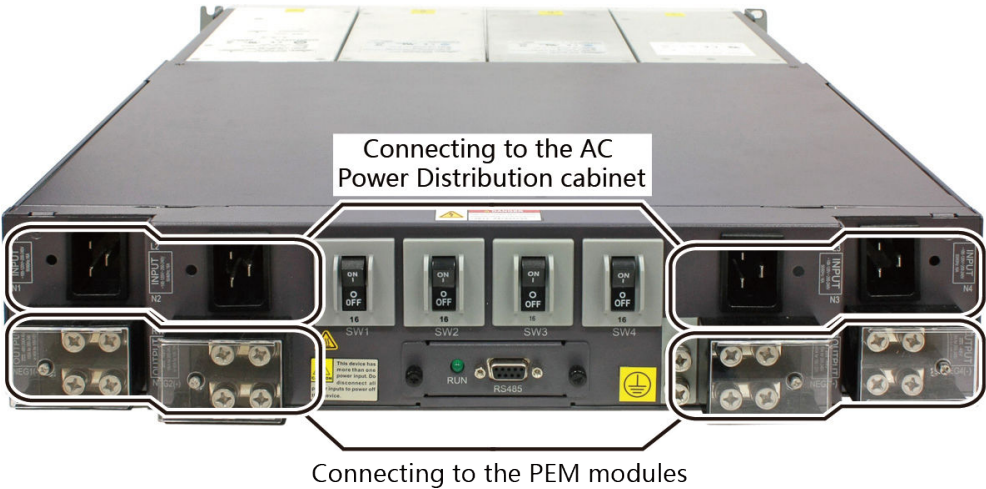
Figure 1-11 Schematic diagram of the appearance of the EPS200-4850B AC power chassis (front)



NOTE

The front of the EPS200-4850B AC power chassis is the same as that of the EPS200-4850A AC power chassis.

Figure 1-12 Schematic diagram of the appearance of the EPS200-4850B AC power chassis (rear)



 NOTE

As the AntiDDoS8000 do not support AC power chassis management, the DB9 interface on the rear of the AC power chassis does not need to connect to the monitoring cable in the installation auxiliary material package.

Table 1-7 describes indicators on the panel of the AC power chassis.

Table 1-7 Indicator description

Indicator	Color	Normal	Abnormal	Cause
Power running indicator	Green	On	Off	Power failure (no AC input, over-voltage AC input, or under-voltage AC input) and no output from the power module
Protection indicator	Yellow	Off	On	Temperature alarm (when the ambient temperature exceeds 65°C, the device is powered off.) Dormant (when the device is in dormant state, the protection indicator of the module is on but the module does not report alarms.)
Fault indicator	Red	Off	On	No output due to the over-voltage output power-off, fan fault, over-temperature power-off, or internal module fault.

Table 1-8 lists the technical specifications of the AC power chassis.

Table 1-8 Technical specifications of the AC power supply module

Item	Technical Specification
Type	EPS200-4850A/EPS200-4850B
Dimensions (Width x Depth x Height)	442 mm x 650 mm x 88 mm
Number of power inputs	4
Maximum input voltage range	● 220 V rated voltage: 175 V AC to 264 V AC, 47 Hz to 63 Hz ● 110 V rated voltage: 90 V AC to 175 V AC, 47 Hz to 63 Hz (The output power reduces to half of the maximum output when the input voltage is in the range of 90 V AC to 175 V AC.)
Rated input voltage range	● 220 V rated voltage: 200 V AC to 240 V AC, 50/60 Hz ● 110 V rated voltage: 100 V AC to 120 V AC, 50/60 Hz
Input current	● 220 V rated voltage: 18.5 A per module (Each power supply input with at least 18.5 A current is recommended.) ● 110 V rated voltage: 16 A per module (Each power supply input with at least 16 A current is recommended.)
Number of power outputs	4
Maximum output current	50 A/single module
Maximum output power	2900 W/single module

1.1.5 Heat Dissipation System

This section describes the heat dissipation system components and the appearance, functions, and technical specifications of fan modules.

1.1.5.1 System Air Channel

This section describes the system air channels and air flows of the AntiDDoS8160.

The AntiDDoS8160 has three air channels:

- The upper and lower chassis have separate air channels that draw air from the front and exhaust air from the rear. The air filters are installed over the air intake vents. Each filter covers a large area and has a curved face and low windage resistance. These features increase heat dissipation efficiency. The air filters on the upper and lower chassis are identical.
- The air channel in the SFU slot area is located on the left side of the chassis. The depth of the air filter is the same as that of an SFU, and the height of the air filter is four times the height of the SFU.

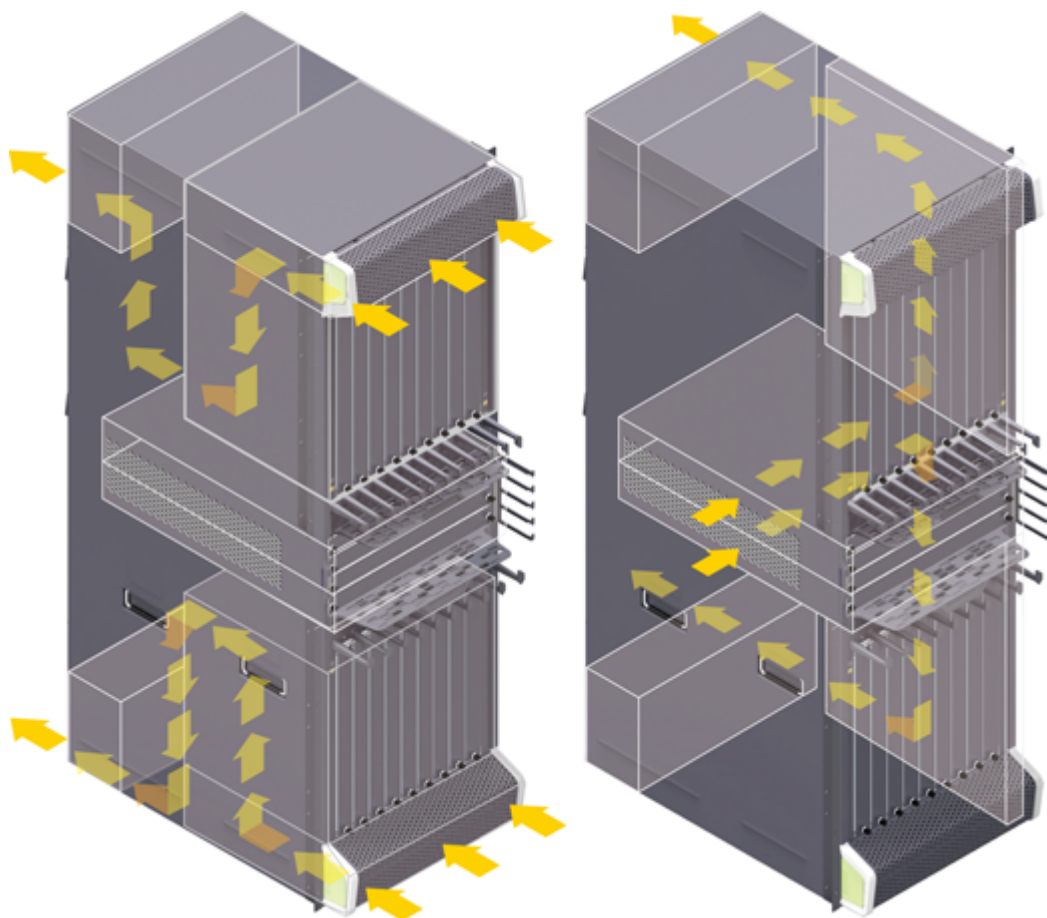
The air intake vent on the upper chassis is located above the board area on the front chassis; the air exhaust vent is located above the board area on the rear chassis. The air intake vent on

the lower chassis is located below the board area on the front chassis; the air exhaust vent on the lower chassis is located below the board area on the rear chassis. The upper chassis and the lower chassis also have separate heat dissipation systems.

The middle area of the AntiDDoS8160 is for SFU slots. The air intake vent in this area is located on the left side of the chassis. Two upper SFU slots in the area draw in air from the left side. When flowing to the right, the air joins the air from the upper chassis. Two lower SFU slots in the area also draw in air from the left. When flowing to the right, the air joins the air from the lower chassis.

Figure 1-13 shows the air flow in the AntiDDoS8160.

Figure 1-13 Air flow in the AntiDDoS8160



1.1.5.2 Fan Module

This section describes the appearance, technical specifications, and speed adjustment of fans.

Appearance and Technical Specifications of Fan Modules

The four fan modules of the AntiDDoS8160 are located side by side next with the air exhaust vents and work in 2+2 backup mode. Each fan module is equipped with one fan. When one fan fails, the heat dissipation system can still allow the device to continue operating at the ambient temperature of 40°C for a short time. The fan modules are hot-swappable.

 **NOTE**

The heat dissipation system allows the device to operate at the ambient temperature for a short time as long as, at the time of failure, the system has not been operating continuously for more than 96 hours and the accumulated operation time of the system per year does not exceed 15 days.

Figure 1-14 Fan module



Table 1-9 describes the indicators on the fan module.

Table 1-9 Description of fan module indicators

Indicator	Color	Description
STATUS	Green	If the indicator blinks once every 2 seconds (0.5 Hz), the fan module is working normally.
	Red	If the indicator blinks once every 2 seconds (0.5 Hz), the fan module or PEM is faulty, or not all PEMs are powered on.

Table 1-10 lists the technical specifications of the fan module.

Table 1-10 Technical specifications of the fan module

Item	Technical Specifications
Dimensions (width x depth x height)	210.4 mm x 100 mm x 243.7 mm
Weight	3.4 kg
Power consumption (typical value)	30 W
Maximum noise	74 dB

Fan Speed Adjustment

When the system is fully configured, fan speeds are adjusted based on temperatures reported by the temperature sensors on the LPUs, SPU, SFUs and MPUs. [Table 1-11](#) lists general fan speed adjustment principles.

Table 1-11 Fan Speed Adjustment Principles

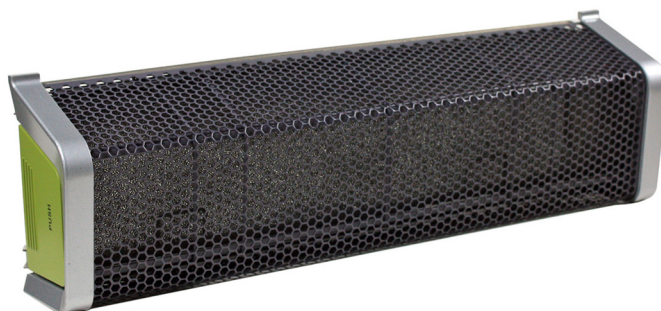
Ambient Temperature	Rotational Speed	Noise and Dissipation Standards
-5°C - +27°C (23°F - 80.6°F)	Low (50% rotational speed)	When fans rotate at a constantly low speed, noise levels meet the NEBS standard, and the fans meet heat dissipation requirements of a fully configured system.
27°C - 50°C (80.6°F - 122°F)	Linear variation	The fan speed is adjusted smoothly and linearly, without sudden increases in noise.
Over 45°C (113°F)	High (100% rotational speed)	Fans rotate at high speeds to meet heat dissipation requirements.

1.1.5.3 Air Filter

This section describes the appearance and features of air filters.

The AntiDDoS8160 draws air from the front and exhausts air from the rear. The two air filters on the upper and lower chassis are identical. To maximize air intake, the filters are fully perforated. Air filters are fixed to the chassis with fasteners to facilitate filter removal and replacement. [Figure 1-15](#) shows an air filter.

Figure 1-15 Air filter



The air channel in the SFU slot area is located on the left side of the chassis. The air filter can be accessed from the front. The depth of the air filter is the same as that of an SFU, and the height of the air filter is four times the width of an SFU, as shown in [Figure 1-16](#).

Figure 1-16 Air filter in the SFU area



 NOTE

Placing a black sponge air filter in front of the air intake vent helps prevent dust from entering the system. You are advised to remove and clean air filters at least once every three months.

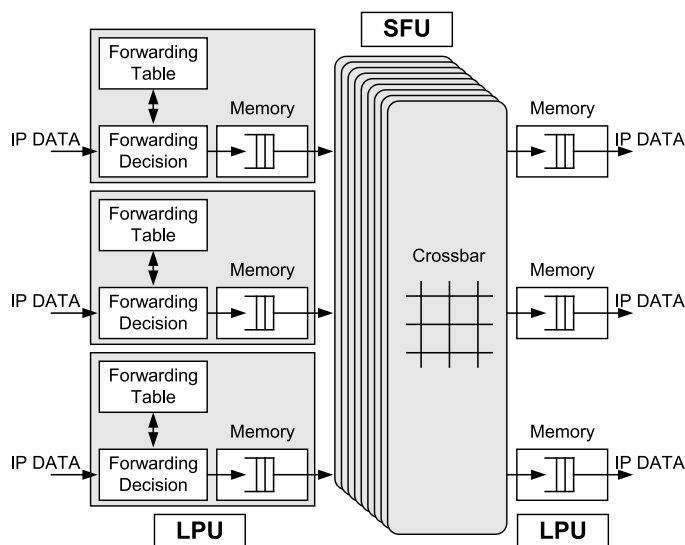
1.1.6 Switch Fabric

This section describes the mechanism of the switch fabric on the AntiDDoS8160.

The AntiDDoS8160 has four independent switch fabric units (SFUs) that work in 3+1 backup mode to achieve simultaneous load balancing. When one SFU is faulty or is being replaced, the other three SFUs automatically take over its tasks to ensure service continuity. For more details about AntiDDoS8160 SFUs, see [1.4.3.1 E8KE-X16-SFUC-200SP](#).

The switching network responsible for switching data between LPUs/SPUs is a key component of the AntiDDoS8160. The AntiDDoS8160 uses switching chips developed by Huawei and Memory-Crossbar-Memory (M-C-M) to provide three-level switching. Level-1 and level-3 switching use a shared-memory model and are performed on LPUs/SPUs; level-2 switching uses a Crossbar model and is performed on SFUs. [Figure 1-17](#) shows the switching network of the AntiDDoS8160. (The LPU is used as an example.)

Figure 1-17 AntiDDoS8160 switching network



The level-1 switching chip on one LPU is fully connected to the level-2 switching chips on the SFUs. The level-2 switching chips on the SFUs are also fully connected to the level-3 switching chip on another LPU. In addition, the level-2 crossbar switching chips work in load balancing mode on multiple switching planes. The entire switching network is unblocked. The process of transmitting data packets across the switching network is as follows:

1. Data packets enter an LPU through physical interfaces and are fragmented into cells of a fixed length. These cells are then sent to the level-1 switching chips. After being buffered and scheduled, the cells enter the crossbar switching chips on the SFU. The level-1 switching chip on an LPU is fully connected with all of the level-2 switching chips. As a result, the same number of cells can be distributed to each level-2 switching plane. This implements load balancing on switching planes and facilitates fault tolerance.
2. After the cells reach the crossbar switching chips, the crossbar switching chips schedule the cells to the corresponding outbound interfaces according to the destination interfaces of the data packets. The cells are then sent to the level-3 switching chips on another LPU. The switching of cells by the level-2 switching chips is then completed.
3. After the cells reach the level-3 switching chips on another LPU, the system searches for the destination interfaces. Once found, the cells are reassembled and sent out through physical interfaces, completing the switching of the data packets.

1.1.7 Control Plane

This section describes the functions and features of the control plane.

AntiDDoS8160 uses the MPU (EKEX16-FWCD00MPUB00) to implement the control plane functions. For details about the MPU, see [1.4.2.1 EKEX16-FWCD00MPUB00](#). The functions of the MPU are described from the aspects of system control and management, system maintenance, and reliability.

System Control and Management Unit

As the system control and management unit, the MPU provides the following functions on the system control panel:

- Route calculation: All routing protocol packets are sent by the forwarding engine to the MPU for processing. In addition, the MPU broadcasts and filters packets, and downloads routing policies from the policy server.
- Outband communication between boards: The LAN switch modules integrated on the SRU provide outband communications for the SFUs, LPUs and SPUs. In this manner, messages can be controlled, maintained, and exchanged between the boards.
- Device management and maintenance: Devices can be managed and maintained through the management interfaces (serial interfaces) provided by the MPU.
- Data configuration: The MPU stores configuration data, startup files, upgrade software, and system logs.
- Data storage: The MPU provides two interfaces for CF cards, which serve as mass storage devices to store data files.

System Maintenance Unit

As the system maintenance unit, the MPU collects monitored information to test system units locally or remotely, or implement in-service upgrading of system units.

The MPU periodically collects the operating data of system units through the Monitorbus. The MPU generates related control information based on the collected information, such as the detection of board installations and fan speed adjustments. Through the joint test action group (JTAG) bus, the MPU remotely or locally tests system units, or performs in-service upgrading of system units.

Reliability

The main control modules, clock modules, and LAN switch modules on the MPU work in 1:1 hot backup mode, improving system reliability.

The two MPUs work in 1:1 backup mode. Each MPU monitors the status of the other. If the active MPU is faulty, the standby MPU automatically takes over as the active MPU.

1.1.8 Technical Specifications

This section describes the dimensions, weight, power, and environment specifications of the AntiDDoS8160.

Table 1-12 lists the technical specifications of the AntiDDoS8160.

Table 1-12 AntiDDoS8160 Technical Specifications

Item	Description
System specifications	
Processing unit of the MPU	Main frequency: 1.5 GHz
BootROM capacity of the MPU	8 MB
SDRAM capacity of the MPU	4 GB

Item		Description
NVRAM capacity of the MPU		4 MB
Flash capacity of the MPU		32 MB
CF card		2 x 2 GB
Number of slots	MPU	2 (slots 17 and 18)
	SFU	4 (slots 19 to 22)
	LPU/ SPU	16 (slots 1 to 16)
Dimensions and weight		
Dimensions (width ^a x depth x height ^b)		442 mm x 650 mm x 1420 mm (32 U). The depth is 770 mm covering the dust filter and cable rack.
Installation position		N68E cabinet or a standard 19-inch cabinet
Weight	Empty chassis	94.4 kg
	Full configuration (maximum)	233.9 kg
Power specifications		
Power supply mode	DC	8 hot-swappable PEMs
	AC	8 PEMs+2 external AC power chassis
Rated input voltage range	DC	-48 V DC to -60 V DC
	AC	● 220 V rated voltage: 200 V AC to 240 V AC, 50/60 Hz ● 110 V rated voltage: 100 V AC to 120 V AC, 50/60 Hz
Maximum input voltage range	DC	-72 V DC to -38 V DC
	AC	● 220 V rated voltage: 175 V AC to 264 V AC, 47 Hz to 63 Hz ● 110 V rated voltage: 90 V AC to 175 V AC, 47 Hz to 63 Hz (The output power reduces to half of the maximum output when the input voltage is in the range of 90 V AC to 175 V AC.)

Item		Description
Typical power (six LPUF-240s and nine SPUs are configured.)	DC	7387 W
	AC	7858 W
Maximum Power (six LPUF-240s and nine SPUs are configured.)	DC	8930 W
	AC	9500 W
Heat dissipation		
Fan module		4 hot-swappable fan modules, each of which has one fan
Air flow		Upper and lower air channels: draw air from the front and exhaust air from the rear. Middle air channels: draw air from the left side and exhaust air from the upper and lower rear.
Air filter		3 air filters in the air intake vents of air channels
Environment specifications		
System reliability	MTB F (year)	25
	MTT R (hour)	0.5
Ambient temperature ^c	Long- term ^d	0°C to 45°C
	Short- term	-5°C to 50°C
	Rema rks	Limit of the temperature change rate: 30°C/hour
Storage temperature		-40°C to 70°C
Ambient relative humidity	Long- term	5% RH to 85% RH, no coagulation
	Short- term	5% RH to 95% RH, no coagulation
Storage relative humidity		0% RH to 95% RH
Long-term altitude		Lower than 3000 m
Storage altitude		Lower than 5000 m

Item	Description
NOTE a. The width does not include the size of the attached mounting ear. b. The height is 1 U (1 U = 1.75 inches, or about 44.45 mm), which is a height unit defined in International Electrotechnical Commission (IEC) 60297 standards. c. The measurement point of the temperature and humidity is 1.5 m above the floor and 0.4 m in front of the cabinet without the front and the back doors. d. The heat dissipation system allows the device to operate at the ambient temperature for a short time as long as, at the time of failure, the system has not been operating continuously for more than 96 hours and the accumulated operation time of the system per year does not exceed 15 days.	

1.2 AntiDDoS8080

The AntiDDoS8080 is a 14 U device. It employs an integrated chassis and has 8 LPU/SPU slots. Its SRUs, SFUs, power modules, and fans work in redundancy mode.

1.2.1 Device Overview

This section describes the appearance and hardware system features of the AntiDDoS8080.

Appearance

The AntiDDoS8080 has an integrated chassis and adopts a centralized routing engine and a distributed forwarding architecture.

Figure 1-18 shows the chassis of the AntiDDoS8080.

Figure 1-18 AntiDDoS8080 chassis



System Features

The AntiDDoS8080 provides the following system features:

- Upgradable and congestion-free switching fabric, with switching capacity in the Tbit/s range
- Distributed hardware-based forwarding and rapid service deployment
- Compact structure for increasing interface density
- Normalized system component design
- Separation of control, service, and monitoring channels for ensuring non-blocking of control and monitoring channels
- Carrier-class reliability and manageability
- Modular-level shielding for meeting Electro Magnetic Compatibility (EMC) requirements
- Hot-swappable boards, power modules, and fans
- U-shaped air channels for improving system heat dissipation
- Distributed power supply for enhancing power supply capabilities of a single chassis
- 200-mm fans
- SRUAs in 1:1 backup mode

- SFUs in load balancing mode
- Backup for key components such as power modules, fan modules, clocks, and management buses
- Protection against misinsertion of boards
- Queries about alarm prompts, alarm indications, running status, and alarm status of the voltage and ambient temperature

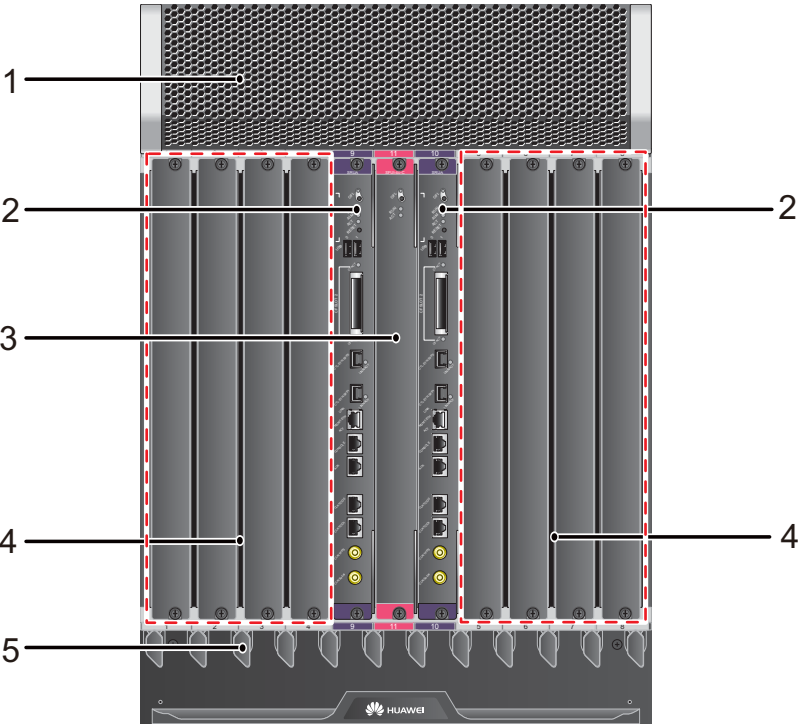
1.2.2 AntiDDoS8080 Components

This section describes the main components of the AntiDDoS8080.

The AntiDDoS8080 has an integrated chassis. [Figure 1-19](#) and [Figure 1-20](#) show the architecture and main components of the AntiDDoS8080.

Front Panel

Figure 1-19 AntiDDoS8080 front panel

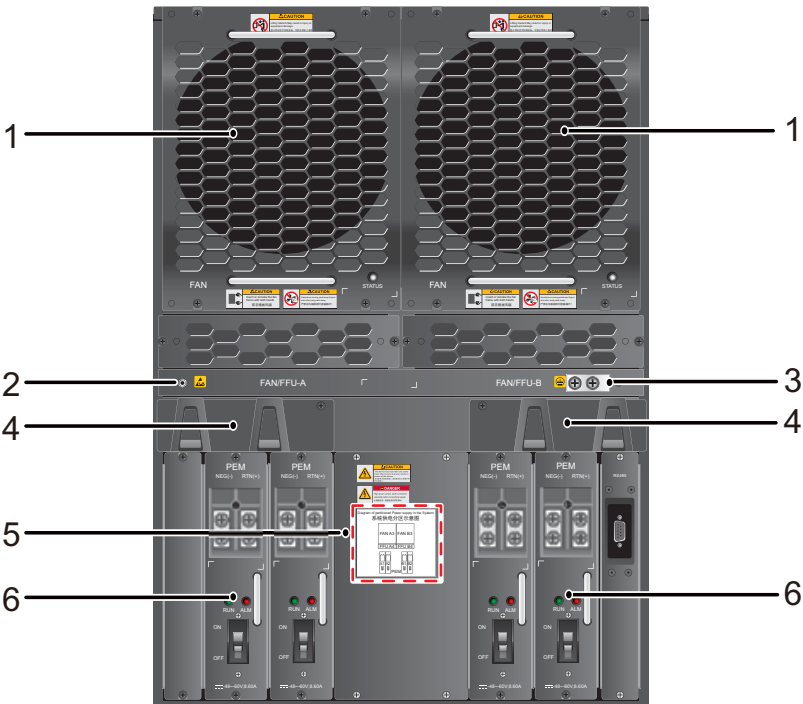


No.	Name	Description
1	Air filter	The air filters of the AntiDDoS8080 are deployed on the air intake vents of chassis air channels to protect the device against dust.

No.	Name	Description
2	SRU	The Switch Router Unit (SRU) on the AntiDDoS8000 is in charge of system control and route information learning. It is the central control unit of the device. The AntiDDoS8000 SRUs work in 1:1 backup mode. When the active SRU is faulty, the standby SRU immediately takes over for it, ensuring service continuity. The AntiDDoS8000 SRU is integrated with an SFU for data switching.
3	SFU	The SFUs of the AntiDDoS8000 are responsible for the data switching of the entire system. The AntiDDoS8000 has one separate SFU. It works with the SFUs integrated in the two SRUs in 2+1 backup mode for load balancing.
4	LPU/SPU slot	Holds an LPU or SPU.
5	Front cable rack	Used for laying optical fibers and cables.

Rear Panel

Figure 1-20 AntiDDoS8000 rear panel



No.	Name	Description
1	Fan module	The AntiDDoS8080 has two fan modules. They are deployed on the air intake vents of chassis air channels and work in 1+1 backup mode.
2	ESD jack	The equipment end of the wrist strap is inserted into the ESD jack. For the wrist strap to be effective, ensure that the device is grounded.
3	Protection ground terminal	The OT terminal of the ground cable is connected to the protection ground terminal of the device, and the other terminal of the ground cable is connected to the ground point of the cabinet or workbench or the ground bar of the equipment room.
4	Rear cable rack	Used for laying optical fibers and cables. There are two rear cable racks on the upper parts of the power modules.
5	Power supply areas	Power supply areas of the four PEMs on the AntiDDoS8080.
6	PEM module	The AntiDDoS8080 uses four PEMs for DC power supply. The AntiDDoS8080 backplane is divided into two areas, each of which has two PEM power inputs. These eight power inputs work in 2+2 backup mode. If the AntiDDoS8080 uses the AC power supply, one additional external AC power chassis is required.

1.2.3 Slot Layout and Supported Boards

This section describes the layout of slots and supported boards on the AntiDDoS8080.

Slots Layout

Figure 1-21 shows the slot layout on the AntiDDoS8080.

Figure 1-21 AntiDDoS8080 slot layout



Table 1-13 describes the slot layout on the AntiDDoS8080.

Table 1-13 Board distribution on the AntiDDoS8080 board cage

Slot Name	Slot Number	Quantity	Slot Height	Remarks
LPU/SPU	1 to 8	8	41 mm (1.6 inches)	These slots hold LPUs or SPUs.
SRU	9 to 10	2	36 mm (1.4 inches)	These slots hold SRUs that work in 1:1 backup mode.
SFU	11	1	36 mm (1.4 inches)	The slot holds an SFU.

Supported Boards

Table 1-14 lists the specifications of boards supported by the AntiDDoS8080.

Table 1-14 Supported boards by the AntiDDoS8080

Type	BOM	Description	Hot Swap
SRU	0305G08N	1.4.2.2 E8KE-X8-SRUA-200	Yes
SFU	0305G08P	1.4.3.2 E8KE-X8-SFUC-200	Yes
SPUs and SPCs	03056690	1.4.4.3 AntiDDoS8080&AntiDDoS8160 Service Processing Unit (ADS-SPUD-B)	Yes
	03056705	1.4.4.4 Service Card (ADS-SPC-40-01)	No
	03056680	1.4.4.6 Service Card (ADS-SPC-80-01)	No
	03057777	1.4.4.5 Service Card (ADS-SPC-60-01)	No
	03057790	1.4.4.7 Service Card (ADS-SPC-120-01)	No
	03057872	1.4.4.8 SPCA-APPSEC-FW	No
	03057873	1.4.4.9 SPCB-APPSEC-FW	No
LPUF-240 and FPIC	03056683	1.4.5.1 LPUF-240	Yes
	03056684	1.4.5.2 6*10GE SFP+ Daughter Card (FW-6X10G-SFP+)	No
	03056686	1.4.5.3 12*10GE SFP+ Daughter Card (FW-12X10G-SFP+)	No
	03056848	1.4.5.4 3-Port 40GBase QSFP+ FPIC ()	No
	03056685	1.4.5.5 1*100GE CFP Daughter Card (FW-1X100G-CFP)	No

Type	BOM	Description	Hot Swap
	03056632	1.4.5.6 5-Port 10GBase LAN/WAN-SFP + FPIC A (E8KE-X-101-5X10GE-SFP+)	No
	03056633	1.4.5.7 24-Port 100/1000 Base-X-SFP FPIC (E8KE-X-101-24XGE-SFP)	No
	03056631	1.4.5.8 1-Port 40GBase LAN-CFP FPIC A (E8KE-X-101-1X40GE-CFP)	No
LPUF-120 and FPIC	03056682	1.4.6.1 LPUF-120	Yes
	03056684	1.4.5.2 6*10GE SFP+ Daughter Card (FW-6X10G-SFP+)	No
	03056686	1.4.5.3 12*10GE SFP+ Daughter Card (FW-12X10G-SFP+)	No
	03056848	1.4.5.4 3-Port 40GBase QSFP+ FPIC ()	No
	03056685	1.4.5.5 1*100GE CFP Daughter Card (FW-1X100G-CFP)	No
	03056632	1.4.5.6 5-Port 10GBase LAN/WAN-SFP + FPIC A (E8KE-X-101-5X10GE-SFP+)	No
	03056633	1.4.5.7 24-Port 100/1000 Base-X-SFP FPIC (E8KE-X-101-24XGE-SFP)	No
	03056631	1.4.5.8 1-Port 40GBase LAN-CFP FPIC A (E8KE-X-101-1X40GE-CFP)	No
LPUF-40-A and FPIC	03056627	1.4.7.1 LPUF-40-A	Yes
	03056629	1.4.7.2 20-Port 100/1000Base-X-SFP Flexible Card (P40-20xGE/FE-SFP)	No
	03056628	1.4.7.3 2-Port 10GBase LAN/WAN-XFP Flexible Card (P40-2x10GBase LAN/WAN-XFP)	No
	0305G07X	1.4.7.4 4-port 10GBase LAN/WAN-XFP FPIC (P40-4x10GBase LAN/WAN-XFP)	No
LPUF-21 and FPIC	03056624	1.4.8.1 LPUF-21	Yes
	03056625	1.4.8.2 1-port 10GBase LAN/WAN-XFP FPIC (1 x 10GBase LAN/WAN)	No
	03056626	1.4.8.3 12-port 100Base-FX/1000Base-X-SFP FPIC (12x100/1000Base-SFP)	No
	0305G054	1.4.8.4 12-port 10Base-T/100Base-TX/1000Base-T-RJ45 FPIC (12x10/100/1000Base-TX-RJ45)	No

Type	BOM	Description	Hot Swap
	0305G055	1.4.8.5 1-port OC-192c/STM-64c POS-XFP FPIC (1 x OC-192c/STM-64c POS-XFP)	No
	0305G07W	1.4.8.6 4-Port 10GBase WAN/LAN-XFP FPIC (4x10GBase LAN/WAN)	No

1.2.4 Power Supply System

This section describes the power supply system architecture, power supply area partitioning, and DC/AC power system of the AntiDDoS8080.

1.2.4.1 Features and Distributed Architecture of the Power Supply System

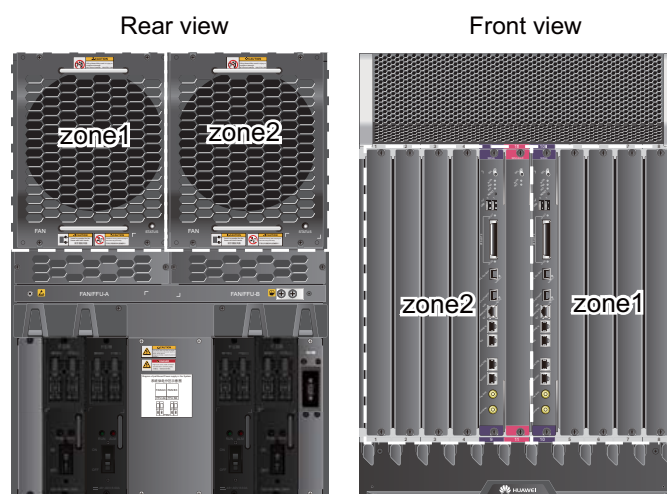
This section describes the power supply mode and power supply area partitioning of the AntiDDoS8080.

The AntiDDoS8080 supports either DC and AC power supplies (but not at the same time).

- If DC power supply is used, connect the DC power cables to the PEM input terminals.
- If AC power supply is used, use two suitable external AC-DC convertors. The number of rectifier modules on the AC-DC convertors depends on the system power consumption. The AC-DC convertor converts AC power to DC power and supplies DC power to the PEMs.

As shown in **Figure 1-22**, the AntiDDoS8080 backplane is divided into two areas, each with two power inputs. These four power inputs work in backup mode.

Figure 1-22 Distributed architecture of the AntiDDoS8080 power supply



1.2.4.2 DC Power Supply System

This section describes the power supply architecture of the DC power system and the appearance and technical specifications of the DC power modules of the AntiDDoS8080.

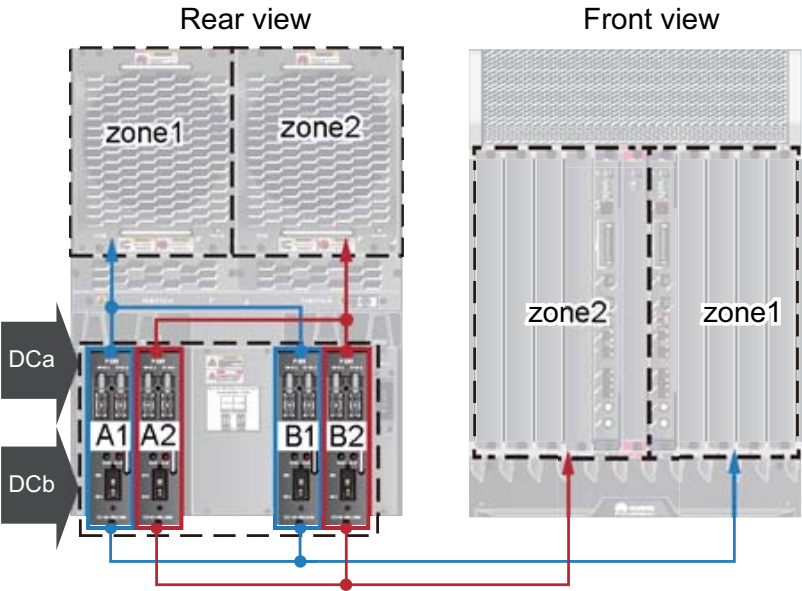
The AntiDDoS8080 uses four 70 A PEM modules that work in 2+2 backup mode for DC power supply. [Figure 1-23](#) describes the power supply solution.

Table 1-15 Power supply solution of the AntiDDoS8080 DC power system

DC Power Module	Powered Area	Powered Part
PEM-A1 PEM-B1	Zone1	● Front panel: slots 5-8, 10 ● Rear panel: fan modules (upper left side)
PEM-A2 PEM-B2	Zone2	● Front panel: slots 1-4, 9, 11 ● Rear panel: fan modules (upper right side)
NOTE PEMs A and B back up each other.		

[Figure 1-23](#) shows the relationships between the power modules and chassis parts. Each DC power input contains one -48 V power input and one RTN input. Two separate RTN inputs join together on the board.

Figure 1-23 Power supply architecture of the AntiDDoS8080 DC power system



[Figure 1-24](#) shows the PEM.

Figure 1-24 Appearance of the PEM

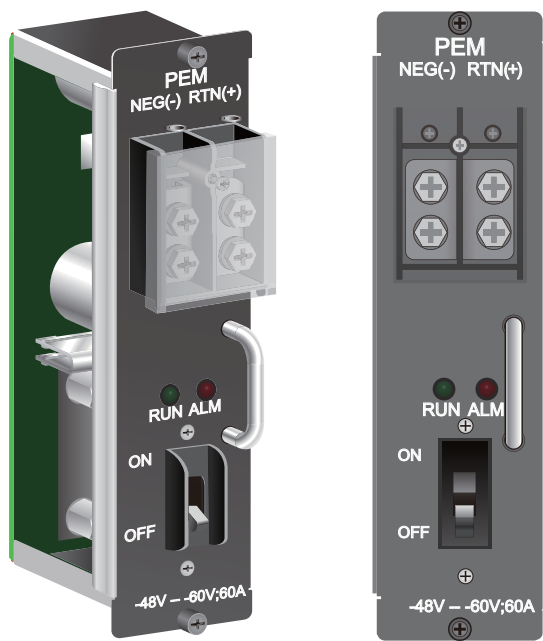


Table 1-16 describes the LED indicators on the PEM.

Table 1-16 Description of the PEM indicators

Indicator	Color	Description
RUN	Green	Indicates normal power output. If the indicator is steady on, the output is normal.
ALM	Red	Power failure indicator. If the indicator is steady on: ● The lightning protection link of the power module has failed. ● The input power cable is not connected to the power module.

Table 1-17 lists the technical specifications of the PEM.

Table 1-17 Technical specifications of the DC PEM

Item	Technical Specification
Type	PEMB
Dimensions (Width x Depth x Height)	58 mm x 115 mm x 220 mm
Weight	1.1 kg

Item	Technical Specification
Number of power inputs	1
Maximum input voltage range	-72 V DC to -38 V DC
Rated input voltage range	-48 V DC to -60 V DC
Input current	60 A (Each power supply input with at least 60 A current is recommended.)
Output voltage	-72 V DC to -38 V DC
Output current	60 A
Rated current of the air-break	70 A (Each PEM is controlled by an air switch).

1.2.4.3 AC Power Supply System

This section describes the power supply architecture of the AC power system and the appearance and technical specifications of the AC power chassis of the AntiDDoS8080.

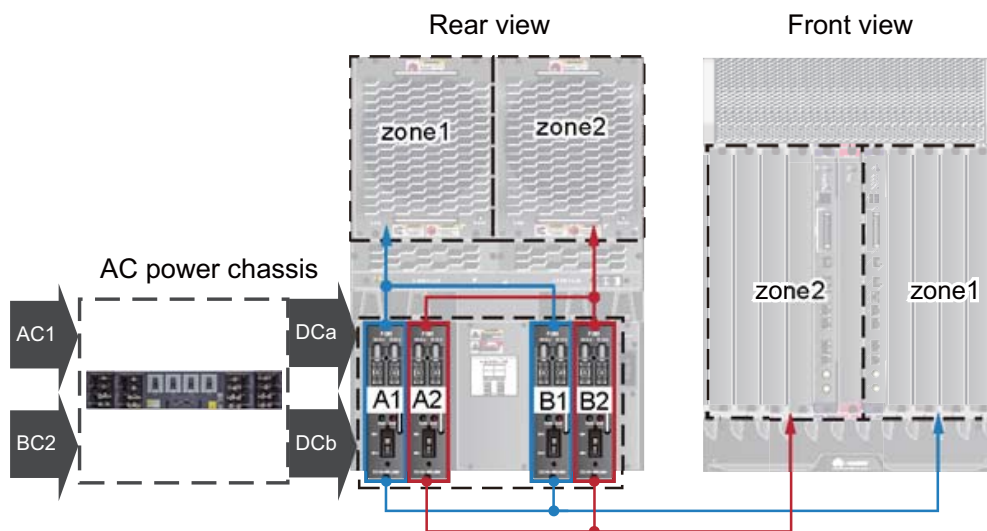
Figure 1-25 shows the power supply architecture of the AntiDDoS8080 AC power supply system. The input AC power is output as steady DC power after being converted by the AC/DC module and being transmitted along external cables to the PEM to power all boards and fans.

Table 1-18 Power supply solution of the AntiDDoS8080 AC power system

AC Power Module	DC Power Module	Powered Area	Powered Part
AC power chassis	PEM-A1 PEM-B1	Zone1	● Front panel: slots 5-8, 10 ● Rear panel: fan modules (upper left side)
	PEM-A2 PEM-B2	Zone2	● Front panel: slots 1-4, 9, 11 ● Rear panel: fan modules (upper right side)
NOTE PEMs A and B back up each other.			

Figure 1-25 shows the relationships between the AC power chassis, power modules, and chassis parts. Each DC power input contains one -48 V power input and one RTN input. Two separate RTN inputs join together on the board.

Figure 1-25 Power supply architecture of the AntiDDoS8080 AC power system



An AC power chassis is 2 U high. Install the AC power chassis in the same cabinet as the device. If they cannot be installed in the same cabinet, install them in as close proximity as possible. The AntiDDoS8080 uses one AC power chassis. There are four air circuit breakers on the AC power chassis. The current of the air circuit breaker is 20 A.

Figure 1-26 and **Figure 1-27** show the appearance of the EPS200-4850A AC power chassis.

Figure 1-26 Schematic diagram of the appearance of the EPS200-4850A AC power chassis (front)

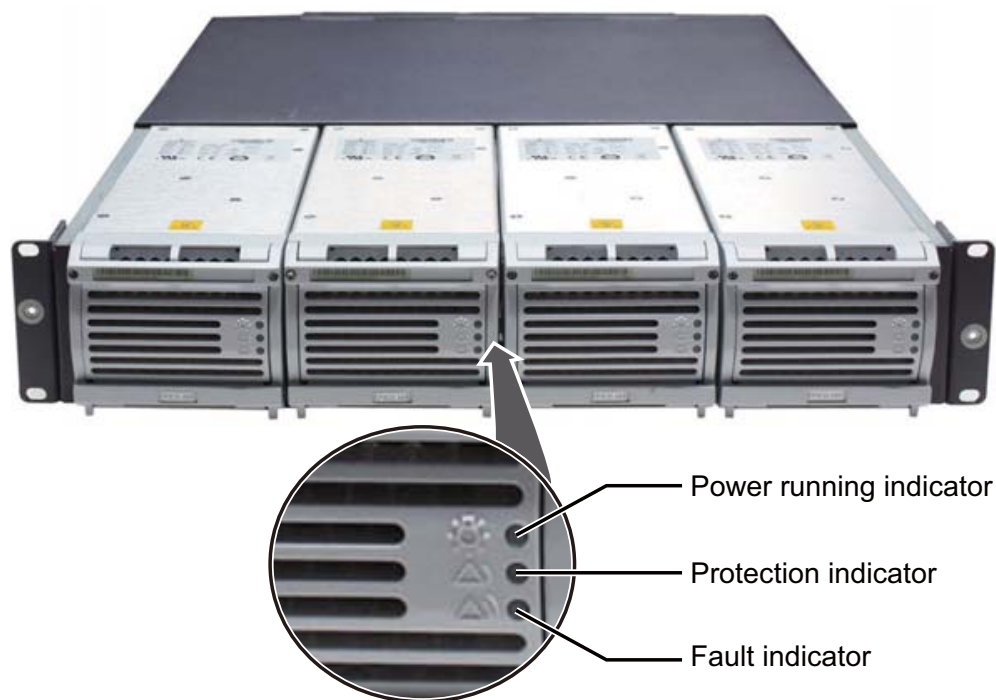


Figure 1-27 Schematic diagram of the appearance of the EPS200-4850A AC power chassis (rear)

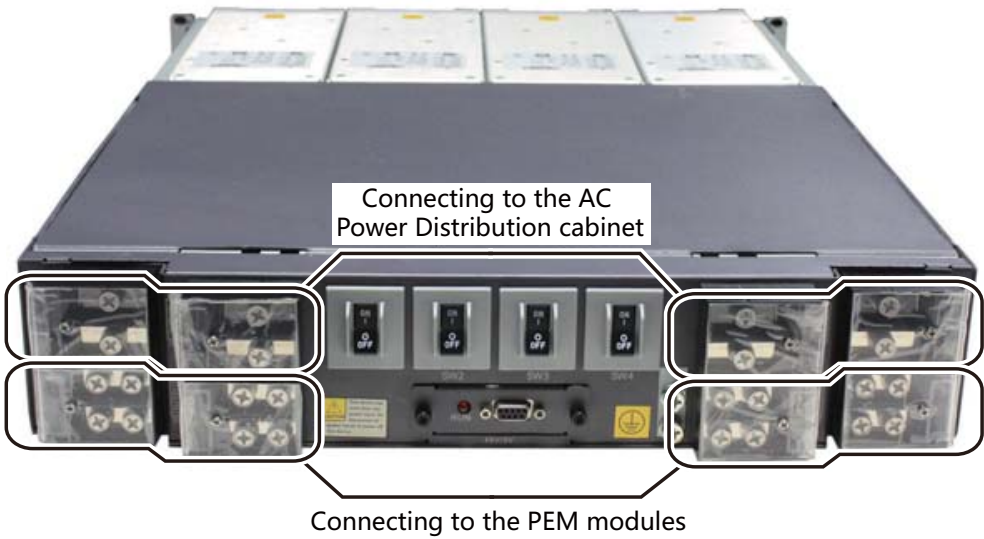


Figure 1-28 and **Figure 1-29** show the appearance of the EPS200-4850B AC power chassis.

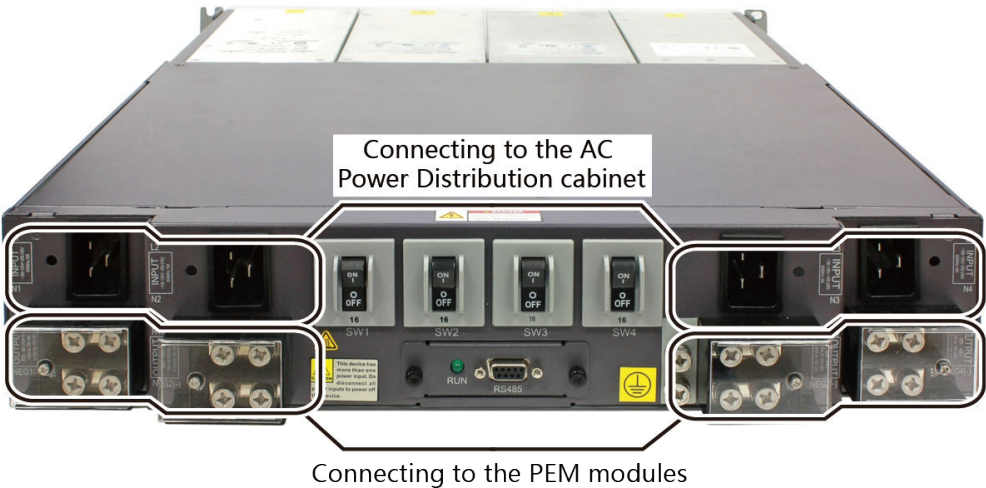
Figure 1-28 Schematic diagram of the appearance of the EPS200-4850B AC power chassis (front)



 **NOTE**

The front of the EPS200-4850B AC power chassis is the same as that of the EPS200-4850A AC power chassis.

Figure 1-29 Schematic diagram of the appearance of the EPS200-4850B AC power chassis (rear)



 **NOTE**

As the AntiDDoS8000 do not support AC power chassis management, the DB9 interface on the rear of the AC power chassis does not need to connect to the monitoring cable in the installation auxiliary material package.

Table 1-19 describes indicators on the panel of the AC power chassis.

Table 1-19 Indicator description

Indicator	Color	Normal	Abnormal	Cause
Power running indicator	Green	On	Off	Power failure (no AC input, over-voltage AC input, or under-voltage AC input) and no output from the power module

Indicator	Color	Normal	Abnormal	Cause
Protection indicator	Yellow	Off	On	Temperature alarm (when the ambient temperature exceeds 65°C, the device is powered off.) Dormant (when the device is in dormant state, the protection indicator of the module is on but the module does not report alarms.)
Fault indicator	Red	Off	On	No output due to the over-voltage output power-off, fan fault, over-temperature power-off, or internal module fault.

Table 1-20 lists the technical specifications of the AC power chassis.

Table 1-20 Technical specifications of the AC power supply module

Item	Technical Specification
Type	EPS200-4850A/EPS200-4850B
Dimensions (Width x Depth x Height)	442 mm x 650 mm x 88 mm
Number of power inputs	4
Maximum input voltage range	● 220 V rated voltage: 175 V AC to 264 V AC, 47 Hz to 63 Hz ● 110 V rated voltage: 90 V AC to 175 V AC, 47 Hz to 63 Hz (The output power reduces to half of the maximum output when the input voltage is in the range of 90 V AC to 175 V AC.)
Rated input voltage range	● 220 V rated voltage: 200 V AC to 240 V AC, 50/60 Hz ● 110 V rated voltage: 100 V AC to 120 V AC, 50/60 Hz

Item	Technical Specification
Input current	● 220 V rated voltage: 18.5 A per module (Each power supply input with at least 18.5 A current is recommended.) ● 110 V rated voltage: 16 A per module (Each power supply input with at least 16 A current is recommended.)
Number of power outputs	4
Maximum output current	50 A/single module
Maximum output power	2900 W/single module

1.2.5 Heat Dissipation System

This section describes the air channel features of the heat dissipation system and the appearance, functions, and technical specifications of fan modules.

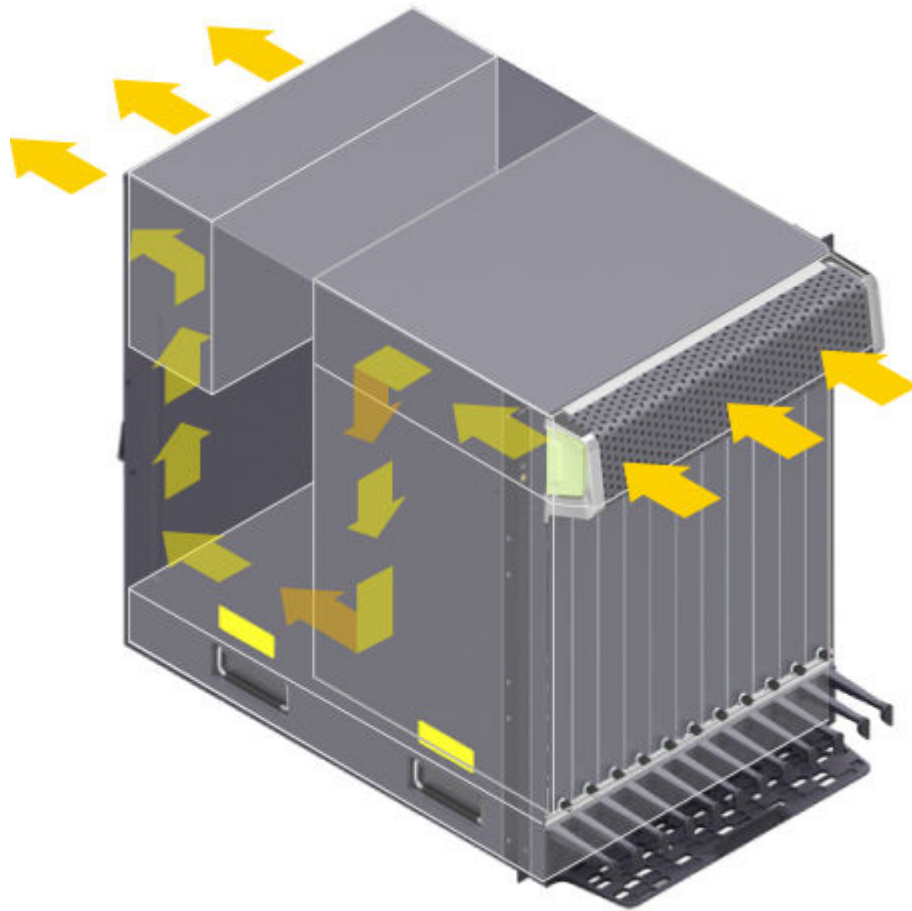
1.2.5.1 System Air Channel

This section describes the system air channels and air flows of the AntiDDoS8080.

The AntiDDoS8080 draws air from the front and exhausts air from the rear. The air intake vent is located above the board area on the front chassis; the air exhaust vent is located above the board area on the rear chassis. The air filter covers a large area and has a curved face and low small windage resistance. These features increase heat dissipation efficiency.

The following figure shows the air flow in the AntiDDoS8080.

Figure 1-30 Air flow in the AntiDDoS8080



1.2.5.2 Fan Module

This section describes the appearance, technical specifications, and speed adjustment of fans.

Appearance and Technical Specifications of Fan Modules

The two fan modules of the AntiDDoS8080 are located side by side next with the air exhaust vents and work in 1+1 backup mode. Each fan module is equipped with one fan. When one fan fails, the heat dissipation system can still allow the device to continue operating at the ambient temperature of 40°C for a short time. The fan modules are hot-swappable.

 NOTE

The heat dissipation system allows the device to operate at the ambient temperature for a short time as long as, at the time of failure, the system has not been operating continuously for more than 96 hours and the accumulated operation time of the system per year does not exceed 15 days.

Figure 1-31 Fan module



Table 1-21 describes the indicators on the fan module.

Table 1-21 Description of fan module indicators

Indicator	Color	Description
STATUS	Green	If the indicator blinks once every 2 seconds (0.5 Hz), the fan module is working normally.
	Red	If the indicator blinks once every 2 seconds (0.5 Hz), the fan module or PEM is faulty, or not all PEMs are powered on.

Table 1-22 lists the technical specifications of the fan module.

Table 1-22 Technical specifications of the fan module

Item	Technical Specifications
Dimensions (width x depth x height)	210.4 mm x 100 mm x 243.7 mm
Weight	3.4 kg
Power consumption (typical value)	30 W
Maximum noise	74 dB

Fan Speed Adjustment

When the system is fully configured, fan speeds are adjusted based on temperatures reported by the temperature sensors on the LPUs, SPUs, SFUs and MPUs. Table 1-23 lists general fan speed adjustment principles.

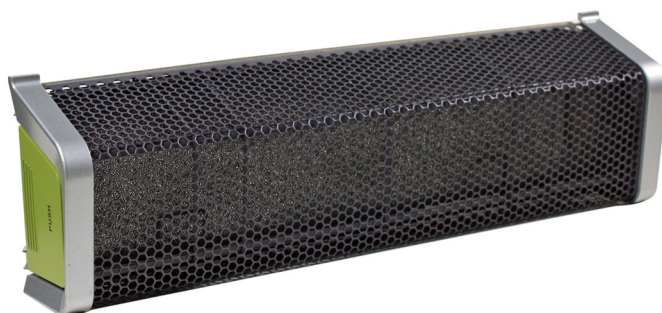
Table 1-23 Fan Speed Adjustment Principles

Ambient Temperature	Rotational Speed	Noise and Dissipation Standards
-5°C - +27°C (23°F - 80.6°F)	Low speed (50% rotational speed)	When fans rotate at a constantly low speed, noise levels meet the NEBS standard, and the fans meet heat dissipation requirements of a fully configured system.
27°C - 50°C (80.6°F - 122°F)	Linear variation	The fan speed is adjusted smoothly and linearly, without sudden increases in noise.
Over 45°C (113°F)	High speed (100% rotational speed) Fans	Fans rotate at high speeds to meet heat dissipation requirements.

1.2.5.3 Air Filter

This section describes the appearance and features of air filters.

The AntiDDoS8080 draws air from the front and exhausts air from the rear. There is a 3 U high space in the upper part of the chassis and an air filter on the front of the chassis. To maximize air intake, the filter is fully perforated. The air filter is fixed to the chassis with a fastener to facilitate filter removal and replacement. [Figure 1-32](#) shows an air filter.

Figure 1-32 Air filter

NOTE

Placing a black sponge air filter in front of the air intake vent helps prevent dust from entering the system. You are advised to remove and clean air filters at least once every three months.

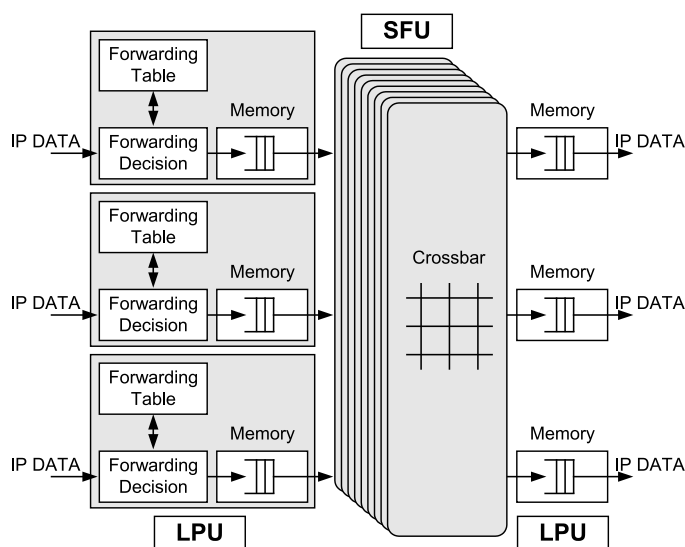
1.2.6 Switch Fabric

This section describes the mechanism of the switch fabric on the AntiDDoS8080.

The AntiDDoS8080 has three SFUs. Two SFUs are integrated on the two SRUs, and another SFU is independent. These three SFUs work in 2+1 backup mode to achieve simultaneous load balancing. When one SFU is faulty or is being replaced, the other two SFUs automatically take over its tasks to ensure service continuity. For details on AntiDDoS8080 SFUs, see [1.4.3.2 E8KE-X8-SFUC-200](#).

The switching network responsible for switching data between LPUs/SPUs is a key component of the AntiDDoS8080. The AntiDDoS8080 uses switching chips developed by Huawei and Memory-Crossbar-Memory (M-C-M) to provide three-level switching. Level-1 and level-3 switching use a shared-memory model and are performed on LPUs/SPUs; level-2 switching uses a Crossbar model and is performed on an SFU. **Figure 1-33** shows the switching network of the AntiDDoS8080. (The LPU is used as an example.)

Figure 1-33 AntiDDoS8080 switching network



The level-1 switching chip on one LPU is fully connected to the level-2 switching chips on the SFUs. The level-2 switching chips on the SFUs are also fully connected to the level-3 switching chip on another LPU. In addition, the level-2 crossbar switching chips work in load balancing mode on multiple switching planes. The entire switching network is unblocked. The process of transmitting data packets across the switching network is as follows:

1. Data packets enter an LPU through physical interfaces and are fragmented into cells of a fixed length. These cells are then sent to the level-1 switching chips. After being buffered and scheduled, the cells enter the crossbar switching chips on the SFU. The level-1 switching chip on an LPU is fully connected with all of the level-2 switching chips. As a result, the same number of cells can be distributed to each level-2 switching plane. This implements load balancing on switching planes and facilitates fault tolerance.
2. After the cells reach the crossbar switching chips, the crossbar switching chips schedule the cells to the corresponding outbound interfaces according to the destination interfaces of the data packets. The cells are then sent to the level-3 switching chips on another LPU. The switching of cells by the level-2 switching chips is then completed.
3. After the cells reach the level-3 switching chips on another LPU, the system searches for the destination interfaces. Once found, the cells are reassembled and sent out through physical interfaces, completing the switching of the data packets.

1.2.7 Control Plane

This section describes the functions and features of the control plane.

AntiDDoS8080 uses the SRU () to implement the control plane functions. For details about the SRU, see [1.4.2.2 E8KE-X8-SRUA-200](#). The functions of the SRU are described from the aspects of system control and management, system maintenance, and reliability.

System Control and Management Unit

As the system control and management unit, the SRU provides the following functions on the system control panel:

- Route calculation: All routing protocol packets are sent by the forwarding engine to the SRU for processing. In addition, the SRU broadcasts and filters packets, and downloads routing policies from the policy server.
- Outband communication between boards: The LAN switch modules integrated on the SRU provide outband communications for the SFUs, LPUs and SPUs. In this manner, messages can be controlled, maintained, and exchanged between the boards.
- Device management and maintenance: Devices can be managed and maintained through the management interfaces (serial interfaces) provided by the SRU.
- Data configuration: The SRU stores configuration data, startup files, upgrade software, and system logs.
- Data storage: The SRU provides two interfaces for CF cards, which serve as mass storage devices to store data files.

System Maintenance Unit

As the system maintenance unit, the SRU collects monitored information to test system units locally or remotely, or implement in-service upgrading of system units.

The SRU periodically collects the operating data of system units through the Monitorbus. The SRU generates related control information based on the collected information, such as the detection of board installations and adjustments to fan speed. Through the joint test action group (JTAG) bus, the SRU remotely or locally tests system units, or performs in-service upgrading of system units.

Reliability

The main control modules, clock modules, and LAN switch modules on the SRU work in 1:1 hot backup mode, improving system reliability.

The two SRUs work in 1:1 backup mode. Each SRU monitors the status of the other. If the active SRU is faulty, the standby SRU automatically takes over as the active SRU.

1.2.8 Technical Specifications

This section describes the dimensions, weight, power, and environment specifications of the AntiDDoS8080.

[Table 1-24](#) lists the technical specifications of the AntiDDoS8080.

Table 1-24 AntiDDoS8080 technical specifications

Item		Description
System specifications		
Processing unit of the SRU		Main frequency: 1.5 GHz
BootROM capacity of the SRU		8 MB
SDRAM capacity of the SRU		4 GB
NVRAM capacity of the SRU		4 MB
Flash capacity of the SRU		32 MB
CF card		2 x 2 GB
Number of slots	SRU	2 (slots 9 and 10)
	SFU	1 (slot 11)
	LPU/SPU	8 (slots 1 to 8)
Dimensions and weight		
Dimensions (width ^a x depth x height ^b)		442 mm x 650 mm x 620 mm (14 U). The depth is 770 mm covering the dust filter and cable rack.
Installation position		N68E cabinet or a standard 19-inch cabinet
Weight	Empty chassis	43.2 kg
	Full configuration (maximum)	112.9 kg
Power specifications		
Power supply mode	DC	4 hot-swappable PEMs
	AC	4 PEMs+1 external AC power chassis
Rated input voltage range	DC	-48 V DC to -60 V DC
	AC	● 220 V rated voltage: 200 V AC to 240 V AC, 50/60 Hz ● 110 V rated voltage: 100 V AC to 120 V AC, 50/60 Hz
Maximum input voltage range	DC	-72 V DC to -38 V DC

	AC	● 220 V rated voltage: 175 V AC to 264 V AC, 47 Hz to 63 Hz ● 110 V rated voltage: 90 V AC to 175 V AC, 47 Hz to 63 Hz (The output power reduces to half of the maximum output when the input voltage is in the range of 90 V AC to 175 V AC.)
Typical power (Three LPUF-240s and five SPUs are configured.)	DC	4025 W
	AC	4282 W
Maximum power (Three LPUF-240s and five SPUs are configured.)	DC	4823 W
	AC	5132 W
Heat dissipation		
Fan module		2 hot-swappable fan modules, each with one fan
Air flow		Front-to-back airflow
Air filter		1 air filter in the air intake vent of the air channel
Environment specifications		
System reliability	MTBF (year)	25
	MTTR (hour)	0.5
Ambient temperature ^c	Long-term ^d	0°C to 45°C
	Short-term	-5°C to 50°C
	Remarks	Temperature change rate limit: 30°C/hour
Storage temperature		-40°C to 70°C
Ambient relative humidity	Long-term	5% RH to 85% RH, no coagulation
	Short-term	5% RH to 95% RH, no coagulation
Storage relative humidity		0% RH to 95% RH
Long-term altitude		Lower than 3000 m
Storage altitude		Lower than 5000 m

NOTE

- a. The width does not include the size of the attached mounting ear.
- b. The height is 1 U (1 U = 1.75 inches, or about 44.45 mm), which is a height unit defined in International Electrotechnical Commission (IEC) 60297 standards.
- c. The measurement point of the temperature and humidity is 1.5 m above the floor and 0.4 m in front of the cabinet without the front and the back doors.
- d. The heat dissipation system allows the device to operate at the ambient temperature for a short time as long as, at the time of failure, the system has not been operating continuously for more than 96 hours and the accumulated operation time of the system per year does not exceed 15 days.

1.3 AntiDDoS8030

The AntiDDoS8030 has DC (4 U) and AC (5 U) chassis models. It employs an integrated chassis and has 3 LPU/SPU slots. Its MPUs, power modules, and fans work in redundancy mode.

1.3.1 Device Overview

This section describes the appearance and hardware system features of the AntiDDoS8030.

Appearance

The AntiDDoS8030 has an integrated chassis and adopts a centralized routing engine and a distributed forwarding architecture.

The AntiDDoS8030 chassis have both AC and DC models. [Figure 1-34](#) shows the DC chassis, and the [Figure 1-35](#) shows the AC chassis.

Figure 1-34 DC chassis



Figure 1-35 AC chassis



System Features

The AntiDDoS8030 provides the following system features:

- Distributed hardware-based forwarding
- Separation of control and service channels for ensuring non-blocking of control channels
- Carrier-class reliability and manageability
- Modular-level shielding for meeting Electro Magnetic Compatibility (EMC) requirements
- Hot-swappable boards, power modules, and fans
- MPUs in 1:1 backup mode
- Backup for key components such as power modules, fan modules, clocks, and management buses
- Protection against misinsertion of boards
- Queries about alarm prompts, alarm indications, running status, and alarm status of the power supply
- Queries about alarm prompts, alarm indications, running status, and alarm status of the voltage and ambient temperature

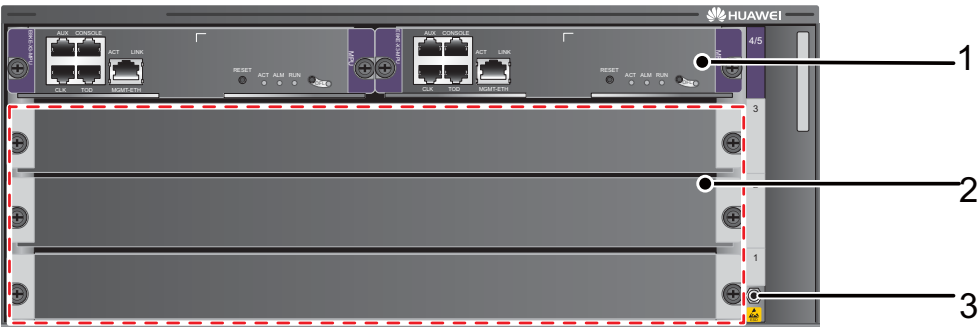
1.3.2 AntiDDoS8030 Components

This section describes the main components of the AntiDDoS8030.

The AntiDDoS8030 has AC and DC chassis models. [Figure 1-36](#) and [Figure 1-37](#) show the parts in the DC chassis. [Figure 1-38](#) and [Figure 1-39](#) show the parts in the AC chassis.

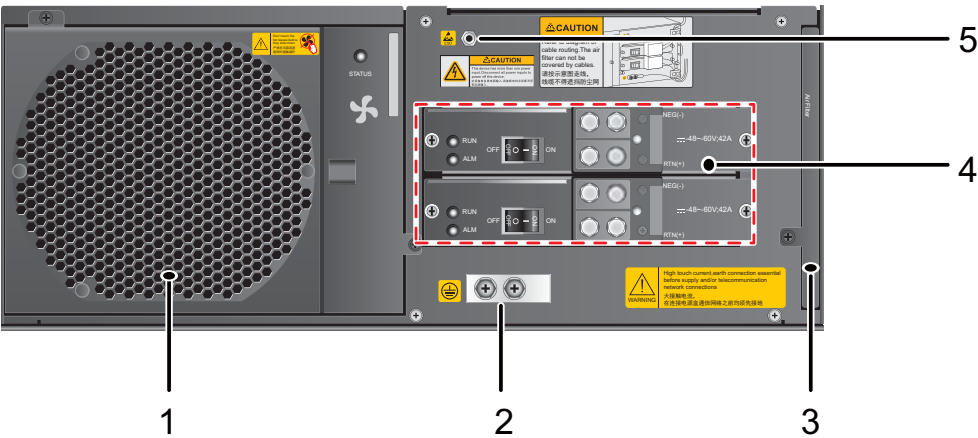
DC Chassis

Figure 1-36 Front panel of the AntiDDoS8030 DC chassis



No.	Name	Description
1	MPU	The Main Processing Unit (MPU) on the AntiDDoS8030 is in charge of system control and route information learning. It is the central control unit of the device. The AntiDDoS8030 MPUs work in 1:1 backup mode. When the active MPU is faulty, the standby MPU immediately takes over for it, ensuring service continuity.
2	LPU/SPU slot	Holds an LPU or SPU.
3	ESD jack	The equipment end of the wrist strap is inserted into the ESD jack. For the wrist strap to be effective, ensure that the device is grounded.

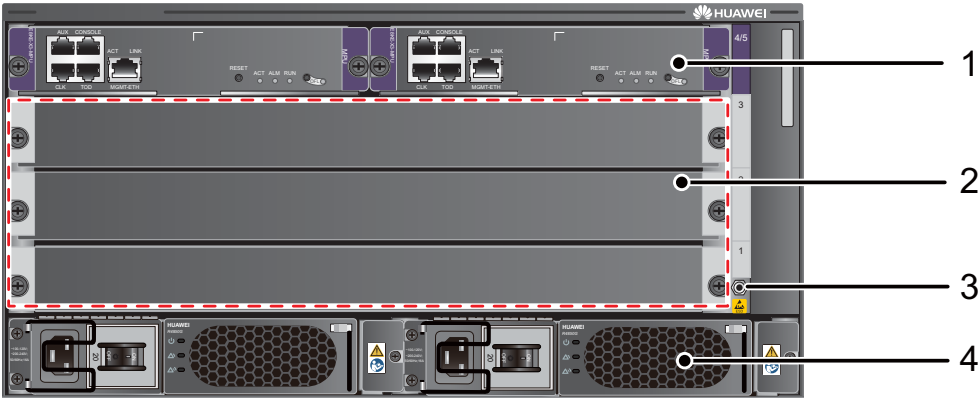
Figure 1-37 Rear panel of the AntiDDoS8030 DC chassis



No.	Name	Description
1	Fan module	The AntiDDoS8030 has one fan module that has two fans. They are deployed on the air intake vents of chassis air channels and work in 1+1 backup mode.
2	Protection ground terminal	The OT terminal of the ground cable is connected to the protection ground terminal of the device, and the other terminal of the ground cable is connected to the ground point of the cabinet or workbench or the ground bar of the equipment room.
3	Air filter	The air filters of the AntiDDoS8030 are deployed on the air intake vents of chassis air channels to protect the device against dust.
4	DC power module	The DC power supply system of the AntiDDoS8030 consists of two DC power modules that are connected to an external direct current distribution panel and work in 1+1 backup mode.
5	ESD jack	The equipment end of the wrist strap is inserted into the ESD jack. For the wrist strap to be effective, ensure that the device is grounded.

AC Chassis

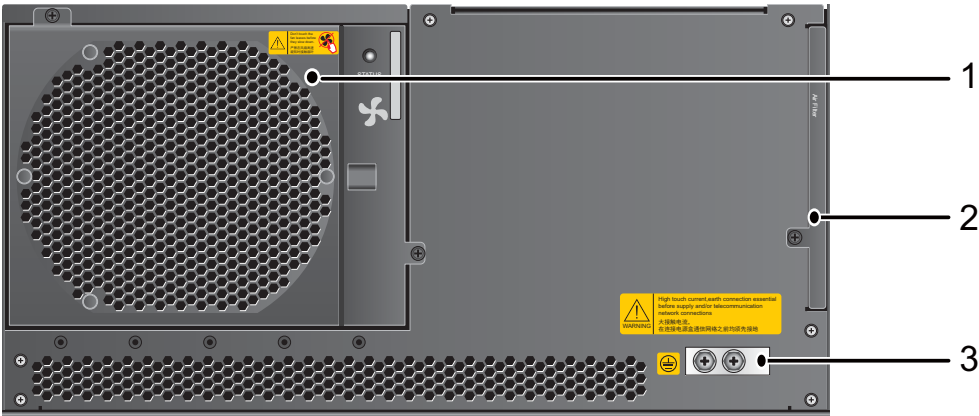
Figure 1-38 Front panel of the AntiDDoS8030 AC chassis



No.	Name	Description
1	MPU	The Main Processing Unit (MPU) on the AntiDDoS8030 is in charge of system control and route information learning. It is the central control unit of the device. The AntiDDoS8030 MPUs work in 1:1 backup mode. When the active MPU is faulty, the standby MPU immediately takes over for it, ensuring service continuity.
2	LPU/SPU slot	Holds an LPU or SPU.

No.	Name	Description
3	ESD jack	The equipment end of the wrist strap is inserted into the ESD jack. For the wrist strap to be effective, ensure that the device is grounded.
4	AC power module	The AC power supply system of the AntiDDoS8030 consists of two DC power modules that are connected to an external direct current distribution panel and work in 1+1 backup mode.

Figure 1-39 Rear panel of the AntiDDoS8030 AC chassis



No.	Name	Description
1	Fan module	The AntiDDoS8030 has one fan module with two fans on it. The fans are deployed on the air intake vents of chassis air channels and work in 1+1 backup mode.
2	Air filter	The air filters of the AntiDDoS8030 are deployed on the air intake vents of chassis air channels to protect the device against dust.
3	Protection ground terminal	The OT terminal of the ground cable is connected to the protection ground terminal of the device, and the other terminal of the ground cable is connected to the ground point of the cabinet or workbench or the ground bar of the equipment room.

1.3.3 Slot Layout and Supported Boards

This section describes the layout of slots and supported boards on the AntiDDoS8030.

Slots Layout

Figure 1-40 shows the slot layout on the AntiDDoS8030.

Figure 1-40 AntiDDoS8030 slot layout

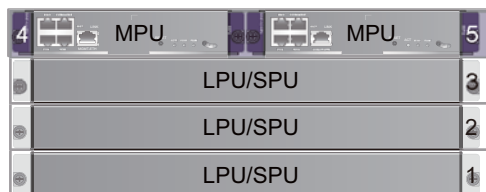


Table 1-25 describes the slot layout on the AntiDDoS8030.

Table 1-25 Board distribution on the AntiDDoS8030 board cage

Slot Name	Slot Number	Quantity	Slot Height	Remarks
LPU/SPU	1 to 3	3	41 mm (1.6 inches)	These slots hold LPUs or SPUs.
MPU	4 to 5	2	41 mm (1.6 inches)	These slots hold MPUs that work in 1:1 backup mode.

Supported Boards

Table 1-26 lists the specifications of boards supported by the AntiDDoS8030.

Table 1-26 Boards supported by the AntiDDoS8030

Type	BOM	Description	Hot-Swappable or Not
MPU	03056305	1.4.2.3 E8KE-X3-MPU	Yes
	0305G06R	1.4.2.4 MPUD	Yes
SPUs and SPCs	03056689	1.4.4.1 AntiDDoS8030 Service Processing Unit (ADS-SPUC-B)	Yes
	03057776	1.4.4.2 AntiDDoS8030 Service Processing Unit (ADS-SPUC-B2)	Yes
	03056705	1.4.4.4 Service Card (ADS-SPC-40-01)	No
	03056680	1.4.4.6 Service Card (ADS-SPC-80-01)	No
	03057777	1.4.4.5 Service Card (ADS-SPC-60-01)	No
	03057790	1.4.4.7 Service Card (ADS-SPC-120-01)	No
	03057872	1.4.4.8 SPCA-APPSEC-FW	No

Type	BOM	Description	Hot-Swappable or Not
	03057873	1.4.4.9 SPCB-APPSEC-FW	No
LPUF-120 and FPIC	03056682	1.4.6.1 LPUF-120	Yes
	03056684	1.4.5.2 6*10GE SFP+ Daughter Card (FW-6X10G-SFP+)	No
	03056686	1.4.5.3 12*10GE SFP+ Daughter Card (FW-12X10G-SFP+)	No
	03056685	1.4.5.5 1*100GE CFP Daughter Card (FW-1X100G-CFP)	No
	03056632	1.4.5.6 5-Port 10GBase LAN/WAN-SFP + FPIC A (E8KE-X-101-5X10GE-SFP+)	No
	03056633	1.4.5.7 24-Port 100/1000 Base-X-SFP FPIC (E8KE-X-101-24XGE-SFP)	No
	03056631	1.4.5.8 1-Port 40GBase LAN-CFP FPIC A (E8KE-X-101-1X40GE-CFP)	No
LPUF-40-A and FPIC	03056627	1.4.7.1 LPUF-40-A	Yes
	03056629	1.4.7.2 20-Port 100/1000Base-X-SFP Flexible Card (P40-20xGE/FE-SFP)	No
	03056628	1.4.7.3 2-Port 10GBase LAN/WAN-XFP Flexible Card (P40-2x10GBase LAN/WAN-XFP)	No
	0305G07X	1.4.7.4 4-port 10GBase LAN/WAN-XFP FPIC (P40-4x10GBase LAN/WAN-XFP)	No
LPUF-21 and FPIC	03056624	1.4.8.1 LPUF-21	Yes
	03056625	1.4.8.2 1-port 10GBase LAN/WAN-XFP FPIC (1 x 10GBase LAN/WAN)	No
	03056626	1.4.8.3 12-port 100Base-FX/1000Base-X-SFP FPIC (12x100/1000Base-SFP)	No
	0305G054	1.4.8.4 12-port 10Base-T/100Base-TX/1000Base-T-RJ45 FPIC (12x10/100/1000Base-TX-RJ45)	No
	0305G055	1.4.8.5 1-port OC-192c/STM-64c POS-XFP FPIC (1 x OC-192c/STM-64c POS-XFP)	No
	0305G07W	1.4.8.6 4-Port 10GBase WAN/LAN-XFP FPIC (4x10GBase LAN/WAN)	No

1.3.4 Power Supply System

This section describes the power supply features, power supply area partitioning, and AC/DC power systems of the AntiDDoS8030.

1.3.4.1 Features of the Power Supply System

This section describes the power supply modes of the AntiDDoS8030.

The AntiDDoS8030 supports DC and AC power supply (but not at the same time).

Power modules convert the input voltage into -48 V DC voltage to supply power for the entire system. The power supply system has the following features:

- Depending on the power supply mode, the power supply system consists of either two AC power modules or two DC power modules working in 1+1 backup mode.
- Both AC power modules and DC power modules support alarm functions.

1.3.4.2 DC Power Supply System

This section describes the appearance, functions, and technical specifications of the DC power module.

The AntiDDoS8030 DC power module is 1 U high, as shown in [Figure 1-41](#).

The power modules are hot-swappable.

Figure 1-41 DC power module and panel



The indicators of the AntiDDoS8030 DC power module are displayed on the panel through LED. [Table 1-27](#) describes the indicators.

Table 1-27 Description of DC power module indicators

Name	Color	Description
RUN	Green	Indicates normal output. If the indicator is steady green, the PEM has normal output.
ALM	Red	Indicates power failure. If the indicator is steady red: ● The lightning protection circuit of the PEM is faulty. ● One of the power modules is not receiving input power.

The DC power module has the following functions:

The AntiDDoS8030 power module can output straight-through power and provide the following functions:

- Surge protection, filtering, and short circuit protection
- Alarm

Table 1-28 lists the technical specifications of the DC power module.

Table 1-28 Technical specifications of the DC power module

Item	Parameter
Model	CR52PEMA
Dimensions (Height × Width × Depth)	40 mm × 100 mm × 190 mm
Weight	0.7 kg
Number of inputs	1
Maximum input voltage range	-72 V DC to -38 V DC
Rated input voltage range	-48 V DC to -60 V DC
Input current	42 A (Each power supply input with at least 42 A current is recommended.)
Output voltage	-72 V DC to -38 V DC
Outgoing current	42 A
Current of customer's air breakers for power distribution	50 A (Each module corresponds to an air breaker.)

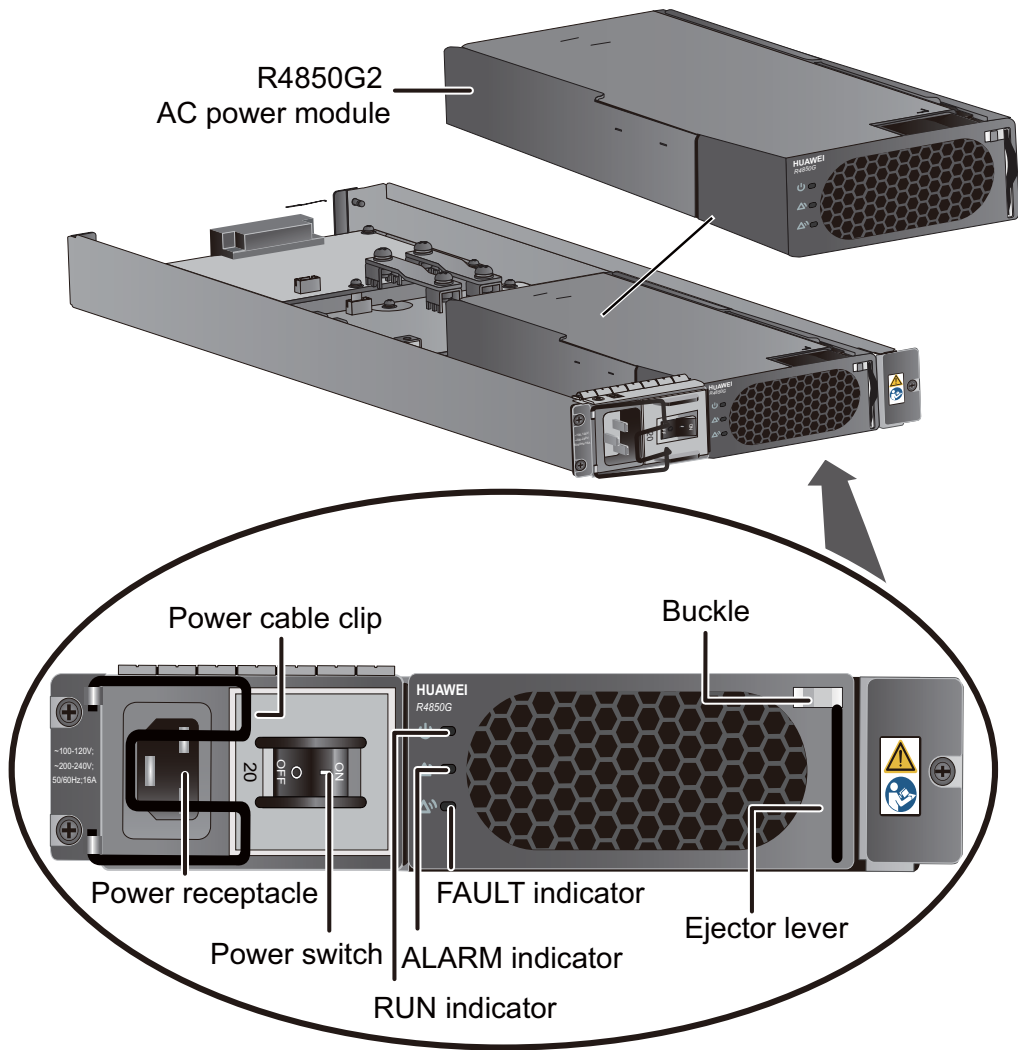
1.3.4.3 AC Power Supply System

This section describes the appearance, functions, and technical specifications of the AC power module and AC power distribution box (PDB).

2200 W AC Power System

The AntiDDoS8030 2200 W AC PDB has a 1 U standard modular structure. It contains the R4850G2 AC power module. Both the 2200 W AC PDB and R4850G2 AC power module are hot-swappable. [Figure 1-42](#) shows the AC PDB and its panel.

Figure 1-42 2200 W AC PDB



Name	Description
Power cable clip	Fixes the power cable in place.
Power receptacle	Connects the C19 connector of the AC power cable.
Power switch	Allows you to turn the power output on or off.

Name	Description
RUN indicator (green)	● Steady on: The power module is working properly. ● Off: The power input or power module is faulty. ● Blink once every 2 seconds (0.5 Hz): The power module is in manual query state. This is a normal state, and no action is required. ● Blink four times every 1 second (4 Hz): The power module is in program loading state. This is a normal state, and no action is required. After the program is loaded, the indicator blinks once every 2 seconds.
ALARM indicator (yellow)	● Off: The power module does not have alarms. ● Steady on: The power module has encountered a fault, such as overvoltage, undervoltage, or overcurrent. ● Blink once every 2 seconds (0.5 Hz): The communication of the power module has been interrupted.
FAULT indicator (red)	● Steady on: An unrecoverable fault occurs in the power supply module, such as fan failure, no output current, or short circuit of output current. ● Off: The power module does not have any faults.
Buckle and ejector lever	-

The R4850G2 AC power module provides protection functions against:

- Input overvoltage
- Input undervoltage
- Output overvoltage
- Output current limiting
- Output short circuit
- Overtemperature

Table 1-29 lists the technical specifications of the 4850G2 AC power module.

Table 1-29 Technical specifications of R4850G2 AC power module

Item	Description
Model	R4850G2
Dimensions (Height × Width × Depth)	40.8 mm x 105 mm x 281 mm

Item	Description
Weight	1.8 kg
Number of inputs	1
Maximum input voltage range	● 220 V rated voltage: 175 V AC to 264 V AC, 47 Hz to 63 Hz ● 110 V rated voltage: 90 V AC to 175 V AC, 47 Hz to 63 Hz (The output power reduces to half of the maximum output when the input voltage is in the range of 90 V AC to 175 V AC.)
Rated input voltage range	● 220 V rated voltage: 200 V AC to 240 V AC, 50/60 Hz ● 110 V rated voltage: 100 V AC to 120 V AC, 50/60 Hz
Input current	17 A (Each power supply input with at least 17 A current is recommended.)
Output voltage	-53.3V DC
Maximum output current	-53.3 V DC/50 A
Maximum output power	2200 W (rated input voltage: 220 V AC)/1100 W (rated input voltage: 110V AC)

1.3.5 Heat Dissipation System

This section describes the air channel features of the heat dissipation system and the appearance, functions, and technical specifications of fan modules.

1.3.5.1 System Air Channel

This section describes the system air channels and air flows of the AntiDDoS8030.

The AntiDDoS8030 draws air from the left side and exhausts air from the rear. The air intake vent is located at the left side of the chassis, and the air exhaust vent is located at the rear of the chassis. The air filter covers a large area and has a curved face and low windage resistance, improving heat dissipation efficiency.

The system draws in air for heat dissipation in the DC and AC chassis, as shown in [Figure 1-43](#) and [Figure 1-44](#), respectively.

Figure 1-43 Air flow in the AntiDDoS8030 DC chassis

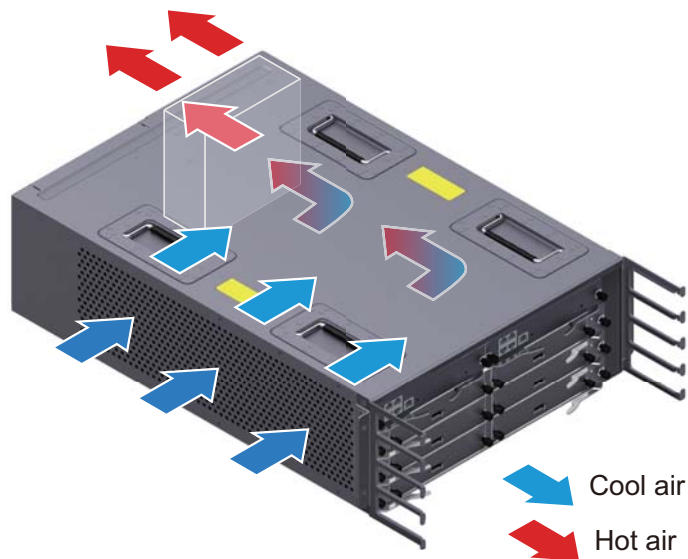
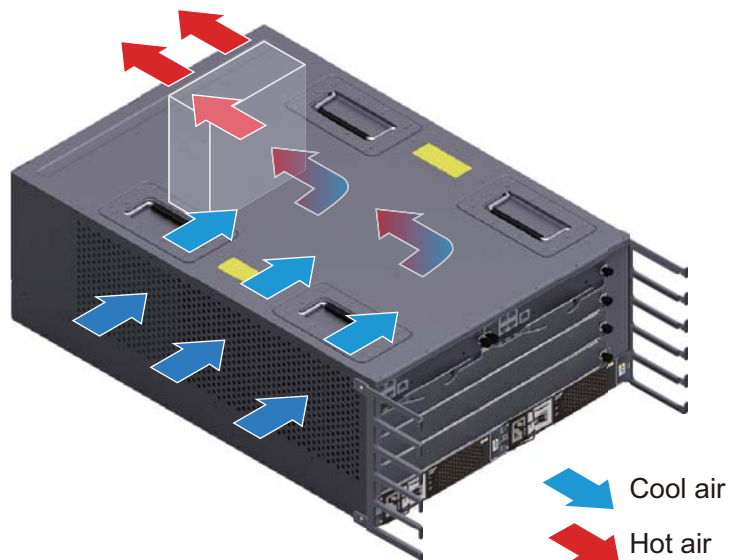


Figure 1-44 Air flow in the AntiDDoS8030 AC chassis



The heat dissipation system consists of the following components:

- Two fan modules
- An air intake vent and an air exhaust vent
- An air filter
- Fans on power modules

1.3.5.2 Fan Module

This section describes the appearance, technical specifications, and speed adjustment of fans.

Appearance and Technical Specifications of Fan Modules

The fan modules of the AntiDDoS8030 are located at the rear of the chassis. Each fan module has two fans that work in 1+1 backup mode. When a fan fails, the heat dissipation system enables the system to continue operating for a short time at the ambient temperature of 40°C. The fan module is hot-swappable. [Figure 1-45](#) shows the fan module.

NOTE

The heat dissipation system allows the device to operate at the ambient temperature for a short time as long as, at the time of failure, the system has not been operating continuously for more than 96 hours and the accumulated operation time of the system per year does not exceed 15 days.

Figure 1-45 Fan module



[Table 1-30](#) describes the indicators on the fan module.

Table 1-30 Description of fan module indicators

Indicator	Color	Description
STATUS	Green	If the indicator blinks once every 2 seconds (0.5 Hz), the fan module is working normally.
	Red	If the indicator blinks once every 2 seconds (0.5 Hz), the fan module or power module is faulty, or not all PEMs are powered on.

[Table 1-31](#) lists the technical specifications of the fan module.

Table 1-31 Technical specifications of the fan module

Item	Specifications
Dimensions (width x depth x height)	160 mm x 108 mm x 213 mm

Item	Specifications
Weight	1.5 kg
Maximum wind pressure	700 Pa
Maximum wind rate	850 m ³ /h
Maximum noise	78 dB

Fan Speed Adjustment

When the system is fully configured, fan speeds are adjusted according to temperatures reported by the temperature sensors on the LPUs, SPUs and MPUs. [Table 1-32](#) describes general fan speed adjustment principles.

Table 1-32 Fan Speed Adjustment Principles

Ambient Temperature	Rotational Speed	Noise and Dissipation Standards
-5°C- +27°C (23°F - 80.6°F)	Low (50% rotational speed)	When fans rotate at a constant low speed, the noises meet the ETSI standard and the fans meet heat dissipation requirements of a fully configured system.
27°C-45°C (80.6°F - 113°F)	Linear variation	The fan speed is adjusted smoothly and linearly, without a sudden increase in volume.
Over 45°C (113°F)	High (100% rotational speed)	Fans rotate at high speeds to meet heat dissipation requirements.

1.3.5.3 Air Filter

This section describes the appearance and features of air filters.

The air filter of the AntiDDoS8030 is located on the left rear of the chassis, as shown in [Figure 1-46](#).

Figure 1-46 Air filter on the AntiDDoS8030 air intake frame



NOTE

The air filter of the AntiDDoS8030 can be adjusted through bending, facilitating the maintenance within a limited space at the rear of the chassis.

Placing a black sponge air filter at the air intake vent helps prevent dust from entering the system. You are advised to remove and clean the air filter once every three months.

1.3.6 Control Plane

This section describes the functions and features of the control plane.

AntiDDoS8030 uses the MPU to implement the functions of the control plane. The functions include centralized control and management and data exchange. For details about the MPU, see [1.4.2.3 E8KE-X3-MPU](#). The functions of the MPU are described from the aspects of system control and management, system maintenance, and reliability:

System Control and Management Unit

As the system control and management unit, the MPU provides the following functions on the system control panel:

- **Route calculation:** All routing protocol packets are sent by the forwarding engine to the MPU for processing. In addition, the MPU broadcasts and filters packets, and downloads routing policies from the policy server.
- **Outband communication between boards:** The LAN switch modules integrated on the MPU provide outband communications between boards. In this manner, communications between the LPUs and SPUs are controlled and maintained, and messages can be exchanged.
- **Device management and maintenance:** Devices can be managed and maintained through the management interfaces (serial interfaces) provided by the MPU.
- **Data configuration:** The MPU stores configuration data, startup files, upgrade software, and system logs.

- Data storage: The MPU has one USB card, which serves as a mass storage device to store data files.

System Maintenance Unit

As the system maintenance unit, the MPU collects monitored information to test system units locally or remotely, or implements in-service upgrading of system units.

The MPU periodically collects information about the operation of system units through the Monitorbus. The MPU generates related control information based on the collected information, such as the detection of board installations and fan speed adjustments. Through the joint test action group (JTAG) bus, the MPU remotely or locally tests system units, or performs in-service upgrading of system units.

Reliability

The main control modules, clock modules, and LAN switch modules on the MPU work in 1:1 hot backup mode, improving system reliability.

The two MPUs work in 1:1 backup mode. Each MPU monitors the status of the other. If the active MPU is faulty, the standby MPU automatically takes over as the active MPU.

1.3.7 Technical Specifications

This section describes the dimensions, weight, power, and environment specifications of the AntiDDoS8030.

Table 1-33 lists the technical specifications of the AntiDDoS8030.

Table 1-33 AntiDDoS8030 Technical Specifications

Item		Specifications
System specifications		
Processing unit of the MPU		Main frequency: 1 GHz
BootROM capacity of the MPU		1 MB
SDRAM capacity of the MPU		2 GB
NVRAM capacity of the MPU		512 MB
Flash capacity of the MPU		32 MB
CF card		1 x 2 GB
Number of slots	MPU	2 (slots 4, 5)
	SFU	-
	LPU/SPU	3 (slots 1, 2, 3)
Dimensions and weight		

Item		Specifications
Dimensions (width ^a x depth x height ^b)		DC chassis: 442 mm x 650 mm x 175 mm (4 U) AC chassis: 442 mm x 650 mm x 220 mm (5 U) The depth is 750 mm, including the dust filter and cable rack.
Installation position		N68E cabinet or a standard 19-inch cabinet
Weight	Empty chassis	DC chassis: 15kg AC chassis: 25kg
	Full configuration (maximum)	DC chassis: 30.7 kg AC chassis: 40.7 kg
Power specifications		
Power supply mode	DC	Double hot-swappable power modules
	AC	Double hot-swappable power modules
Rated input voltage range	DC	-48 V DC to -60 V DC
	AC	● 220 V rated voltage: 200 V AC to 240 V AC, 50/60 Hz ● 110 V rated voltage: 100 V AC to 120 V AC, 50/60 Hz
Maximum input voltage range	DC	-72 V DC to -38 V DC
	AC	● 220 V rated voltage: 175 V AC to 264 V AC, 47 Hz to 63 Hz ● 110 V rated voltage: 90 V AC to 175 V AC, 47 Hz to 63 Hz (The output power reduces to half of the maximum output when the input voltage is in the range of 90 V AC to 175 V AC.)
Typical power (One LPUF-120 and two SPUs are configured.)	DC	1066 W
	AC	1185 W
Maximum Power (One LPUF-120 and two SPUs are configured.)	DC	1272 W
	AC	1414 W
Heat dissipation		
Fan module		1 hot-swappable fan module that has two fans
Air flow		Left-to-back airflow
Air filter		1 air filter in the air intake vent of the air channel

Item		Specifications
Environment specifications		
System reliability	MTBF (year)	25
	MTTR (hour)	0.5
Ambient temperature ^c	Long-term ^d	0°C to 45°C
	Short-term	-5°C to 50°C
	Remarks	Temperature change rate limit: 30°C/hour
Storage temperature		-40°C to 70°C
Ambient relative humidity	Long-term	5% RH to 85% RH, no coagulation
	Short-term	5% RH to 95% RH, no coagulation
Storage relative humidity		0% RH to 95% RH
Long-term altitude		Lower than 3000 m
Storage altitude		Lower than 5000 m
NOTE a. The width does not include the size of attached mounting ear. b. The height is 1 U (1 U = 1.75 inches, or about 44.45 mm), which is a height unit defined in International Electrotechnical Commission (IEC) 60297 standards. c. The measurement point of the temperature and humidity is 1.5 m above the floor and 0.4 m in front of the cabinet without the front and the back doors. d. The heat dissipation system allows the device to operate at the ambient temperature for a short time as long as, at the time of failure, the system has not been operating continuously for more than 96 hours and the accumulated operation time of the system per year does not exceed 15 days.		

1.4 Boards

This section describes various supported boards and their specifications.

1.4.1 Board Overview

This section describes types, structures, and mappings of boards and rules for numbering board/subcard slots and interfaces.

1.4.1.1 Types and Mappings of Boards

This section describes the board types supported by the AntiDDoS8000 and mappings between boards and cards.

The AntiDDoS8000 supports the following types of boards:

- MPU/SRU

The AntiDDoS8000 MPU/SRU adopts the integrated board structure. It controls the system in the centralized manner and learns routing information. It is the controlling center of the system.

- SFU

The AntiDDoS8000 SFU adopts the integrated board structure. It is responsible for data switching between boards.

- SPU

The AntiDDoS8000 SPU adopts the flexible plug-in card (FPIC) structure. It is responsible for processing security services in a centralized manner.

An FPIC SPU consists of two parts: mother board and FPIC. The AntiDDoS8000 provides multiple types of SPUs with different performance. An SPU mother board can hold one or two Service Processing Cards (SPCs).

- LPU

The AntiDDoS8000 LPU adopts either the FPIC or integrated board structure and provides network interfaces externally.

[Table 1-34](#), [Table 1-35](#), and [Table 1-36](#) show AntiDDoS8000 board mappings.

Table 1-34 Board mappings

Type	Board Name	BO M	Anti DDoS S803 0	Anti DDoS S808 0	Anti DDoS S816 0	Subcard	Hot Swap
MPU/ SRU	E8KE-X3-MPU	0305 6305	Yes	-	-	-	Yes
	E8KE-X8-SRUA-200	0305 G08 N	-	Yes	-	-	Yes
	EKEX16-FWCD00MPUB00	0305 G06 U	-	-	Yes	-	Yes
	MPUD	0305 G06 R	Yes	-	-	-	Yes
SFU	E8KE-X8-SFUC-200	0305 G08P	-	Yes	-	-	Yes
	E8KE-X16-SFUC-200SP	0305 G08 Q	-	-	Yes	-	Yes

Type	Board Name	BO M	Anti DDoS S803 0	Anti DDoS S808 0	Anti DDoS S816 0	Subcard	Hot Swa p
SPU	ADS-SPUC-B	0305 6689	Yes	-	-	● ADS-SPC-40-01 ● ADS-SPC-80-01 ● SPCA-APPSEC-FW ● SPCB-APPSEC-FW	Yes
	ADS-SPUD-B	0305 6690	-	Yes	Yes	● ADS-SPC-40-01 ● ADS-SPC-60-01 ● ADS-SPC-80-01 ● ADS-SPC-120-01 ● SPCA-APPSEC-FW ● SPCB-APPSEC-FW	Yes
	ADS-SPUC-B2	0305 7776	Yes	-	-	● ADS-SPC-60-01 ● ADS-SPC-120-01 ● SPCA-APPSEC-FW ● SPCB-APPSEC-FW	Yes

Type	Board Name	BO M	Anti DDoS S803 0	Anti DDoS S808 0	Anti DDoS S816 0	Subcard	Hot Swa p
Flexibl e Card LPU	LPUF-240	0305 6683	-	Yes	Yes	● 1.4.5.2 6*10GE SFP+ Daughter Card (FW-6X10G-SFP+) ● 1.4.5.3 12*10GE SFP + Daughter Card (FW-12X10G-SFP+) ● 1.4.5.5 1*100GE CFP Daughter Card (FW-1X100G-CFP) ● 1.4.5.6 5-Port 10GBase LAN/WAN-SFP+ FPIC A (E8KE-X-101-5X10G E-SFP+) ● 1.4.5.7 24-Port 100/1000 Base-X-SFP FPIC (E8KE-X-101-24XGE-SFP) ● 1.4.5.8 1-Port 40GBase LAN-CFP FPIC A (E8KE-X-101-1X40G E-CFP)	Yes

Type	Board Name	BO M	Anti DDoS S803 0	Anti DDoS S808 0	Anti DDoS S816 0	Subcard	Hot Swa p
	LPUF-120	0305 6682	Yes	Yes	Yes	● 1.4.5.2 6*10GE SFP+ Daughter Card (FW-6X10G-SFP+) ● 1.4.5.3 12*10GE SFP + Daughter Card (FW-12X10G-SFP+) ● 1.4.5.5 1*100GE CFP Daughter Card (FW-1X100G-CFP) ● 1.4.5.6 5-Port 10GBase LAN/WAN-SFP+ FPIC A (E8KE-X-101-5X10G E-SFP+) ● 1.4.5.7 24-Port 100/1000 Base-X-SFP FPIC (E8KE-X-101-24XGE-SFP) ● 1.4.5.8 1-Port 40GBase LAN-CFP FPIC A (E8KE-X-101-1X40G E-CFP)	Yes

Type	Board Name	BOM	Anti DDoS8030	Anti DDoS8080	Anti DDoS8160	Subcard	Hot Swap
	LPUF-40-A	0305G074	Yes	Yes	Yes	● 1.4.7.2 20-Port 100/1000Base-X-SFP Flexible Card (P40-20xGE/FE-SFP) ● 1.4.7.3 2-Port 10GBase LAN/WAN-XFP Flexible Card (P40-2x10GBase LAN/WAN-XFP) ● 1.4.7.4 4-port 10GBase LAN/WAN-XFP FPIC (P40-4x10GBase LAN/WAN-XFP)	Yes

Table 1-35 Mappings between SPUs and cards

SPU Card	BOM	SPU Mother Board			Hot Swap
		ADS-SPUC-B	ADS-SPUD-B	ADS-SPUC-B2	
ADS-SPC-40-01	03056705	Yes	Yes	No	No
ADS-SPC-80-01	03056680	Yes	Yes	No	No
ADS-SPC-60-01	03057777	No	Yes	Yes	No
ADS-SPC-120-01	03057790	No	Yes	Yes	No
SPCA-APPSEC-FW	03057872	Yes	Yes	Yes	No
SPCA-APPSEC-FW	03057873	Yes	Yes	Yes	No

Table 1-36 Mappings between FPIC LPUs and cards

FPIC LPU Card	BOM	FPIC LPU Mother Board				Hot Swap
		LPUF-2 40	LPUF-1 20	LPUF-4 0-A	LPUF-2 1	
1.4.5.2 6*10GE SFP+ Daughter Card (FW-6X10G-SFP+)	03056684	Yes	Yes	-	-	No
1.4.5.3 12*10GE SFP+ Daughter Card (FW-12X10G-SFP+)	03056686	Yes	Yes	-	-	No
1.4.5.5 1*100GE CFP Daughter Card (FW-1X100G-CFP)	03056685	Yes	Yes	-	-	No
1.4.5.6 5-Port 10GBase LAN/ WAN-SFP+ FPIC A (E8KE-X-101-5X10GE-SFP+)	0305G09K	Yes	Yes	-	-	No
1.4.5.7 24-Port 100/1000 Base-X-SFP FPIC (E8KE-X-101-24XGE-SFP)	0305G09M	Yes	Yes	-	-	No
4-Port 10G Base LAN -SFP+ FPIC (E8KE-X-101-4X10GE-SFP+)	0305G09L	-	-	-	-	No
1.4.5.8 1-Port 40GBase LAN-CFP FPIC A (E8KE-X-101-1X40GE-CFP)	0305G09J	Yes	Yes	-	-	No

FPIC LPU Card	BOM	FPIC LPU Mother Board				Hot Swap
		LPUF-2 40	LPUF-1 20	LPUF-4 0-A	LPUF-2 1	
1.4.7.2 20-Port 100/1000Base-X-SFP Flexible Card (P40-20xGE/FE-SFP)	0305G076	-	-	Yes	-	No
1.4.7.3 2-Port 10GBase LAN/WAN-XFP Flexible Card (P40-2x10GBase LAN/WAN-XFP)	0305G075	-	-	Yes	-	No
1.4.7.4 4-port 10GBase LAN/WAN-XFP FPIC (P40-4x10GBase LAN/WAN-XFP)	0305G07X	-	-	Yes	-	No
1.4.8.2 1-port 10GBase LAN/WAN-XFP FPIC (1 x 10GBase LAN/WAN)	0305G052	-	-	-	Yes	No
1.4.8.3 12-port 100Base-FX/1000Base-X-SFP FPIC (12x100/1000Base-SFP)	0305G053	-	-	-	Yes	No
1.4.8.4 12-port 10Base-T/100Base-TX/1000Base-T-RJ45 FPIC (12x10/100/1000Base-TX-RJ45)	0305G054	-	-	-	Yes	No
1.4.8.5 1-port OC-192c/STM-64c POS-XFP FPIC (1 x OC-192c/STM-64c POS-XFP)	0305G055	-	-	-	Yes	No

FPIC LPU Card	BOM	FPIC LPU Mother Board				Hot Swap
		LPUF-2 40	LPUF-1 20	LPUF-4 0-A	LPUF-2 1	
1.4.8.6 4-Port 10GBase WAN/ LAN-XFP FPIC (4x10GBase LAN/WAN)	0305G07 W	-	-	-	Yes	No

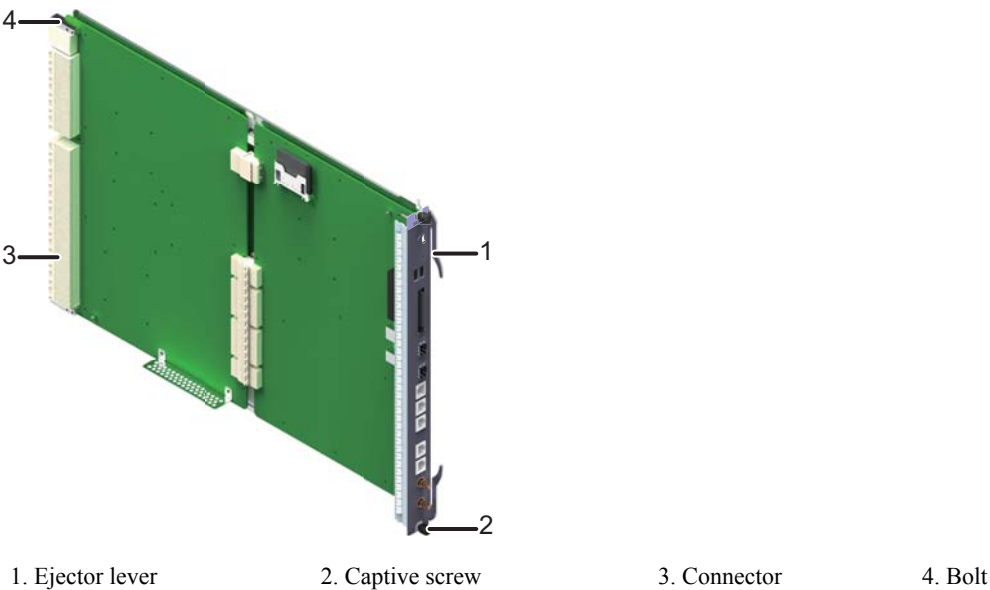
1.4.1.2 Board Structure

This section describes the structures of boards and cards.

Structure of the Integrated Board

The integrated board on the AntiDDoS8000 is a plug-in board and consists of a circuit board, connectors, upward and downward ejector levers, captive screws, and a bolt, as shown in [Figure 1-47](#).

Figure 1-47 Structure of the integrated board



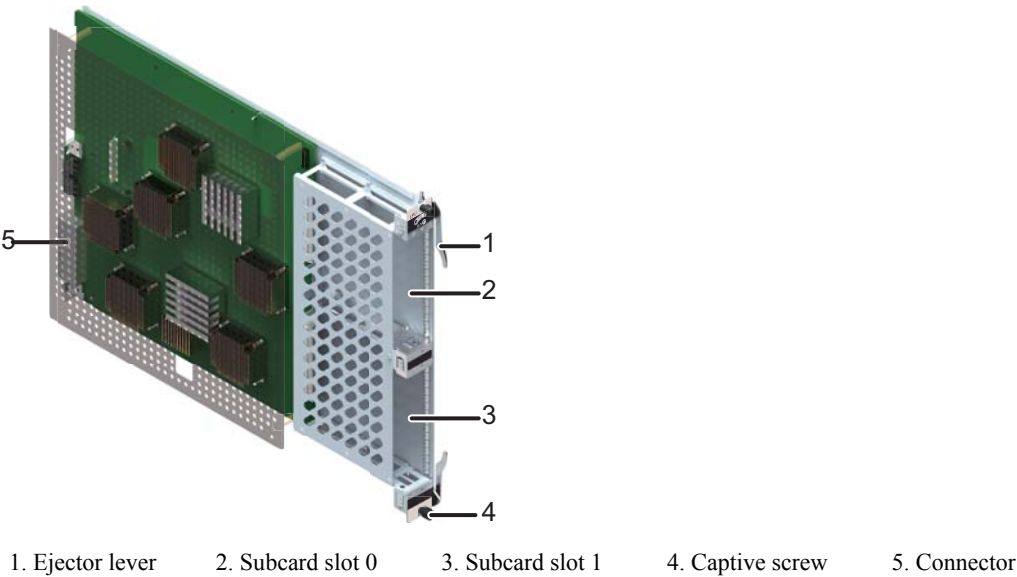
Structure of the Flexible Board

A flexible board consists of two parts:

- Motherboard
- Flexible subcard

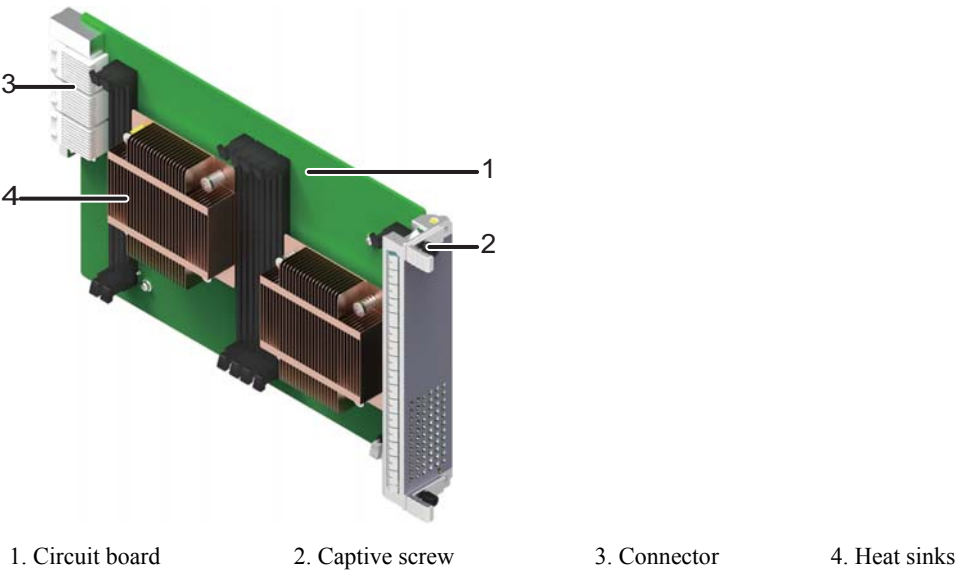
The flexible board is a plug-in board and consists of the circuit board, connector, heat sinks, ejector lever, two subcard slots, and captive screws, as shown in [Figure 1-48](#).

Figure 1-48 Structure of the flexible board



The flexible subcard is a plug-in board and consists of the circuit board, connector, heat sinks, ejector lever, and captive screws, as shown in [Figure 1-49](#).

Figure 1-49 Structure of the flexible subcard



1.4.1.3 Rules for Numbering Slots and Interfaces

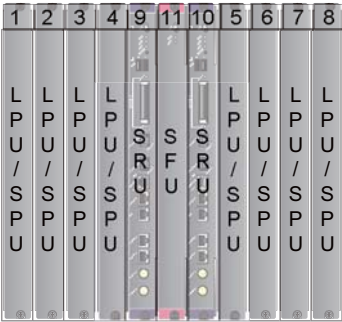
The section describes the rule for numbering board slots, card slots, and interfaces.

Board Slot Numbering

Slots are numbered in order from left to right and top to bottom.

For example, on the AntiDDoS8080, slot numbers start at 1 and go up to 8, as shown in [Figure 1-50](#).

Figure 1-50 Slot layout on the AntiDDoS8080

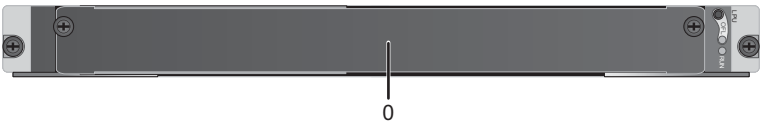


Card Numbering

Slot numbers start from 0. The numbering rules are as follows:

- For cards without subcards, the default subcard slot number is 0, as shown in [Figure 1-51](#).

Figure 1-51 Subcard slot numbering for cards without subcards



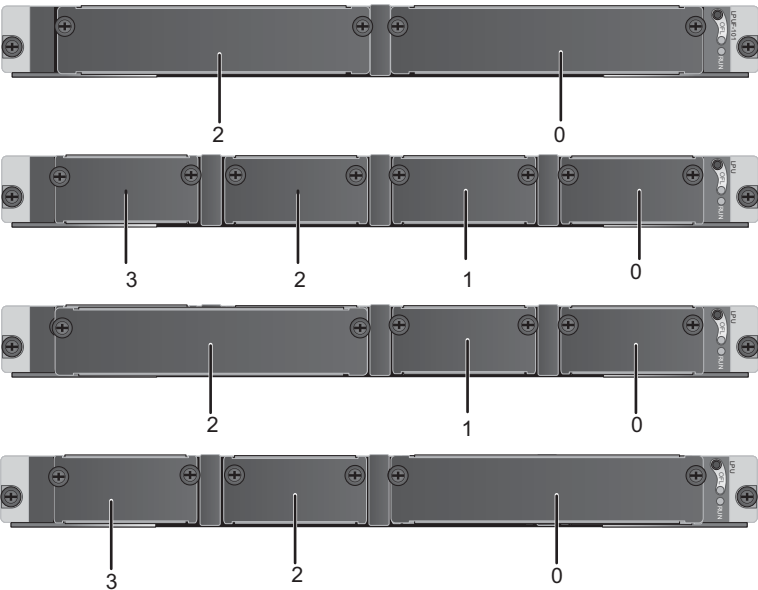
- For cards with subcards, if a card has only half-width subcards, the subcard slot numbers are 0 and 1, as shown in [Figure 1-52](#).

Figure 1-52 Subcard slot numbering for cards providing only half-width subcards



- For cards with subcards, if a card has both half-width and one-quarter-width subcards, such as LPUF-101, the subcard slot number depends on the type of inserted subcards, as shown in [Figure 1-53](#).

Figure 1-53 Subcard slot numbering for cards with half-width and one-quarter-width subcards



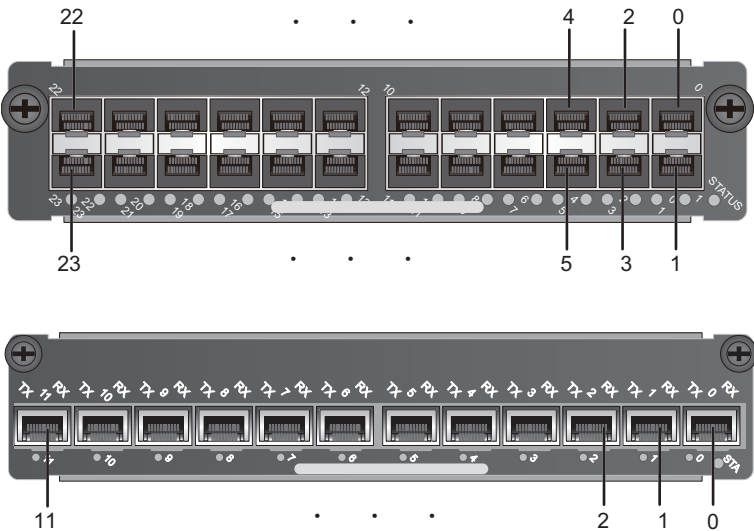
Interface Numbering

Interfaces are named using the format LPU slot/FPIC slot/interface number.

Interfaces are numbered alternating from right to left and top to bottom, beginning at 0.

Interfaces are arranged in one or two rows. [Figure 1-54](#) shows how interfaces are numbered.

Figure 1-54 Interface numbers



For example, on the AntiDDoS8080, the LPU slot number is 7, the FPIC slot number is 1, and the interface number is 2. Therefore, the interface is named 7/1/2.

NOTE

If the LPU is a fixed interface board, the FPIC slot number is considered 0.

1.4.2 MPUs and SRUs

The MPU/SRU controls the system in a centralized manner and learns routing information. It is the of the system' control center.

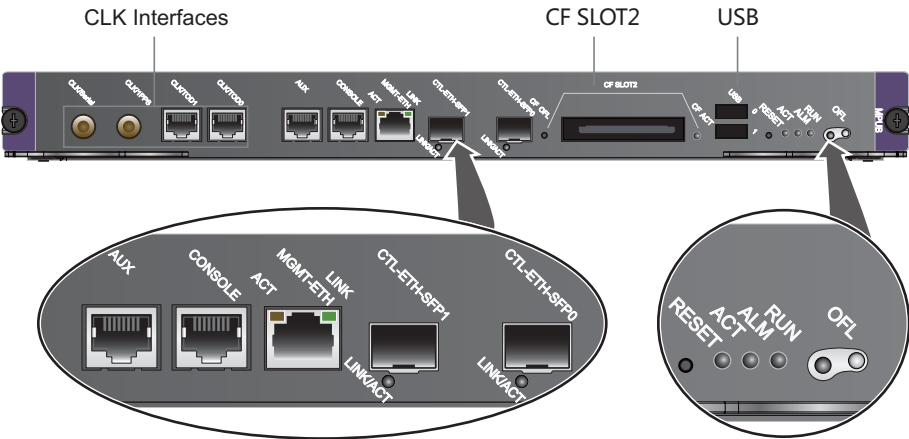
1.4.2.1 EKEX16-FWCD00MPUB00

EKEX16-FWCD00MPUB00 is the AntiDDoS8160 MPU and is hot-swappable.

Panel

Figure 1-55 shows the EKEX16-FWCD00MPUB00.

Figure 1-55 EKEX16-FWCD00MPUB00 panel



Name	Description
Buttons and indicators on the panel	
OFL button	To remove a board, press and hold the button for six seconds until the OFL indicator turns on. NOTE This button only works on the standby MPU.
OFL indicator (red)	Steady on: You can remove the board.
RUN indicator (green)	- Blinks every 2 seconds (0.5 Hz): The system is working properly. - Blinks twice each second (2 Hz): The system is in the alarm state.
ALM indicator (red)	- Steady on: The system is in the alarm state. - Off: The system is working properly.
ACT active/standby indicator (green)	- Steady on: The MPU is in the active state. - Off: The MPU is in the standby state.

Name	Description
RESET button	The button is used for resetting the MPU. If you press the RESET button, the MPU resets.
CF card slot, button, and indicator	
CF SLOT2	The MPUs of the AntiDDoS8160 have two CF cards numbered CF card 1 and CF card 2. CF card 1 lies on the circuit board of the MPU and is used to store system files and configuration files. CF card 2 lies on the panel of the MPU and is used to store logs and alarms.
CF ACT indicator (green)	● On: The CF card is in position. ● Blinking: Data is being read or written. ● Off: The CF card is not in position or can be removed.
CF OFL button	If you press the CF OFL button, all operations on the CF card will be ended, and the CF card will be powered off.
Interfaces and indicators	
CTL-ETH-SFP interface (1000MBase-X)	It is reserved for use after capacity expansion.
SFP LINK/ACT indicator (green)	● Steady on: The link is normal. ● Blinking: Data is being transmitted.
MGMT-ETH interface (10M/100M/1000M Base-TX auto-sensing)	It connects to the NMS workstation and has LINK and ACT indicators.
MGMT-ETH LINK indicator (green) (on Ethernet network interfaces)	● Steady on: The link is normal. ● Off: The link is Down.
MGMT-ETH ACT indicator (amber) (on Ethernet interfaces)	● Blinking: Data is being transmitted. ● Off: No data is being transmitted.
Console interface	It connects to the console for on-site configuration of the system.
AUX interface	It connects to the Modem for remote maintenance through dialing.
Others	
USB interface	It is not used and reserved.
CLK/TOD0	They are reserved to input or output clock signals.
CLK/TOD1	
CLK/1PPS	

Name	Description
CLK/Serial	

Interface Attributes

Table 1-37 lists the 1000MBase-X-SFP interface attributes.

Table 1-37 1000MBase-X-SFP interface attributes

Attribute	Description
Connector type	SFP
Operation mode	1000M fiber
Standards compliance	IEEE 802.3-2002
Cable specification	Single-mode or multi-mode fibers

Table 1-38 lists the attributes of the 10Base-T/100Base-TX/1000Base-T-RJ45 interfaces.

Table 1-38 10Base-T/100Base-TX/1000Base-T-RJ45 interface attributes

Attribute	Description
Connector type	RJ45
Operation mode	10M/100M/1000M auto-sensing interfaces, supporting full-duplex mode
Standards compliance	IEEE 802.3-2002
Cable specification	Category 5 unshielded twisted pair (UTP) cables recommended when the interface rate is 10 Mbit/s or 100 Mbit/s; super category 5 Shielded Twisted Pair (STP) cables recommended when the interface rate is 1000 Mbit/s

Table 1-39 lists the console interface attributes.

Table 1-39 Console interface attributes

Attribute	Description
Connector type	RJ45
Operation mode	Duplex Universal Asynchronous Receiver/Transmitter (UART)
Electrical attribute	RS-232

Attribute	Description
Baud rate	9600 bit/s (default value), adjustable
Data equipment type	Data Circuit-terminating Equipment (DCE)
Cable specification	8-core shielded cable

Table 1-40 lists the AUX interface attributes.

Table 1-40 AUX interface attributes

Attribute	Description
Connector type	RJ45
Operation mode	Duplex UART
Electrical attribute	RS-232
Baud rate	9600 bit/s (default value), adjustable
Data equipment type	Data Terminal Equipment (DTE)
Cable specification	8-core shielded cable

Technical Specifications

Table 1-41 lists the technical specifications of the EKEX16-FWCD00MPUB00.

Table 1-41 Technical specifications of the EKEX16-FWCD00MPUB00

Item	Specifications
Board silkscreen name	MPUB
Dimensions (width x depth x height)	398.5 mm x 554 mm x 40.5 mm
Typical power consumption	85 W
Maximum power consumption	95 W
Typical heat consumption	290 BTU/hour
Maximum heat consumption	324.2 BTU/hour
Board weight	4.2 kg

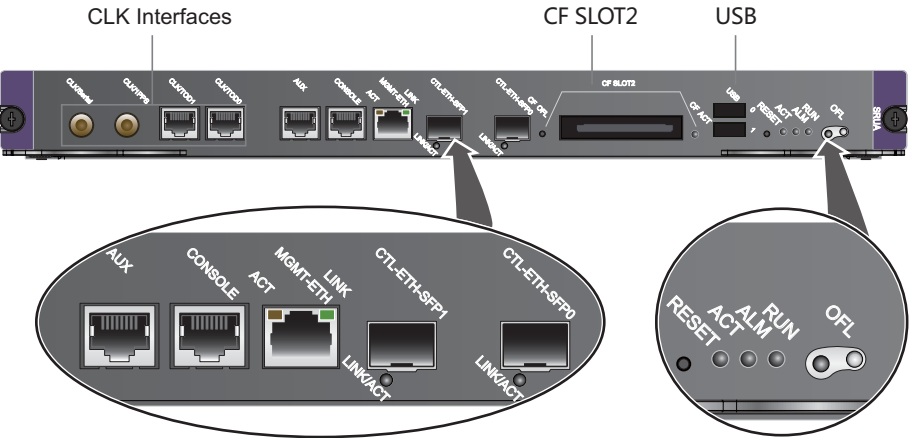
1.4.2.2 E8KE-X8-SRUA-200

E8KE-X8-SRUA-200 is the AntiDDoS8080 SRU. E8KE-X8-SRUA-200 integrates a main control unit and a switch fabric unit for data switching and is hot-swappable.

Panel

Figure 1-56 shows E8KE-X8-SRUA-200.

Figure 1-56 E8KE-X8-SRUA-200



Name	Description
Buttons and indicators on the panel	
OFL button	To remove a board, press and hold the button for six seconds until the OFL indicator turns on. NOTE This button works only on the standby SRU.
OFL indicator (red)	Steady on: You can remove the board.
RUN indicator (green)	- Blinks every 2 seconds (0.5 Hz): The system is working properly. - Blinks twice each second (2 Hz): The system is in the alarm state.
ALM indicator (red)	- Steady on: The system is in the alarm state. - Off: The system is working properly.
ACT active/standby indicator (green)	- Steady on: The SRU is in the active state. - Off: The SRU is in the standby state.
RESET button	The button is used for resetting the SRU. If you press the RESET button, the SRU resets.
CF card slot, button, and indicator	

Name	Description
CF SLOT2	SRUs of the AntiDDoS8080 have two CF cards numbered CF card 1 and CF card 2. CF card 1 lies on the circuit board of the SRU and stores system files and configuration files. CF card 2 lies on the panel of the SRU and stores logs and alarms.
CF ACT indicator (green)	● On: The CF card is in position. ● Blinking: Data is being read or written. ● Off: The CF card is not in position or can be removed.
CF OFL button	If you press the CF OFL button, all operations on the CF card will be ended, and the CF card will be powered off.
Interfaces and indicators	
CTL-ETH-SFP interface (1000MBase-X)	It is reserved for use after capacity expansion.
SFP LINK/ACT indicator (green)	● Steady on: The link is normal. ● Blinking: Data is being transmitted.
MGMT-ETH interface (10M/100M/1000M Base-TX auto-sensing)	It connects to the NMS workstation and has LINK and ACT indicators.
MGMT-ETH LINK indicator (green) (on Ethernet network interfaces)	● Steady on: The link is normal. ● Off: The link is Down.
MGMT-ETH ACT indicator (amber) (on Ethernet interfaces)	● Blinking: Data is being transmitted. ● Off: No data is being transmitted.
Console interface	It connects to the console for on-site configuration of the system.
AUX interface	It connects to the Modem for remote maintenance through dialing.
Others	
USB interface	It is not used and reserved.
CLK/TOD0	They are reserved to input or output clock signals.
CLK/TOD1	
CLK/1PPS	
CLK/Serial	

Interface Attributes

Table 1-42 lists the 1000MBase-X-SFP interface attributes.

Table 1-42 1000MBase-X-SFP interface attributes

Attribute	Description
Connector type	SFP
Operation mode	1000M fiber
Standards compliance	IEEE 802.3-2002
Cable specification	Single-mode or multi-mode fibers

Table 1-43 lists the attributes of the 10Base-T/100Base-TX/1000Base-T-RJ45 interfaces.

Table 1-43 10Base-T/100Base-TX/1000Base-T-RJ45 interface attributes

Attribute	Description
Connector type	RJ45
Operation mode	10M/100M/1000M auto-sensing interfaces, supporting full-duplex mode
Standards compliance	IEEE 802.3-2002
Cable specification	Category 5 unshielded twisted pair (UTP) cables recommended when the interface rate is 10 Mbit/s or 100 Mbit/s; super category 5 Shielded Twisted Pair (STP) cables recommended when the interface rate is 1000 Mbit/s

Table 1-44 lists the console interface attributes.

Table 1-44 Console interface attributes

Attribute	Description
Connector type	RJ45
Operation mode	Duplex Universal Asynchronous Receiver/Transmitter (UART)
Electrical attribute	RS-232
Baud rate	9600 bit/s (default value), adjustable
Data equipment type	Data Circuit-terminating Equipment (DCE)
Cable specification	8-core shielded cable

Table 1-45 lists the AUX interface attributes.

Table 1-45 AUX interface attributes

Attribute	Description
Connector Type	RJ45
Operation mode	Duplex UART
Electrical attribute	RS-232
Baud rate	9600 bit/s (default value), adjustable
Data equipment type	Data Terminal Equipment (DTE)
Cable specification	8-core shielded cable

Technical Specifications

Table 1-46 shows the technical specifications of the E8KE-X8-SRUA-200.

Table 1-46 Technical specifications of the E8KE-X8-SRUA-200

Item	Specifications
Board silkscreen name	SRUA
Dimensions (width x depth x height)	398.5 mm x 554 mm x 35 mm
Typical power consumption	149 W
Maximum power consumption	160 W
Typical heat consumption	508.4 BTU/hour
Maximum heat consumption	545.9 BTU/hour
Board weight	4.8 kg

1.4.2.3 E8KE-X3-MPU

E8KE-X3-MPU is the AntiDDoS8030 MPU. It is hot-swappable.

Panel

Figure 1-57 shows the appearance of the E8KE-X3-MPU.

Figure 1-57 Appearance of the E8KE-X3-MPU



NOTE

This MPU uses a USB storage device. This USB storage device is installed on the PCB and is not replaceable. To be compatible with the MPUs that use CF cards as storage devices, the USB storage device is displayed as a CF card during a file operation, while is displayed as USB during an MPU restart.

Name	Description
Buttons and indicators on the panel	
OFL button	To remove a board, press and hold the button for six seconds until the OFL indicator turns on. NOTE This button takes effect only on the slave MPU.
OFL indicator (red)	Steady on: You can remove the board.
RUN indicator (green)	- Blinks every two seconds (0.5 Hz): The system is working properly. - Blinks twice each second (2 Hz): The system is in the alarm state.
ALM indicator (red)	- Steady on: The system is in the alarm state. - Off: The system is working properly.
ACT active/standby indicator (green)	- Steady on: The MPU is in the active state. - Off: The MPU is in the standby state.
RESET button	The button is used for resetting the MPU. If you press the RESET button, you can reset the MPU.
Interfaces and indicators	
MGMT-ETH interface (10M/100M/1000M Base-TX auto-sensing)	It connects to the NMS workstation and has LINK and ACT indicators.
MGMT-ETH LINK indicator (green) (on Ethernet network interfaces)	- Steady on: The link is normal. - Off: The link is Down.
MGMT-ETH ACT indicator (amber) (on Ethernet interfaces)	- Blinking: Data is being transmitted. - Off: No data is being transmitted.

Name	Description
Console interface	It connects to the console for on-site configuration of the system.
AUX interface	It connects to the Modem for remote maintenance through dialing.
Others	
CLK	They are reserved to input or output clock signals.
TOD	

Interface Attributes

Table 1-47 lists the attributes of the 10Base-T/100Base-TX/1000Base-T-RJ45 interfaces.

Table 1-47 10Base-T/100Base-TX/1000Base-T-RJ45 interface attributes

Attribute	Description
Connector type	RJ45
Operation mode	10M/100M/1000M auto-sensing interfaces, supporting full-duplex mode
Standards compliance	IEEE 802.3-2002
Cable specification	Category 5 unshielded twisted pair (UTP) cables recommended when the interface rate is 10 Mbit/s or 100 Mbit/s; super category 5 Shielded Twisted Pair (STP) cables recommended when the interface rate is 1000 Mbit/s

Table 1-48 lists the console interface attributes.

Table 1-48 Console interface attributes

Attribute	Description
Connector type	RJ45
Operation mode	Duplex Universal Asynchronous Receiver/Transmitter (UART)
Electrical attribute	RS-232
Baud rate	9600 bit/s (default value), which can be changed as required
Data equipment type	Data Circuit-terminating Equipment (DCE)
Cable specification	8-core shielded cable

Table 1-49 lists the AUX interface attributes.

Table 1-49 AUX interface attributes

Attribute	Description
Connector Type	RJ45
Operation mode	Duplex UART
Electrical attribute	RS-232
Baud rate	9600 bit/s (default value), which can be changed as required
Data equipment type	Data Terminal Equipment (DTE)
Cable specification	8-core shielded cable

Technical Specifications

Table 1-50 shows the technical specifications of the E8KE-X3-MPU.

Table 1-50 Technical specifications of the E8KE-X3-MPU

Item	Description
Silkscreen of the board name	MPU E8KE-X3-MPU
Dimensions (W x D x H)	198.5 mm x 551 mm x 40 mm
Typical power consumption	32 W
Maximum power consumption	35.2 W
Typical heat consumption	109.2 BTU/hour
Maximum heat consumption	120.1 BTU/hour
Board weight	1.7 kg

1.4.2.4 MPUD

MPUD is the AntiDDoS8030 MPU and is hot-swappable.

MPUD Panel

Figure 1-58 shows the MPUD panel.

 **NOTE**

The CF card is not hot-swappable.

Figure 1-58 MPUD panel

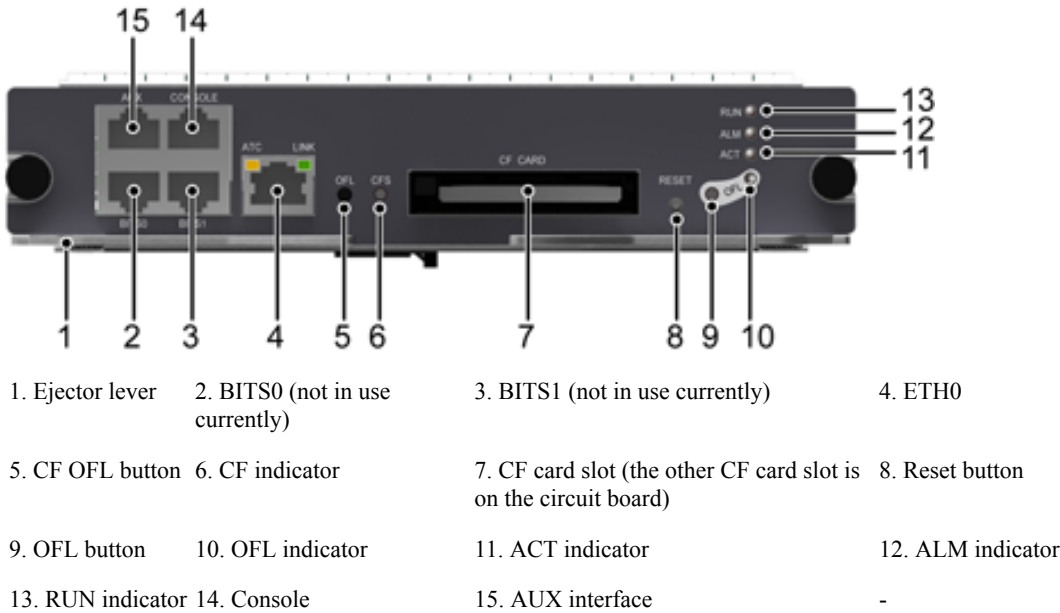


Table 1-51 describes the buttons and indicators on the MPUD panel.

Table 1-51 Buttons and indicators on the MPUD panel

Indicator/Button	Description
OFL button	To remove a board, press and hold the button for six seconds until the OFL indicator turns on. NOTE This button works only on the standby MPUD.
OFL indicator (red)	If the indicator is on, you can remove the board.
RUN indicator (green)	If the indicator blinks once every two seconds (0.5 Hz), the system is in the normal state. If the indicator blinks twice each second (2 Hz), the system is in the alarm state.
ALM indicator (red)	If the indicator is steady on, the system is in the alarm state. If the indicator is steady off, the system is in the normal state.
ACT active/standby indicator (green)	If the indicator is on, the MPUD is in the active state. If the indicator is off, the MPUD is in the standby state.
RESET button	Press this button to reset the MPUD.

Indicator/Button	Description
CF ACT indicator (green)	If the indicator is on, the CF is in the correct position. If the indicator is blinking, data is being read or written. If the indicator is off, the CF is not in the correct position or can be removed.
LINK indicator (green) (on the Ethernet interface)	If the indicator is steady on, the link is normal. If the indicator is off, the link is Down.
ACT indicator (amber) (on Ethernet interfaces)	If the indicator is blinking, data is being transmitted. If the indicator is off, no data is being transmitted.

Table 1-52 describes the interfaces on the MPUD.

Table 1-52 MPUD interfaces

Interface Name	Connector Type	Description
Eth0 (10M/100M/1000M Base-TX auto-sensing)	RJ45	Connects to the NMS workstation and has LINK and ACT indicators.
Console interface	RJ45	Connects to the console for on-site configuration of the system.
AUX interface	RJ45	Connects to the Modem for remote maintenance through dialing.
CF card interface	TYPE II standard (compatible with TYPE I standard)	Used to hold a CF card to store data files as a massive storage device.

Interface Attributes

Table 1-53 lists the attributes of the 10Base-T/100Base-TX/1000Base-T-RJ45 interfaces.

Table 1-53 10Base-T/100Base-TX/1000Base-T-RJ45 interface attributes

Attribute	Description
Connector type	RJ45
Operation mode	10M/100M/1000M auto-sensing interfaces, supporting full-duplex mode
Standards compliance	IEEE 802.3-2002

Attribute	Description
Cable specification	Category 5 unshielded twisted pair (UTP) cables recommended when the interface rate is 10 Mbit/s or 100 Mbit/s; super category 5 Shielded Twisted Pair (STP) cables recommended when the interface rate is 1000 Mbit/s

Table 1-54 lists the console interface attributes.

Table 1-54 Console interface attributes

Attribute	Description
Connector type	RJ45
Operation mode	Duplex Universal Asynchronous Receiver/Transmitter (UART)
Electrical attribute	RS-232
Baud rate	9600 bit/s (default value), adjustable
Data equipment type	Data Circuit-terminating Equipment (DCE)
Cable specification	8-core shielded cable

Table 1-55 lists the AUX interface attributes.

Table 1-55 AUX interface attributes

Attribute	Description
Connector type	RJ45
Operation mode	Duplex UART
Electrical attribute	RS-232
Baud rate	9600 bit/s (default value), adjustable
Data equipment type	Data Terminal Equipment (DTE)
Cable specification	8-core shielded cable

Technical Specifications

Table 1-56 lists the technical specifications of the MPUD.

Table 1-56 Technical specifications of the MPUD

Item	Specifications
Board silkscreen name	MPUD
Dimensions (width x depth x height)	198.5 mm x 551 mm x 40 mm
Typical power consumption	41 W
Maximum power consumption	41 W
Typical heat consumption	139.9 BTU/hour
Maximum heat consumption	139.9 BTU/hour
Board weight	2 kg

1.4.3 SFUs

SFUs are responsible for data switching between boards. The AntiDDoS8030 does not support SFUs.

1.4.3.1 E8KE-X16-SFUC-200SP

E8KE-X16-SFUC-200SP is the AntiDDoS8160 SFU. It uses non-blocking switch fabric, is hot-swappable, and is responsible for data switching of the entire system.

Panel

Figure 1-59 shows the E8KE-X16-SFUC-200SP.

Figure 1-59 E8KE-X16-SFUC-200SP



Name	Description
OFL button	To remove a board, press and hold the button for six seconds until the OFL indicator turns on.
OFL indicator (red)	Steady on: You can remove the board.
RUN indicator (green)	- Blinks every 2 seconds (0.5 Hz): The system is working properly. - Blinks twice each second (2 Hz): The system is in the alarm state.
ACT (green)	- Steady on: The SFU is working properly. - Off: The SFU is faulty.

Interface Attributes

The E8KE-X16-SFUC-200SP does not have external interfaces.

Technical Specifications

Table 1-57 shows the technical specifications of the E8KE-X16-SFUC-200SP.

Table 1-57 Technical specifications of the E8KE-X16-SFUC-200SP

Item	Specifications
Board silkscreen name	SFUI-200-B
Dimensions (width x depth x height)	410 mm x 553.5 mm x 40.5 mm
Typical power consumption	90 W
Maximum power consumption	100 W
Typical heat consumption	307.1 BTU/hour
Maximum heat consumption	341.2 BTU/hour
Board weight	4.26 kg

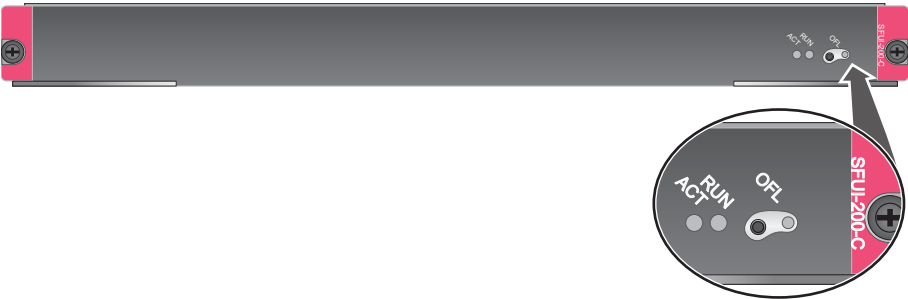
1.4.3.2 E8KE-X8-SFUC-200

E8KE-X8-SFUC-200 is the AntiDDoS8080 SFU. It uses non-blocking switch fabric, is hot-swappable, and is responsible for data switching of the entire system.

Panel

Figure 1-60 shows the E8KE-X8-SFUC-200.

Figure 1-60 E8KE-X8-SFUC-200



Name	Description
OFL button	To remove a board, press and hold the button for six seconds until the OFL indicator turns on.
OFL indicator (red)	Steady on: You can remove the board.
RUN indicator (green)	● Blinks every 2 seconds (0.5 Hz): The system is working properly. ● Blinks twice each second (2 Hz): The system is in the alarm state.
ACT (green)	● Steady on: The SFU is working properly. ● Off: The SFU is faulty.

Interface Attributes

The E8KE-X8-SFUC-200 does not have external interfaces.

Technical Specifications

Table 1-58 shows the technical specifications of the E8KE-X8-SFUC-200.

Table 1-58 Technical specifications of the E8KE-X8-SFUC-200

Item	Specifications
Specifications	SFUI-200-C
Dimensions (width x depth x height)	400 mm x 553.5 mm x 35 mm
Typical power consumption	77 W

Item	Specifications
Maximum power consumption	90 W
Typical heat consumption	262.7 BTU/hour
Maximum heat consumption	307.1 BTU/hour
Board weight	3.82 kg

1.4.4 SPU and SPCs

SPUs are responsible for security service processing.

1.4.4.1 AntiDDoS8030 Service Processing Unit (ADS-SPUC-B)

The ADS-SPUC-B motherboard applies to the AntiDDoS8030 platform. By default, this board does not have any service processing capability and must be used together with subcards. This board has two slots, and each slot can house a DDoS service card.

The ADS-SPUC-B is inserted into the LPU/SPU slot of the AntiDDoS8030.

The board is hot-swappable.

Panel

Figure 1-61 shows the ADS-SPUC-B.

Figure 1-61 ADS-SPUC-B



Name	Description
SPU	
OFL button	To remove an SPU, press and hold the OFL button for six seconds until the OFL indicator turns on.
OFL indicator (red)	Steady on: You can remove the SPU.

Name	Description
RUN indicator (green)	- Blinks every 2 seconds (0.5 Hz): The SPU is running normally. - Blinks four times every second (4 Hz): The SPU is in the alarm state or starting but not registered.
SPC	
! NOT SWAP	The SPC and SPU share one sales code in a slot. They both must be replaced at the same time.
OFL button	To remove an SPC, press and hold the OFL button for six seconds until the OFL indicator turns red for one second and then turns off.
OFL indicator	- If the indicator is green and blinks once every second (1 Hz), the SPC is running normally. - If the indicator is green and blinks four times every second (4 Hz), the SPC is in the alarm state or starting but not registered. - If the indicator turns red for one second and then turns off, you can safely remove the SPC.

Interface Attributes

The ADS-SPUC-B does not have external interfaces.

Technical Specifications

Table 1-59 lists the technical specifications of the ADS-SPUC-B.

Table 1-59 Technical specifications of the ADS-SPUC-B

Item	Specifications
Board silkscreen name	SPUC ADS-SPUC-B
Dimensions (width x depth x height)	400 mm x 520 mm x 41 mm
Power consumption (typical value)	116 W
Heat dissipation	395.79 BTU/hour
Board weight	5.23 kg

Item	Specifications
Maximum input voltage range (DC)	-72 V to -38 V
CPU	1.2 GHz

1.4.4.2 AntiDDoS8030 Service Processing Unit (ADS-SPUC-B2)

The ADS-SPUC-B2 is a hot-swappable motherboard that works with the AntiDDoS8030. By default, this board does not have any service processing capability and must be used together with subcards. It has one available slot that can house a DDoS service card.

The ADS-SPUC-B2 is inserted into the LPU/SPU slot of the AntiDDoS8030.

Panel

Figure 1-62 shows the ADS-SPUC-B2.

Figure 1-62 ADS-SPUC-B2



Name	Description
OFL button	To remove a board, press and hold the button for six seconds until the OFL indicator turns on.
OFL indicator (red)	Steady on: You can remove the board.
RUN indicator (green)	- Blinks every 2 seconds (0.5 Hz): The board is working properly. - Blinks four each second (4 Hz): The board is in the alarm state or starting and not registered.

Interface Attributes

The ADS-SPUC-B2 does not have external interfaces.

Technical Specifications

Table 1-60 lists the technical specifications of the ADS-SPUC-B2.

Table 1-60 Technical specifications of the ADS-SPUC-B2

Item	Specifications
Board silkscreen name	SPUE ADS-SPUC-B2
Dimensions (width x depth x height)	400 mm x 520 mm x 41 mm
Typical power consumption	80 W
Maximum power consumption	100 W
Typical heat consumption	273 BTU/hour
Maximum heat consumption	341.2 BTU/hour
Board weight	5.18 kg
Maximum input voltage range (DC)	-72 V to -38 V
CPU	1.6 GHz

1.4.4.3 AntiDDoS8080&AntiDDoS8160 Service Processing Unit (ADS-SPUD-B)

The ADS-SPUD-B motherboard applies to the AntiDDoS8080 and AntiDDoS8160 platforms. By default, this board does not have any service processing capability and must be used together with subcards. Each slot can house a DDoS service card.

The ADS-SPUD-B is inserted into the LPU/SPU slot of the AntiDDoS8080 and AntiDDoS8160.

The board is hot-swappable.

Panel

Figure 1-63 shows the ADS-SPUD-B.

Figure 1-63 ADS-SPUD-B



Name	Description
SPU	
OFL button	To remove an SPU, press and hold the OFL button for six seconds until the OFL indicator turns on.
OFL indicator (red)	Steady on: You can remove the SPU.
RUN indicator (green)	- Blinks every 2 seconds (0.5 Hz): The SPU is running normally. - Blinks four times every second (4 Hz): The SPU is in the alarm state or starting but not registered.
SPC	
! NOT SWAP	The SPC and SPU share one sales code in a slot. They both must be replaced at the same time.
OFL button	To remove an SPC, press and hold the OFL button for six seconds until the OFL indicator turns red for one second and then turns off.
OFL indicator	- If the indicator is green and blinks once every second (1 Hz), the SPC is running normally. - If the indicator is green and blinks four times every second (4 Hz), the SPC is in the alarm state or starting but not registered. - If the indicator turns red for one second and then turns off, you can safely remove the SPC.

Interface Attributes

The ADS-SPUD-B does not have external interfaces.

Technical Specifications

Table 1-61 lists the technical specifications of the ADS-SPUD-B.

Table 1-61 Technical specifications of the ADS-SPUD-B

Item	Specifications
Board silkscreen name	SPUD ADS-SPUD-B
Dimensions (width x depth x height)	400 mm x 520 mm x 41 mm
Power consumption (typical value)	125 W
Heat dissipation	426.5 BTU/hour
Board weight	5.34 kg
Maximum input voltage range (DC)	-72 V to -38 V
CPU	1.2 GHz

1.4.4.4 Service Card (ADS-SPC-40-01)

ADS-SPC-40-01 is a subcard of the DDoS SPU and occupies a subslot on the DDoS SPU.

 **NOTE**

The cleaning or detecting function of the ADS-SPC-40-01 is controlled by a license. Before using the function, purchase and activate the license.

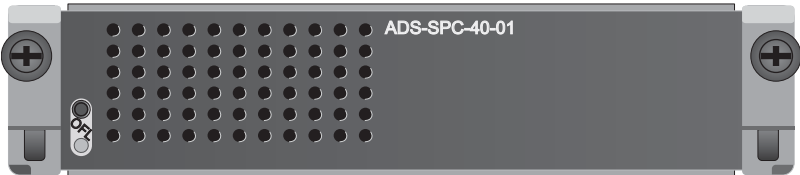
A cleaning or detecting license supports 20G processing performance. Multiple licenses can be used together.

The ADS-SPC-40-01 is not hot-swappable.

Panel

Figure 1-64 shows the ADS-SPC-40-01.

Figure 1-64 ADS-SPC-40-01



Name	Description
OFL button	To remove a board, press and hold the OFL button for six seconds until the OFL indicator turns red for one second and then turns off.
OFL indicator	● If the indicator is green and blinks once every second (1 Hz), the board is running normally. ● If the indicator is green and blinks four times every second (4 Hz), the board is in the alarm state or starting but not registered. ● If the indicator turns red for one second and then turns off, you can safely remove the board.

Interface Attributes

The ADS-SPC-40-01 does not have external interfaces.

Technical Specifications

Table 1-62 lists the technical specifications of the ADS-SPC-40-01.

Table 1-62 Technical specifications of the ADS-SPC-40-01

Item	Specifications
Board silkscreen name	ADS-SPC-40-01
Dimensions (width x depth x height)	175 mm x 280 mm x 36 mm
Power consumption (typical value)	159 W
Heat dissipation	542.51 BTU/hour
Board weight	1.62 kg
CPU	1.2 GHz

1.4.4.5 Service Card (ADS-SPC-60-01)

The ADS-SPC-60-01 is a single-CPU service sub-card of the anti-ddos service board, can be inserted into an SPU slot.

NOTE

The cleaning or detecting function of the ADS-SPC-60-01 is controlled by a license. Before using the function, purchase and activate the license.

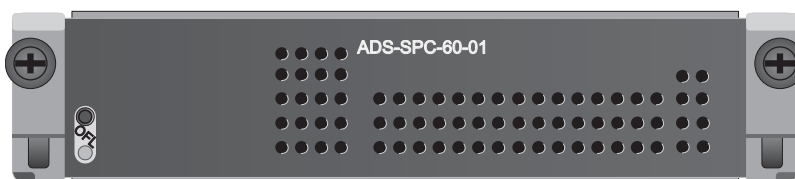
A cleaning or detecting license supports 20G processing performance. Multiple licenses can be used together.

The ADS-SPC-60-01 is not hot-swappable.

Panel

Figure 1-65 shows the ADS-SPC-60-01.

Figure 1-65 ADS-SPC-60-01



Name	Description
OFL button	To remove a board, press and hold the OFL button for six seconds until the OFL indicator turns red for one second and then turns off.
OFL indicator	● If the indicator is green and blinks once every second (1 Hz), the board is running normally. ● If the indicator is green and blinks four times every second (4 Hz), the board is in the alarm state or starting but not registered. ● If the indicator turns red for one second and then turns off, you can safely remove the board.

Interface Attributes

The ADS-SPC-60-01 does not have external interfaces.

Technical Specifications

Table 1-63 lists the technical specifications of the ADS-SPC-60-01.

Table 1-63 Technical specifications of the ADS-SPC-60-01

Item	Specifications
Board silkscreen name	ADS-SPC-60-01

Item	Specifications
Dimensions (width x depth x height)	175 mm x 280 mm x 36 mm
Typical power consumption	90 W
Maximum power consumption	100 W
Typical heat consumption	307.1 BTU/hour
Maximum heat consumption	341.2 BTU/hour
Board weight	1.30 kg
CPU number	1
CPU	1.6 GHz
Memory	DDR4 32 GB

1.4.4.6 Service Card (ADS-SPC-80-01)

ADS-SPC-80-01 is a subcard of the DDoS SPU and occupies a subslot on the DDoS SPU.

NOTE

The cleaning or detecting function of the ADS-SPC-80-01 is controlled by a license. Before using the function, purchase and activate the license.

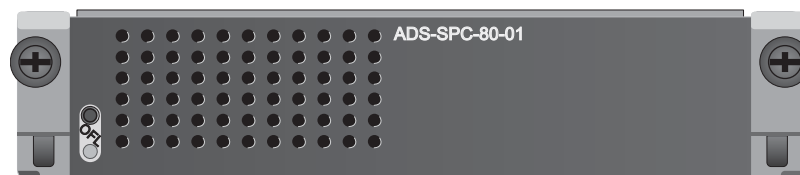
A cleaning or detecting license supports 20G processing performance. Multiple licenses can be used together.

The ADS-SPC-80-01 is not hot-swappable.

Panel

[Figure 1-66](#) shows the ADS-SPC-80-01.

Figure 1-66 ADS-SPC-80-01



Name	Description
OFL button	To remove a board, press and hold the OFL button for six seconds until the OFL indicator turns red for one second and then turns off.
OFL indicator	● If the indicator is green and blinks once every second (1 Hz), the board is running normally. ● If the indicator is green and blinks four times every second (4 Hz), the board is in the alarm state or starting but not registered. ● If the indicator turns red for one second and then turns off, you can safely remove the board.

Interface Attributes

The ADS-SPC-80-01 does not have external interfaces.

Technical Specifications

Table 1-64 lists the technical specifications of the ADS-SPC-80-01.

Table 1-64 Technical specifications of the ADS-SPC-80-01

Item	Specifications
Board silkscreen name	ADS-SPC-80-01
Dimensions (width x depth x height)	175 mm x 280 mm x 36 mm
Power consumption (typical value)	159 W
Heat dissipation	542.51 BTU/hour
Board weight	1.62 kg
CPU	1.2 GHz

1.4.4.7 Service Card (ADS-SPC-120-01)

The ADS-SPC-120-01 is a dual-CPU service sub-card of the anti-ddos service board, can be inserted into an SPU slot.

NOTE

The cleaning or detecting function of the ADS-SPC-120-01 is controlled by a license. Before using the function, purchase and activate the license.

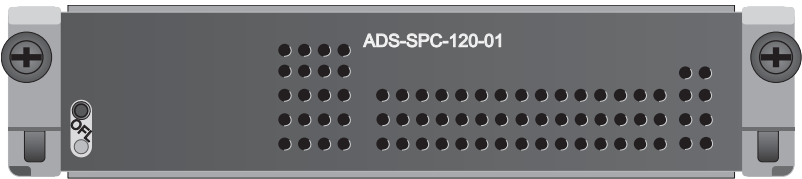
A cleaning or detecting license supports 20G processing performance. Multiple licenses can be used together.

The ADS-SPC-120-01 is not hot-swappable.

Panel

Figure 1-67 shows the ADS-SPC-120-01.

Figure 1-67 ADS-SPC-120-01



Name	Description
OFL button	To remove a board, press and hold the OFL button for six seconds until the OFL indicator turns red for one second and then turns off.
OFL indicator	● If the indicator is green and blinks once every second (1 Hz), the board is running normally. ● If the indicator is green and blinks four times every second (4 Hz), the board is in the alarm state or starting but not registered. ● If the indicator turns red for one second and then turns off, you can safely remove the board.

Interface Attributes

The ADS-SPC-120-01 does not have external interfaces.

Technical Specifications

Table 1-65 lists the technical specifications of the ADS-SPC-120-01.

Table 1-65 Technical specifications of the ADS-SPC-120-01

Item	Specifications
Board silkscreen name	ADS-SPC-120-01

Item	Specifications
Dimensions (width x depth x height)	175 mm x 280 mm x 36 mm
Typical power consumption	180 W
Maximum power consumption	200 W
Typical heat consumption	614.2 BTU/hour
Maximum heat consumption	682.4 BTU/hour
Board weight	1.42 kg
CPU number	2
CPU	1.6 GHz
Memory	DDR4 32 GB/CPU

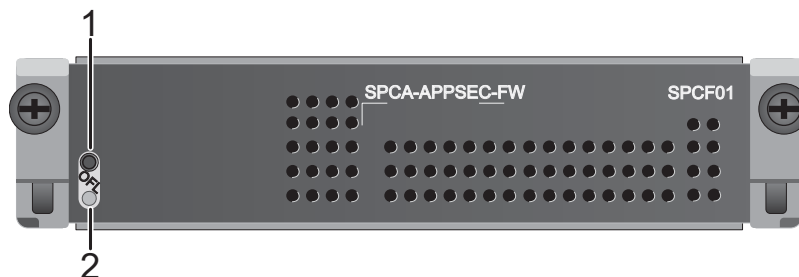
1.4.4.8 SPCA-APPSEC-FW

SPCA-APPSEC-FW is a single-CPU subcard of the anti-DDoS service and provides the SSL decryption function. The subcard occupies one sub-slot of the service board. The subcard can be installed on the backplane of the service board or intermixed with the anti-DDoS service subcard. Hot swap is not supported.

Panel

[Figure 1-68](#) shows the SPCA-APPSEC-FW.

Figure 1-68 SPCA-APPSEC-FW



N u m b e r	Name	Description
1	OFL button	To remove a board, press and hold the OFL button for six seconds until the OFL indicator turns red for one second and then turns off.
2	OFL indicator	● If the indicator is green and blinks once every second (1 Hz), the board is running normally. ● If the indicator is green and blinks four times every second (4 Hz), the board is in the alarm state or starting but not registered. ● If the indicator turns red for one second and then turns off, you can safely remove the board.

Technical Specifications

Table 1-66 lists the technical specifications of the SPCA-APPSEC-FW.

Table 1-66 Technical specifications of the SPCA-APPSEC-FW

Item	Specifications
Board silkscreen name	SPCF01 SPCA-APPSEC-FW
Part number	
Dimensions (width x depth x height)	175 mm x 280 mm x 36 mm
Typical power consumption	90 W
Maximum power consumption	100 W
Typical heat consumption	307.1 BTU/hour
Maximum heat consumption	341.2 BTU/hour
Board weight	1.30 kg
CPU number	1
CPU	1.6 GHz

Item	Specifications
Memory	DDR4 32 GB

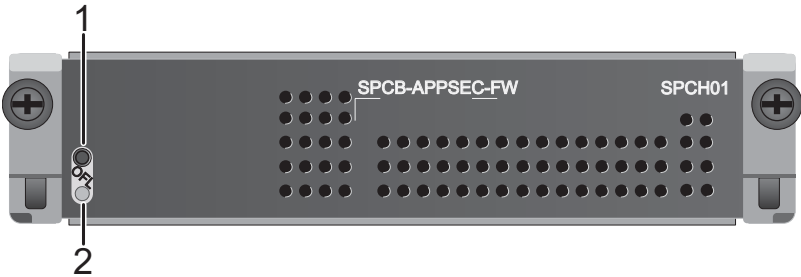
1.4.4.9 SPCB-APPSEC-FW

SPCB-APPSEC-FW is a dual-CPU subcard of the anti-DDoS service and provides the SSL decryption function. The subcard occupies one sub-slot of the service board. The subcard can be installed on the backplane of the service board or intermixed with the anti-DDoS service subcard. Hot swap is not supported.

Panel

Figure 1-69 shows the SPCB-APPSEC-FW.

Figure 1-69 SPCB-APPSEC-FW



N u m b e r	Name	Description
1	OFL button	To remove a board, press and hold the OFL button for six seconds until the OFL indicator turns red for one second and then turns off.
2	OFL indicator	● If the indicator is green and blinks once every second (1 Hz), the board is running normally. ● If the indicator is green and blinks four times every second (4 Hz), the board is in the alarm state or starting but not registered. ● If the indicator turns red for one second and then turns off, you can safely remove the board.

Technical Specifications

Table 1-67 lists the technical specifications of the SPCB-APPSEC-FW.

Table 1-67 Technical specifications of the SPCB-APPSEC-FW

Item	Specifications
Board silkscreen name	SPCH01 SPCB-APPSEC-FW
Part number	
Dimensions (width x depth x height)	175 mm x 280 mm x 36 mm
Typical power consumption	180 W
Maximum power consumption	200 W
Typical heat consumption	614.2 BTU/hour
Maximum heat consumption	682.4 BTU/hour
Board weight	1.42 kg
CPU number	2
CPU	1.6 GHz
Memory	DDR4 32 GB/CPU

1.4.5 LPUF-240 and FPICs

The flexible LPU comprises the motherboard (LPUF-240) and multiple flexible cards (subcards), improving networking flexibility. The flexible LPU supports 240G line-rate forwarding, which reduces costs and provides customized solutions for users.

1.4.5.1 LPUF-240

The hot-swappable LPUF-240 supports 240G line-rate forwarding. It supports mixed insertion among different FPICs and has two half-width slots, each of which holds one FPIC.



NOTICE

The LPUF-240 does not support the hot swap of FPICs.
The LPUF-240 is not compatible with the AntiDDoS8030.

Panel

Figure 1-70 shows the LPUF-240.

Figure 1-70 LPUF-240



Name	Description
OFL button	To remove a board, press and hold the button for five seconds until the OFL indicator turns on.
OFL indicator (red)	Steady on: You can remove the board.
RUN indicator (green)	- Blinks every 2 seconds (0.5 Hz): The system is working properly. - Blinks twice each second (2 Hz): The system is in the alarm state.

Interface Attributes

The LPUF-240 does not have external interfaces.

Technical Specifications

Table 1-68 lists the technical specifications of the LPUF-240.

Table 1-68 Technical specifications of the LPUF-240

Item	Specifications
Board silkscreen name	LPUF-240 FW-LPUF-240
Dimensions (width x depth x height)	399.2 mm x 555.2 mm x 40.1 mm
Typical power consumption	353 W

Item	Specifications
Maximum power consumption	410 W
Typical heat consumption	1204.5 BTU/hour
Maximum heat consumption	1399 BTU/hour
Board weight	9 kg

1.4.5.2 6*10GE SFP+ Daughter Card (FW-6X10G-SFP+)

The FW-6X10G-SFP+ occupies one 1/2-width slot, is compatible with LPUF-240s and LPUF-120s, works in LAN or WAN mode, uses SFP+ optical modules, but is not hot-swappable.

Panel

Figure 1-71 shows the FW-6X10G-SFP+.

Figure 1-71 FW-6X10G-SFP+



Name	Description
STA (green)	● Blinks every 2 seconds (0.5 Hz): The system is working properly. ● Blinks twice each second (2 Hz): The system is in the alarm state.
Indicator below the interface (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-69 lists the attributes of interfaces on the FW-6X10G-SFP+.

Table 1-69 FW-6X10G-SFP+ interface attributes

Attribute	Description
Connector type	LC/PC
Optical interface attribute	Compliant with the selected SFP+ optical module. For details about the optional attributes of the optical module, see: ● 1.5.1 1 Gbit/s Electrical Transceiver ● 1.5.2 1.25 Gbit/s SFP/eSFP Optical Module ● 1.5.4 10 Gbit/s SFP+ Optical Module
Working mode	Full-duplex
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP
Network protocol	IP

Technical Specifications

Table 1-70 lists the technical specifications of the FW-6X10G-SFP+.

Table 1-70 Technical specifications of the FW-6X10G-SFP+

Item	Specifications
Board silkscreen name	FW-6X10G-SFP+
Dimensions (width x depth x height)	178 mm x 180 mm x 38 mm
Typical power consumption	34 W
Maximum power consumption	37.4 W
Typical heat consumption	116 BTU/hour
Maximum heat consumption	127.6 BTU/hour
Board weight	0.65 kg

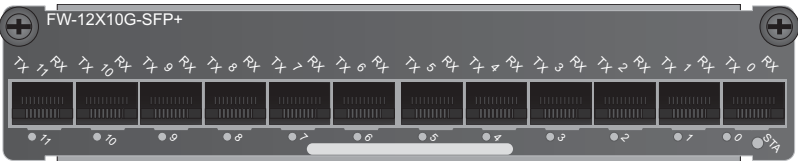
1.4.5.3 12*10GE SFP+ Daughter Card (FW-12X10G-SFP+)

The FW-12X10G-SFP+ occupies one 1/2-width slot, is compatible with LPUF-240s and LPUF-120s, works in LAN or WAN mode, uses SFP+ optical modules, but is not hot-swappable.

Panel

Figure 1-72 shows the FW-12X10G-SFP+.

Figure 1-72 FW-12X10G-SFP+



Name	Description
STA (green)	● Blinks every 2 seconds (0.5 Hz): The system is working properly. ● Blinks twice each second (2 Hz): The system is in the alarm state.
Indicator below the interface (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-71 lists the attributes of interfaces on the FW-12X10G-SFP+.

Table 1-71 FW-12X10G-SFP+ interface attributes

Attribute	Description
Connector type	LC/PC
Optical interface attribute	Compliant with the selected SFP+ optical module. For details about the optional attributes of the optical module, see: ● 1.5.1 1 Gbit/s Electrical Transceiver ● 1.5.2 1.25 Gbit/s SFP/eSFP Optical Module ● 1.5.4 10 Gbit/s SFP+ Optical Module
Working mode	Full-duplex

Attribute	Description
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP
Network protocol	IP

Technical Specifications

Table 1-72 lists the technical specifications of the FW-12X10G-SFP+.

Table 1-72 Technical specifications of the FW-12X10G-SFP+

Item	Specifications
Board silkscreen name	FW-12X10G-SFP+
Dimensions (width x depth x height)	193 mm x 178.65 mm x 37.2 mm
Typical power consumption	52 W
Maximum power consumption	57.2 W
Typical heat consumption	177.4 BTU/hour
Maximum heat consumption	195.2 BTU/hour
Board weight	0.75 kg

1.4.5.4 3-Port 40GBase QSFP+ FPIC ()

The occupies one 1/2-width flexible card slot, is compatible with LPUF-240s and LPUF-120s, works in LAN mode, uses QSFP+ optical modules, but is not hot-swappable.

Panel

Figure 1-73 shows the .

Figure 1-73



Name	Description
STATUS (green)	● Blinks every 2 seconds (0.5 Hz): The system is working properly. ● Blinks twice each second (2 Hz): The system is in the alarm state.
L/A (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-73 lists the attributes of interfaces on .

Table 1-73 interface attributes

Attribute	Description
Connector type	LC/PC
Optical interface attributes	Compliant with the selected SFP+ optical module. For details about the optional attributes of the optical module, see 40 Gbit/s QSFP+ Optical Module.
Working mode	Full-duplex
Standards compliance	IEEE 802.3-2002
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP
Network protocol	IP

Technical Specifications

Table 1-74 lists the technical specifications of the .

Table 1-74 Technical specifications of the

Item	Specifications
Board silkscreen name	
Dimensions (width x depth x height)	178 mm x 225 mm x 38 mm
Typical power consumption	50 W

Item	Specifications
Maximum power consumption	55 W
Typical heat consumption	170.6 BTU/hour
Maximum heat consumption	187.7 BTU/hour
Board weight	0.85 kg

1.4.5.5 1*100GE CFP Daughter Card (FW-1X100G-CFP)

The FW-1X100G-CFP occupies one 1/2-width slot, is compatible with LPUF-240s, LPUF-120s and LPUF-101s, works in LAN mode, uses CFP optical modules, but is not hot-swappable.

Panel

Figure 1-74 shows the FW-1X100G-CFP.

Figure 1-74 FW-1X100G-CFP



Name	Description
STATUS (green)	● Blinks every 2 seconds (0.5 Hz): The system is working properly. ● Blinks twice each second (2 Hz): The system is in the alarm state.
L/A (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-75 lists the attributes of interfaces on the FW-1X100G-CFP.

Table 1-75 FW-1X100G-CFP interface attributes

Attribute	Description
Connector type	LC/PC
Optical interface attribute	Compliant with the selected CFP optical module For details about the optional attributes of the optical module, see 1.5.6 100 Gbit/s CFP Optical Modules .
Working mode	Full duplex
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP
Network protocol	IP

Technical Specifications

[Table 1-76](#) lists the technical specifications of the FW-1X100G-CFP.

Table 1-76 Technical specifications of the FW-1X100G-CFP

Item	Specifications
Board silkscreen name	FW-1X100G-CFP
Dimensions (width x depth x height)	178 mm x 130 mm x 35 mm
Typical power consumption	51 W
Maximum power consumption	56.1 W
Typical heat consumption	174 BTU/hour
Maximum heat consumption	191.4 BTU/hour
Board weight	1.3 kg

1.4.5.6 5-Port 10GBase LAN/WAN-SFP+ FPIC A (E8KE-X-101-5X10GE-SFP+)

The E8KE-X-101-5X10GE-SFP+ occupies one 1/2-width flexible card slot, is compatible with LPUF-240s, LPUF-120s, and LPUF-101s, works in LAN or WAN mode, uses SFP+ optical modules, but is not hot-swappable.

Panel

[Figure 1-75](#) shows the E8KE-X-101-5X10GE-SFP+.

Figure 1-75 E8KE-X-101-5X10GE-SFP+



Name	Description
STATUS (green)	● Blinks every 2 seconds (0.5 Hz): The system is working properly. ● Blinks twice each second (2 Hz): The system is in the alarm state.
L/A (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-77 lists the attributes of interfaces on the E8KE-X-101-5X10GE-SFP+.

Table 1-77 E8KE-X-101-5X10GE-SFP+ interface attributes

Attribute	Description
Connector type	LC/PC
Optical interface attribute	Compliant with the selected SFP+ optical module. For details about the optional attributes of the optical module, see: ● 1.5.1 1 Gbit/s Electrical Transceiver ● 1.5.2 1.25 Gbit/s SFP/eSFP Optical Module ● 1.5.4 10 Gbit/s SFP+ Optical Module
Working mode	Full-duplex
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP
Network protocol	IP

Technical Specifications

Table 1-78 lists the technical specifications of the E8KE-X-101-5X10GE-SFP+.

Table 1-78 Technical specifications of the E8KE-X-101-5X10GE-SFP+

Attribute	Specifications
Board silkscreen name	E8KE-X-101-5X10GE-SFP+
Dimensions (width x depth x height)	203.3 mm x 178.65 mm x 37.2 mm
Typical power consumption	29 W
Maximum power consumption	31.9 W
Typical heat consumption	99 BTU/hour
Maximum heat consumption	108.8 BTU/hour
Board weight	0.9 kg

1.4.5.7 24-Port 100/1000 Base-X-SFP FPIC (E8KE-X-101-24XGE-SFP)

The E8KE-X-101-24XGE-SFP occupies one 1/2-width flexible card slot, is compatible with LPUF-240s, LPUF-120s, and LPUF-101s, but is not hot-swappable.

The 24-port 100/1000Base-X-SFP flexible card supports the following features:

- GE optical module, supporting GE optical interface features.
- FE optical module, supporting FE optical interface features.
- Electrical SFP module, supporting 1000M electrical interface feature.
- Mixed insertion among the above modules.

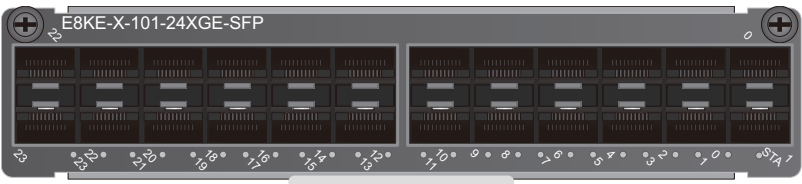
 NOTE

Only the interfaces indexed in odd numbers support the electrical interface module.

Panel

Figure 1-76 shows the E8KE-X-101-24XGE-SFP.

Figure 1-76 E8KE-X-101-24XGE-SFP



Name	Description
STATUS (green)	● Blinks every 2 seconds (0.5 Hz): The system is working properly. ● Blinks twice each second (2 Hz): The system is in the alarm state.
Indicator below the interface (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-79 lists the attributes of interfaces on the E8KE-X-101-24XGE-SFP.

Table 1-79 E8KE-X-101-24XGE-SFP interface attributes

Attribute	Description
Connector type	LC/PC
Optical interface attribute	Compliant with the selected SFP optical module For details about the optional attributes of the optical module, see: ● 1.5.1 1 Gbit/s Electrical Transceiver ● 1.5.2 1.25 Gbit/s SFP/eSFP Optical Module
Working mode	Full duplex
Standards compliance	IEEE 802.3-2002
Frame format	Ethernet_II, Ethernet_SAP, Ethernet_SNAP, and 802.3
Network protocol	IP

Technical Specifications

Table 1-80 lists the technical specifications of the E8KE-X-101-24XGE-SFP.

Table 1-80 Technical specifications of the E8KE-X-101-24XGE-SFP

Item	Specifications
Board silkscreen name	E8KE-X-101-24XGE-SFP
Dimensions (width x depth x height)	178 mm x 225 mm x 38 mm

Item	Specifications
Typical power consumption	37 W
Maximum power consumption	40.7 W
Typical heat consumption	126.2 BTU/hour
Maximum heat consumption	138.9 BTU/hour
Board weight	0.9 kg

1.4.5.8 1-Port 40GBase LAN-CFP FPIC A (E8KE-X-101-1X40GE-CFP)

The E8KE-X-101-1X40GE-CFP occupies one 1/2-width flexible card slot, is compatible with LPUF-240s, LPUF-120s, and LPUF-101s, works in LAN mode, uses CFP optical modules, but is not hot-swappable.

Panel

[Figure 1-77](#) shows the E8KE-X-101-1X40GE-CFP.

Figure 1-77 E8KE-X-101-1X40GE-CFP



Name	Description
STATUS (green)	● Blinks every 2 seconds (0.5 Hz): The system is working properly. ● Blinks twice each second (2 Hz): The system is in the alarm state.
L/A (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

[Table 1-81](#) lists the attributes of interfaces on the E8KE-X-101-1X40GE-CFP.

Table 1-81 E8KE-X-101-1X40GE-CFP interface attributes

Attribute	Description
Connector type	LC/PC
Optical interface attribute	Compliant with the selected CFP optical module For details about the optional attributes of the optical module, see 1.5.5 40 Gbit/s CFP Optical Modules .
Working mode	Full duplex
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP
Network protocol	IP

Technical Specifications

[Table 1-82](#) lists the technical specifications of the E8KE-X-101-1X40GE-CFP.

Table 1-82 Technical specifications of the E8KE-X-101-1X40GE-CFP

Item	Specifications
Board silkscreen name	E8KE-X-101-1X40GE-CFP
Dimensions (width x depth x height)	178 mm x 225 mm x 38 mm
Typical power consumption	28 W
Maximum power consumption	30.8 W
Typical heat consumption	95.5 BTU/hour
Maximum heat consumption	105.1 BTU/hour
Board weight	0.9 kg

1.4.6 LPUF-120 and FPICs

The flexible LPU comprises the motherboard (LPUF-120) and multiple flexible cards (subcards), improving networking flexibility. The flexible LPU supports 120G line-rate forwarding, which reduces costs and provides customized solutions for users.

1.4.6.1 LPUF-120

The hot-swappable LPUF-120 provides two 1/2-width slots, each of which holds one subcard. It supports 120G line-rate forwarding and mixed insertion among different FPICs.

 NOTICE

The LPUF-120 does not support the hot swap of FPICs.

The total LPUF-120 subcard performance cannot exceed 120G. To insert the FW-1X100G-CFP on the LPUF-120, you can insert only one FW-1X100G-CFP.

Mapping

Table 1-83 shows the mapping among the LPUF-120, chassis, and FPIC.

Table 1-83 Mapping relationship

Board	Mapping Chassis	Mapping FPIC
LPUF-120	● AntiDDoS8030 ● AntiDDoS8080 ● AntiDDoS8160	● E8KE-X-101-24XGE-SFP ● E8KE-X-101-5X10GE-SFP+ ● FW-6X10G-SFP+ ● FW-12X10G-SFP+ ● E8KE-X-101-1X40GE-CFP ● FW-1X100G-CFP

Panel

Figure 1-78 shows the LPUF-120.

Figure 1-78 LPUF-120



N u m b e r	Name	Description
1	OFL button	To remove a board, press and hold the button for five seconds until the OFL indicator turns on.
2	OFL indicator (red)	Steady on: You can remove the board.
3	RUN indicator (green)	- Blinks every 2 seconds (0.5 Hz): The system is working properly. - Blinks twice each second (2 Hz): The system is in the alarm state.

Technical Specifications

Table 1-84 lists the technical specifications of the LPUF-120.

Table 1-84 Technical specifications of the LPUF-120

Item	Specifications
Board silkscreen name	LPUF-120 FW-LPUF-120
Part number	03056682
Dimensions (width x depth x height)	400 mm x 530 mm x 41 mm
Typical power consumption	195 W
Maximum power consumption	214.5 W
Typical heat consumption	665.4 BTU/hour
Maximum heat consumption	731.9 BTU/hour
Board weight	7.15 kg

1.4.6.2 6*10GE SFP+ Daughter Card (FW-6X10GE-SFP+)

The FW-6X10G-SFP+ occupies one 1/2-width flexible card slot, is compatible with LPUF-240s and LPUF-120s, works in LAN or WAN mode, uses SFP+ optical modules, but is not hot-swappable.

Panel

Figure 1-79 shows the FW-6X10G-SFP+.

Figure 1-79 FW-6X10G-SFP+



Name	Description
STA (green)	● Blinks every 2 seconds (0.5 Hz): The system is working properly. ● Blinks twice each second (2 Hz): The system is in the alarm state.
Indicator below the interface (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-85 lists the attributes of interfaces on the FW-6X10G-SFP+.

Table 1-85 FW-6X10G-SFP+ interface attributes

Attribute	Description
Connector type	LC/PC
Optical interface attribute	Compliant with the selected SFP+ optical module. For details about the optional attributes of the optical module, see: ● 1.5.1 1 Gbit/s Electrical Transceiver ● 1.5.2 1.25 Gbit/s SFP/eSFP Optical Module ● 1.5.4 10 Gbit/s SFP+ Optical Module
Working mode	Full-duplex
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP

Attribute	Description
Network protocol	IP

Technical Specifications

Table 1-86 lists the technical specifications of the FW-6X10G-SFP+.

Table 1-86 Technical specifications of the FW-6X10G-SFP+

Item	Specifications
Board silkscreen name	FW-6X10G-SFP+
Dimensions (width x depth x height)	178 mm x 180 mm x 38 mm
Typical power consumption	34 W
Maximum power consumption	37.4 W
Typical heat consumption	116 BTU/hour
Maximum heat consumption	127.6 BTU/hour
Board weight	0.65 kg

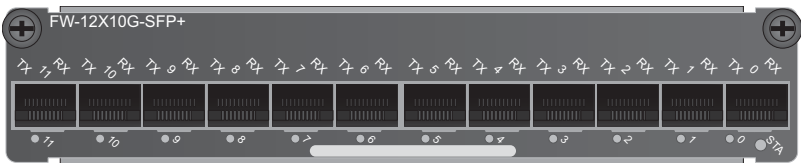
1.4.6.3 12*10GE SFP+ Daughter Card (FW-12X10GE-SFP+)

The FW-12X10G-SFP+ occupies one 1/2-width flexible card slot, is compatible with LPUF-240s and LPUF-120s, works in LAN or WAN mode, uses SFP+ optical modules, but is not hot-swappable.

Panel

Figure 1-80 shows the FW-12X10G-SFP+.

Figure 1-80 FW-12X10G-SFP+



Name	Description
STA (green)	● Blinks every 2 seconds (0.5 Hz): The system is working properly. ● Blinks twice each second (2 Hz): The system is in the alarm state.
Indicator below the interface (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-87 lists the attributes of interfaces on the FW-12X10G-SFP+.

Table 1-87 FW-12X10G-SFP+ interface attributes

Attribute	Description
Connector type	LC/PC
Optical interface attribute	Compliant with the selected SFP+ optical module. For details about the optional attributes of the optical module, see: ● 1.5.1 1 Gbit/s Electrical Transceiver ● 1.5.2 1.25 Gbit/s SFP/eSFP Optical Module ● 1.5.4 10 Gbit/s SFP+ Optical Module
Working mode	Full-duplex
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP
Network protocol	IP

Technical Specifications

Table 1-88 lists the technical specifications of the FW-12X10G-SFP+.

Table 1-88 Technical specifications of the FW-12X10G-SFP+

Item	Specifications
Board silkscreen name	FW-12X10G-SFP+
Dimensions (width x depth x height)	193 mm x 178.65 mm x 37.2 mm
Typical power consumption	52 W

Item	Specifications
Maximum power consumption	57.2 W
Typical heat consumption	177.4 BTU/hour
Maximum heat consumption	195.2 BTU/hour
Board weight	0.75 kg

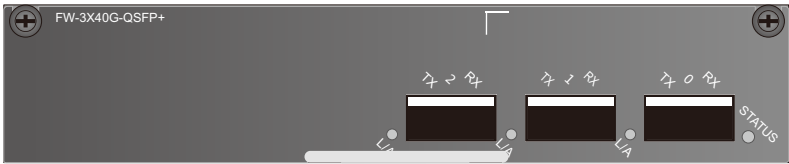
1.4.6.4 3-Port 40GBase QSFP+ FPIC ()

The occupies one 1/2-width flexible card slot, is compatible with LPUF-240s and LPUF-120s, works in LAN mode, uses QSFP+ optical modules, but is not hot-swappable.

Panel

Figure 1-81 shows the .

Figure 1-81



Name	Description
STATUS (green)	● Blinks every 2 seconds (0.5 Hz): The system is working properly. ● Blinks twice each second (2 Hz): The system is in the alarm state.
L/A (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-89 lists the attributes of interfaces on .

Table 1-89 interface attributes

Attribute	Description
Connector type	LC/PC
Optical interface attributes	Compliant with the selected SFP+ optical module. For details about the optional attributes of the optical module, see 40 Gbit/s QSFP+ Optical Module.
Working mode	Full-duplex
Standards compliance	IEEE 802.3-2002
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP
Network protocol	IP

Technical Specifications

Table 1-90 lists the technical specifications of the .

Table 1-90 Technical specifications of the

Item	Specifications
Board silkscreen name	
Dimensions (width x depth x height)	178 mm x 225 mm x 38 mm
Typical power consumption	50 W
Maximum power consumption	55 W
Typical heat consumption	170.6 BTU/hour
Maximum heat consumption	187.7 BTU/hour
Board weight	0.85 kg

1.4.6.5 1*100GE CFP Daughter Card (FW-1X100GE-CFP)

The FW-1X100G-CFP occupies one 1/2-width flexible card slot, is compatible with LPUF-240s, LPUF-120s and LPUF-101s, works in LAN mode, uses CFP optical modules, but is not hot-swappable.

Panel

Figure 1-82 shows the FW-1X100G-CFP.

Figure 1-82 FW-1X100G-CFP



Name	Description
STATUS (green)	● Blinks every 2 seconds (0.5 Hz): The system is working properly. ● Blinks twice each second (2 Hz): The system is in the alarm state.
L/A (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-91 lists the attributes of interfaces on the FW-1X100G-CFP.

Table 1-91 FW-1X100G-CFP interface attributes

Attribute	Description
Connector type	LC/PC
Optical interface attribute	Compliant with the selected CFP optical module For details about the optional attributes of the optical module, see 1.5.6 100 Gbit/s CFP Optical Modules .
Working mode	Full duplex
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP
Network protocol	IP

Technical Specifications

Table 1-92 lists the technical specifications of the FW-1X100G-CFP.

Table 1-92 Technical specifications of the FW-1X100G-CFP

Item	Specifications
Board silkscreen name	FW-1X100G-CFP
Dimensions (width x depth x height)	178 mm x 130 mm x 35 mm
Typical power consumption	51 W
Maximum power consumption	56.1 W
Typical heat consumption	174 BTU/hour
Maximum heat consumption	191.4 BTU/hour
Board weight	1.3 kg

1.4.6.6 5-Port 10GBase LAN/WAN-SFP+ FPIC A (E8KE-X-101-5X10GE-SFP+)

The E8KE-X-101-5X10GE-SFP+ occupies one 1/2-width flexible card slot, is compatible with LPUF-240s, LPUF-120s, and LPUF-101s, works in LAN or WAN mode, uses SFP+ optical modules, but is not hot-swappable.

Panel

Figure 1-83 shows the E8KE-X-101-5X10GE-SFP+.

Figure 1-83 E8KE-X-101-5X10GE-SFP+



Name	Description
STATUS (green)	● Blinks every 2 seconds (0.5 Hz): The system is working properly. ● Blinks twice each second (2 Hz): The system is in the alarm state.

Name	Description
L/A (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-93 lists the attributes of interfaces on the E8KE-X-101-5X10GE-SFP+.

Table 1-93 E8KE-X-101-5X10GE-SFP+ interface attributes

Attribute	Description
Connector type	LC/PC
Optical interface attribute	Compliant with the selected SFP+ optical module. For details about the optional attributes of the optical module, see: ● 1.5.1 1 Gbit/s Electrical Transceiver ● 1.5.2 1.25 Gbit/s SFP/eSFP Optical Module ● 1.5.4 10 Gbit/s SFP+ Optical Module
Working mode	Full-duplex
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP
Network protocol	IP

Technical Specifications

Table 1-94 lists the technical specifications of the E8KE-X-101-5X10GE-SFP+.

Table 1-94 Technical specifications of the E8KE-X-101-5X10GE-SFP+

Attribute	Specifications
Board silkscreen name	E8KE-X-101-5X10GE-SFP+
Dimensions (width x depth x height)	203.3 mm x 178.65 mm x 37.2 mm
Typical power consumption	29 W
Maximum power consumption	31.9 W

Attribute	Specifications
Typical heat consumption	99 BTU/hour
Maximum heat consumption	108.8 BTU/hour
Board weight	0.9 kg

1.4.6.7 24-Port 100/1000 Base-X-SFP FPIC (E8KE-X-101-24XGE-SFP)

The E8KE-X-101-24XGE-SFP occupies one 1/2-width flexible card slot, is compatible with LPUF-240s, LPUF-120s, and LPUF-101s, but is not hot-swappable.

The 24-port 100/1000Base-X-SFP flexible card supports the following features:

- GE optical module, supporting GE optical interface features.
- FE optical module, supporting FE optical interface features.
- Electrical SFP module, supporting 1000M electrical interface feature.
- Mixed insertion among the above modules.

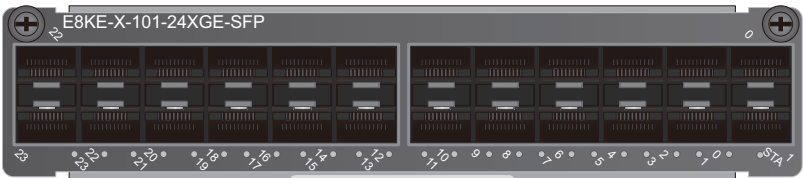
NOTE

Only the interfaces indexed in odd numbers support the electrical interface module.

Panel

Figure 1-84 shows the E8KE-X-101-24XGE-SFP.

Figure 1-84 E8KE-X-101-24XGE-SFP



Name	Description
STATUS (green)	● Blinks every 2 seconds (0.5 Hz): The system is working properly. ● Blinks twice each second (2 Hz): The system is in the alarm state.
Indicator below the interface (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-95 lists the attributes of interfaces on the E8KE-X-101-24XGE-SFP.

Table 1-95 E8KE-X-101-24XGE-SFP interface attributes

Attribute	Description
Connector type	LC/PC
Optical interface attribute	Compliant with the selected SFP optical module For details about the optional attributes of the optical module, see: ● 1.5.1 1 Gbit/s Electrical Transceiver ● 1.5.2 1.25 Gbit/s SFP/eSFP Optical Module
Working mode	Full duplex
Standards compliance	IEEE 802.3-2002
Frame format	Ethernet_II, Ethernet_SAP, Ethernet_SNAP, and 802.3
Network protocol	IP

Technical Specifications

Table 1-96 lists the technical specifications of the E8KE-X-101-24XGE-SFP.

Table 1-96 Technical specifications of the E8KE-X-101-24XGE-SFP

Item	Specifications
Board silkscreen name	E8KE-X-101-24XGE-SFP
Dimensions (width x depth x height)	178 mm x 225 mm x 38 mm
Typical power consumption	37 W
Maximum power consumption	40.7 W
Typical heat consumption	126.2 BTU/hour
Maximum heat consumption	138.9 BTU/hour
Board weight	0.9 kg

1.4.6.8 1-Port 40GBase LAN-CFP FPIC A (E8KE-X-101-1X40GE-CFP)

The E8KE-X-101-1X40GE-CFP occupies one 1/2-width flexible card slot, is compatible with LPUF-240s, LPUF-120s and LPUF-101s, works in LAN mode, uses CFP optical modules, but is not hot-swappable.

Panel

Figure 1-85 shows the E8KE-X-101-1X40GE-CFP.

Figure 1-85 E8KE-X-101-1X40GE-CFP



Name	Description
STATUS (green)	● Blinks every 2 seconds (0.5 Hz): The system is working properly. ● Blinks twice each second (2 Hz): The system is in the alarm state.
L/A (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-97 lists the attributes of interfaces on the E8KE-X-101-1X40GE-CFP.

Table 1-97 E8KE-X-101-1X40GE-CFP interface attributes

Attribute	Description
Connector type	LC/PC
Optical interface attribute	Compliant with the selected CFP optical module For details about the optional attributes of the optical module, see 1.5.5 40 Gbit/s CFP Optical Modules .
Working mode	Full duplex
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP
Network protocol	IP

Technical Specifications

Table 1-98 lists the technical specifications of the E8KE-X-101-1X40GE-CFP.

Table 1-98 Technical specifications of the E8KE-X-101-1X40GE-CFP

Item	Specifications
Board silkscreen name	E8KE-X-101-1X40GE-CFP
Dimensions (width x depth x height)	178 mm x 225 mm x 38 mm
Typical power consumption	28 W
Maximum power consumption	30.8 W
Typical heat consumption	95.5 BTU/hour
Maximum heat consumption	105.1 BTU/hour
Board weight	0.9 kg

1.4.7 LPUF-40-A and FPIC

This section describes the structure and specifications of the Flexible Card Line Processing Unit (LPUF-40-A, 2 sub-slots) and FPIC.

1.4.7.1 LPUF-40-A

The LPUF-40-A is hot swappable and provides two 1/2-width slots, each of which holds one FPIC. It supports the following functions: 1. Forwards packets at the line speed of 40 Gbit/s. 2. Enhances networking flexibility and provides low-cost and customized solutions. 3. Supports mixed insertion between different FPICs.



NOTICE

The LPUF-40-A backplane does not support the hot swap of FPICs.

The sum of the LPUF-40-A subcard performance cannot exceed 40G. Each slot supports a maximum of 20-Gbit/s bandwidth.

Panel

Figure 1-86 shows the appearance of the LPUF-40-A.

Figure 1-86 Appearance of the LPUF-40-A



Name	Description
OFL button	To remove a board, press and hold the button for five seconds until the OFL indicator turns on.
OFL indicator (red)	Steady on: You can remove the board.
RUN indicator (green)	- Blinks every 2 seconds (0.5 Hz): The system is working properly. - Blinks twice each second (2 Hz): The system is in the alarm state.

Interface Attributes

Th LPUF-40-A does not provide interfaces externally.

Technical Specifications

Table 1-99 lists the technical specifications of the LPUF-40-A.

Table 1-99 Technical specifications of the LPUF-40-A

Item	Description
Silkscreen of the board name	LPUF-40-A E8KE-X-LPUF-40-A
Dimensions (W x D x H)	400 mm x 520 mm x 41 mm
Typical power consumption	280 W
Maximum power consumption	290 W
Typical heat consumption	955.4 BTU/hour

Item	Description
Maximum heat consumption	989.5 BTU/hour
Board weight	6.6 kg

1.4.7.2 20-Port 100/1000Base-X-SFP Flexible Card (P40-20xGE/FE-SFP)

The P40-20xGE/FE-SFP occupies one 1/2-width flexible card slot, is compatible with LPUF-40-A, but is not hot-swappable.

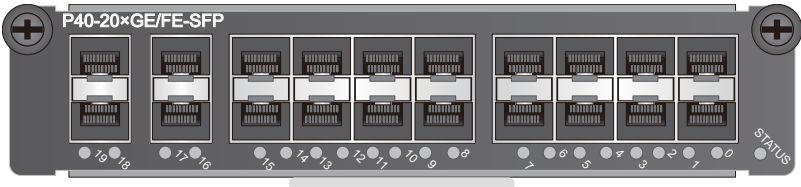
The P40-20xGE/FE-SFP supports the following features:

- GE optical module, for GE optical interface features
- FE optical module, for FE optical interface features
- Electrical SFP module, for features of the 10M/100M/1000M auto-sensing electrical interfaces
- Mixed application of GE optical, FE optical, and electrical SFP modules

Panel

Figure 1-87 shows the P40-20xGE/FE-SFP.

Figure 1-87 P40-20xGE/FE-SFP



Name	Description
STATUS (green)	● Blinks every 2 seconds (0.5 Hz): The system is running normally. ● Blinks twice each second (2 Hz): The system is in the alarm state.
Indicator below the interface (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-100 lists the attributes of interfaces on the P40-20xGE/FE-SFP.

Table 1-100 P40-20xGE/FE-SFP interface attributes

Attributes	Description
Connector type	LC/PC
Optical interface attributes	Compliant with the selected SFP optical module. For details about the optional attributes of the optical module, see: ● 1.5.1 1 Gbit/s Electrical Transceiver ● 1.5.2 1.25 Gbit/s SFP/eSFP Optical Module
Working mode	Full-duplex
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP
Network protocol	IP

Technical Specifications

Table 1-101 lists the technical specifications of the P40-20xGE/FE-SFP.

Table 1-101 Technical specifications of the P40-20xGE/FE-SFP

Item	Specifications
Board silkscreen name	P40-20xGE/FE-SFP
Dimensions (width x depth x height)	180 mm x 145 mm x 40 mm
Typical power consumption	37 W
Maximum power consumption	41 W
Typical heat consumption	126.2 BTU/hour
Maximum heat consumption	139.9 BTU/hour
Board weight	0.6 kg

1.4.7.3 2-Port 10GBase LAN/WAN-XFP Flexible Card (P40-2x10GBase LAN/WAN-XFP)

The P40-2x10GBase LAN/WAN-XFP occupies one 1/2-width flexible card slot, is compatible with LPUF-40-A, works in LAN or WAN mode, uses XFP optical modules, but is not hot-swappable.

Panel

Figure 1-88 shows the P40-2x10GBase LAN/WAN-XFP.

Figure 1-88 P40-2x10GBase LAN/WAN-XFP



Name	Description
STATUS (green)	● Blinks every 2 seconds (0.5 Hz): The system is running normally. ● Blinks twice each second (2 Hz): The system is in the alarm state.
LINK/ACT (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-102 lists the attributes of interfaces on the P40-2x10GBase LAN/WAN-XFP.

NOTICE

If you configure a 10 GE interface to work in WAN mode, use single-mode optical fibers to connect devices.

Table 1-102 P40-2x10GBase LAN/WAN-XFP interface attributes

Attributes	Description
Connector type	LC/PC
Optical interface attributes	Compliant with the selected XFP optical module. For details about the optional attributes of the optical module, see 1.5.3 10 Gbit/s XFP Optical Module .
Working mode	Full-duplex
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP
Network protocol	IP

Technical Specifications

Table 1-103 lists the technical specifications of the P40-2x10GBase LAN/WAN-XFP.

Table 1-103 Technical specifications of the P40-2x10GBase LAN/WAN-XFP

Item	Specifications
Board silkscreen name	P40-2x10GBase LAN/WAN-XFP
Dimensions (width x depth x height)	180 mm x 145 mm x 40 mm
Typical power consumption	12 W
Maximum power consumption	12 W
Typical heat consumption	40.9 BTU/hour
Maximum heat consumption	40.9 BTU/hour
Board weight	0.6 kg

1.4.7.4 4-port 10GBase LAN/WAN-XFP FPIC (P40-4x10GBase LAN/WAN-XFP)

The P40-4x10GBase LAN/WAN-XFP occupies one 1/2-width flexible card slot, is compatible with LPUF-40-A, works in LAN or WAN mode, uses XFP optical modules, but is not hot-swappable.

NOTE

The P40-4x10GBase LAN/WAN-XFP supports convergence. The left-most two ports can be converged to 10 Gbit/s on average. The right-most two ports can be converged to 10 Gbit/s on average.

Panel

Figure 1-89 shows the P40-4x10GBase LAN/WAN-XFP.

Figure 1-89 P40-4x10GBase LAN/WAN-XFP



Name	Description
STATUS (green)	● Blinks every 2 seconds (0.5 Hz): The system is running normally. ● Blinks twice each second (2 Hz): The system is in the alarm state.
LA (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-104 lists the attributes of interfaces on the P40-4x10GBase LAN/WAN-XFP.



NOTICE

If you configure a 10 GE interface to work in WAN mode, use single-mode optical fibers to connect devices.

Table 1-104 P40-4x10GBase LAN/WAN-XFP interface attributes

Attributes	Description
Connector type	LC/PC
Optical interface attributes	Compliant with the selected XFP optical module. For details about the optional attributes of the optical module, see 1.5.3 10 Gbit/s XFP Optical Module .
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP
Network protocol	IP

Technical Specifications

Table 1-105 lists the technical specifications of the P40-4x10GBase LAN/WAN-XFP.

Table 1-105 Technical specifications of the P40-4x10GBase LAN/WAN-XFP

Item	Specifications
Board silkscreen name	P40-4x10GBase LAN/WAN-XFP
Dimensions (width x depth x height)	180 mm x 145 mm x 40 mm

Item	Specifications
Typical power consumption	25 W
Maximum power consumption	28 W
Typical heat consumption	85.3 BTU/hour
Maximum heat consumption	95.5 BTU/hour
Board weight	0.58 kg

1.4.8 LPUF-21 and FPIC

This section describes the structure and specifications of the Flexible Card Line Processing Unit (LPUF-21, 2 sub-slots) and FPIC.

1.4.8.1 LPUF-21

The LPUF-21 is hot-swappable and has two 1/2-width slots, each of which holds one FPIC. It supports the following functions: 1. forwarding packets at the line speed of 20 Gbit/s; 2. Networking flexibility and provisioning of low-cost and customized solutions; 3. Mixed application of different FPICs.

 NOTICE

The LPUF-21 backplane does not support the hot swapping of FPICs.

Panel

Figure 1-90 shows the LPUF-21.

Figure 1-90 LPUF-21



Name	Description
OFL button	To remove a board, press and hold the button for five seconds until the OFL indicator turns on.
OFL indicator (red)	Steady on: You can remove the board.
RUN indicator (green)	● Blinks every 2 seconds (0.5 Hz): The system is working properly. ● Blinks twice each second (2 Hz): The system is in the alarm state.

Interface Attributes

The LPUF-21 does not have external interfaces.

Technical Specifications

Table 1-106 lists the technical specifications of the LPUF-21.

Table 1-106 Technical specifications of the LPUF-21

Item	Specifications
Board silkscreen name	LPUF-21 E8KE-X-LPUF-21
Dimensions (width x depth x height)	400 mm x 520 mm x 41 mm
Typical power consumption	170 W
Maximum power consumption	187 W
Typical heat consumption	580.1 BTU/hour
Maximum heat consumption	638.1 BTU/hour
Board weight	5.0 kg

1.4.8.2 1-port 10GBase LAN/WAN-XFP FPIC (1 x 10GBase LAN/WAN)

The 1 x 10GBase LAN/WAN occupies one 1/2-width flexible card slot, is compatible with LPUF-21, works in LAN or WAN mode, uses XFP optical modules, but is not hot-swappable.

Panel

Figure 1-91 shows the 1 x 10GBase LAN/WAN.

Figure 1-91 1 x 10GBase LAN/WAN



Name	Description
STATUS (green)	● Blinks every 2 seconds (0.5 Hz): The system is running normally. ● Blinks twice each second (2 Hz): The system is in the alarm state.
L/A (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-107 lists the attributes of interfaces on the 1 x 10GBase LAN/WAN.

**NOTICE**

If you configure a 10 GE interface to work in WAN mode, use single-mode optical fibers to connect devices.

Table 1-107 1 x 10GBase LAN/WAN interface attributes

Attribute	Description
Connector type	LC/PC
Optical interface attributes	Compliant with the selected XFP optical module. For details about the optional attributes of the optical module, see 1.5.3 10 Gbit/s XFP Optical Module .
Compliance	IEEE 802.3ae
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP
Network protocol	IP

Technical Specifications

Table 1-108 shows the technical specifications of 1 x 10GBase LAN/WAN.

Table 1-108 Technical specifications of the 1 x 10GBase LAN/WAN

Item	Specifications
Board silkscreen name	1 x 10GBase LAN/WAN
Dimensions (width x depth x height)	180 mm x 145 mm x 40 mm
Typical power consumption	16 W
Maximum power consumption	17.6 W
Typical heat consumption	54.6 BTU/hour
Maximum heat consumption	60.1 BTU/hour
Board weight	0.5 kg

1.4.8.3 12-port 100Base-FX/1000Base-X-SFP FPIC (12x100/1000Base-SFP)

The 12x100/1000Base-SFP occupies one 1/2-width flexible card slot, is compatible with LPUF-21, but is not hot-swappable.

The 12x100/1000Base-SFP supports the following features:

- GE optical module, for GE optical interface features
- FE optical module, for FE optical interface features
- Electrical SFP module, for features of the 10M/100M/1000M auto-sensing electrical interfaces
- Mixed application of GE optical, FE optical, and electrical SFP modules

Panel

Figure 1-92 shows the 12x100/1000Base-SFP.

Figure 1-92 12x100/1000Base-SFP



Name	Description
STATUS (green)	● Blinks every 2 seconds (0.5 Hz): The system is running normally. ● Blinks twice each second (2 Hz): The system is in the alarm state.
L/A (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-109 lists the attributes of interfaces on the 12x100/1000Base-SFP.

Table 1-109 12x100/1000Base-SFP interface attributes

Attribute	Description
Connector type	LC/PC
Interface attributes	Compliant with the selected SFP optical module. For details about the optional attributes of the optical module, see ● 1.5.1 1 Gbit/s Electrical Transceiver ● 1.5.2 1.25 Gbit/s SFP/eSFP Optical Module
Working mode	Full-duplex
Compliance	IEEE 802.3-2002
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP
Network protocol	IP

Technical Specifications

Table 1-110 shows the technical specifications of 12x100/1000Base-SFP.

Table 1-110 Technical specifications of 12x100/1000Base-SFP

Item	Specifications
Board silkscreen name	12x100/1000Base-SFP
Dimensions (width x depth x height)	180 mm x 145 mm x 40 mm
Typical power consumption	13 W

Item	Specifications
Maximum power consumption	14.3 W
Typical heat consumption	44.4 BTU/hour
Maximum heat consumption	48.8 BTU/hour
Board weight	0.50 kg

1.4.8.4 12-port 10Base-T/100Base-TX/1000Base-T-RJ45 FPIC (12x10/100/1000Base-TX-RJ45)

The 12x10/100/1000Base-TX-RJ45 occupies one 1/2-width flexible card slot, is compatible with LPUF-21, but is not hot-swappable.

Panel

Figure 1-93 shows the 12x10/100/1000Base-TX-RJ45.

Figure 1-93 12x10/100/1000Base-TX-RJ45



Name	Description
STATUS (green)	● Blinks every 2 seconds (0.5 Hz): The system is running normally. ● Blinks twice each second (2 Hz): The system is in the alarm state.
LINK (green)/ACT (yellow)	● Steady on: The link is connected. ● Blinking: Data is transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-111 lists the attributes of interfaces on the 12x10/100/1000Base-TX-RJ45.

Table 1-111 12x10/100/1000Base-TX-RJ45 interface attributes

Attribute	Description
Connector type	RJ45
Working mode	10M/100M/1000M adaptive, supporting full duplex
Cable specifications	When the working mode is 10M or 100M, it is recommended that Category 5 unshielded twisted pairs be used. When the working mode is 1000M, it is recommended that super Category 5 unshielded twisted pairs be used.
Compliance	IEEE802.3-2002
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP
Network protocol	IP

Technical Specifications

Table 1-112 lists the technical specifications of the 12x10/100/1000Base-TX-RJ45.

Table 1-112 Technical specifications of the 12x10/100/1000Base-TX-RJ45

Item	Specifications
Board silkscreen name	12x10/100/1000Base-TX-RJ45
Dimensions (width x depth x height)	180 mm x 145 mm x 40 mm
Typical power consumption	10 W
Maximum power consumption	11 W
Typical heat consumption	34.1 BTU/hour
Maximum heat consumption	37.5 BTU/hour
Board weight	0.50 kg

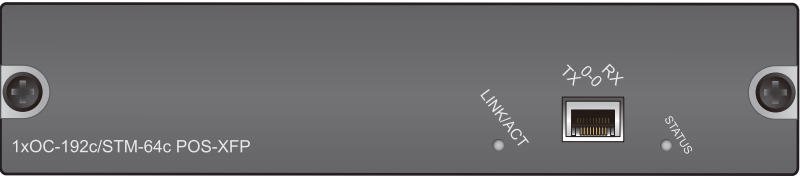
1.4.8.5 1-port OC-192c/STM-64c POS-XFP FPIC (1 x OC-192c/STM-64c POS-XFP)

The 1 x OC-192c/STM-64c POS-XFP occupies one 1/2-width flexible card slot, is compatible with LPUF-21, uses 10G XFP optical modules, provides one 10 GE POS interface, but is not hot-swappable.

Panel

Figure 1-94 shows the 1 x OC-192c/STM-64c POS-XFP.

Figure 1-94 1 x OC-192c/STM-64c POS-XFP



Name	Description
STATUS (green)	● Blinks every 2 seconds (0.5 Hz): The system is running normally. ● Blinks twice each second (2 Hz): The system is in the alarm state.
LINK/ACT (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-113 lists the attributes of interfaces on the 1 x OC-192c/STM-64c POS-XFP.

Table 1-113 1 x OC-192c/STM-64c POS-XFP interface attributes

Attribute	Description
Connector type	LC/PC
Optical interface attributes	Compliant with the selected XFP optical module. For details about the optional attributes of the optical module, see 1.5.3 10 Gbit/s XFP Optical Module .
Working mode	Full duplex
Compliance	STM-64c SDH/OC-192c SONET and RFC 2615 (1619)/1662
Link protocol	PPP and HDLC
Network protocol	IP

Technical Specifications

Table 1-114 lists the technical specifications of the 1-port OC-192c/STM-64c POS-XFP FPIC.

Table 1-114 Technical specifications of the 1-port OC-192c/STM-64c POS-XFP FPIC

Item	Specifications
Board silkscreen name	1 x OC-192c/STM-64c POS-XFP
Dimensions (width x depth x height)	180 mm x 145 mm x 40 mm
Typical power consumption	16 W
Maximum power consumption	17.6 W
Typical heat consumption	54.6 BTU/hour
Maximum heat consumption	60.1 BTU/hour
Board weight	0.50 kg

1.4.8.6 4-Port 10GBase WAN/LAN-XFP FPIC (4x10GBase LAN/WAN)

The 4x10GBase LAN/WAN occupies two 1/2-width flexible card slots, applies to LPUF-21, works in LAN or WAN mode, uses XFP optical modules, but does not support hot swap.

 **NOTE**

The 4x10GBase LAN/WAN supports convergence. The left-most two ports can be converged to 10 Gbit/s on average. The right-most two ports can be converged to 10 Gbit/s on average.

Panel

Figure 1-95 shows the 4x10GBase LAN/WAN.

Figure 1-95 4x10GBase LAN/WAN



Name	Description
STATUS (green)	● Blinks every 2 seconds (0.5 Hz): The system is running normally. ● Blinks twice each second (2 Hz): The system is in the alarm state.

Name	Description
LINK/ACT (green)	● Steady on: The link is connected. ● Blinking: Data is being transmitted or received. ● Off: The link is disconnected.

Interface Attributes

Table 1-115 lists the attributes of interfaces on the 4x10GBase LAN/WAN.

Table 1-115 4x10GBase LAN/WAN interface attributes

Attributes	Description
Connector type	LC/PC
Optical interface attributes	Compliant with the selected XFP optical module. For details about the optional attributes of the optical module, see 1.5.3 10 Gbit/s XFP Optical Module .
Working mode	Full-duplex
Frame format	Ethernet_II, Ethernet_SAP, and Ethernet_SNAP
Network protocol	IP

Technical Specifications

Table 1-116 lists the technical specifications of the 4x10GBase LAN/WAN.

Table 1-116 Technical specifications of the 4x10GBase LAN/WAN

Item	Specifications
Board silkscreen name	4x10GBase LAN/WAN
Dimensions (width x depth x height)	340 mm x 180 mm x 40 mm
Typical power consumption	31 W
Maximum power consumption	34.1 W
Typical heat consumption	105.8 BTU/hour
Maximum heat consumption	116.4 BTU/hour

Item	Specifications
Board weight	1.2 kg

1.5 Optical/Electrical Module

This section describes supported optical/electrical modules.

1.5.1 1 Gbit/s Electrical Transceiver

Electrical transceivers apply to GE and 10GE interfaces for interconnection between GE optical and electrical interfaces and between 10GE optical and GE electrical interfaces.

Figure 1-96 1 Gbit/s electrical transceiver



Table 1-117 lists the currently available 1 Gbit/s electrical transceivers.

Table 1-117 1 Gbit/s electrical transceivers

Product Model	BOM Number	Interface Standard	Transmission Distance	Transmission Medium	Auto-negotiation	Remarks
SFP-GE-1000BaseT SFP-1000BaseT	34100080 02314171	1000BASE-T	100 m (328.08 ft)	RJ-45	Supported	To meet NEBS standards, shielded cables must be available for this type of optical module used at sites in North America.

Table 1-118 lists the basic features of 1 Gbit/s electrical transceivers and compliance standards.

Table 1-118 Basic features of 1 Gbit/s electrical transceivers and compliance standards

Item	Description
Interface standard	IEEE Std 802.3z, IEEE Std 802.3ab SFP MSA
Temperature	0-75°C (32°F - 167°F)
Digital diagnosis	N/A
Environment standard	RoHS(exempted)
Security standard	FCC class B, IEC 61000-4-3
ESD	> 500 V (Human body model)

Table 1-119 lists the specifications of 1 Gbit/s electrical transceivers.

Table 1-119 Specifications of 1 Gbit/s electrical transceivers

Item	Description	Remarks
Interface standard	1000BASE-T	-
Transmission rate	10-1000 Mbit/s	Complying with IEEE802.3

Item	Description	Remarks
Interface type	RJ-45	-
Transmission distance	100m (328.08 ft)	Category 5 UTP, BER < 10 ⁻¹² , (SFP/RJ45-GE-100)

1.5.2 1.25 Gbit/s SFP/eSFP Optical Module

You can use different levels of 1.25 Gbit/s SFP/eSFP optical modules with GE interfaces and 10 GE interfaces. The wavelength of common 1.25 Gbit/s SFP/eSFP optical modules can be 850 nm, 1310 nm, or 1550 nm, and the transmission distance ranges from 0.5 km (0.31 mi) to 80 km (49.71 mi).

Figure 1-97 1.25 Gbit/s SFP/eSFP optical module



Table 1-120 lists the currently available 1.25 Gbit/s SFP/eSFP optical modules.

Table 1-120 1.25 Gbit/s SFP/eSFP optical modules

Product Model	BOM Number	Interface Standard	Transmission Distance (km) (mi)	Transmission Medium	Wavelength (nm)	Remarks
eSFP-850 nm-1000Base-Sx/FC200 MM eSFP-GE-SX-MM850	34060286 02315204	1000BASE-SX	0.5 (0.31)	Multi-mode	850	Preferred

Product Model	BOM Number	Interface Standard	Transmission Distance (km) (mi)	Transmission Medium	Wavelength (nm)	Remarks
OSG010N05 SFP-GE-LX-SM1310	S401606702315200	1000BASE-LX	10 (6.21)	Single-mode	1310	Preferred
OSG040002 S-SFP-GE-LH40-SM1310	S401695402317346	1000BASE-LX	40 (24.86)	Single-mode	1310	Preferred When performing a self-loop test, use an optical attenuator
eSFP-1550nm-1000Base-Zx/FC100 S-SFP-GE-LH80-SM1550	3406036002317348	1000BASE-ZX	80 (49.71)	Single-mode	1550	Preferred When performing a self-loop test, use an optical attenuator

Table 1-121 lists the basic features of 1.25 Gbit/s SFP/eSFP optical modules and compliance standards.

Table 1-121 Basic features of 1.25 Gbit/s SFP/eSFP optical modules and compliance standards

Item	Description
Interface standard	IEEE802.3, SFP MSA
Bit Error Ratio (BER)	$< 1 \times 10^{-12}$
Temperature	0°C -70°C (32°F -158°F)
Digital diagnosis	SFF-8472(exclude SFP optical modules)
Environment standard	RoHS (exempted)
Security standard	FCC class B, IEC 60825-1 Class 1
ESD	> 500 V (Human body model)

Table 1-122 lists the specifications of the eSFP-850nm-1000Base-Sx/FC200 MM / eSFP-GE-SX-MM850 optical module.

Table 1-122 Specifications of the eSFP-850nm-1000Base-Sx/FC200 MM / eSFP-GE-SX-MM850 optical module

Item	Specifications
Interface standard	1000BASE-SX
Transmission rate	1.25 Gbit/s
Interface type	LC/PC
Applicable cable and maximum transmission distance	● Multimode fiber (with diameter of 62.5 μm): 220 m ● Multimode fiber (OM1) (with diameter of 62.5 μm): 275 m ● Multimode fiber (with diameter of 50 μm): 500 m ● Multimode fiber (OM2) (with diameter of 50 μm): 550 m
Modal bandwidth	● Multimode fiber: 160 MHz*km ● Multimode fiber (OM1): 200 MHz*km ● Multimode fiber: 400 MHz*km ● Multimode fiber (OM2): 500 MHz*km
Optical transmitter	
Optical source type	VCSEL
Center wavelength	850 nm
Operating wavelength range	830 nm-860 nm
Spectral characteristics	
Maximum root mean square (RMS) Spectral Width	0.85 nm
Maximum spectral width (-20 dB)	N/A
Minimum side mode suppression ratio (SMSR)	N/A
Average transmit optical power	
Maximum transmit optical power	-3 dBm
Minimum transmit optical power	-9 dBm
Minimum extinction ratio	9.0 dB
Optical receiver	

Item	Specifications
Operating wavelength range	770 nm - 860 nm
Maximum receiver sensitivity	-17 dBm
Overload power	0 dBm
Maximum optical channel cost	N/A
Maximum reflection factor	N/A

Table 1-123 lists the specifications of the OSG010N05 / SFP-GE-LX-SM1310 optical module.

Table 1-123 Specifications of the OSG010N05 / SFP-GE-LX-SM1310 optical module

Parameter	Specifications
Interface standard	1000BASE-LX
Transmission rate	1.25 Gbit/s
Interface type	LC
Transmission distance	10 km(6.21 mi)
Optical transmitter	
Optical source type	FP
Center wavelength	1310 nm
Operating wavelength range	1270-1355 nm
Spectral characteristics	
Maximum root mean square (RMS) Spectral Width	4 nm
Maximum spectral width (-20 dB)	N/A
Minimum side mode suppression ratio (SMSR)	N/A
Average transmit optical power	
Maximum transmit optical power	-3 dBm
Minimum transmit optical power	-9 dBm
Minimum extinction ratio	9.5 dB
Optical receiver	
Operating wavelength range	1260-1580 nm

Parameter	Specifications
Minimum receiver sensitivity	-20 dBm
Overload power	-3 dBm
Maximum optical channel cost	N/A
Maximum reflection factor	N/A

Table 1-124 lists the specifications of the OSG040002 / S-SFP-GE-LH40-SM1310 optical module.

Table 1-124 Specifications of the OSG040002 / S-SFP-GE-LH40-SM1310 optical module

Parameter	Specifications
Interface standard	1000BASE-ZX
Transmission rate	1.25 Gbit/s
Interface type	LC/PC
Transmission distance	40 km (25 mi)
Optical transmitter	
Optical source type	DFB
Center wavelength	1310 nm
Operating wavelength range	1275 nm-1335 nm
Spectral characteristics	
Maximum root mean square (RMS) Spectral Width	N/A
Maximum spectral width (-20 dB)	1.0 nm
Minimum side mode suppression ratio (SMSR)	30 dB
Average transmit optical power	
Maximum transmit optical power	0 (34060298) dBm
Minimum transmit optical power	-5 (34060298) dBm
Minimum extinction ratio	9dB
Optical receiver	
Operating wavelength range	1260 nm-1580 nm
Receiver sensitivity	-23 dBm

Parameter	Specifications
Overload power	-3 dBm
Maximum optical channel cost	N/A
Maximum reflection factor	N/A

Table 1-125 lists the specifications of the eSFP-1550nm-1000Base-Zx/FC100 / S-SFP-GE-LH80-SM1550 optical module.

Table 1-125 Specifications of the eSFP-1550nm-1000Base-Zx/FC100 / S-SFP-GE-LH80-SM1550 optical module

Parameter	Specifications
Interface standard	1000BASE-ZX
Transmission rate	1.25 Gbit/s
Interface type	LC/PC
Transmission distance	80 km (50 mi)
Optical transmitter	
Optical source type	DFB
Center wavelength	1550 nm
Operating wavelength range	1540 nm-1570 nm
Spectral characteristics	
Maximum root mean square (RMS) Spectral Width	N/A
Maximum spectral width (-20 dB)	1.0 nm
Minimum side mode suppression ratio (SMSR)	30 dB
Average transmit optical power	
Maximum transmit optical power	3 dBm
Minimum transmit optical power	-2 dBm
Minimum extinction ratio	9 dB
Optical receiver	
Operating wavelength range	1270 nm-1570 nm
Minimum receiver sensitivity	-22 dBm
Overload power	-3 dBm

Parameter	Specifications
Maximum optical channel cost	N/A
Maximum reflection factor	N/A

1.5.3 10 Gbit/s XFP Optical Module

You can use different levels of 10 Gbit/s XFP optical modules with OC-192/STM-64 POS interfaces and 10 GE interfaces. The wavelength of these 10 Gbit/s XFP optical modules can be 850 nm, 1310 nm, or 1550 nm, and the transmission distance ranges from 0.3 km (0.19 mi.) to 80 km (49.71 mi.).

Figure 1-98 10 Gbit/s XFP Optical Module



Table 1-126 lists the currently available 10 Gbit/s XFP optical modules.

Table 1-126 10 Gbit/s XFP optical modules

Product Model	BOM Number	Interface Standard	Transmission Distance (km)	Transmission Medium	Wavelength (nm)	Remarks
XFP-SX-MM850	02315176	10GBASE-SR/SW	0.3 (0.19 mi.)	Multi-mode	850	-
XFP-STM64-LX-SM1310	02315208	10GBASE-LR/LW STM-64/OC-192	10 (6.21 mi.)	Single-mode	1310	-

Product Model	BOM Number	Interface Standard	Transmission Distance (km)	Transmission Medium	Wavelength (nm)	Remarks
XFP-STM64-LH40-SM1550	02315209	10GBASE-ER/EW STM-64/OC-192	40 (24.86 mi.)	Single-mode	1550	When performing a self-loop test, use an optical attenuator
XFP-STM64-SM1550-80km	02315143	10GBASE-ZR/ZW STM-64/OC-192	80 (49.71 mi.)	Single-mode	1550	When performing a self-loop test, use an optical attenuator

Table 1-127 lists the basic features of 10 Gbit/s XFP optical modules and compliance standards.

Table 1-127 Basic features of 10 Gbit/s XFP optical modules and compliance standards

Item	Description
Interface standard	IEEE802.3ae 10GE, SONET OC-192/SDH STM-64, XFP MSA XFP-10G-MM850-300 do not support SONET OC-192/SDH STM-64
Bit Error Ratio (BER)	$< 1 \times 10^{-12}$
Temperature	0-70°C (32°F to 158°F)
Digital diagnosis	XFP MSA INF8077i
Environment standard	RoHS (exempted)
Security standard	FCC class B, IEC 60825-1 Class 1 laser eye safe
ESD	> 500 V (Human body model)

Table 1-128 lists the specifications of the XFP-SX-MM850 optical module.

Table 1-128 Specifications of the XFP-SX-MM850 optical module

Item	Specifications
Interface standard	10GBASE-SR/SW
Transmission rate	10.3125 Gbit/s (10GBASE-SR/SW) 9.95328 Gbit/s (10GBASE-SW)
Interface type	LC
Applicable cable and maximum transmission distance	● Multimode fiber (with diameter of 62.5 μm): 26 m ● Multimode fiber (OM1) (with diameter of 62.5 μm): 33 m ● Multimode fiber (with diameter of 50 μm): 66 m ● Multimode fiber (OM2) (with diameter of 50 μm): 82 m ● Multimode fiber (OM3) (with diameter of 50 μm): 300 m ● Multimode fiber (OM4) (with diameter of 50 μm): 400 m
Modal bandwidth	● Multimode fiber: 160 MHz*km ● Multimode fiber (OM1): 200 MHz*km ● Multimode fiber: 400 MHz*km ● Multimode fiber (OM2): 500 MHz*km ● Multimode fiber (OM3): 2000 MHz*km ● Multimode fiber (OM4): 4700 MHz*km
Optical transmitter	
Optical source type	VCSEL
Center wavelength	850 nm
Operating wavelength range	840-860 nm
Spectral characteristics	
Maximum root mean square (RMS) Spectral Width	0.45 nm
Maximum spectral width (-20 dB)	N/A
Minimum side mode suppression ratio (SMSR)	N/A
Average transmit optical power	
Maximum transmit optical power	-1.3 dBm
Minimum transmit optical power	-7.3 dBm

Item	Specifications
Minimum extinction ratio	3.0 dB
Optical receiver	
Operating wavelength range	840-860 nm
Receiver sensitivity	-9.9 dBm
Overload power	-1 dBm
Maximum optical channel cost	N/A
Maximum reflection factor	-12 dB

Table 1-129 lists the specifications of the XFP-STM64-LX-SM1310 optical module.

Table 1-129 Specifications of the XFP-STM64-LX-SM1310 optical module

Item	Specifications
Interface standard	10GBASE-LR/LW, STM-64/OC-192
Transmission rate	9.95328 Gbit/s (STM-64/OC-192/10GBASE-LW)
	10.3125 Gbit/s (10GBASE-LR/LW)
Interface type	LC
Transmission distance	10 km (6.21 mi.)
Optical transmitter	
Optical source type	DFB
Center wavelength	1310 nm
Operating wavelength range	1290-1330 nm
Spectral characteristics	
Maximum root mean square (RMS) Spectral Width	N/A
Maximum spectral width (-20 dB)	1.0 nm
Minimum side mode suppression ratio (SMSR)	30 dB
Average transmit optical power	
Maximum transmit optical power	-1 dBm
Minimum transmit optical power	-6 dBm

Item	Specifications
Minimum extinction ratio	6 dB
Optical receiver	
Operating wavelength range	1270-1565 nm
Receiver sensitivity	-14.4 dBm
Overload power	0.5 dBm
Maximum optical channel cost	1 dB
Maximum reflection factor	-14 dB

Table 1-130 lists the specifications of the XFP-STM64-LH40-SM1550 optical module.

Table 1-130 Specifications of the XFP-STM64-LH40-SM1550 optical module

Item	Specifications
Interface standard	10GBASE-ER/EW, STM-64/OC-192
Transmission rate	9.95328 Gbit/s (STM-64/OC-192/EW)
	10.3125 Gbit/s (10GBASE-ER)
Interface type	LC
Transmission distance	40 km (24.86 mi.)
Optical transmitter	
Optical source type	EML
Center wavelength	1550 nm
Operating wavelength range	1530-1565 nm
Spectral characteristics	
Maximum root mean square (RMS) Spectral Width	N/A
Maximum spectral width (-20 dB)	1.0 nm
Minimum side mode suppression ratio (SMSR)	30 dB
Average transmit optical power	
Maximum transmit optical power	2 dBm
Minimum transmit optical power	-1 dBm
Minimum extinction ratio	8.2 dB

Item	Specifications
Optical receiver	
Operating wavelength range	1270-1565 nm
Receiver sensitivity	-15.8 dBm
Overload power	-1 dBm
Maximum optical channel cost	2 dB
Maximum reflection factor	-26 dB

Table 1-131 lists the specifications of the XFP-STM64-SM1550-80km optical module.

Table 1-131 Specifications of the XFP-STM64-SM1550-80km optical module

Item	Specifications
Interface standard	10GBASE-ZR/ZW, STM-64/OC-192
Transmission rate	9.95328 Gbit/s (STM-64/OC-192/ZW)
	10.3125 Gbit/s (10GBASE-ZR)
Interface type	LC/PC
Transmission distance	80 km (49.71 mi.)
Optical transmitter	
Optical source type	EML
Center wavelength	1550 nm
Operating wavelength range	1530-1565 nm
Spectral characteristics	
Maximum root mean square (RMS) Spectral Width	N/A
Maximum spectral width (-20 dB)	1.0 nm
Minimum side mode suppression ratio (SMSR)	30 dB
Average transmit optical power	
Maximum transmit optical power	4 dBm
Minimum transmit optical power	0 dBm
Minimum extinction ratio	9 dB
Optical receiver	

Item	Specifications
Operating wavelength range	1270-1600 nm
Receiver sensitivity	-24 dBm
Overload power	-7 dBm
Maximum optical channel cost	2 dB
Maximum reflection factor	-27 dB

1.5.4 10 Gbit/s SFP+ Optical Module

You can use different levels of 10 Gbit/s SFP+ optical modules only with 10 GE interfaces. The wavelength of these 10 Gbit/s SFP+ optical modules can be 850 nm, 1310 nm, or 1550 nm, and the transmission distance ranges from 0.3 km (0.19 mi.) to 80 km (49.71 mi.).

Figure 1-99 10 Gbit/s SFP+ optical module



Table 1-132 lists the currently available 10 Gbit/s SFP+ optical modules.

Table 1-132 10 Gbit/s SFP+ optical modules

Product Model	BOM Number	Interface Standard	Transmission Distance (km)	Transmission Medium	Wavelength (nm)	Remarks
OMXD30000	02318169	10GBASE-SR	0.3 (0.19 mi.)	Multi-mode	850	-
OSX010000	02318170	10GBASE-LR	10 (6.21 mi.)	Single-mode	1310	-

Product Model	BOM Number	Interface Standard	Transmission Distance (km)	Transmission Medium	Wavelength (nm)	Remarks
OSX040 N01	02310CNF	10GBASE-ER	40 (24.86 mi.)	Single-mode	1550	The optical modules of FINISAR are of the cooled type, and the initialization time does not exceed 90s. When performing a self-loop test, use an optical attenuator.
SFP-10G-ZR	02310SNN	10GBASE-ZR	80 (49.71 mi.)	Single-mode	1550	When performing a self-loop test, use an optical attenuator.

Table 1-133 lists the basic features of 10 Gbit/s SFP+ optical modules and compliance standards.

Table 1-133 Basic features of 10 Gbit/s SFP+ optical modules and compliance standards

Item	Description
Interface standard	IEEE802.3ae 10GE, SFP+ MSA, SFF-8472 SONET OC-192/SDH STM-64 is not supported.
Bit Error Ratio (BER)	<1x10E-12

Item	Description
Temperature	0°C to 70°C (32°F to 158°F)
Digital diagnosis	SFF-8472
Environment standard	RoHS-6 (lead free)
Security standard	IEC 60825-1 Class 1 laser eye safe
ESD	>500 V (Human body model)

Table 1-134 lists the specifications of the OMXD30000 optical modules.

Table 1-134 Specifications of the OMXD30000 optical modules

Item	Specifications
Interface standard	10GBASE-SR
Transmission rate	10.3125 Gbit/s (10GBASE-SR)
Interface type	LC
Applicable cable and maximum transmission distance	● Multimode fiber (with diameter of 62.5 μm): 26 m ● Multimode fiber (OM1) (with diameter of 62.5 μm): 33 m ● Multimode fiber (with diameter of 50 μm): 66 m ● Multimode fiber (OM2) (with diameter of 50 μm): 82 m ● Multimode fiber (OM3) (with diameter of 50 μm): 300 m ● Multimode fiber (OM4) (with diameter of 50 μm): 400 m
Modal bandwidth	● Multimode fiber: 160 MHz*km ● Multimode fiber (OM1): 200 MHz*km ● Multimode fiber: 400 MHz*km ● Multimode fiber (OM2): 500 MHz*km ● Multimode fiber (OM3): 2000 MHz*km ● Multimode fiber (OM4): 4700 MHz*km
Optical transmitter	
Optical source type	VCSEL
Center wavelength	850 nm
Operating wavelength range	840-860 nm

Item	Specifications
Spectral characteristics	
Maximum root mean square (RMS) spectral width	0.45 nm
Maximum spectral width (-20 dB)	N/A
Minimum side mode suppression ratio (SMSR)	N/A
Average transmit optical power	
Maximum transmit optical power	-1 dBm
Minimum transmit optical power	-7.3 dBm
Minimum extinction ratio	3.0 dB
Optical receiver	
Operating wavelength range	840-860 nm
Receiver sensitivity	-9.9 dBm
Overload power	-1 dBm
Maximum optical channel cost	N/A
Maximum reflection factor	-12 dB

Table 1-135 lists the specifications of the OSX010000 optical modules.

Table 1-135 Specifications of the OSX010000 optical modules

Item	Specifications
Interface standard	10GBASE-LR
Transmission rate	10.3125 Gbit/s (10GBASE-LR)
Interface type	LC
Transmission distance	10 km (6.21 mi.)
Optical transmitter	
Optical source type	DFB
Center wavelength	1310 nm
Operating wavelength range	1260-1355 nm
Spectral characteristics	

Item	Specifications
Maximum root mean square (RMS) spectral width	N/A
Maximum spectral width (-20dB)	N/A
Minimum side mode suppression ratio (SMSR)	30 dB
Average transmit optical power	
Maximum transmit optical power	0.5 dBm
Minimum transmit optical power	-8.2 dBm
Minimum extinction ratio	3.5 dB
Optical receiver	
Operating wavelength range	1260-1355 nm
Receiver sensitivity	-14.4 dBm
Overload power	0.5 dBm
Maximum optical channel cost	N/A
Maximum reflection factor	-12 dB

Table 1-136 lists the specifications of the OSX040N01 optical modules.

Table 1-136 Specifications of the OSX040N01 optical modules

Item	Specifications
Interface standard	10GBASE-ER
Transmission rate	10.3125 Gbit/s (10GBASE-ER)
Interface type	LC
Transmission distance	40 km (24.86 mi.)
Optical transmitter	
Optical source type	EML
Center wavelength	1550 nm
Operating wavelength range	1530-1565 nm
Spectral characteristics	
Maximum root mean square (RMS) spectral width	N/A

Item	Specifications
Maximum spectral width (-20dB)	1 nm
Minimum side mode suppression ratio (SMSR)	30 dB
Average transmit optical power	
Maximum transmit optical power	4 dBm
Minimum transmit optical power	-4.7 dBm
Minimum extinction ratio	3 dB
Optical receiver	
Operating wavelength range	1530-1565 nm
Receiver sensitivity	-15.8 dBm
Overload power	0.5 dBm
Maximum optical channel cost	N/A
Maximum reflection factor	-26 dB

Table 1-137 lists the specifications of the SFP-10G-ZR optical modules.

Table 1-137 Specifications of the SFP-10G-ZR optical modules

Item	Specifications
Interface standard	10GBASE-ER
Transmission rate	10.3125 (10GBASE-ER) 9.953 (10GBASE-WAN)
Interface type	LC
Transmission distance	80 km (49.72 mi.)
Optical transmitter	
Optical source type	EML
Center wavelength	1550 nm
Operating wavelength range	1530-1565 nm
Spectral characteristics	
Maximum root mean square (RMS) spectral width	N/A
Maximum spectral width (-20dB)	1 nm

Item	Specifications
Minimum side mode suppression ratio (SMSR)	30 dB
Average transmit optical power	
Maximum transmit optical power	4 dBm
Minimum transmit optical power	0 dBm
Minimum extinction ratio	9 dB
Optical receiver	
Operating wavelength range	1530-1565 nm
Receiver sensitivity	-24 dBm
Overload power	-7 dBm
Maximum optical channel cost	N/A
Maximum reflection factor	-27 dB

1.5.5 40 Gbit/s CFP Optical Modules

You can use 40 Gbit/s CFP optical modules only on 40 GE interfaces. They provide multiple wavelength ranges. The transmission distance is 10 km (6.21 mi).

Figure 1-100 40 Gbit/s CFP optical modules



Table 1-138 lists the available 40 Gbit/s CFP optical modules.

Table 1-138 40 Gbit/s CFP optical modules

Model	BOM Number	Interface Standard	Transmission Distance (km) (mi)	Transmission Medium	Wavelength (nm)	Remarks
CFP40-1331-10-LC	02310TMD	40GBASE-LR4	10 (6.21)	Single mode	1271 1291 1311 1331	-

Table 1-139 lists the attributes and standards of 40 Gbit/s CFP optical modules.

Table 1-139 Attributes and standards of 40 Gbit/s CFP optical modules

Attribute and standard	Description
Interface standard	40GBASE-LR4, ITU-T G.959.1 4I1-9D1F
Bit error rate (BER)	$< 1 \times 10^{-12}$
Operating temperature	0-70°C (32°F to 158°F)
Digital diagnosis	
Environment standard	RoHS (exempted)
Safety standard	FCC class B, IEC 60825-1 Class 1 laser eye safe
ESD	>500V (Human Body Model (HBM))

Table 1-140 lists the CFP40-1331-10-LC optical module specifications.

Table 1-140 CFP40-1331-10-LC optical module specifications

Item	Specifications
Interface standard	40GBASE-LR4
Transmission rate	41.25 Gbit/s
Interface type	LC
Transmission distance	10 km (6.21 mi)
Optical transmitter	
Optical source type	Semi-cooled EA-DFB

Item	Specifications
Center wavelength	1271 nm 1291 nm 1311 nm 1331 nm
Working wavelength	1264.5-1277.5 nm 1284.5-1297.5 nm 1304.5-1317.5 nm 1324.5-1337.5 nm
Spectrum attributes	
Maximum root-mean-square (RMS) spectral width	N/A
Maximum spectrum width (-20 dB)	N/A
Minimum Side Mode Suppression Ratio (SMSR)	30 dB
Average transmit optical power	
Maximum transmit optical power	3.5 dBm
Minimum transmit optical power	-4 dBm
Minimum extinction ratio	4.0 dB
Optical receiver	
Working wavelength	1264.5-1277.5 nm 1284.5-1297.5 nm 1304.5-1317.5 nm 1324.5-1337.5 nm
Minimum receiver sensitivity	-13.7 dBm
Overload optical power	3.5 dBm
Minimum optical channel overhead	1.5 dB
Maximum reflection coefficient	-26 dB

1.5.6 100 Gbit/s CFP Optical Modules

You can use 100 Gbit/s CFP optical modules only on 100 GE interfaces. They provide multiple wavelength ranges. The transmission distance ranges from 0.1 km (0.06 mi.) to 10 km (6.21 mi.).

Figure 1-101 100 Gbit/s CFP optical modules



Table 1-141 lists the available 100 Gbit/s CFP optical modules.

Table 1-141 100 Gbit/s CFP optical modules

Model	BOM Number	Interface Standard	Transmissi on Distance (km) (mi)	Transmissi on Medium	Wavelengt h (nm)
CFP-100G-LR4	02310YTD	100GBASE-LR4	10 (6.21)	Single mode	1295 1300 1304 1309
CFP-100G-SR10 CFP-100G-MPO	02310YTB 02310YNE	100GBASE-SR10	0.1 (0.06)	Multi-mode	850

Table 1-142 lists the attributes and standards of 100 Gbit/s CFP optical modules.

Table 1-142 Attributes and standards of 100 Gbit/s CFP optical modules

Item	Description
Interface standard	100GBASE-LR4 100GBASE-SR10
Bit error rate (BER)	< 1 x 10E -12
Operating temperature	0-70°C (32°F to 158°F)
Digital diagnosis	-

Item	Description
Environment standard	RoHS (exempted)
Safety standard	FCC class B, IEC 60825-1 Class 1 laser eye safe
ESD	>500V

Table 1-143 lists the CFP-100G-LR4 optical module specifications.

Table 1-143 CFP-100G-LR4 optical module specifications

Item	Specifications
Interface standard	100GBASE-LR4
Transmission rate	103.125 Gbit/s
Interface type	LC/PC
Transmission distance	10 km (6.21 mi)
Optical transmitter	
Optical source type	EML
Center wavelength	1295 nm 1300 nm 1304 nm 1309 nm
Working wavelength	1294.53-1296.59 nm 1299.02-1301.09 nm 1303.54-1305.63 nm 1308.09-1310.19 nm
Spectrum attributes	
Maximum root-mean-square (RMS) spectral width	N/A
Maximum spectrum width (-20 dB)	N/A
Minimum Side Mode Suppression Ratio (SMSR)	30 dB
Average transmit optical power	
Maximum transmit optical power	4.5 dBm
Minimum transmit optical power	-4.3 dBm
Minimum extinction ratio	4.0 dB

Item	Specifications
Optical receiver	
Working wavelength	1294.53-1296.59 nm 1299.02-1301.09 nm 1303.54-1305.63 nm 1308.09-1310.19 nm
Receiver sensitivity	-10.6 dBm
Overload optical power	4.5 dBm
Minimum optical channel overhead	1.5 dB
Maximum reflection coefficient	-26 dB

Table 1-144 lists the CFP-100G-SR10/CFP-100G-MPO optical module specifications.

Table 1-144 CFP-100G-SR10/CFP-100G-MPO optical module specifications

Item	Specifications
Interface standard	100GBASE-SR10
Transmission rate	103.125 Gbit/s
Interface type	MPO
Applicable cable and maximum transmission distance	● Multimode fiber (OM2) (with diameter of 50 μm): 30 m ● Multimode fiber (OM3) (with diameter of 50 μm): 100 m ● Multimode fiber (OM4) (with diameter of 50 μm): 150 m
Modal bandwidth	● Multimode fiber (OM2): 500 MHz*km ● Multimode fiber (OM3): 2000 MHz*km ● Multimode fiber (OM4): 4700 MHz*km
Optical transmitter	
Optical source type	DFB
Center wavelength	850 nm
Working wavelength	840-860 nm
Spectrum attributes	
Maximum root-mean-square (RMS) spectral width	-

Item	Specifications
Maximum spectrum width (-20 dB)	-
Minimum Side Mode Suppression Ratio (SMSR)	-
Average transmit optical power	
Maximum transmit optical power	-2.4 dBm
Minimum transmit optical power	-7.6 dBm
Minimum extinction ratio	3 dB
Optical receiver	
Working wavelength	840-860 nm
Receiver sensitivity	-9.5 dBm
Overload optical power	2.5 dBm
Minimum optical channel overhead	3.5 dB
Maximum reflection coefficient	-